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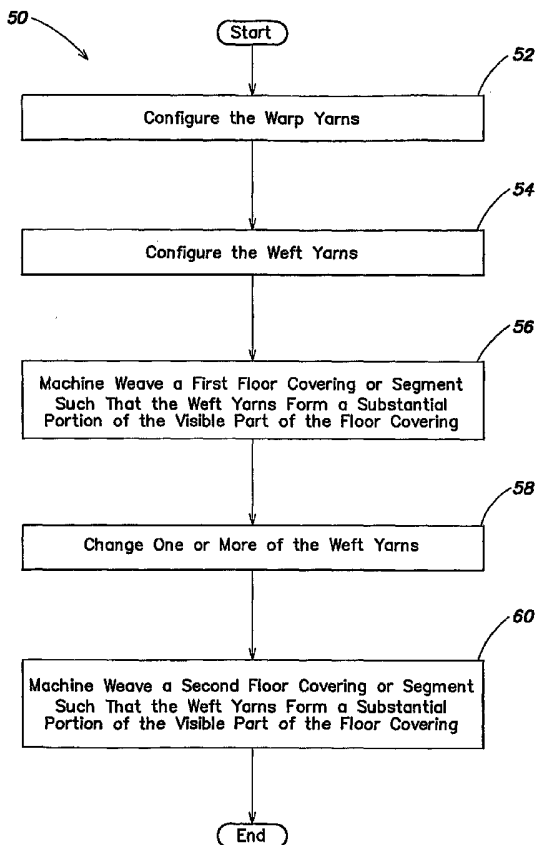
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- (54) Title: METHOD FOR WEAVING FLOOR COVERINGS
- (57) Abstract: A method of producing a floor covering including the steps of providing two sets of yarns and machine weaving the sets of yarns such that the second set of yarns is in the weft direction and forms at least a substantial portion of the visible part of the floor covering. A floor covering includes a set of suitable warp yarns and a set of suitable weft yarns woven in a direction perpendicular to the warp yarns, where the weft yarns form at least a substantial portion of the visible part of the floor covering. A method of producing a floor covering including the steps of cutting selvedge edges of first and second floor covering segments to form corresponding sets of upper and lower selvedge portions, removing the respective lower portions, and joining the corresponding upper selvedge portions by hand stitching.
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METHOD FOR WEAVING FLOOR COVERINGS**FIELD OF THE INVENTION**

5 The present invention relates to methods for weaving floor coverings.

BACKGROUND OF THE INVENTION

Conventional woven floor coverings, such as rugs and carpets, are manufactured on looms in which the yarns that give the floor covering its color or form its pattern are supplied from the warp direction. The warp yarns, which may number in the thousands, or even tens of thousands, are woven with generally uniform weft yarns to form the rug or carpet. One of the principal drawbacks of this method is that it is very difficult and time consuming to change the colors or pattern of the floor covering because changing the warp yarns may mean changing, usually by hand, thousands and thousands of creels. For this reason, it can be quite expensive to produce rugs of differing colors and patterns. In cases in which the quantity desired of a particular color or pattern is small, the cost of configuring the warp yarns may be so high as to render production of the pattern financially impractical.

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SUMMARY OF THE INVENTION

20 One aspect of the invention provides a method of producing a floor covering that includes the steps of providing a first set of yarns, providing a second set of yarns, and machine weaving the first set of yarns in a warp direction with the second set of yarns in a weft direction, wherein the second set of yarns forms at least a substantial portion of the visible part of the floor covering.

25 Another aspect of the invention provides a method of producing a floor covering that includes the steps of providing a first set of yarns, providing a second set of yarns, and machine weaving the first set of yarns in a warp direction with the second set of yarns in a weft direction, wherein the second set of yarns forms more of the visible part of the floor covering than is formed by the first set of yarns.

30 Another aspect of the invention provides a method of producing a floor covering that includes the steps of providing a first set of yarns, providing a second set of yarns, and

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machine weaving the first set of yarns in a warp direction with the second set of yarns in a weft direction, wherein the second set of yarns forms substantially more of the visible part of the floor covering than is formed by the first set of yarns.

Another aspect of the invention provides a method of producing a floor covering that includes the steps of providing a first set of yarns, providing a second set of yarns, and machine weaving the first set of yarns in a warp direction with the second set of yarns in a weft direction, wherein the second set of yarns forms substantially all of the visible part of the floor covering.

Another aspect of the invention provides a method of producing a floor covering that includes the steps of providing a first set of yarns, providing a second set of yarns, and machine weaving the first set of yarns in a warp direction with the second set of yarns in a weft direction, wherein the second set of yarns forms at least a substantial portion of the visible part of the floor covering, and wherein the yarns of the second set have a weight of between about 288 and about 1,760 yards per pound or, more narrowly, between about 576 and about 832 yards per pound.

Another aspect of the invention provides a method of producing a floor covering that includes the steps of providing a first set of yarns, providing a second set of yarns, and machine weaving the first set of yarns in a warp direction with the second set of yarns in a weft direction, wherein the second set of yarns forms at least a substantial portion of the visible part of the floor covering, and wherein the second set of yarns makes up between about 85 percent and about 95 percent of the total weight of the floor covering or, more narrowly, about 92 percent of the total weight of the floor covering.

Another aspect of the invention provides a method of producing a floor covering that includes the steps of providing a first set of yarns, providing a second set of yarns, and machine weaving the first set of yarns in a warp direction with the second set of yarns in a weft direction, wherein the second set of yarns forms at least a substantial portion of the visible part of the floor covering, and wherein the first and second sets of yarns are woven at a density of between about 75 and about 100 ends per inch or, more narrowly, at a density of about 85 ends per inch.

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Another aspect of the invention provides a method of producing a floor covering that includes the steps of providing a first set of yarns, providing a second set of yarns, and machine weaving the first set of yarns in a warp direction with the second set of yarns in a weft direction, wherein the second set of yarns forms at least a substantial portion of the visible part of the floor covering, and wherein the first and second sets of yarns are woven at a density of
5 between about 25 and about 65 picks per inch or, more narrowly, at a density of between about 40 and about 50 picks per inch.

Another aspect of the invention provides a method of producing a floor covering that includes the steps of providing a first set of yarns, providing a second set of yarns, and
10 machine weaving the first set of yarns in a warp direction with the second set of yarns in a weft direction, wherein the second set of yarns forms at least a substantial portion of the visible part of the floor covering, and wherein the first and second sets of yarns are woven at a rate of between about 75 and about 250 picks per minute.

Another aspect of the invention provides a method of producing a floor covering that
15 includes the steps of providing a first set of yarns, providing a second set of yarns, and machine weaving the first set of yarns in a warp direction with the second set of yarns in a weft direction, wherein the second set of yarns forms at least a substantial portion of the visible part of the floor covering, and wherein the floor covering has a weight of between about 1.65 pounds per square yard and about 3.0 pounds per square yard or, more narrowly, about 2.25
20 pounds per square yard.

Another aspect of the invention provides a method of producing a floor covering that includes the steps of providing a first set of yarns, providing a second set of yarns, and machine weaving the first set of yarns in a warp direction with the second set of yarns in a weft
25 direction, wherein the second set of yarns forms at least a substantial portion of the visible part of the floor covering, and wherein the yarns of the first set have a cotton count between 20/2 and 80/2 or, more narrowly, where the cotton count is 40/2.

Another aspect of the invention provides a method of producing a floor covering that includes the steps of providing a first set of yarns, providing a second set of yarns, machine weaving the first set of yarns in a warp direction with the second set of yarns in a weft

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direction, and applying a border to at least one edge of the floor covering, wherein the second set of yarns forms at least a substantial portion of the visible part of the floor covering.

Another aspect of the invention provides a method of producing a floor covering that includes the steps of providing a first set of yarns, providing a second set of yarns, machine
5 weaving the first set of yarns in a warp direction with the second set of yarns in a weft direction, and applying a backing to at least one face of the floor covering, wherein the second set of yarns forms at least a substantial portion of the visible part of the floor covering.

Yet another aspect of the invention provides a method of producing floor coverings that includes the steps of providing a set of warp yarns, providing a first set of weft yarns, machine
10 weaving the warp yarns and the first set of weft yarns to form a first floor covering or floor covering segment, replacing at least one of the weft yarns to form a second set of weft yarns, and machine weaving the warp yarns and the second set of weft yarns to form a second floor covering or floor covering segment.

Another aspect of the invention provides a method for producing a floor covering. The
15 method includes the steps of providing two segments of floor covering, each including a set of warp yarns woven with a set of weft yarns and each having a selvage edge. The respective selvage edges are cut to form respective top halves and bottom halves. The respective bottom halves are then removed and the respective top halves are joined by hand stitching.

A further aspect of the invention provides a floor covering. The floor covering
20 comprises a set of warp yarns suitable for use in a floor covering and a set of weft yarns suitable for use in a floor covering, where the weft yarns are woven in a direction perpendicular to the warp yarns and form at least a substantial portion of the visible part of the floor covering.

These and other aspects of the present invention will be apparent from the following
25 detailed description and the appended claims.

BRIEF DESCRIPTION OF DRAWINGS

The accompanying drawings are not intended to be drawn to scale. For purposes of clarity, not every component may be labeled in every drawing. In the drawings:

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Fig. 1 is a flowchart illustrating one embodiment of a method of producing a floor covering in accordance with an aspect of the present invention;

Fig. 2 is a cross-sectional view of a portion of one embodiment of a floor covering manufactured in accordance with an aspect of the present invention;

5 Fig. 3 is a perspective view of a portion of the floor covering of Fig. 2;

Fig. 4 is a cross-sectional view of a portion of a second embodiment of a floor covering manufactured in accordance with an aspect of the present invention;

Fig. 5 is a perspective view of a portion of the floor covering of Fig. 4;

10 Fig. 6 is a cross-sectional view of a portion of a third embodiment of a floor covering manufactured in accordance with an aspect of the present invention;

Fig. 7 is a perspective view of a portion of the floor covering of Fig. 6;

Fig. 8 is a cross-sectional view of a portion of a fourth embodiment of a floor covering manufactured in accordance with an aspect of the present invention;

Fig. 9 is a perspective view of a portion of the floor covering of Fig. 8; and

15 Fig. 10 is a flowchart illustrating another embodiment of a method of producing a floor covering in accordance with an aspect of the present invention.

DETAILED DESCRIPTION

20 This invention is not limited in its application to the details of construction and the arrangement of components set forth in the following description or illustrated in the drawings. The invention is capable of other embodiments and of being practiced or carried out in various ways. Also, the phraseology and terminology used herein is for the purpose of description only and should not be regarded as limiting. The use of "including," "comprising," "having," "containing," "involving," and variations thereof is meant to encompass the items listed
25 thereafter and equivalents, as well as additional items.

The present invention relates to improved methods for weaving colored or patterned floor coverings. In one embodiment of the invention, the yarns that form the color or pattern of the floor covering are woven in the weft direction. Such a method is opposite the traditional method of machine weaving, in which the yarns that make up the color or pattern are woven
30 from the warp direction. Among the advantages of weaving a floor covering with the color or pattern yarns on the weft is that the colors and/or pattern may be changed much more easily

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than in methods where the yarns that make up the pattern run in the warp direction. The fact that the colors may be changed easily and inexpensively as compared to conventional methods may allow a manufacturer to make available a wider range of floor coverings than has been feasible in the past. Among the other advantages of such embodiments is that, by facilitating quick and efficient production of large and small batches of floor coverings with different colors or patterns, they may also reduce the need to stock large quantities of floor coverings and may therefore result in substantial savings in the form of reduced inventory costs.

The present invention also relates to methods for joining segments of colored or patterned floor coverings.

One embodiment of the invention provides a method for weaving a colored or patterned floor covering. This method 50, illustrated in steps 52-56 of Fig. 1, comprises weaving a first set of yarns in a warp direction with a second set of yarns in a substantially perpendicular weft direction, such that the weft yarns form at least a substantial portion of the color or pattern of the floor covering. As can be seen in steps 52-60 of Fig. 1, this embodiment allows the colors or pattern to be changed by simply changing one or more of the relatively small number of yarns that make up the weft. The warp yarns do not need to be reconfigured.

In various embodiments of the invention, the weft yarns may form more of the visible part of the floor covering than is formed by the warp yarns, may form substantially more of the visible part of the floor covering than is formed by the warp yarns, or may form substantially all of the visible part of the floor covering. "Visible part" means that portion of the floor covering that can be seen when the floor covering is placed on a floor or other flat surface, uncovered by furniture or any other objects, as if for normal use. Ordinarily, the visible part will be the floor covering's top face, exclusive of portions covered by edging or the like. In various embodiments, the weft yarns may make up at least about 15%, 25%, 50%, 75%, or 95% of the visible part the floor covering, such percentages to be measured by selecting a fixed area of the visible part and determining, by visual, optical, mechanical, digital, or other means, the percentage of the fixed area that is occupied by weft yarns. It has been found that increasing the proportion of the visible part that is comprised of weft yarns allows the appearance of the floor covering to be changed more easily.

The set of weft yarns may be one or more colors and, as described above, may comprise varying portions of the color or pattern of the floor covering. The weft yarns may

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include yarns that form the color or pattern of the floor covering, as well as yarns that have a principal purpose of tying other yarns or portions of the floor covering together.

The set of warp yarns may comprise binder yarns, which may operate to tie the various yarns and layers together, and stuffer yarns, which may provide thickness, durability, and weight. The binder yarns, at least a portion of which may be visible in the finished product, may in some embodiments be of a color that is neutral in value, such as an off-white or a light brown. In other embodiments, the binder yarns may not be neutral in value. As noted, while the color of the binder yarns may contribute to the overall appearance of the floor covering, their contribution is generally less than that of the weft yarns. The color of the stuffer yarns may be less important because they are generally not visible in the finished product.

The composition of the warp and weft yarns is not critical to the invention, and any of the below described embodiments may be constructed of any suitable type of yarn, including, for example, natural fibers such as woolens and cottons, synthetic materials such as rayon, nylon, acrylic, and polyester, and/or any other suitable material or combination of materials. The yarns may have any suitable or desired colors, textures, or other aesthetic characteristics or combination of characteristics.

Floor coverings according to the invention may be woven on industrial fabric looms, such as those manufactured by Lindauer Dornier GmbH of Lindau, Germany. The invention is not limited to any particular brand, type, or model of loom, however, and any suitable loom may be used, as would be appreciated by one of skill in the art.

One reason that materials are conventionally woven with the color on the warp is that the colored yarns are generally thicker than the other yarns, in part because they are intended to provide the material with its appearance. The colored yarns would be expected to cause problems if machine woven in the weft direction in a conventional manner because their thickness would create a large amount of tension on the warp and/or weft yarns as a result of the beat up. In some cases, the amount of tension could be sufficient to prevent the warp yarns from being fully hidden and/or could cause failure of one or more warp yarns.

It has been found that one solution to the problem of increased tension is to lower the speed at which the inventive floor covering is woven. For example, while the looms on which the inventive floor covering may be woven may conventionally be run at a rate of about 400 picks per minute with the color on the warp, floor coverings of some embodiments of the

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present invention may be woven on these same looms, but with the color on the weft, at a rate of between about 75 and about 250 picks per minute. Although lowering the speed of the loom may mean that manufacture takes longer than for than conventional materials woven on these looms, the advantages described above, namely the flexibility in changing the colors and/or
5 pattern, can outweigh any additional manufacturing time.

In one embodiment of the invention, the floor covering is woven such that relatively thin binder and stuffer warp yarns are woven with weft yarns that are thicker than a traditional weft material. The binder yarns that are visible on the face of the material are generally uniform in color. The result is a floor covering that has the appearance of being composed of a
10 grid of small squares or rectangles, not unlike a traditional "needlepoint" material. The stuffer yarns may be of varying thickness and densities, so as to provide the appropriate thickness, durability, and/or weight to the floor covering.

Fig. 2 shows a portion of a cross-section of an illustrative "needlepoint"-type floor covering according to the invention. The cross-section of Fig. 2 is taken in the weft direction and shows the weft yarns in profile and the warp yarns in cross-section. Fig. 2 depicts the
15 main body 102 of the floor covering, including top face 104 and bottom face 106, as well as the seam selvage area 108.

The floor covering of Fig. 2 employs three types of warp yarns, primary binders 170a-c, secondary binders 180a-c, and stuffers 190, and six weft, or "pick," yarns. In the particular
20 section shown in Fig. 1, picks 110 and 140 lie principally on the top face 104 of the floor covering, and picks 120 and 150 lie principally on the bottom face 106 of the floor covering. The remaining picks 130 and 160 are binder wefts that operate, as shown, to tie the warp yarns together. The weft yarns may be each be a different color, allowing the floor covering of this
25 embodiment to have as many as six different colors on the weft. The warp yarns, while commonly neutral, may also be colored. As noted, by providing the color on the weft, as opposed to on the warp, some or all of the colors of the pattern may easily be changed, as may the pattern itself.

Fig. 3 is a perspective view of a portion of the top face of the floor covering of Fig. 2 in which the spacing between the yarns has been enlarged for purposes of clarity. From this
30 view, it can be seen that primary binders 170a-c lie largely on the top face of the floor covering and, in combination with secondary binders 180a-c, impart a needlepoint-like appearance to

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the material. It should be noted that, in this and the other illustrated embodiments, primary and secondary binders 170, 180 may be fed from a different beam than the stuffers 190.

Fig. 3 also illustrates variable interlacement, such as may be used to impart a particular pattern or design to the floor covering. In this embodiment, a first warpwise portion defined by
5 picks 110a-160a has picks 110a and 140a that lie entirely on the face of the floor covering except where they pass under primary binders 170a-c, and picks 120a and 150a that lie entirely under the face of the floor covering, except where they pass over secondary binders 180a-b. In a second warpwise portion defined by picks 110b-160b, however, picks 110b and 140b lie
10 entirely under the face of the floor covering, except where they pass over secondary binders 180a or 180b, while picks 120b and 150b lie on the face of the floor covering, except where they pass under primary binders 170a-c. This variable interlacement pattern is merely illustrative, however, and it should be understood that the invention contemplates any number of other patterns, variable or constant, as would be appreciated by one of skill in the art.

Fig. 4 illustrates a portion of another "needlepoint" embodiment that uses eight weft
15 yarns in conjunction with primary binders 270a-c, secondary binders 280a-c, and stuffers 290. The floor covering of this embodiment may thus have as many as eight colors on the weft. In the particular section shown in Fig. 4, picks 210 and 240 lie principally on the top face 104 of the floor covering, and picks 220 and 250, as well as picks 264 and 268, lie principally on the bottom face 106 of the floor covering. The remaining picks 230 and 260 are binder wefts that
20 operate to tie the neutral warp yarns together.

Fig. 5 is a perspective view of a portion of the face of the floor covering of Fig. 4 in which the spacing between the yarns has been enlarged for clarity. From this view it can be seen that, similar to the floor covering of Fig. 2, primary binders 270a-c lie largely on the face of the fabric and, in combination with secondary binders 280a-c, impart a needlepoint-like
25 appearance to the floor covering. Fig. 5 also illustrates a variable interlacement pattern. In first a warpwise portion defined by picks 210a-260a, picks 210a and 240a lie entirely on the face of the floor covering except where they pass under primary binders 270a-c, while picks 220a, 264a, 250a, and 268a lie entirely under the face of the floor covering, except where they pass over secondary binders 280a-c. In a second warpwise portion defined by picks 210b-
30 268b, however, picks 210b and 240b lie entirely under the face of the floor covering, except where they pass over secondary binders 280a-b, while picks 220b and 250b lie on the face of

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the floor covering, except where they pass under primary binders 270a-c. This variable interlacement pattern is also only illustrative, however, as the invention includes any number of other variable or non-variable patterns.

The floor covering of Fig. 6 is a third exemplar "needlepoint" construction that
5 employs ten weft yarns in conjunction with primary binders 370a-c, secondary binders 380a-c, and stuffers 390. The floor covering of this embodiment may thus have as many as ten colors on the weft. In the particular section shown in Fig. 6, picks 310 and 340 lie principally on the top face 104 of the floor covering, and picks 320, 364, 366, 350, 368, and 367 lie principally on the bottom face 106 of the floor covering. The remaining picks 330 and 360 are binder
10 wefts that operate to tie the neutral warp yarns together.

Fig. 7 is a perspective view of a portion of the face of the floor covering of Fig. 6 in which the spacing between the yarns has been enlarged for clarity. From this view it can be seen that, similar to the floor covering of Figs. 2 and 4, primary binders 370a-c lie largely on the face of the fabric and, in combination with secondary binders 380a-c, impart a needlepoint-
15 like appearance to the floor covering. Fig. 7, like Figs 3 and 5, also shows an exemplar variable interlacement pattern. In first a warpwise portion defined by picks 310a-360a, picks 310a and 340a lie entirely on the face of the floor covering except where they pass under primary binders 370a-c, while the remaining picks lie entirely under the face of the floor covering, except where they pass over primary binders 370a-c, in the case of picks 330 and
20 360, or over secondary binders 380a-c, in the case of the remaining picks. In a second warpwise portion defined by picks 310b-360b, however, pick 310a lies principally on the face of the floor covering between primary binders 370a and 370c, and pick 340b lies principally on the face between primary binders 370a and 370b, but both are largely buried otherwise.

While the above-described figures show a maximum of ten different weftwise colors,
25 known currently available commercial looms allow for up to twelve different colors on the weft. The invention is not limited to even this amount, however, as it contemplates any number of colors being provided from the weft direction.

The weft yarns of the "needlepoint" embodiment may be one or more colors and may have any desired uniform or non-uniform size, weight, texture or appearance. In one
30 embodiment, for example, weft yarns of varying thicknesses may be used to achieve different aesthetic effects. Some embodiments of the "needlepoint" construction may use weft yarns

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with a Philadelphia or Bradford count in the range of 3/18 to 1/110 (worsted 3/1.54 to 1/3.1; approximately 288 to 1,760 yards per pound), or 4/32 to 2/65 (worsted 4/3.6 to 2/3.71; approximately 512 to 1,040 yards per pound), or 3/36 to 2/55 (worsted 3/3.09 to 2/3.14; approximately 576 to 832 yards per pound). In one preferred embodiment, the Philadelphia or
5 Bradford count is 3/42 (worsted 3/3.6; approximately 672 yard per pound). In other preferred embodiments, the weft yarns may be Nm700 (worsted 1/.62; 348 yards per pound), Tex 2000 (worsted 1/.44; approximately 249 yards per pound), and/or 4/4 cc (worsted 4/6.0; approximately 840 yards per pound). Yarns in these ranges and/or of these types are generally thick enough to impart the desired aesthetic effects, while at the same time being sufficiently
10 thin to be machine woven from the weft direction without causing excessive tension in the loom.

The warp yarns of the "needlepoint" embodiment also may have any suitable uniform or non-uniform texture or appearance, although it is preferred to employ warp yarns that are generally uniform in color, such that they provide the appearance of a uniform grid. Unlike
15 conventional warp yarns, which are generally thicker than the weft yarns so as to provide the fabric its color and texture, the face warp yarns of the inventive floor covering may be thin, so as to be seen as little as possible and/or to provide the appearance of a uniform grid. In particular, some needlepoint embodiments may use warp yarns with a cotton count in the range of 20/2 to 80/2 (approximately 8,400 to 33,600 yards per pound), or, more narrowly, 30/2 to
20 60/2 (approximately 12,600 to 25,200 yards per pound). In one preferred needlepoint embodiment, the warp yarns may have a cotton count of 40/2, or approximately 16,800 yards per pound. The number of warp ends per inch in the finished needlepoint floor covering may be in the range of about 65 to about 110, or, more narrowly, in the range of about 75 to about 100 ends per inch. In one preferred embodiment, the floor covering is woven at about 85 ends
25 per inch.

In another embodiment of the invention, the floor covering is woven such that relatively thin binder warp yarns are combined with thicker stuffer warp yarns and woven with relatively thick weft yarns in such a way as to result in a "grosse pointe" construction, characterized by pronounced warpwise rows or ridges.

30 Fig. 8 depicts a portion of an embodiment of a "grosse pointe" floor covering according to another embodiment of the invention. The floor covering of Fig. 8 employs six weft yarns

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and thus may have as many as six colors on the weft. This embodiment includes three types of warps, including face yarns 470a-c, backbinder yarns 480a-c, and stuffer yarns 490. Although this floor covering has the same number of colored weft yarns as the floor covering of Fig. 2, it has a very different appearance. The binder wefts 430 and 460 both pass over adjacent face
5 yarns (e.g., 470a, 470b) and under an intervening backbinder (e.g., 480a), creating pockets (e.g., 485a) that, when filled with stuffer yarns 490, create pronounced ridges running in the warp direction. The size of the ridges may be controlled by the use of lighter or heavier stuffer yarns 490. Light colored face warps 470 may be used in some embodiments to provide a contrast with darker face weft yarns and enhance the visual effect of the rows.

10 A portion of the floor covering of Fig. 8 can be seen in perspective in Fig. 9, which also shows that the face of this exemplar embodiment is dominated by the weft yarns 410a and 440a in a lower portion defined by weft yarns 410a-460a, while a different pattern of interlacing brings yarns 420b and 450b to the face in a second portion defined by weft yarns 410b through 460b. In different embodiments, face warp yarns of different colors may be used
15 to provide different effects.

As with the needlepoint construction, the warps yarns of the "grosse pointe" embodiment may be of varying sizes, textures, appearances, and/or colors, and warp yarns of varying characteristics and/or appearances may be used to achieve different aesthetic or physical effects. Some embodiments of the "grosse pointe" construction may use weft yarns
20 with a Philadelphia or Bradford count in the range of 3/18 to 1/110 (worsted 3/1.54 to 1/3.1; approximately 288 to 1,760 yards per pound), or 4/32 to 2/65 (worsted 4/3.6 to 2/3.71; approximately 512 to 1,040 yards per pound), or 3/36 to 2/55 (worsted 3/3.09 to 2/3.14; approximately 576 to 832 yards per pound). In one preferred embodiment, the Philadelphia or Bradford count is 3/42 (worsted 3/3.6; approximately 672 yard per pound). In other preferred
25 embodiments, the weft yarns may be Nm700 (worsted 1/.62; 348 yards per pound), Tex 2000 (worsted 1/.44; approximately 249 yards per pound), and/or 4/4 cc (worsted 4/6.0; approximately 840 yards per pound). Yarns of these types and/or in these ranges are generally thick enough to impart the desired aesthetic effects, while and the same time being sufficiently thin to be machine woven from the weft direction without causing excessive tension in the
30 loom.

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Like the warp yarns of the needlepoint arrangement, the face warp yarns employed in the grosse point construction may be thin, so as to be seen as little as possible. The warp yarns may have a cotton count in the range of 4/4 to 10/2 (approximately 840 to 4,200 yards per pound), or, more narrowly, 3/2 to 8/2 (approximately 1,260 to 3,360 yards per pound). In one preferred "grosse pointe" embodiment, the warp yarns may have a cotton count of 8/4, or
5 approximately 1,680 yards per pound. The finished "grosse pointe" floor covering may have in the range of about 20 to about 40 ends per inch and, in one particular embodiment, may be have about 28 ends per inch.

The heavy weft yarns of some embodiments may result in a floor covering that has
10 fewer weft picks per inch than in conventional materials woven on the same loom. The needlepoint and grosse point embodiments, for example, may be woven at between about 25 and about 65 picks per inch, and preferably between about 40 and about 50 picks per inch.

As a result of weaving with heavier yarns on the weft, floor coverings according to the invention are also heavier than other materials woven on the same type of looms. In one
15 embodiment, for example, a floor covering woven according to the present invention weighs between about 2 and about 3 pounds per square yard and, in one particular embodiment, the floor covering weighs about 2.4 pounds per square yard. In contrast, the types of materials typically woven on these types of looms generally weigh in the range of less than 2 pounds per square yard. In addition, because the weft is heavier than is conventional, floor coverings
20 produced according to the invention also have a larger proportion of their total weight made up of yarns from the weft. In one embodiment, for example, the weft makes up between about 85 and about 95 percent of the total weight of the material and, in one preferred embodiment, the weft makes up about 92 percent of the total weight of the material.

In another aspect of the invention, a backing may be positioned adjacent at least one
25 side of the floor covering. Advantages of a backing include extra strength and durability conferred to the floor covering, especially where it is intended for an application in which it will be subjected to many mechanical stresses. In various embodiments, the backing may be comprised of any suitable natural or synthetic material. In one embodiment, the backing may be a type of plastic. The backing may be applied in any conventional manner, as would readily
30 be appreciated by one of skill in the art.

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The inventive floor covering, with or without a backing, may also be cut to any desired dimension or shape. In some embodiments, the floor covering may be woven on a wide loom, allowing the production of a wide, continuous sheet of a fabric. The sheet of material produced by the loom may be cut into any number of desired shapes having any desired
5 dimensions. The use of such a process may speed up production of floor coverings and/or may facilitate the production of a large number of orders for floor coverings of the same pattern but different sizes.

In some embodiments, a border may be positioned along all or a portion of one or more edges of the floor covering to further strengthen the edges and reduce the possibility of fraying.
10 Such a border, which may be adhered to the floor covering by stitching, adhesive, or any other suitable means, may cover the ends of some or all of the warp and/or weft yarns to prevent fraying and may comprise any suitable material or materials, including cloth, paper, plastic, or leather, among others. If the floor covering is circular, the border can be applied along the circumference.

15 Another aspect of the present invention provides a method for joining segments of a woven floor covering. Such segments would be employed, for example, where it is desired to produce a floor covering wider than the operative width of the loom, such as in the case of a wall-to-wall carpeting.

In one embodiment of such a joinery method, illustrated generally as steps 550 through
20 560 of method 500 in Fig. 10, at least two segments of floor covering material are provided, each comprising a first set of yarns that are woven in a warp direction, and a second set of yarns that are woven in a weft direction. Each segment of floor covering will have a selvedge edge running along at least one warpwise side as a by-product of the weaving process. The two segments are aligned such that their warp yarns are parallel and the respective selvedge
25 edges of the sides to be joined are adjacent to each other. The adjacent selvedge edges are sliced along their outside edges, resulting in an upper selvedge portion 109a and lower selvedge portion 109b, such as can be seen in, for example, Fig. 2. The respective lower selvedge portions 109b are then either folded back under the main bodies 104 of the floor covering segments or simply cut away, and the upper selvedge portions 109a are then stitched
30 together in a conventional manner to join the two segments.

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As a result of this joinery method, the inventive floor coverings may be used in situations that call for floor coverings that are larger than the operative width of the loom, and the advantages associated with the inventive method of weaving with the color on the weft, as discussed above, can be extended to a wider variety of applications, such as wall-to-wall
5 carpeting. The combination of weaving with the color on the weft and the above-described joinery method may therefore allow a wide variety of large colored and patterned floor coverings, such as wall-to-wall carpets, to be produced and sold without the expense associated with changing thousands of creels and without the expense of maintaining a large inventory.

Having thus described several aspects of at least one embodiment of this invention, it is
10 to be appreciated various alterations, modifications, and improvements will readily occur to those skilled in the art. Such alterations, modifications, and improvements are intended to be part of this disclosure, and are intended to be within the spirit and scope of the invention. Accordingly, the foregoing description and drawings are by way of example only. \

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CLAIMS

1. A method of producing a floor covering, comprising:
providing a first set of yarns;
5 providing a second set of yarns; and
machine weaving the first set of yarns in a warp direction with the second set of yarns
in a weft direction, wherein the second set of yarns forms at least a substantial portion of the
visible part of the floor covering.
- 10 2. The method of claim 1, wherein the second set of yarns forms more of the visible part
of the floor covering than is formed by the first set of yarns.
3. The method of claim 1, wherein the second set of yarns forms substantially more of the
visible part of the floor covering than is formed by the first set of yarns.
- 15 4. The method of claim 3, wherein the second set of yarns forms at least about seventy-
five percent of the visible part of the floor covering.
5. The method of claim 1, wherein the second set of yarns forms substantially all of the
20 visible part of the floor covering.
6. The method of claim 5, wherein the second set of yarns forms at least about ninety-five
percent of the visible part of the floor covering.
- 25 7. The method of claim 1, wherein the yarns of the second set have a weight of between
about 288 and about 1,760 yards per pound.
8. The method of claim 7, wherein the yarns of the second set have a weight of between
about 576 and about 832 yards per pound.

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9. The method of claim 1, wherein the second set of yarns makes up between about 85 percent and about 95 percent of the total weight of the floor covering.
10. The method of claim 10, wherein the second set of yarns makes up about 92 percent of the total weight of the floor covering.
11. The method of claim 1, wherein the first and second sets of yarns are woven at a density of between about 75 and about 100 ends per inch.
12. The method of claim 11, wherein the number of ends per inch is about 85.
13. The method of claim 1, wherein the first and second sets of yarns are woven at a density of between about 25 and about 65 picks per inch.
14. The method of claim 13, wherein the number of picks per inch is between about 40 and about 50.
15. The method of claim 1, wherein the first and second sets of yarns are woven at a rate of between about 75 and about 250 picks per minute.
16. The method of claim 1, wherein the floor covering has a weight of between about 1.65 pounds per square yard and about 3.0 pounds per square yard.
17. The method of claim 16, wherein the floor covering has a weight of about 2.25 pounds per square yard.
18. The method of claim 1, wherein the yarns of the first set have a cotton count between 20/2 and 80/2.
19. The method of claim 18, wherein the yarns of the first set have a cotton count of 40/2.

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20. The method of claim 1, wherein the floor covering has at least one edge and further comprising the step of applying a border to the at least one edge.
21. The method of claim 1, wherein the floor covering has at least one face and further
5 comprising the step of applying a backing to the at least one face.
22. A floor covering, comprising:
a set of warp yarns suitable for use in a floor covering; and
a set of weft yarns suitable for use in a floor covering, the weft yarns woven in a
10 direction perpendicular to the warp yarns,
wherein the weft yarns form at least a substantial portion of the visible part of the floor covering.
23. The floor covering of claim 22, wherein the weft yarns form more of the visible part of
15 the floor covering than is formed by the warp yarns.
24. The floor covering of claim 22, wherein the weft yarns have a weight of between about 288 and about 1,760 yards per pound.
- 20 25. The floor covering of claim 22, wherein the warp yarns have a cotton count between 20/2 and 80/2.
26. The floor covering of claim 22, wherein the yarns are woven at a density of between about 75 and about 100 ends per inch.
25
27. The floor covering of claim 22, wherein the floor covering has a weight of between about 1.65 pounds per square yard and about 3 pounds per square yard.
28. The floor covering of claim 22, wherein the floor covering has at least one edge and
30 further comprising a border positioned adjacent the at least one edge.

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29. The floor covering of claim 22, wherein the floor covering has at least one face and further comprising a backing positioned adjacent the at least one face.

30. A method of producing a floor covering, comprising:

5 providing a first segment of a floor covering including a set of warp yarns woven with a set of weft yarns, the first segment having a first selvage edge;

providing a second segment of a floor covering including a set of warp yarns woven with a set of weft yarns, the second segment having a second selvage edge;

cutting the first selvage edge to form a first top half and a first bottom half;

10 cutting the second selvage edge to form a second top half and a second bottom half;

removing the bottom halves of the respective segments; and

joining the top halves by hand stitching.

31. A method of producing floor coverings, comprising:

15 providing a set of warp yarns;

providing a first set of weft yarns;

machine weaving the warp yarns and the first set of weft yarns to form a first floor covering or floor covering segment;

replacing at least one of the weft yarns to form a second set of weft yarns; and

20 machine weaving the warp yarns and the second set of weft yarns to form a second floor covering or floor covering segment.

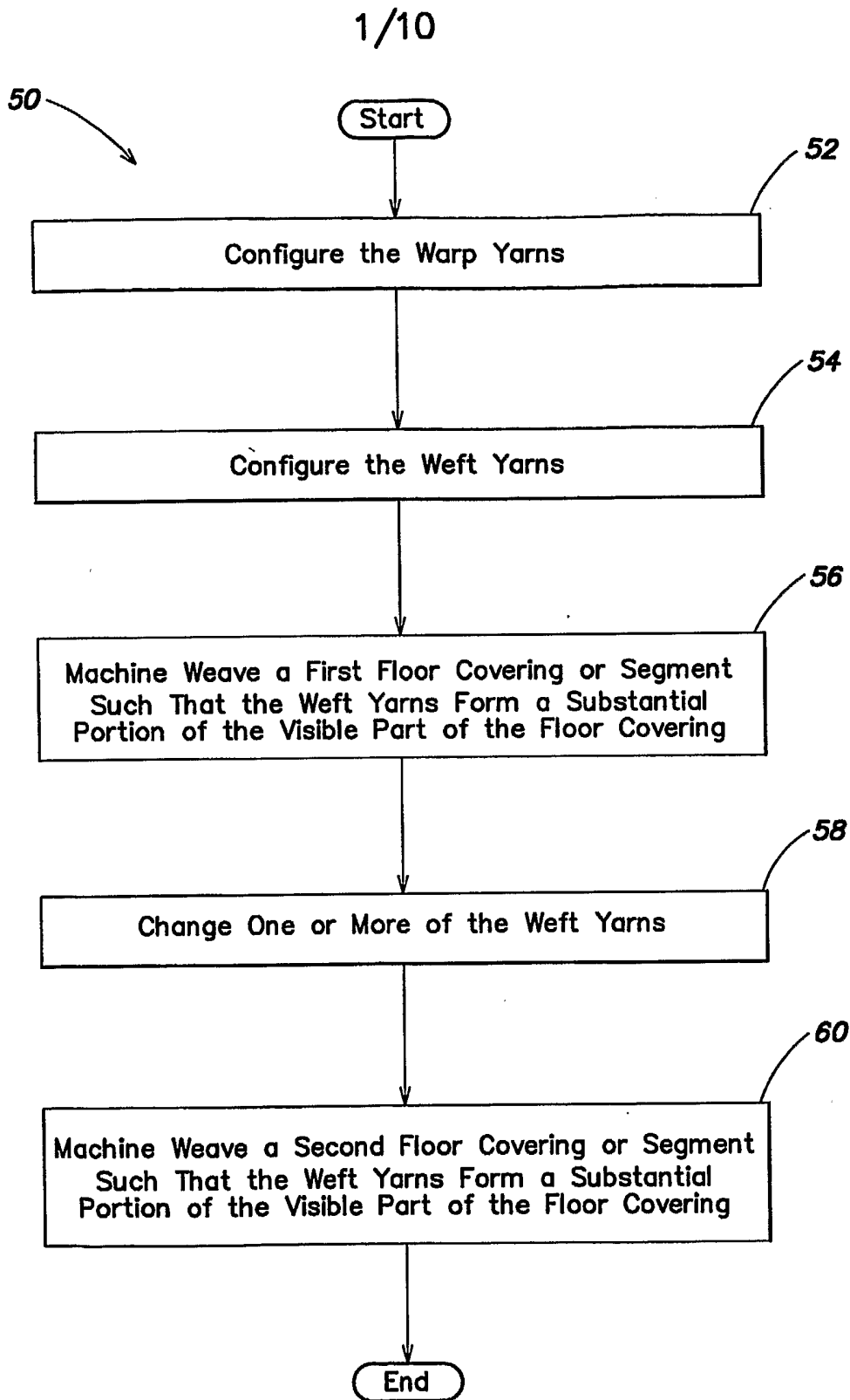
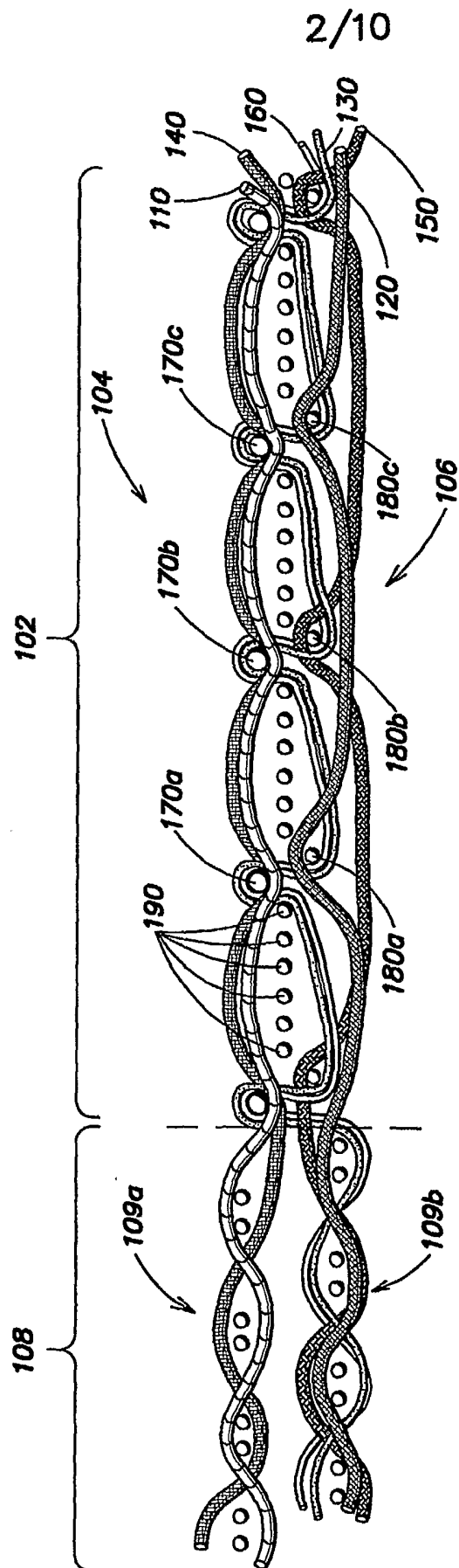


FIG. 1



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FIG. 2

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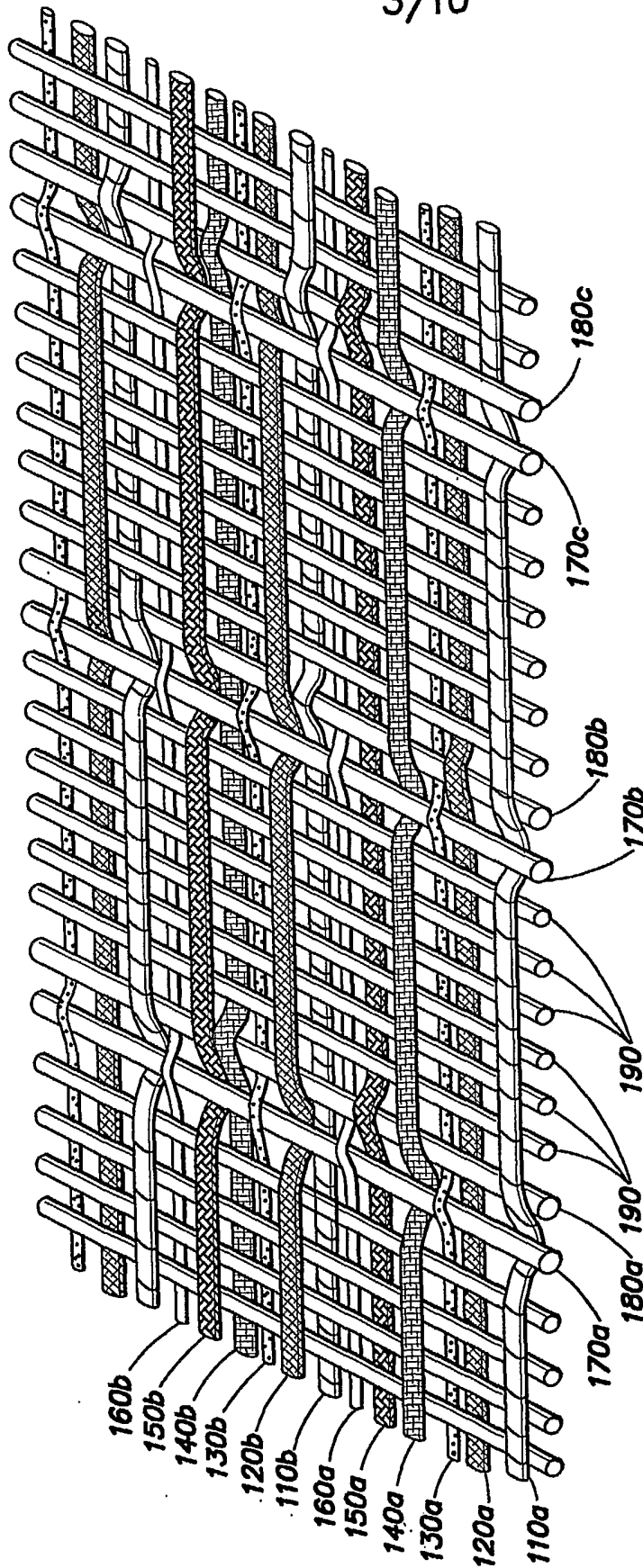


FIG. 3

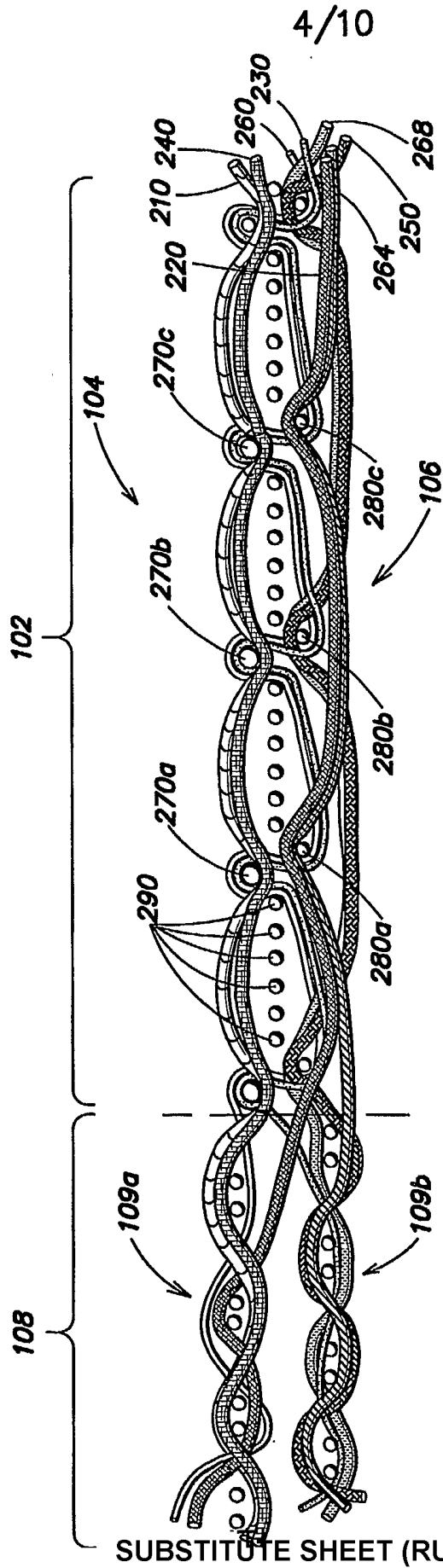


FIG. 4

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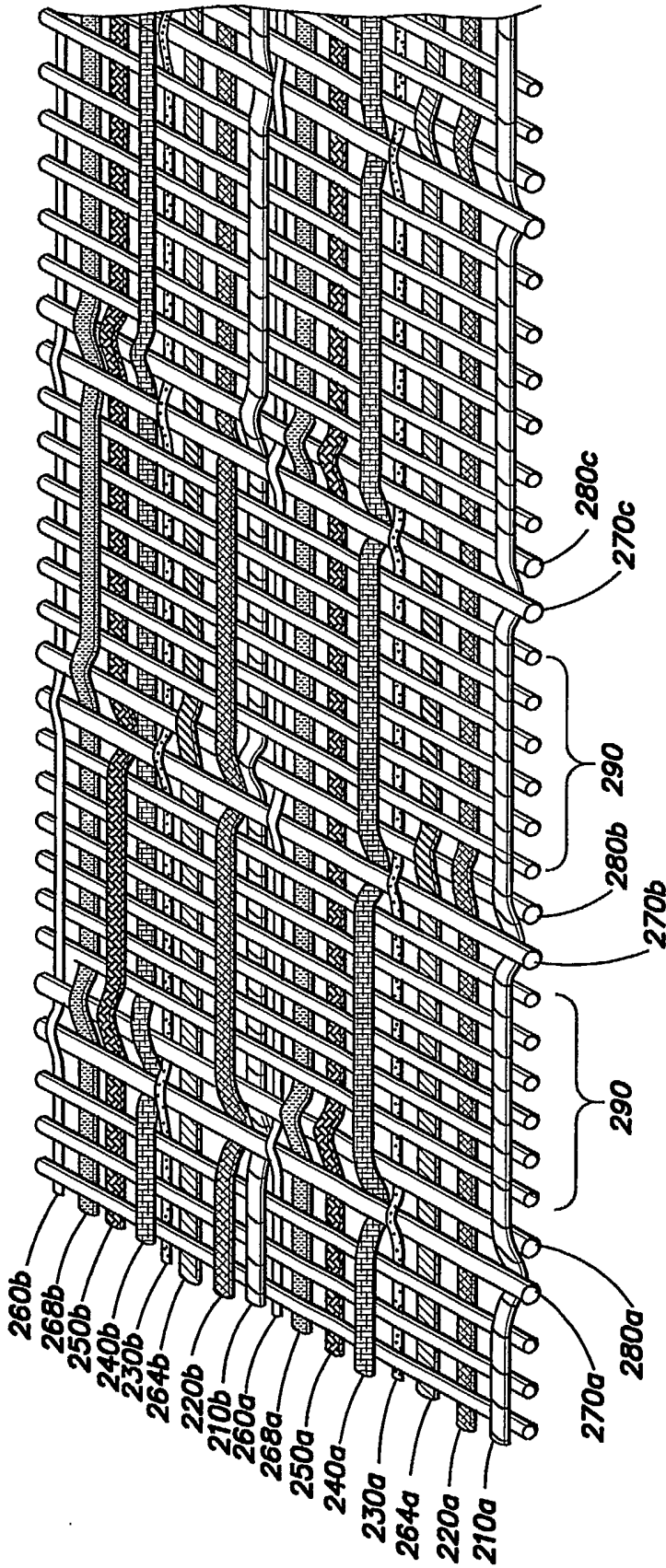


FIG. 5

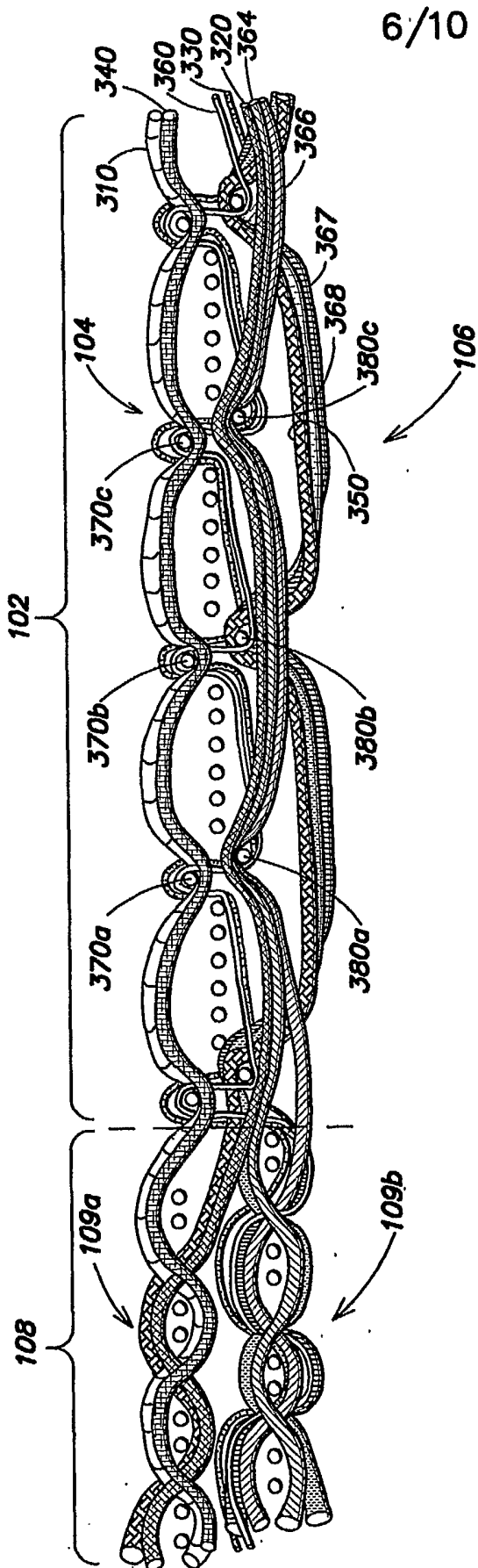


FIG. 6

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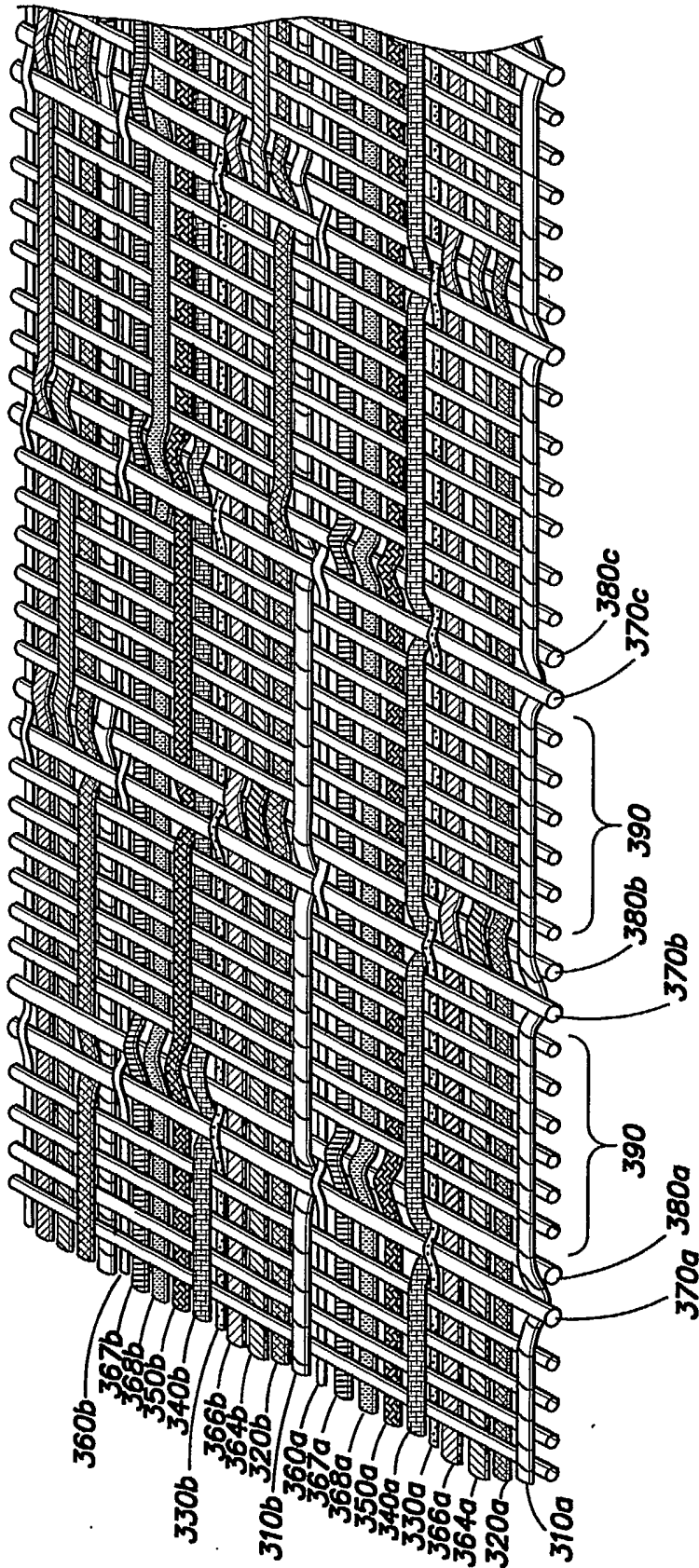


FIG. 7

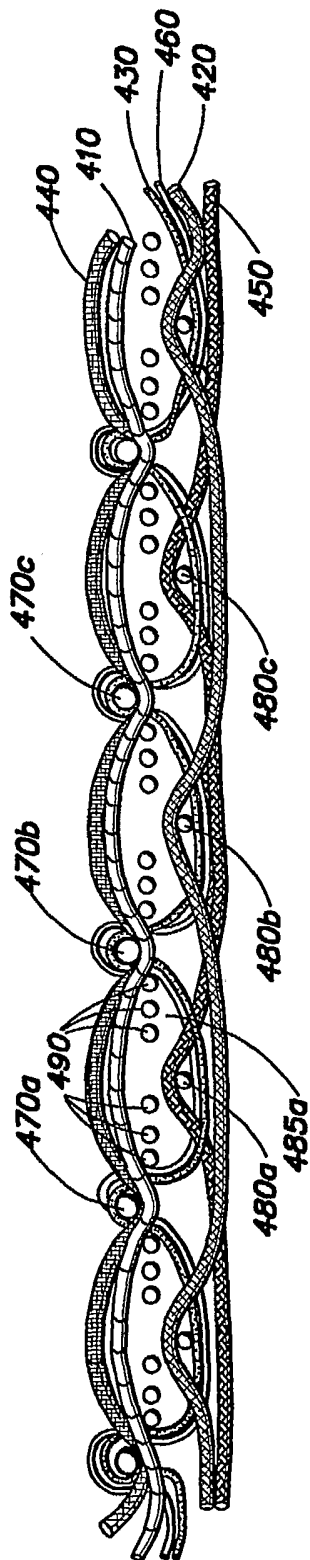


FIG. 8

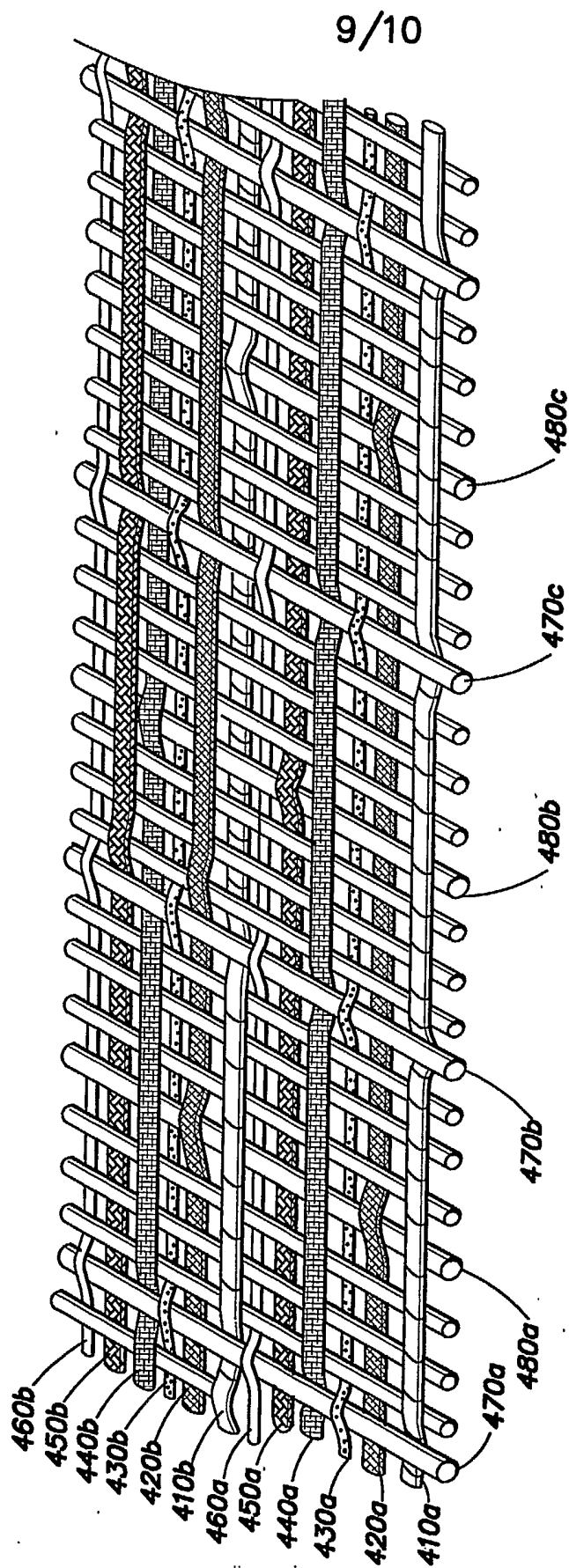


FIG. 9

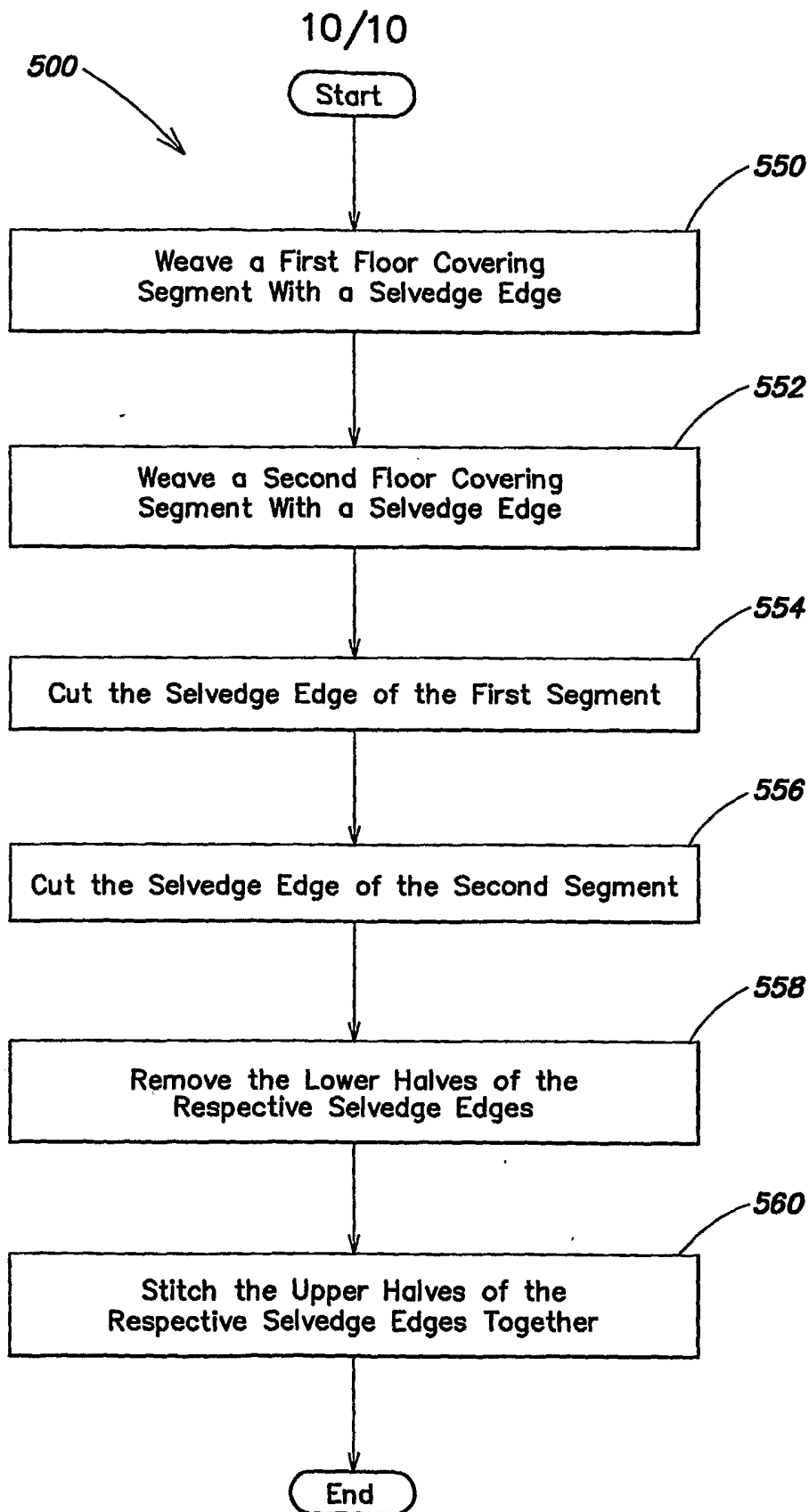


FIG. 10
SUBSTITUTE SHEET (RULE 26)