ABSTRACT

This specification discloses a plywood overlaid with a decorative paper and the method of manufacturing the same. An adhesive bonds the paper to the plywood. The decorative paper is characterized by being very thin and by having a simulated wood grain pattern. The overlaid paper is coated with a transparent resin coat. The coat is embossed with wood-grain simulating pattern. The coat also includes elongated longitudinal parallel channels wider than the embossings and reaching the depth of the plywood. The channels are colored differently from the color of the wood grain pattern.

17 Claims, 9 Drawing Figures
This application is a continuation-in-part of my abandoned application, Ser. No. 765,426, now abandoned, filed Sept. 27, 1968, entitled "Method of Manufacture of Ornamental Plywood."

SUMMARY OF THE INVENTION

The present invention relates to improvements in or relating to a fibrous sheet covered plywood. It is one object of the present invention to provide an improved plywood overlayed with a decorative overlay sheet bonded thereto. It is another object of the present invention to provide an improved process for manufacturing a decorative overlay sheet covered plywood. It is a further object of the present invention to provide high quality plywood panels adapted for use as interior and exterior wall panels, furniture and the like. It is still further object of the present invention to provide a method for the manufacture of a plywood having a desired wood grain pattern which gives an appearance of a real grain of wood, such as the grain of walnut, rosewood, or oak, etc. It is another object of the present invention to provide a plywood to the kind stated which can be manufactured and sold at a reasonable cost.

According to one aspect of the present invention, there is provided an improved plywood overlayed with a decorative overlay paper bonded thereto, which comprises a base plywood, a thin decorative overlay paper bonded to the surface of said plywood by a resin adhesive, said overlay paper having a weight when dry, within the range of from 23 to 27 grams per square meter and being characterized by having the color print of a wood grain pattern, a layer of a transparent resin coat applied to the overlay paper and heat-cured so that said colored wood grain pattern may be visible through said layer, a number of transversely spaced-apart, relatively shallow and narrow grooves preformed on said layer, said grooves each extending intermittently in the general direction of said colored wood grain pattern so as to simulate a duct of wood, and a plurality of longitudinally extending, relatively wide, substantially V-shaped parallel grooves formed in said transparent layer of resin coat and reaching said base plywood, said V-shaped grooves being coated with paint of a different color from the color of the printed wood grain pattern on said overlaid paper, thereby giving an appearance of a real wood to said plywood.

According to another aspect of the present invention, there is provided an improvement in the process for the manufacture of a plywood overlayed with a decorative overlay paper bonded thereto, which comprises the steps of: uniformly coating the surface of a base plywood with a resin adhesive which fills the holes and recesses in said surface; partially drying the adhesive coated on said surface; bonding a thin decorative overlay paper to said surface by said adhesive, said overlay paper having a weight, when dry, within the range of from 23 to 27 grams per square meter and being characterized by having the color print of a wood grain pattern; trimming the edges of said overlaid paper; coating a transparent resin coat on said overlaid paper; drying the transparent resin coat completely; press-forming on the layer of said transparent resin coat a number of transversely spaced-apart, fine-grained grooves extending intermittently in the general direction of the wood grain pattern on said overlaid paper; forming a plurality of transversely spaced, relatively wide, substantially V-shaped or arcuate grooves extending longitudinally of said base plywood, said grooves each being of such depth as to reach the base plywood; and coating the surfaces of said grooves with paint of a different color from said overlaid paper, whereby the wood grain pattern on said overlaid paper can be viewed through the layer of said transparent resin coat, thus giving an appearance of a real wood to the plywood.

These and other features of the invention are pointed out in the claims. Other objects, features and advantages of the present invention will become apparent by reading the following detailed description in conjunction with the accompanying drawings in which:

FIG. 1 is a flow diagram showing the sequence of the respective operations or stages according to an embodiment of the present invention;

FIG. 2 illustrates a section of the partially completed product to show the step of applying adhesive to the face surface of a base plywood;

FIG. 3 illustrates a section of the partially completed product to show the step of adhesively securing an overlay paper to the face surface of the plywood;

FIG. 4 is a section of the partially completed product and illustrates the step of coating the surface of the overlaid paper with a transparent resin coat;

FIG. 5 is a partly broken away plan view of a finished plywood panel of the present invention;

FIG. 6 is a cross-sectional view taken along the line A—A of FIG. 5;

FIG. 6a illustrates a similar cross section of a finished plywood panel but embodying another feature of the invention;

FIG. 7 is a perspective view schematically illustrating a device for coating grooves with paint, employed in the process of the present invention; and

FIG. 8 is a schematic side view of the device shown in FIG. 7.

Referring now to the drawing in FIG. 1, there is illustrated a method for manufacturing the plywood according to the present invention.

As shown, first, a suitable thermosetting resin adhesive, such, for example, as a composition of a urea resin and a vinyl acetate emulsion in the proportion of 2 to 8, is applied to the face surface of a base plywood 1 by pressing the base plywood through roll coaters 2 to which the adhesive is supplied from an adhesive feeder unit 3. It has been found that the quantity of the adhesive suitable for coating the surface is about 8 grams per foot of the surface area.

Then, the base plywood 1 is passed through reversing rollers 4 where the adhesive, which fills the holes and recesses of said surface, is uniformly rolled and smoothed on the surface. Thereafter the adhesive coated base plywood passes to a drying oven 5 wherein the adhesive layer 6 shown in FIG. 2 is half-dried at a temperature within the range of about 90° to 100° C. for about 20 seconds so that the layer is secured to the surface of the base plywood.

A thin decorative overlay paper 7, shown in FIG. 3, on which a wood grain pattern 7a simulating such, for example, as the grain of oak is color-printed, is fed from a spool 8 to press rollers 9 and is roll pressed onto the adhesive layer 6 on said base plywood under the pressure of 1.5 ton per 4 square foot so that the overlay paper 7 is adhesively secured to the face surface of said base plywood. Whereupon the front edge of the overlaid paper is trimmed by the edge shaper 10 and then the side edges thereof are cut off by the cutter rollers 11.

Then, a thermosetting transparent resin coat such, for example, as an aminoalkyld resin is coated on the overlaid paper 7 by passing the plywood through roll coaters 12 to which the resin coat is supplied from a resin feeder unit 12a. Preferably, the resin coat is applied to the surface of the paper two or three times in the amount of 1.5g per square foot each time. Then, the transparent resin coat coated on the paper is smoothed by means of rollers 12b. Whereupon, the plywood thus treated is passed to a second drying oven 14 so as to heat-cure the coating layer 13 of the transparent resin completely. See FIG. 4.

Subsequently, the plywood thus treated is fed to embossing rollers 15 or serrated disks to press-form on the transparent coating layer 13 a number of fine grooves 16 which are transversely spaced-apart and extend intermittently in the general...
direction of said wood grain pattern so as to stimulate ducts of wood. The plywood thus treated is then fed to cutter means 17 to form a plurality of V-shaped or semi-circular wide grooves 18 in the layer 13. The plywood with semi-circular grooves 18 is illustrated in FIGS. 5 and 6. The plywood with V-shaped grooves is cross-sectionally illustrated in FIG. 6a. The grooves 18 extend longitudinally of the plywood and each is of such depth as to reach the base plywood. Also, the grooves 18 are coated with paint 19 of a different color from the color print of the wood grain pattern of said overlaid paper by means of a painting device generally designated 20.

As clearly shown in FIGS. 7 and 8, the painting device 20 comprises a paint tank 21, pump means 22, a paint receiving tray 23, a paint feeder roller 24, a plurality of transversely disposed painting disks 25 with their peripheral surfaces roughened and hold-down rollers 26.

Indicated by numeral 27 is the product obtained by carrying out the aforementioned method of the present invention.

It should be noted that the overlay paper 7 employed in the present invention is a very thin one having a weight, when dry, within the range of from about 23 to 27 grams per square meter. The overlay sheet which has heretofore been used in the art has a weight, when dry, within the range of from 60 to 140 grams per square meter. Accordingly, the cost for manufacturing the laminated plywood can be greatly reduced according to the present invention. Further, the thin overlay paper 7 has proved to be stronger mechanically than the thick paper, which has heretofore been used in the art. Furthermore, the overlay paper 7 has a very smooth surface and is well adapted for use in printing. Moreover, it can be well impregnated with a resin adhesive or coat.

While embodiments of the invention have been described in detail it will be obvious to those skilled in the art, that the invention may be embodied otherwise without departing from its spirit and scope.

What I claim is:

1. A plywood overlaid with a decorative overlay paper bonded thereto, comprising a base plywood, a thin decorative overlay paper, an adhesive bonding the paper to the surface of said plywood, said overlay paper having a dry weight within the range of 23 to 27 grams per square meter and being characterized by having the color prints of a wood grain pattern, and a layer of a transparent coat overlaid on the paper, said layer being sufficiently transparent so that said colored wood grain pattern is visible through said layer, said layer having a number of transversely spaced-apart relatively shallow and narrow grooves less than the depth of said layer, the grooves each extending intermittently in the general direction of the colored wood grain pattern so as to simulate a duct of wood; said layer having a plurality of elongated, longitudinally extending, parallel channels wider than the grooves and reaching said base plywood; said layer being coated in said channels with a color different from the color of the printed wood grain pattern on said overlaid paper, thereby giving an appearance of a real wood to said plywood.

2. A plywood as in claim 1, wherein said adhesive includes a resin.

3. A plywood as in claim 1, wherein said layer of a transparent coat includes a resin.

4. A plywood as in claim 3, wherein said resin is heat cured.

5. A plywood as in claim 1, wherein the elongated channels in said layer have arcuate cross sections.

6. A plywood as in claim 1, wherein the elongated channels in said layer have V-shaped cross sections.

7. A plywood as in claim 2, wherein said layer of a transparent coat includes a resin and the resin of said layer is cured.

8. A plywood as in claim 7, wherein the elongated channels in said layer have arcuate cross sections.

9. A plywood as in claim 7, wherein the elongated channels in said layer have V-shaped cross sections.

10. The process for the manufacture of a plywood overlaid with a decorative overlay paper, which comprises the steps of uniformly coating the surface of a base plywood with an adhesive which fills the holes and recesses in said surface; partially drying the adhesive coated on said surface; with said adhesive, bonding to said surface a thin decorative overlay paper having a dry weight within the range of 23 to 27 grams per square meter and having the color print of a wood grain pattern; trimming the edges of said overlay paper; coating a transparent coat on said overlay paper; drying the transparent coat completely; press-forming on the layer of said transparent coat a number of transversely spaced-apart, fine-grained grooves extending intermittently in the direction of the wood grain pattern on said overlaid paper; forming a plurality of elongated, transversely spaced, recesses wider than the grooves and extending longitudinally of said base plywood; forming the recesses to such depth as to reach the base plywood; and coating the surfaces of said recesses with paint of a different color from said overlaid paper, whereby the wood grain pattern on said overlaid paper can be embossedly viewed through the layer of said transparent coat, thus giving an appearance of a real wood to the plywood.

11. The process as in claim 10, wherein the base of the plywood is coated with a resin adhesive.

12. The process as in claim 10, wherein the overlaid paper is coated with a transparent resin coat.

13. The process as in claim 10, wherein forming the elongated recesses includes forming them with arcuate cross sections.

14. The process as in claim 10, wherein the recesses are formed so they have V-shaped cross sections.

15. The process as in claim 11, wherein coating of the overlaid paper is done with a resin and the resin is cured.

16. The process as in claim 15, wherein forming the recesses includes forming them with arcuate cross sections.

17. The process as in claim 15, wherein forming the recesses includes forming them with V-shaped cross sections.