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(54) **STAIR TREAD OVERLAY AND MANUFACTURING PROCESS**

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(57) **ABSTRACT**

(21) Appl. No.: **13/800,874**

A stair tread overlay and a riser overlay made from solid wood for fitting over a conventional, exposed wooden stair having a generally rounded nose like those found in most residential general construction staircases and prefabricated staircases. The tread overlay and riser overlay cover the exterior surface of a conventional wooden stair from stringer to stringer to hide a construction grade stair tread and riser below that are made from a composite material or unsalvageable hardwood to present an attractive, solid wood surface that is finishable. One or more manufacturing processes for manufacturing a stair tread overlay and a riser overlay. The manufacturing process comprises the forming or milling of wood blanks, to fit over a conventional, exposed wooden stair having a generally rounded nose like those found in most residential and prefabricated staircases.

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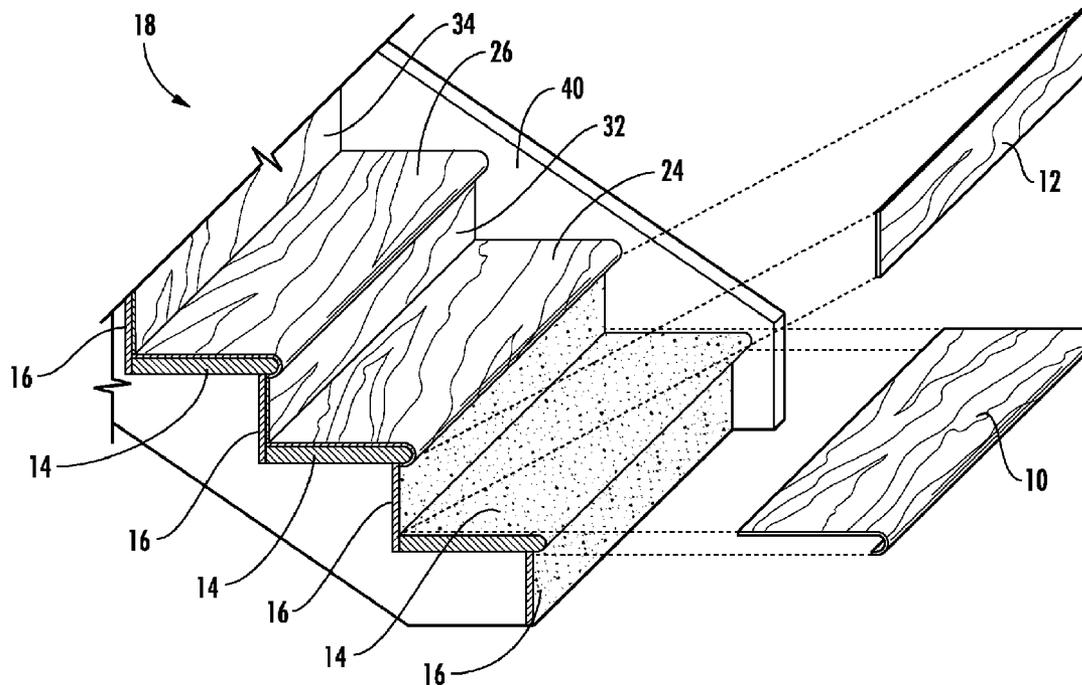
Related U.S. Application Data

(63) Continuation-in-part of application No. 12/436,378, filed on May 6, 2009.

(60) Provisional application No. 61/050,636, filed on May 6, 2008, provisional application No. 61/610,157, filed on Mar. 13, 2012.

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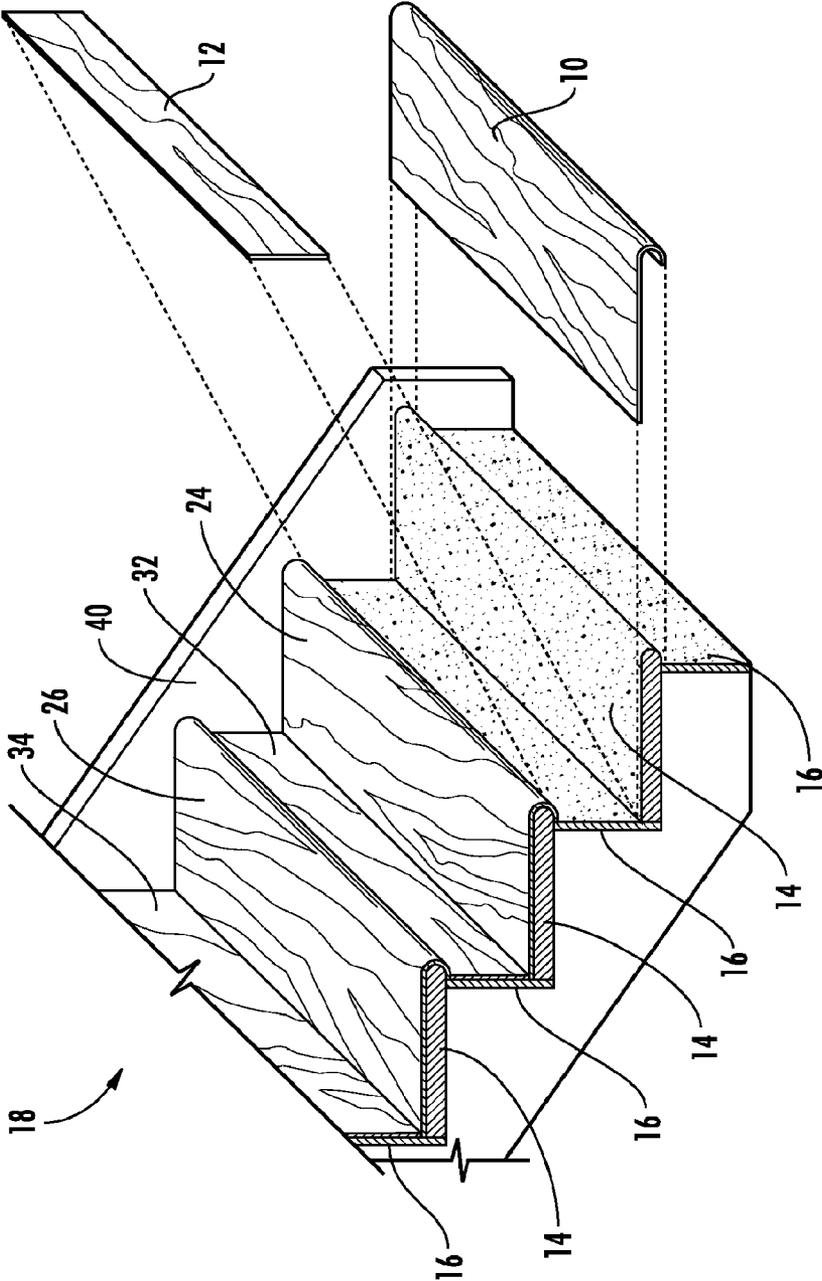


Fig. 1

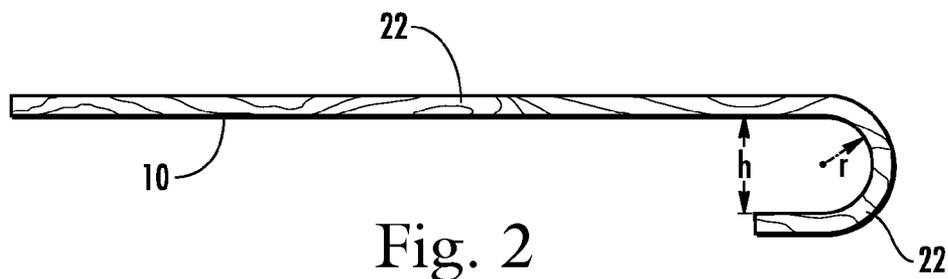


Fig. 2

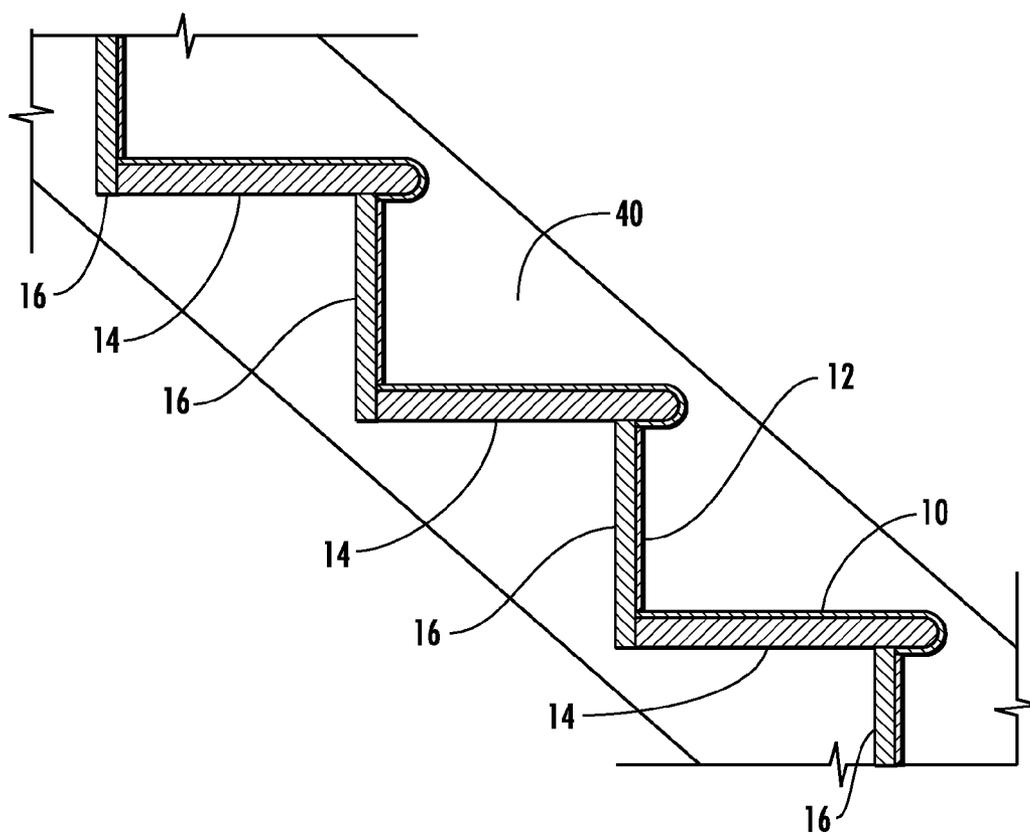


Fig. 3

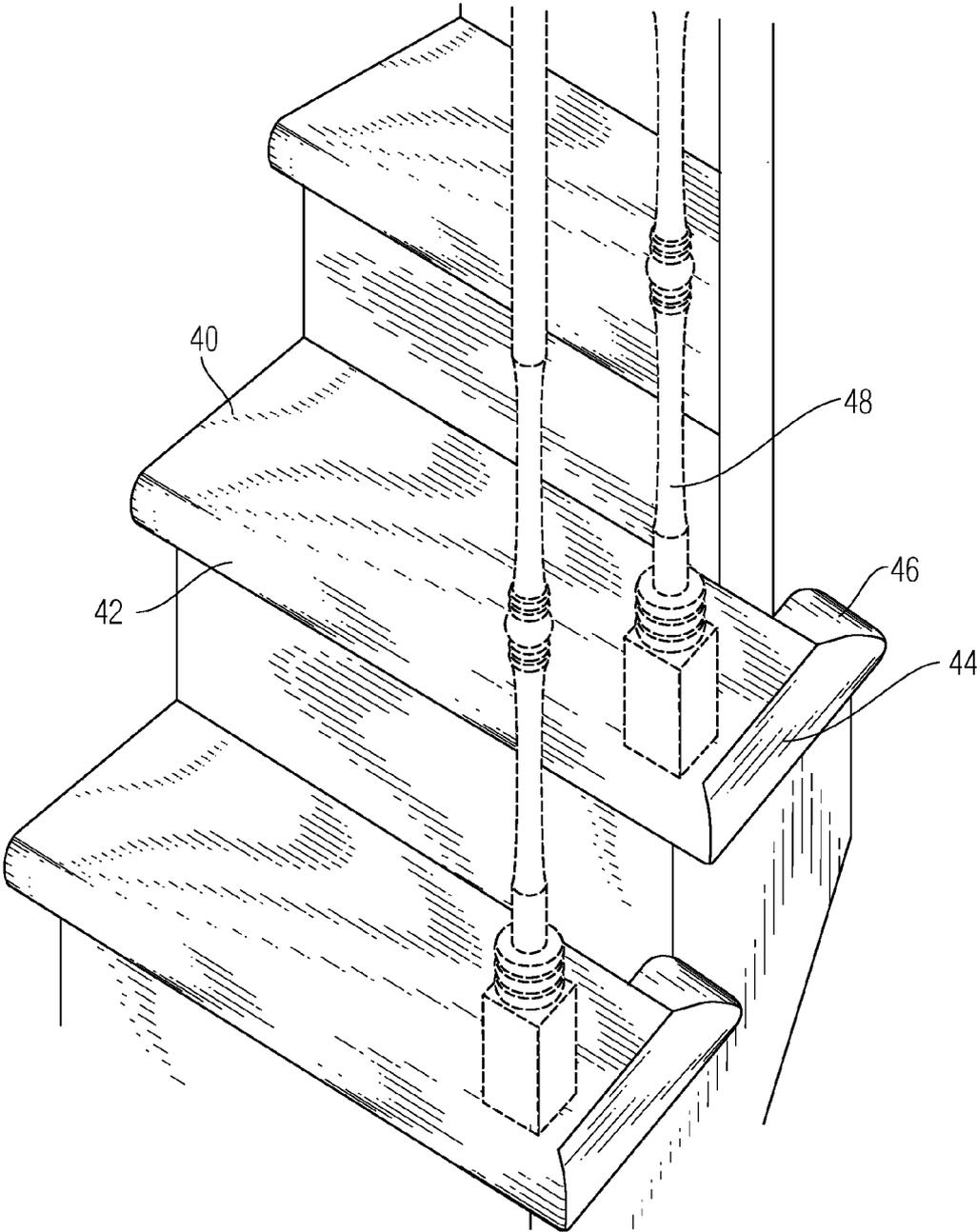


Fig. 4

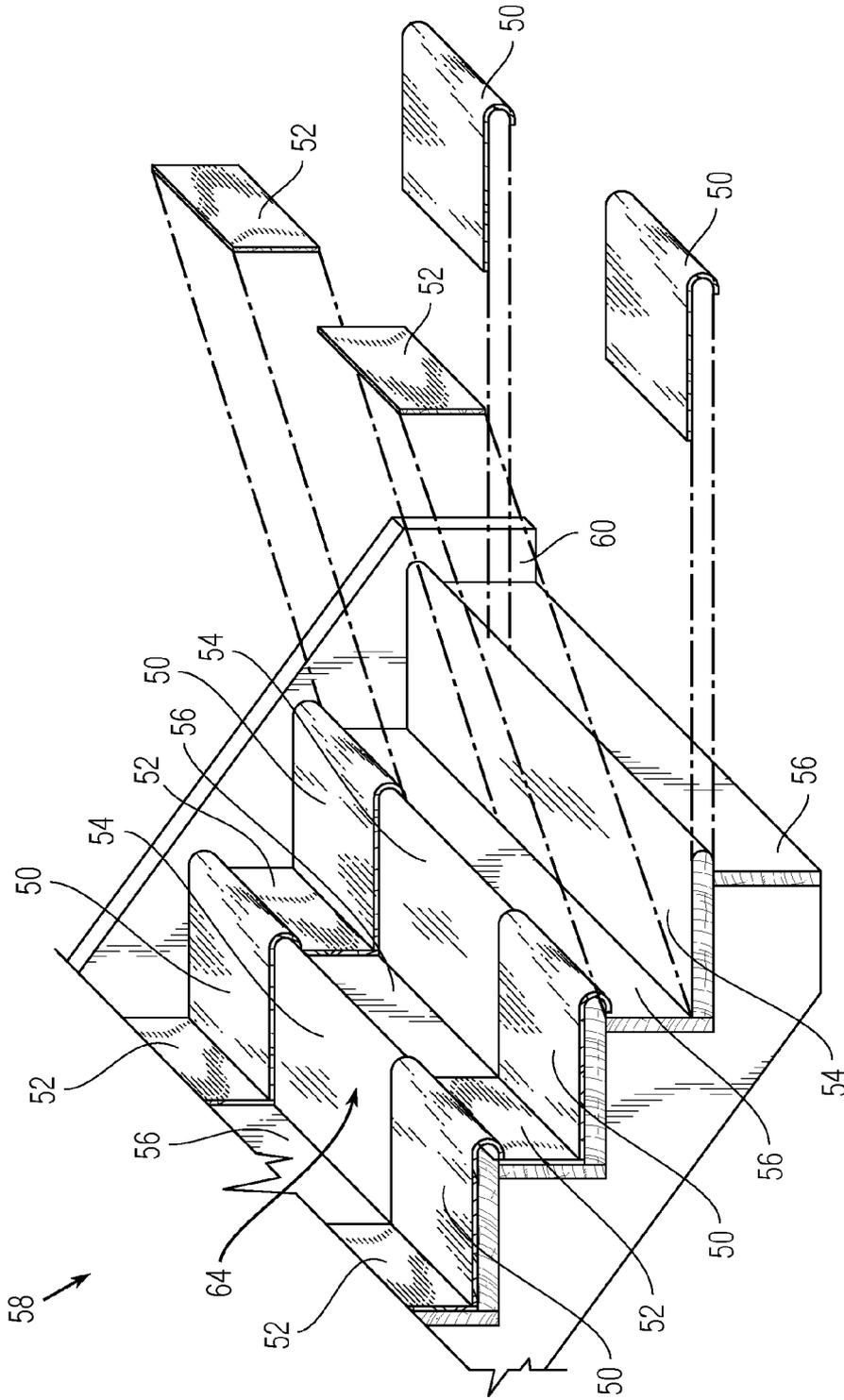


Fig. 5

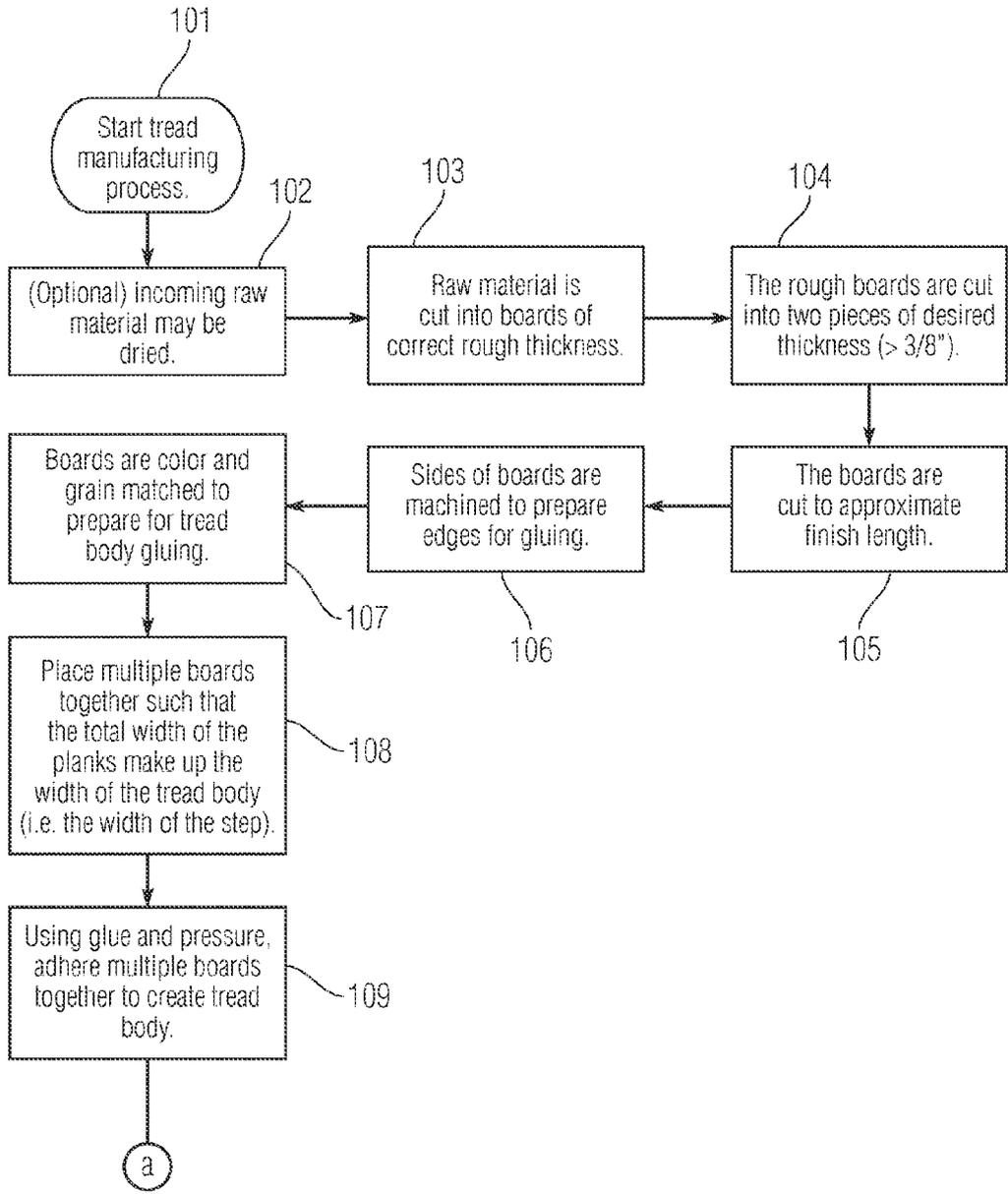


Fig. 6

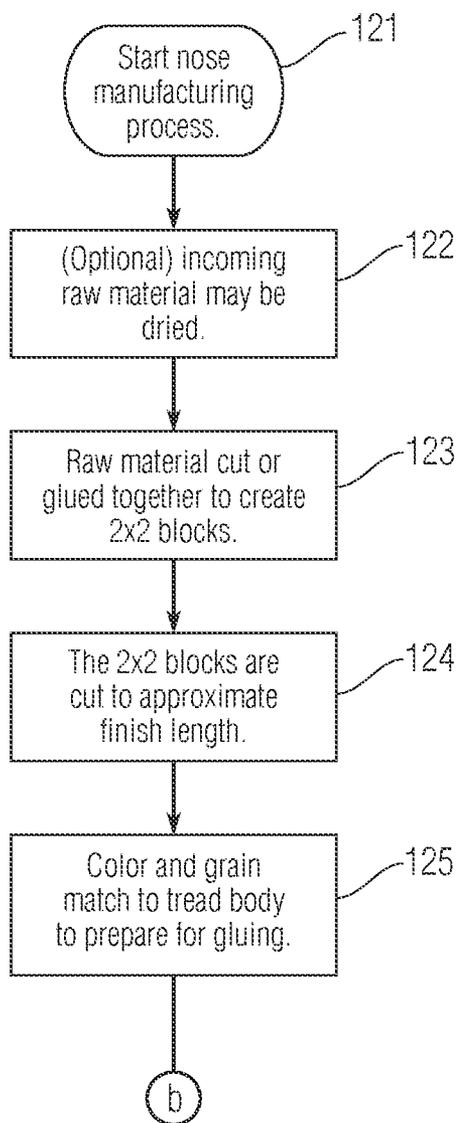


Fig. 7

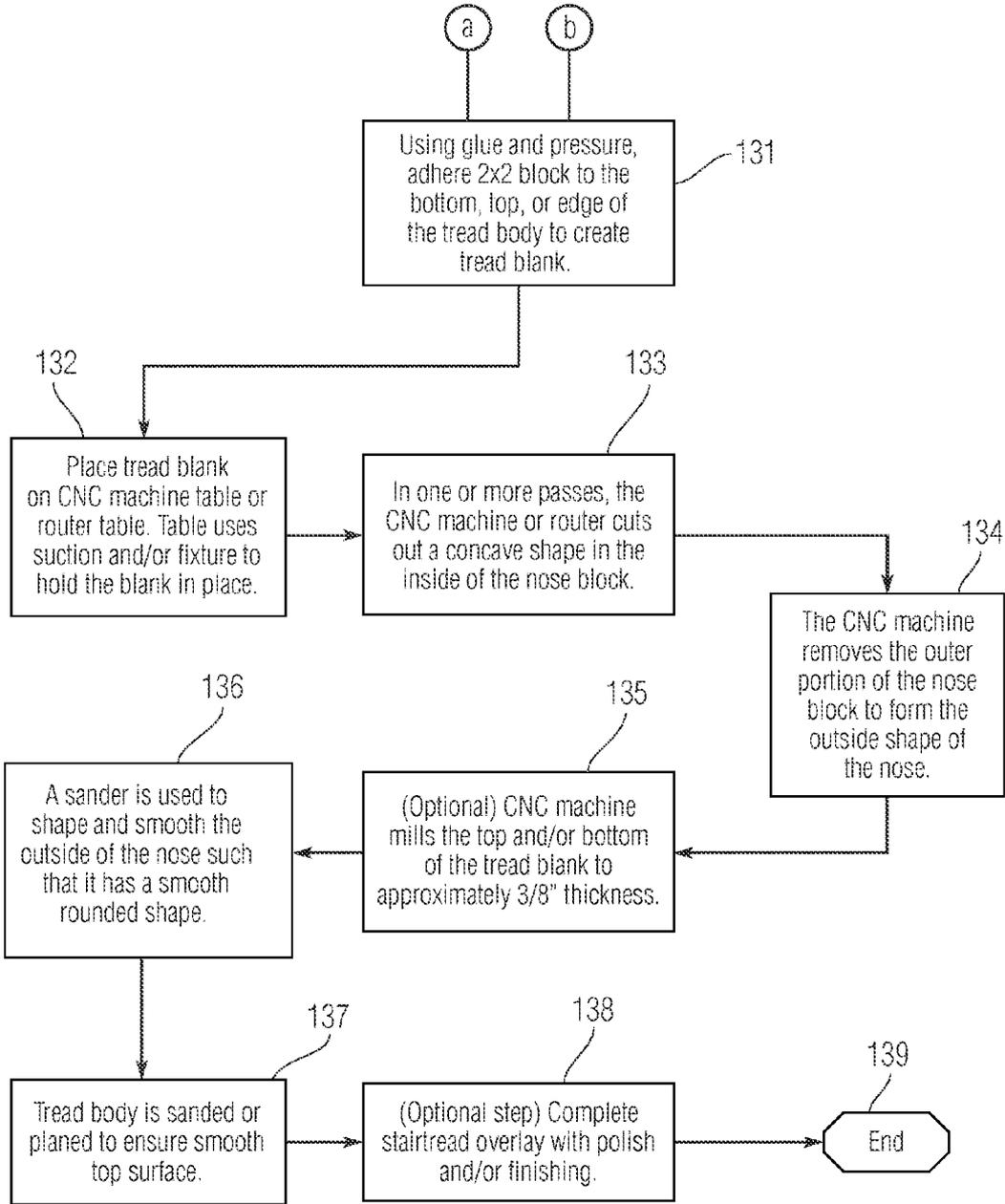


Fig. 8

STAIR TREAD OVERLAY AND MANUFACTURING PROCESS

CROSS-REFERENCES TO RELATED APPLICATIONS

[0001] This application is a continuation-in-part of co-pending application Ser. No. 12/436,378, filed on May 6, 2009 which claims priority to U.S. Provisional Patent Application No. 61,050,636 filed on May 6, 2008, and this application further claims priority to U.S. Provisional Patent Application No. 61/610,157 filed on Mar. 13, 2012, entitled "Manufacturing Process for Staircase Overlay", the entirety of all of which are incorporated herein.

BACKGROUND OF THE INVENTION

[0002] 1. Field Of The Invention

[0003] This invention relates generally to the field of staircase repair and restoration and relates more particularly to hardwood overlays for covering an existing composite or solid wood staircase, a method of installing the same, and the manufacturing process for the tread and nose of a staircase overlay.

[0004] 2. Description Of The Related Art

[0005] Conventional staircases of the type found in many residential buildings are commonly fabricated from raw, construction grade materials, such as plywood, fiberboard or various other composites, and are covered with flooring materials such as carpeting to provide an attractive and comfortable exterior surface. It is also relatively common for residential staircases to be fabricated from solid hardwood, such as oak, walnut, or cherry. Hardwood staircases are generally more desirable than carpeted composite staircases and are more expensive to construct due to the higher cost of the materials involved.

[0006] In the case of carpeted staircases, it is sometimes desirable to upgrade the staircase to a solid hardwood staircase for aesthetic reasons, such as when the seller of a home wishes to make the home more attractive to potential buyers, even when the original carpeted staircase is in good condition. In the case of hardwood staircases, the accumulation of surface wear over the course of time can make replacement of the staircase desirable, and sometimes even necessary, for aesthetic and functional reasons. In either case, replacing an existing staircase with a new, solid hardwood staircase typically requires extensive demolition and can sometimes be prohibitively expensive.

[0007] It would therefore be advantageous to have a means for achieving the appearance, durability, and longevity of a brand new, solid hardwood staircase without having to demolish an existing hardwood or carpeted composite staircase. It would further be advantageous to have such a means to manufacture and install such overlays that are affordable and that can be implemented quickly and easily.

SUMMARY OF THE INVENTION

[0008] In accordance with the present invention, there is provided a stair tread overlay and a riser overlay that are made from solid wood and that are milled and cut to fit over a conventional, exposed wooden stair having a generally rounded nose like those found in most residential general construction staircases and prefabricated staircases. The tread overlay and riser overlay can cover a conventional wooden stair tread and riser completely from end to end (stringer to

stringer) to hide a construction grade stair tread and riser (e.g., a stair tread and a riser that are made from plywood or another composite and that are typically covered with flooring material, such as carpeting) or an unsalvageable hardwood stair tread and riser to present an attractive, solid wood surface that is finishable. The tread overlay and riser overlay can also be used to cover a tread and riser only at the longitudinal ends of the tread and riser, against the abutting stringers of the staircase, to provide a finished hardwood surface at each end of the tread and riser in order to facilitate the installation of a carpet type runner in the middle of the staircase.

[0009] The profile of the tread overlay is preferably J-shaped and conforms to the shape of a conventional wooden stair tread profile having a rounded front edge. The overlay is formed with a length and a depth that are greater than that of a standard tread for allowing the overlay to be trimmed to size for accommodating a variety of standard and non-standard applications. The overlay can be milled and/or carved to allow fitment over multiple tread thicknesses. The overlay is affixed to an existing tread by using any conventional wood-to-wood adhesive, although it is contemplated that any other fastener for mounting the overlay to an existing tread, such as nails or screws, can also be used.

[0010] The tread overlay and riser overlay are preferably each formed of a single piece of solid hardwood material with an exterior surface that is finishable for accepting a desired stain color and/or finish coat. It is contemplated, however, that the overlay can be formed of multiple pieces of wood that are fit together. The overlays can be finished prior to installation (prefinished) or finished after installation (site finished).

[0011] The invention thus provides an alternative means of converting wooden staircases made from construction grade materials (solid or composite) or unsalvageable hardwood staircases into substantially new-looking solid hardwood staircases. The invention simplifies the task of conversion by eliminating the need to demolish, modify, and/or reconstruct the existing staircase as is typical with current methods for achieving hardwood conversion. Applying the tread overlays and riser overlays of the present invention to an existing staircase provides the staircase with an exterior surface that is consistent with most characteristics of a conventional solid hardwood staircase. The overlays achieve the beauty, durability and longevity that solid wood provides. Because the overlays are made of solid hardwood and have a substantial thickness, they can be sanded and refinishable.

[0012] The present invention also provides for one or more manufacturing processes of a stair tread overlay and a riser overlay that are made from solid wood or a wood based material. An exemplary embodiment of the manufacturing process comprises the milling of wood blanks, including the milling of the tread overlay nose, and cutting the solid wood to fit over a conventional, exposed wooden stair having a generally rounded nose like those found in most residential and prefabricated staircases.

[0013] The present invention provides for one or more manufacturing processes of a stair tread overlay and a riser overlay including stair tread and riser overlays made from solid wood or a wood based material. An exemplary embodiment of the manufacturing process comprises the milling of wood blanks, including the milling of the tread overlay nose, and cutting the overlays to fit over a conventional, exposed wooden stair having a generally rounded nose like those found in most residential and prefabricated staircases. An additional exemplary embodiment of the manufacturing pro-

cess comprises forming the tread overlay with a concave inner surface nose using pressure molding of a wood based material including pressure forming, pressure molding, and extrusion using a mold or convex nose mold or extrusion through a mold having a profile with a nose which forms a concave inner surface.

[0014] The present invention provides a method of manufacturing a solid wood stair tread overlay, said method comprising the steps of: (a) cutting raw material into at least one board of a desired thickness; (b) cutting the board to a desired length; (c) machining the board edges; (d) grain matching at least two boards; (e) adhering the edges of the two boards together to create a tread body; (f) cutting raw material into at least one nose block; (g) cutting the nose block to desired length; (h) grain matching the nose block with the tread body; (i) adhering the nose block to the tread body creating a tread blank; (j) machining the inside of the nose block to create a concave shape; (k) machining the outside of the nose block to create an outside shape of nose. Further, the adhering of the edges may be done using glue and pressure. The adhering of the nose block may be done using glue and pressure. The machining of the tread overlays may be done in one or more passes. The nose block may be adhered to the bottom of the tread body or the edge of the tread body. The tread blank may be secured to a machining table using suction or mechanical means or fixtures. The method may make use of a router to form the concave inner surface of the nose. The nose may be formed before being attached to the tread body. The present invention also embodies a stair tread overlay manufactured according to the method described above.

[0015] The present invention also provides a method of manufacturing a solid wood stair tread overlay, said method comprising the steps of: (a) cutting raw material into at least one board of a desired thickness; (b) cutting the board to a desired length; (c) machining the board edges; (d) grain matching at least two boards; (e) adhering the edges of the two boards together to create a tread body; (f) cutting raw material into at least one nose block; (g) cutting the nose block to desired length; (h) grain matching the nose block with the tread body; (i) adhering the nose block to the tread body creating a tread blank; and (j) forming a concave shape on the inner surface of the nose block. Further, the adhering of the edges may be done using glue and pressure. The adhering of the nose block may be done using glue and pressure. The forming of the concave shape on the inner surface of the nose block may be made by milling the nose block. A stair tread overlay manufactured according to the method described above.

[0016] The present invention also provides a method of manufacturing a stair tread overlay, said method comprising the steps of: (a) cutting raw material into at least one board of a desired thickness; (b) cutting the board to a desired length; (c) machining the board edges; (d) grain matching at least two boards; (e) adhering the edges of the two boards together to create a tread body; and (f) forming a nose on the end of the tread body wherein the nose has a concave inner surface. The inner concave surface of the nose may be formed by milling. The adhering of the edges in may be done using glue and pressure. The adhering of the nose block may be done using glue and pressure. A stair tread overlay manufactured according to the method described above.

[0017] The present invention also provides a method of manufacturing a stair tread overlay nose, the method comprising the steps of: (a) cutting raw material into at least one

nose block; (b) cutting the nose block to a desired length; (c) machining the inside of the nose block to create a concave shape; (d) machining the outside of the nose block to create an outside shape. A stair tread overlay manufactured according to the method described above.

[0018] The present invention also provides a method of manufacturing a stair tread overlay, said method comprising the steps of: (a) forming a stair tread body from wood material, wherein the stair tread has a front edge; (b) forming a nose on the front edge, wherein the nose has a concave inner surface. Forming the nose may include the step of adhering a nose block to a stair tread body and milling the nose block to the concave inner surface. Forming the nose may include the step of adhering a nose block which has already been milled to have a concave inner surface to the stair tread body. Forming the nose may include the step of pressure molding where the tread and/or nose are a wood fiber and epoxy mix. Forming the nose may include the step of pressure molding the front edge of the tread body around a convex mold. Forming the nose may include the step of bending the front edge of the tread body around a convex mold. Forming the tread overlay may include the step of using pressure extrusion through an extrusion mold having a profile with a nose having a concave inner surface. A stair tread overlay manufactured according to the method described above.

[0019] These and other objects, features, and/or advantages may accrue from various aspects of embodiments of the present invention, as described in more detail below.

[0020] These and other objects, features, and/or advantages may accrue from various aspects of embodiments of the present invention, as described in more detail below.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

[0021] FIG. 1 is a perspective exploded view in section illustrating the preferred embodiment of the present invention.

[0022] FIG. 2 is a side view illustrating the tread overlay of the preferred embodiment of the present invention shown in FIG. 1.

[0023] FIG. 3 is a side view in section illustrating the preferred embodiment of the present invention.

[0024] FIG. 4 is a perspective view illustrating a first alternative embodiment of the present invention.

[0025] FIG. 5 is a perspective exploded view in section illustrating a second alternative embodiment of the present invention.

[0026] FIG. 6 illustrates a flowchart depicting the manufacturing process for the tread of a solid wood staircase overlay.

[0027] FIG. 7 illustrates a flowchart depicting the manufacturing process for the nose of a solid wood staircase overlay.

[0028] FIG. 8 illustrates the continuation of the manufacturing process where the tread and the nose are attached to create the finished solid wood staircase overlay product.

[0029] In describing the preferred embodiment of the invention which is illustrated in the drawings, specific terminology will be resorted to for the sake of clarity. However, it is not intended that the invention be limited to the specific term so selected and it is to be understood that each specific term includes all technical equivalents which operate in a similar manner to accomplish a similar purpose. For example, the word connected or terms similar thereto are often used. They are not limited to direct connection, but include connec-

tion through other elements where such connection is recognized as being equivalent by those skilled in the art.

DETAILED DESCRIPTION OF THE INVENTION

[0030] Referring to FIGS. 1-3, a stair tread overlay **10** and a riser overlay **12** for fitting over the treads **14** and risers **16** of a prefabricated composite or solid wood staircase **18** are shown. Both the tread overlay **10** and the riser overlay **12** are fabricated from solid oak, although it is contemplated that the tread overlay **10** and the riser overlay **12** can alternatively be fabricated from the wood of any non-monocot angiosperm tree (i.e., hardwood), including, but not limited to walnut, ash, cherry, and hickory. It is further contemplated that the tread overlay **10** and riser overlay **12** can be fabricated from the wood of any coniferous tree (i.e., softwood), including, but not limited to cedar, pine, and spruce, although hardwoods are generally preferred over softwoods for their superior durability.

[0031] The tread overlay **10** is preferably milled from a solid piece of hardwood and is defined by a planar tread portion **20** (see FIG. 2) and a rounded nose portion **22**, although it is contemplated that the tread overlay **10** can be formed of two or more separate pieces of wood that are mounted to one another, such as with conventional fasteners or adhesives. For example, an equivalent tread overlay can be made of a separate planar panel and a curved piece that are glued together when installed. Referring to FIG. 2, the tread overlay has a J-shaped profile with a uniform thickness of $\frac{3}{8}$ inches, although it is contemplated that tread overlay **10** can have any thickness in a range of about 0.05 inches to about 1 inch. It is further contemplated that the thickness of the tread overlay **10** can be non-uniform, for example to accommodate an underlying obstruction.

[0032] The nose portion **22** of the tread overlay has an interior height, h of 1.5 inches and an interior radius, r of 0.075 inches for fitting over the nosing of most standard size stair treads (as will be described in greater detail below), although it is contemplated that the interior height, h and interior radius, r of the tread overlay **10** can be varied to conform to the size and shape of any stair tread that is to be covered. It is further contemplated that the nose portion **22** of the tread overlay can have a variety of other profile shapes, such as rectangular or triangular, for conforming to an existing stair tread that is not rounded. Still further, it is contemplated that the nose portion **22** of the tread overlay can have an interior profile shape that conforms to the nose shape of a stair tread to be covered but an exterior profile shape that is different than the nose shape of the stair tread to be covered. For example, it is contemplated that the nose portion **22** of the tread overlay **10** can have a rounded interior profile shape for fitting over the rounded nose of an underlying stair tread and a square exterior profile shape for providing the underlying staircase with a new and different exterior shape. Still further, it is contemplated that voids can exist if the interior profile shape does not precisely conform to the exterior shape of the stair tread.

[0033] Referring to FIG. 1, the tread overlay **10** and a plurality of similar tread overlays **24** and **26** that are intended to cover the stair treads **14** of the same existing composite or unsalvageable solid wood staircase **18** are preferably fabricated with a uniform width and a uniform depth that are greater than the width and the depth of the stair treads **14** that are to be covered. The tread overlays **10**, **24**, and **26** can therefore be individually trimmed down to a necessary width

and depth on-site, such as with a table saw or a circular saw. This allows precise custom fitting of the tread overlays **10**, **24**, and **26** for each of the individual stair treads **14** in the existing staircase **18**, some of which may have been built with intended or unintended variances in size or which may have shifted or been repaired over time. For example, for covering most standard size stair treads having a width of 3.5 feet and a depth of 10 inches, the tread overlays **10**, **24**, and **26** are preferably fabricated with a width of 4 feet and a depth of 12 inches. Alternatively, it is contemplated that the treads **14** on the existing staircase **18** can be individually measured and that each individual tread overlay **10**, **24**, and **26** can be fabricated with dimensions matching a specific premeasured tread **14** to achieve a proper fit thereon.

[0034] Still referring to FIG. 1, the riser overlay **12** is an elongated rectangular panel that is preferably cut from a single piece of hardwood, although it is contemplated that the riser overlay **12** can be formed of two or more separate pieces of wood that are mounted to one another, such as with conventional fasteners or adhesives. The riser overlay **12** has a uniform thickness of $\frac{3}{8}$ inches, although it is contemplated that riser overlay **12** can have any thickness in a range of about 0.05 inches to about 1 inch. It is further contemplated that the thickness of the riser overlay **12** can be non-uniform. Still further, it is contemplated that the riser overlay **12** can have any shape other than rectangular, such as triangular or trapezoidal, for conforming to the shape of a particular riser that is to be covered.

[0035] As with the stair tread overlays **10**, **24**, and **26** described above, the riser overlay **10** and a plurality of similar riser overlays **32** and **34** that are intended to cover the risers **16** of the same existing staircase **18** are preferably fabricated with a uniform width and a uniform height that are greater than the width and the height of the risers **16** that are to be covered. The riser overlays **12**, **32**, and **34** can therefore be individually trimmed to a necessary width and height on-site, such as with a table saw or a circular saw, to allow precise custom fitting of the riser overlays **12**, **32**, and **34** for each of the individual risers **16** in the existing staircase **18**, some of which may have been built with intended or unintended variances in size. For example, for covering most standard size stair risers having a width of 3.5 feet and a height of 7 inches, the riser overlays **12**, **32**, and **34** are preferably fabricated with a width of 4 feet and a height of 8 inches. Alternatively, it is contemplated that the risers **16** on the existing staircase **18** can be individually measured and that each individual riser overlay **12**, **32**, and **34** can be fabricated with dimensions matching a specific premeasured riser **16** to achieve a proper fit thereon.

[0036] In order to install the tread overlays **10**, **24**, and **26** and the riser overlays **12**, **32**, and **34** on an existing composite or unsalvageable hardwood staircase, such as the staircase **18** in FIG. 1, an installer first measures the width and depth of the existing staircase's treads **14** and the width and height of the existing staircase's risers **16**. If the existing treads **14** and risers **16** are obviously of uniform size, the installer will generally only need to measure the tread and riser of a single stair, otherwise the installer will have to measure each tread and riser that differs in size.

[0037] Next, the tread overlays **10**, **24**, and **26** and the riser overlays **12**, **32**, and **34** of the present invention, which are fabricated with dimensions larger than those of the existing treads **14** and risers **16** (as described above), are cut down to the measured sizes of the existing treads **14** and risers **16**

on-site. For example, the tread overlays **10**, **24**, and **26** are cut longitudinally and laterally to reduce their depths and widths, respectively, to appropriate sizes. Similarly, the riser overlays **12**, **32**, and **34** are cut laterally to reduce their widths to appropriate sizes.

[0038] Finally, the cut tread overlays **10**, **24**, and **26** and cut riser overlays **12**, **32**, and **34** are firmly mounted to the treads **14** and risers **16** of the existing staircase with conventional wood-to-wood adhesive. Of course, it is contemplated that the tread overlays **10**, **24**, and **26** and riser overlays **12**, **32**, and **34** can be mounted to the treads **14** and risers **16** using any other suitable means of affixation, such as with conventional fasteners or with other types of adhesives. The surfaces of the tread overlays **10**, **24**, and **26** and riser overlays **12**, **32**, and **34** that face and engage the existing treads **14** and risers **16** have a moderately rough texture for holding the adhesive to achieve proper adhesion. Such a surface texture can be achieved using any conventional means, such as by sanding or by the milling and cutting processes used to fabricate the overlays **10**, **24**, **26**, **12**, **32**, and **34**. In some cases, it may be beneficial or necessary to sand or otherwise distress the exterior surfaces of the existing stair treads **14** and risers **16** before mounting the overlays **10**, **24**, **26**, **12**, **32**, and **34** in order to provide the treads **14** and risers **16** with a surface that is sufficiently rough to hold the adhesive.

[0039] Once installed, the tread overlays **10**, **24**, and **26** and riser overlays **12**, **32**, and **34** cover substantially all of the exterior surfaces of the treads **14** and risers **16** of the underlying staircase from stringer **40** to stringer **42** (only the stringer **40** is shown in FIGS. **1** and **3**). The tread overlays **10**, **24**, and **26** and riser overlays **12**, **32**, and **34** preferably have finishable exterior surfaces for accepting any desired stain color and/or finish coat, such as varnish or paint. It is contemplated that the overlays **10**, **24**, **26**, **12**, **32**, and **34** can be finished prior to installation (prefinished) or finished after installation (site finished) as will be appreciated by those skilled in the art of flooring materials.

[0040] Referring to FIG. **4**, a first alternative embodiment of the inventive tread overlay, indicated generally at **40**, is contemplated for fitting over an “open-ended” stair tread. An “open-ended” stair tread is defined herein as a stair tread having a first longitudinal end that abuts a conventional stringer and an opposite longitudinal end that extends into open space (i.e., does not abut a stringer in the same way). An open-ended tread therefore has three exposed edges (i.e., a front edge, a partially protruding rear edge, and a longitudinal edge) which is to be contrasted with the “closed-end” stair treads **14** described above which only have one exposed edge (i.e., a front edge).

[0041] The tread overlay **40** is similar to the tread overlay **10** described above with a first nose portion **42** extending from the front of the tread portion, but additionally includes a second, separate nose portion **44** adjoining the first nose portion **42** that extends from a longitudinal end of the tread portion and a third, separate nose portion **46** adjoining the second nose portion **44** that extends from the rear of the tread portion. When assembled together, the three nose portions **42-46** cover all three exposed edges of the underlying open-ended tread. It is contemplated that the tread overlay **40** can alternatively be fabricated with a fourth adjoining nose portion (not pictured) extending from the opposite longitudinal end of the tread overlay **40** from the second nose portion **44** for covering a stair tread having two open longitudinal ends (i.e., a tread that does not abut a stringer at either longitudinal

end). During installation, the tread overlay **40** is measured, cut, and mounted in a substantially similar manner to the tread overlay **10** described above. It should be noted that some open-ended staircases feature a banister, such as the banister **48**, which generally must be removed before the overlay **40** is installed and can be replaced after installation is complete. Once the overlay **40** is installed, the nose portions **44** and **46** are trimmed and installed.

[0042] Referring to FIG. **5**, a second alternative embodiment of the present invention is contemplated for accommodating the installation of a central runner made from a flooring material such as carpeting or tile on a staircase. In this embodiment, the tread overlays **50** and riser overlays **52** are similar to the tread overlay **10** and riser overlay **12** described above, except that each of the tread overlays **50** and riser overlays **52** has a width that is less than half the width of the stair treads **54** and risers **56** of the underlying stair case **58**. The tread overlays **50** and riser overlays **52** are mounted over the opposing longitudinal ends of their respective stairs in abutment with the stringers **60** and **62** (only the stringer **60** is shown in FIG. **5**). Each pair of tread overlays **50** and each pair of riser overlays **52** thus define an exposed central channel **64** in which flooring material, such as carpeting or tile, can be installed in a conventional manner in direct contact with the existing staircase **58** to provide the staircase **58** with a central runner. The flooring material of the runner thereby sits flush with the longitudinally-adjacent tread overlays **50** and riser overlays **52** and presents an attractive, uniform appearance.

[0043] An exemplary embodiment of one of the manufacturing processes of the present invention is illustrated in FIGS. **6**, **7**, and **8**. For purposes of this detailed description, the manufacturing process of the stair tread, FIG. **6**, shall be described first and the manufacturing process of the nose, FIG. **7**, shall be described second. It should be noted, however, that this does not dictate the order in which the tread and nose must be manufactured. The manufacturing process of the tread and nose may occur simultaneously or at different times. Subsequently, the manufacturing process in which the tread and the nose are combined are illustrated in FIG. **8**.

[0044] An exemplary manufacturing process for the stair tread, as illustrated in FIG. **6**, commences in step **101** with the incoming of raw material. The raw material may be dried in step **102**. For example, the raw material may be kiln dried to approximately 6-7% moisture. The raw materials in step **103** are then cut into boards of correct rough thickness. In an exemplary embodiment, the boards are cut into a rough thickness of about $\frac{3}{4}$ inches. In step **104**, the thick rough boards are cut into two pieces of desired thickness. In this exemplary embodiment, the thickness of each piece should be greater than $\frac{3}{8}$ inches. In step **105**, the boards are cut to an approximate finish length.

[0045] In step **106**, the sides or edges of the boards are machined to prepare the edges for gluing. A joiner may be used to prepare the edges of the boards for joining the sides of the boards together. The boards, in step **107**, are then color and grain matched to prepare for tread body gluing. In order to manufacture a tread equal to the width of a step in a staircase, multiple boards are placed together in step **108** such that the total width of the planks make up the width of the tread body (i.e. the width of a step). Preferably, the width would be about **11** inches across but it can be any other size to fit a customized step. The boards placed together are joined at the edges by gluing or using a joiner. Depending on the width of the steps, the manufacturing process may be modified to

accommodate for different widths. For example, boards could be added, removed, or cut to create any desired width. In step **109**, the multiple boards are adhered together using glue and pressure to create the tread body. Pressure may be applied manually or through an automated means such as an automated press machine. In addition, biscuits, a tongue and groove design, or any combination thereof may also be used in the process of gluing the multiple boards or blanks together. It should be noted that steps **102** through **109** could be performed in various orders to achieve the desired outcome of a cut and ready tread body. Further, several steps within steps **102-109** may be combined into one step.

[0046] The manufacturing of the overlay nose in this embodiment, as illustrated in FIG. 7, runs concurrently and/or separately with the manufacturing of the overlay tread illustrated in FIG. 6. The manufacturing process of the stair nose commences in step **121** with the incoming of raw material. In step **122**, the raw material may be dried. For example, the raw material may be kiln dried to approximately 6-7% moisture. In step **123**, one or more pieces of raw material are cut or glued together creating 2 inch×2 inch blocks or strips. In step **124**, the 2×2 blocks or strips are cut to the approximate finish length. In step **125**, the 2×2 blocks are then color and grain matched with the tread body from step **107**.

[0047] The 2×2 blocks may be formed of multiple pieces. For example, the process may use 2×1 rough strips which are grain matched with a second 2×1 strip. The two strips are adhered together using glue and pressure such that the two 2×1 blocks together make up a 2×2 nose block. In addition, biscuits, a tongue and groove design, or any combination thereof may also be used in the process for connecting the multiple strips together to form the nose block.

[0048] In step **131**, using glue and pressure, the 2×2 nose block is adhered to the bottom, top, or edge of the tread body to create the tread blank. In the exemplary embodiment, the nose block is adhered on the bottom of the tread body with the long edge of the tread and the nose block flush. In an alternative embodiment, the nose block can be positioned next to the board such that the length of the nose and board combination is equal to the length of the board plus the block. The nose block is adhered using glue and pressure. The nose block may also be adhered using glue and pressure in combination with biscuits or a tongue and groove design.

[0049] In step **132**, the tread blank is placed on a router table or computer numerical control (“CNC”) fixture or machine. Typically, a CNC machine consists of a table that moves in the X and Y axes with a tool, spindle, or cutter that moves in the Z direction. However, in the exemplary process, the cutter is moving in multiple axes including the X, Y, and Z axes. The position of the tool is driven by motors through a series of step-down gears which provide highly accurate movements. The CNCs often have multiple, fast changing cutter heads which allow the CNC machine to change cutting tools automatically by the rotation of the cutting head. The cutting heads used might include various metal cutting heads, drill bits, router bits, laser cutting, flame and plasma cutting, or any other cutting head. The item being milled is placed on a fixture. In our exemplary embodiment, the tread body is placed on a fixture with holes in the fixture. The holes on the mounting fixture work in combination with a suction element which sucks the tread to the fixture to secure the tread in place while the tread is milled by the CNC machine. The CNC machine also uses various guides and blocks to help align the tread during milling.

[0050] The CNC machine or router, in step **133**, then cuts or mills out a shape on the inside of the nose block. In a preferred embodiment, the shape on the inside of the nose is a concave shape which fits over the rounded bullnose of many stair treads. The cutting of milling could be accomplished in one or more passes. The CNC machine may use one or more cutter heads to cut out the inner shape of the nose. In cutting out and shaping the inner shape of the nose for the concave shape, the CNC machine needs to cut out approximately 1 and $\frac{1}{16}$ inches of the 2 inch nose block, leaving an approximate $\frac{5}{16}$ inch thick front nose edge. It should be noted that thickness of the frontal edge (i.e. $\frac{5}{16}$ inch) may vary depending on the staircase, and thus, the process may be designed to cut out more or less than 1 and $\frac{1}{16}$ inches of the 2 inch nose block.

[0051] In this exemplary embodiment, the process of forming the inside nose profile has the CNC machine make two passes. In the first pass, the CNC machine cuts half of the inside of the nose in the step **133**. Then the CNC machine makes a second pass and cuts the remaining shape on the interior surface of the nose. The manufacturing process is not limited to two passes, but may consist of multiple passes to cut out the shape of the inner surface of the nose. Once the concave inner portion of the nose is cut out, the tread body may be flipped or rotated with the nose portion placed on a nose fixture.

[0052] In step **134**, the CNC machine cuts the outer portion or surface of the nose block to form the outside shape of the nose. In the exemplary embodiment, the outside shape or profile of the nose is convex.

[0053] Alternatively, the outer portion of the nose (step **134**) could be cut before the inner portion of the nose (step **135**).

[0054] An optional step or process (step **135**) has the CNC machine mill the top and or bottom of the tread to a desired thickness such as $\frac{3}{8}$ inches. In step **136**, a conveyer belt sander shaped to match the profile of the outer nose surface is used. The tread board and nose combination is sanded using the conveyer belt sander to shape and smooth the outside of the nose such that it has a smooth rounded shape. Step **136** could also be done manually. In step **137**, the tread body is sanded or planed to provide a smooth top surface. The sanding steps in **136** and **137** could include multiple steps from rough sanding to finish sanding with multiple machines at different sanding grits. In an optional step **138**, the overlay may be completed with stain and/or a finishing coating, such as polyurethane.

[0055] After finishing the tread board, the process ends in step **139**. The product of the process provides a solid, one piece, wooden, stair tread overlay with a concave inner surface nose portion.

[0056] In an alternative embodiment of the present manufacturing process, the blanks, boards, and nose blocks may be cut to different widths, thickness, lengths, and heights such that the overlay may be customized to fit over different staircases. For example, the number of blanks glued together in steps **108** through **109** may vary depending on the width of the steps (i.e. the width of the board may be greater or less than 11 inches). As a second example, the blanks in step **105** may be cut to different lengths depending on the length of the steps (i.e. the blanks may be cut to a length of 4 feet instead of a standard 3 foot length).

[0057] It should be noted that the present manufacturing process is not limited to a CNC machine, and that the milling and cutting of the board and nose block may be done manu-

ally or by a similar automated machine. Further, the present manufacturing process is not limited to the step order described in FIGS. 6, 7 and 8; some steps may be omitted, combined, or switched without losing the durability, integrity, and attractiveness of the end product, a solid wood staircase overlay with a concave inner nose surface. For example, the CNC machine may be used to cut out a concave shape of the inner nose before attaching the nose to the board.

[0058] Further, the manufacturing process is not limited to milling or to solid wood. The process can be altered to make use of particle boards and laminates. In this embodiment, wood fibers or wood particles are combined with a glue or epoxy to adhere the particles together and then pressed and formed into a wood fiber tread blank. The tread blank may be formed and pressed into the desired shape including the J-shape profile or nose with a concave inner surface. A laminate wood grain layer is adhered to the wood fiber tread blank which may be adhered before or after it is pressed into the J-shape profile. By way of example, the wood fibers and epoxy mix may be poured into a mold with a J-shape or concave inner nose surface profile and pressure formed, extruded through a J-shaped press, or formed into a flat fiber board shape and then having an end or edge of the board bent around a J-shaped mold while the fiber board is permeable. In all instances the wood grain top laminate layer may be added prior to the fiber board being shaped or after the fiber board is shaped.

[0059] Alternatively, the wood fiber tread blank may be formed with a block nose section and a tread section. In this scenario, the fiber block nose section can be milled as in FIG. 7 to form the J-shape profile or concave inner surface nose.

[0060] This detailed description in connection with the drawings is intended principally as a description of the presently preferred embodiments of the invention, and is not intended to represent the only form in which the present invention may be constructed or utilized. The description sets forth the designs, functions, means, and methods of implementing the invention in connection with the illustrated embodiments. It is to be understood, however, that the same or equivalent functions and features may be accomplished by different embodiments that are also intended to be encompassed within the spirit and scope of the invention and that various modifications may be adopted without departing from the invention or scope of the following claims.

We claim:

1. A method of manufacturing a solid wood stair tread overlay, said method comprising the steps of:

- (a) cutting raw material into at least one board of a desired thickness;
- (b) cutting the board to a desired length;
- (c) machining the board edges;
- (d) grain matching at least two boards;
- (e) adhering the edges of the two boards together to create a tread body;
- (f) cutting raw material into at least one nose block;
- (g) cutting the nose block to desired length;
- (h) grain matching the nose block with the tread body;
- (i) adhering the nose block to the tread body creating a tread blank;
- (j) machining the inside of the nose block to create a concave shape; and
- (k) machining the outside of the nose block to create an outside nose shape.

2. The method of claim 1, wherein the adhering of the edges in step (e) is by glue and pressure.

3. The method of claim 1, wherein the adhering of the nose block in step (i) is by glue and pressure.

4. The method of claim 1, wherein the machining is performed in at least one pass.

5. The method of claim 1, wherein the nose block is adhered to the bottom of the tread body in step (j).

6. The method of claim 1, wherein the nose block is adhered to the edge of the tread body in step (j).

7. The method of claim 1, wherein the tread blank is secured to a machining table using suction.

8. The method of claim 1, wherein the tread blank is secured to a machining table using at least one fixture.

9. The method of claim 1, wherein a CNC machine is used to machine the nose block.

10. The method of claim 1, wherein a router is used to machine the nose block.

11. The method of claim 1, wherein the nose block is machined before being attached to the tread body.

12. A stair tread overlay manufactured according to the method in claim 1.

13. A method of manufacturing a solid wood stair tread overlay, said method comprising the steps of:

- (a) cutting raw material into at least one board of a desired thickness;
- (b) cutting the board to a desired length;
- (c) machining the board edges;
- (d) grain matching at least two boards;
- (e) adhering the edges of the two boards together to create a tread body;
- (f) cutting raw material into at least one nose block;
- (g) cutting the nose block to desired length;
- (h) grain matching the nose block with the tread body;
- (i) adhering the nose block to the tread body creating a tread blank; and
- (j) forming a concave shape on the inner surface of the nose block.

14. The method of claim 13, wherein the adhering of the edges in step (e) is by glue and pressure.

15. The method of claim 13, wherein the adhering of the nose block in step (i) is by glue and pressure.

16. The method of claim 13, wherein forming the concave shape on the inner surface of the nose block is by milling the nose block.

17. A stair tread overlay manufactured according to the method in claim 13.

18. A method of manufacturing a stair tread overlay, said method comprising the steps of:

- (a) cutting raw material into at least one board of a desired thickness;
- (b) cutting the board to a desired length;
- (c) machining the board edges;
- (d) grain matching at least two boards
- (e) adhering the edges of the two boards together to create a tread body; and
- (f) forming a nose on the end of the tread body wherein the nose has a concave inner surface.

19. The method of claim 18, wherein the inner concave surface of the nose is formed by milling.

20. The method of claim 18, wherein the adhering of the edges in step (e) is by glue and pressure.

21. The method of claim 18, wherein the nose block is adhered to the end of the tread body by glue and pressure.

22. A stair tread overlay manufactured according to the method in claim 18.

23. A method of manufacturing a stair tread overlay nose, said method comprising the steps of:

- (a) cutting raw material into at least one nose block;
- (b) cutting the nose block to a desired length;
- (c) machining the inside of the nose block to create a concave shape; and
- (d) machining the outside of the nose block to create an outside nose shape.

24. A stair tread overlay nose manufactured according to the method in claim 23.

25. A method of manufacturing a stair tread overlay, said method comprising the steps of:

- (a) forming a stair tread body from wood material, wherein the stair tread has a front edge; and
- (b) forming a nose on the front edge, wherein the nose has a concave inner surface.

26. The method of claim 25, wherein forming the nose includes the steps of:

- adhering a nose block to the stair tread body; and
- milling the nose block to the concave inner surface.

27. The method of claim 25, wherein forming the nose includes the step of:

adhering a nose block which has already been milled to have a concave inner surface to the stair tread body.

28. The method of claim 25, wherein forming the nose includes the step of:

forming the nose by pressure molding wherein the wood material is a wood fiber and epoxy mix.

29. The method of claim 25, wherein forming the nose includes the step of:

forming the nose by pressure molding the front edge of the tread body around a convex mold.

30. The method of claim 25, wherein forming the nose includes the step of:

forming the nose by bending the front edge of the tread body around a convex mold.

31. The method of claim 25, wherein forming the tread overlay includes the step of:

forming the tread overlay by pressure extrusion through an extrusion mold having a profile with a nose having a concave inner surface.

32. A stair tread overlay manufactured according to the method in claim 25.

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