A. ELMENDORF.

VENEERED PULP BOARD AND PROCESS OF MAKING THE SAME.

APPLICATION FILED JUNE 16, 1921.

1,435,594. Patented Nov. 14, 1922.

Fig. 1.

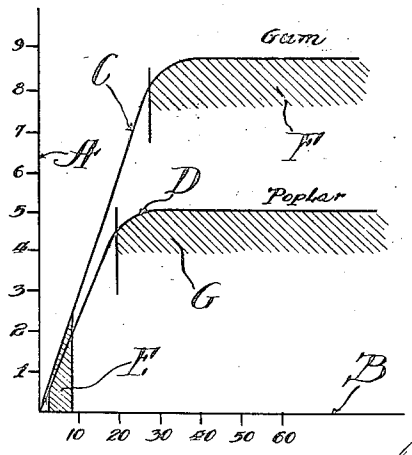


Fig. 3.

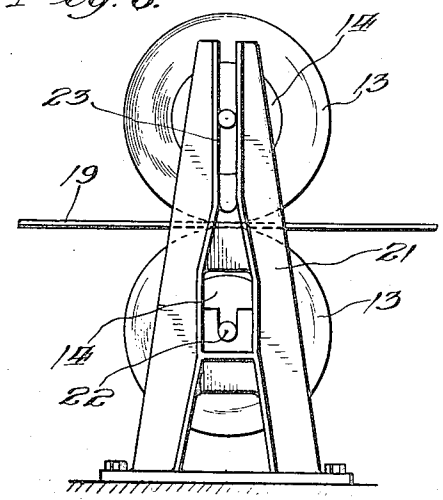


Fig. 4.

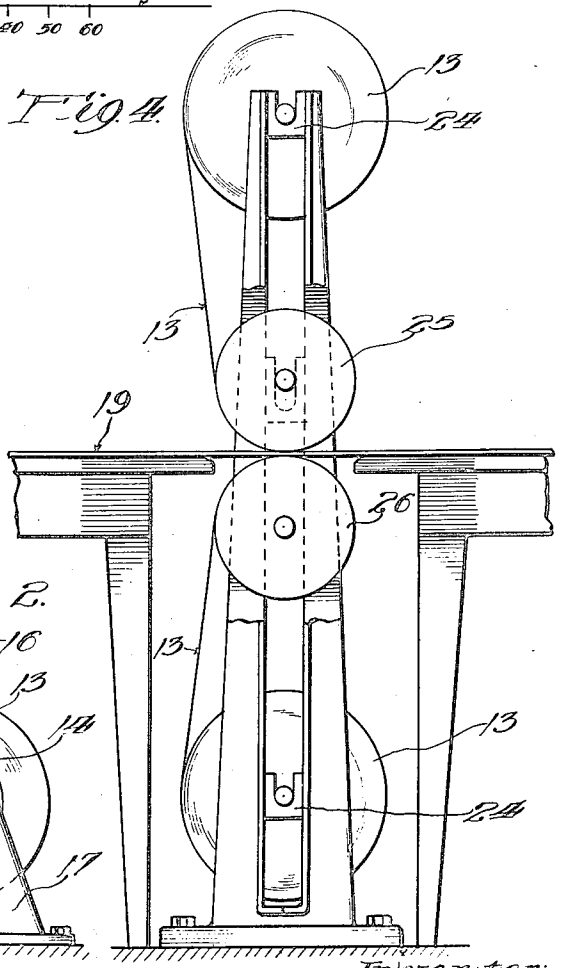
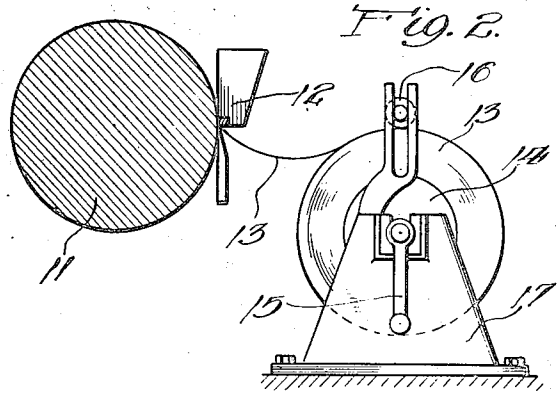


Fig. 2.



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Patented Nov. 14, 1922. 1,435,594

UNITED STATES PATENT OFFICE.

ARMIN ELMENDORF, OF CHICAGO, ILLINOIS.

VENEERED PULPBOARD AND PROCESS OF MAKING THE SAME.

Application filed June 16, 1921. Serial No. 478,108.

To all whom it may concern:

Be it known that I, ARMIN ELMENDORF, a citizen of the United States, residing at Chicago, county of Cook, State of Illinois, have invented a certain new and useful Improvement in Veneered Pulpboards and Processes of Making the Same, and declare the following to be a full, clear, and exact description of the same, such as will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

While my invention may be viewed in various aspects, its primary object may be said to be to produce a simple, novel and inexpensive method of covering the faces of pulp board as, for example, the material now commonly known as wallboard, with wood veneer.

While the usual method of producing veneer is to shave thin continuous sheets from the log, it is the practice to break the sheet up into sections as it is formed, these sections being subsequently dried and being then clipped or trimmed to size. Where large surfaces are to be covered with veneer, a number of sheets of veneer must be placed edge to edge, glue being carefully placed between the meeting edges to insure satisfactory joints. It is practically impossible accurately to match the grain in adjacent strips or sheets of veneer joined together and therefore in large veneered surfaces the line of demarcation between adjacent pieces clearly appeared. The thickness of veneers now employed commercially is not by any means limited by the possibilities of veneer cutting machines, because veneer can successfully be cut very much thinner than the thickness which it has been deemed necessary in practice to use. One reason which makes it necessary for the veneer to be comparatively thick is that if the veneer be very thin it will become extremely fragile when it dries out and cannot be successfully handled. In actual practice the gluing of veneers is done at a time when their moisture content is very low, say from two percent to eight percent, because the shrinkage across the grain of veneers is approximately proportional to the decrease in the percentage of moisture after the amount of moisture has been reduced to what is known as the point of fiber saturation for any given wood, which point is reached when the moisture content is somewhere between twenty percent and thirty percent. Consequently, if the veneers were glued in place while having a high moisture content, the glued face would be rigidly held while the exposed face would be free to shrink, thus causing the exposed surface to check and crack. Furthermore, many kinds of glue that are used in gluing veneer will not set unless given an opportunity to dry out and, if the veneer contain too high a percentage of moisture, it could not take up moisture from the glue and the gluing process would therefore be seriously retarded.

I have discovered that if very thin veneer is attached to a comparatively thick core, particularly when a comparatively dry glue is employed, it is possible to allow a moisture content in the veneer at or above the fiber saturation point, especially if the moisture content of the core be below the fiber saturation point of the material from which the core is made; the core acting somewhat in the manner of blotting paper to extract moisture from both the glue and the wet veneer so as to permit the glue to set if it be of the type which sets by drying instead of by a crystallization process. I have furthermore discovered that where extremely thin veneer is used in a state much wetter than that ordinarily used for commercial purposes, the checking and cracking which would result when using thick veneers is either entirely absent or is at least so little in evidence as not to be visible to the naked eye. This phenomenon results perhaps from an inherent elasticity in very thin veneer or from the fact that the cohesion between the fibers is so small that stresses cannot be transmitted across the grain of the veneer through any appreciable distance, thus producing a uniform stretching of the veneer throughout its entire area instead of permitting considerable areas to remain intact and simply break away from adjacent areas when the stresses become too great to be resisted by the weakest elements.

My discovery of the possibilities of using thin wet veneer permits the handling of veneer from the time it is cut from the log until it is used to be something simpler and quite different from the practice heretofore followed. In other words, the veneer, instead of being torn or cut into sections as it is produced, may simply be wound up on a drum in one continuous sheet and, since

it may be applied in a wet state, the drying processes to which the usual thick veneers are subjected may be entirely dispensed with. Of course the veneer, if extremely wet, may be partially dried, but no great pains need be taken to insure that the percentage of moisture will lie between narrow defined limits, because it is sufficient that thin veneer have a moisture content approximating or greater than the fiber saturation point, since there is no appreciable expansion or contraction as the moisture content increases or decreases above the fiber saturation point.

My invention therefore makes it possible to employ a veneer which is very cheap because of its thinness, to reduce the expense of handling and treatment up to the point of consumption, by making it possible simply to wind the veneer on a drum as it is cut from the log, and permits surfaces of any desired length to be veneered in such a way as to show a perfectly matched grain free from cracks and checks.

The various features of novelty whereby my invention is characterized will hereinafter be pointed out with particularity in the claims; but, for a full understanding of my invention and of its objects and advantages, reference may be had to the following detailed description taken in connection with the accompanying drawing, wherein:

Figure 1 is a diagram containing the expansion and contraction curves for two different kinds of wood as the moisture content varies from zero to a point well beyond the saturation point;

Fig. 2 is a diagrammatic view of a machine for cutting and winding up veneer;

Fig. 3 is an end view of a simple machine for veneering both faces of the pulp board core; and

Fig. 4 is an end view of another form of simple machine for veneering both faces of a board.

Referring to Fig. 1, the vertical graduations, A, represent the percentage of shrinkage across the grain of the wood, while the horizontal graduations, B, represent percentages of moisture. The curve, C, represents the characteristics of gum wood while the curve, D, represents the characteristics of poplar. It will be noted that as the moisture increases from zero up to approximately thirty percent, the expansion of the gum is proportionate to the increase in moisture until an expansion of almost nine percent has been reached and that thereafter no further expansion occurs. In the case of poplar, the expansion increases uniformly until a fiber saturation point slightly above twenty percent is reached, the expansion being at this time approximately five percent. Assuming that the wood is wet to begin with and that it is drying, no appreciable contraction will take place in the case of gum until the moisture content has been reduced to the neighborhood of thirty percent while the poplar will not begin to contract until the moisture has been reduced to the neighborhood of twenty percent. The shaded area, E, represents the limits within which the work of gluing veneers is usually practiced in the commercial arts. In the case of gum wood the shaded area, F, and in the case of poplar the shaded area, G, represent the range of moistures under which gluing is practiced in accordance with my process; the lower limit being preferably not much below the fiber saturation point and the upper limit being comparatively unimportant. The curves for any two woods may differ from each other, but the fiber saturation points of most woods used commercially for veneering lie between twenty and thirty percent.

Fig. 2 illustrates the method of manufacturing the veneer, 11, representing a log adapted to be revolved in front of a suitable cutting device, 12, which is constantly pressed against the log and shaves the wood therefrom in a thin continuous layer, 13. The veneer is rolled on a drum, 14, which may conveniently be turned by means of a handle, 15; a small idle roller, 16, resting loosely on the top of the roll of veneer so as to prevent the veneer from unwinding.

All of the veneer which may be cut from a single log may be wound up on a single roll which is then removed from the temporary supporting stand, 17, adjacent to the veneer cutting machine and may be stored until the veneer is to be used, or it may be taken directly to a veneering machine.

In Fig. 3 I have illustrated a means for veneering both faces of a comparatively thick board of wood pulp or other pulp. Two of the drums, 14, containing rolls of veneer, 13, are placed in suitable standards, 21, one above the other; the standards having stationary bearings, 22, for the lower roll and vertically-elongated bearings, 23, for the upper roll which simply rests loosely upon the lower roll. A thin layer of glue is applied to each face of the core which is then pushed bodily between the two rolls which are of course so disposed that as the two pieces of veneer adhere to the upper and lower faces of the core, respectively, they are unwound as the rolls slowly turn, the rolls themselves constituting pressure devices which press the veneer firmly against the core.

Instead of inserting the board or core directly between two rolls of veneer, two such rolls may be supported at a considerable distance apart as shown in Fig. 4, both rolls being mounted in stationary bearings, 24, and the sheets of veneer being carried respectively underneath and across the top of

two pressure rollers, 25, and 26, one of which rests loosely upon the other so that the work in passing between them is subjected to a definite pressure. The board or core, 19, is coated on both sides with a thin layer of comparatively dry glue as heretofore explained and, as it is pushed between the rollers 25 and 26, the two sheets of veneer are progressively glued to the same.

The thickness of the veneer which may be employed in my process will vary with the wood out of which it is made and with the service to be obtained. With the ordinary commercial woods such as gum, maple, poplar, walnut and birch, the veneer is preferably made very thin, namely of a thickness of from one-sixtieth of an inch to one-eightieth of an inch. Woods that have open pores as, for example, Spanish cedar and mahogany, seem to possess a greater degree of elasticity of the kind which permits uniform stretching, than do the woods heretofore named, and therefore veneers made of wood of that kind may be considerably thicker, perhaps as thick as one-thirty-second of an inch or even more. The thin veneers are preferably prevented from drying out below the fiber saturation point before being used, thus avoiding warping and splitting of the veneer and at the same time maintaining it in a soft flexible condition. The core of wood pulp or other pulp may have any desired moisture content, as long as it is less moist than the veneer so that some of the moisture in the veneer can be absorbed by the core. Similarly, a transfer of moisture from the glue to the core can occur, so that a glue which sets by a drying out process may be utilized. Only a very small amount of glue is required and, in fact, if the glue is applied too thickly, it may spoil the product. Consequently, since the core which, in the case of an ordinary wallboard, is about one-fourth of an inch thick, has a mass many times greater than that of the two layers of glue and two layers of veneer, the amount of moisture absorbed by the core in the drying out of the veneer and of the glue will not produce any material change in the percentage of moisture in the core. When a glue such as casein glue is employed, the moisture in the core may rise above the fiber saturation point without interfering with the setting of the glue, since the glue does not set through a drying-out process which makes it highly desirable to provide for the transference of moisture from the veneer and the glue to the core when the glue is one that sets by drying.

After the cores or boards have been veneered, they may be placed in stacks to allow the glue to set.

My improved product, made up of pulp board core and thin facings of veneer, not only presents the appearance of wood when used as panels, but it is much stronger, mechanically, than the pulp board alone and possesses the advantages over a solid wood board of being much cheaper, not likely to split or crack, and the possibility of being made in large sheets or panels which would be utterly impracticable for commercial purposes in the case of solid wood boards. My improved product possesses the advantages over what is known as ply-wood of being much less expensive and having a uniform grain design over each entire face instead of having a face which is obviously made up of numerous pieces as must be the case in manufacturing large sheets or panels of ply-wood.

While I have illustrated and described in detail apparatus for carrying out my improved process and have described the process in connection with the manufacture of veneered boards of wood pulp or other pulp, I do not desire to be limited to the specific details so illustrated and described; but intend to cover all forms of my invention as defined in the appended claims.

I claim:

1. A method of manufacturing a veneered product comprising the cutting from fiber saturated wood, of a veener so thin that a free face thereof will not visibly check in the drying of the veneer from the vicinity of the fiber saturation point to practical dryness while the opposite face is being held fixed; and, before the veneer has lost moisture beyond approximately the fiber saturation point and still retains its flexibility, gluing said veneer to a core sufficiently thick, dry and absorptive to absorb the moisture of the glue and an appreciable portion of the moisture of the veneer.

2. A method of manufacturing a veneered product which consists in cutting from saturated wood and forming into a roll a veneer so thin that it will not check in drying from the saturation point when one face is held fixed; and before the veneer has lost moisture beyond approximately the fiber saturation point, progressively laying said veneer by applying an edge and gradually unrolling the roll upon a core coated with wet glue but still sufficiently absorptive to absorb not only the moisture of the glue but to draw part at least of the moisture from the veneer.

3. A method of manufacturing a veneered board-like product which consists in gluing a sheet of wood veneer so thin as to permit the moisture content to be changed between limits of fiber saturation and practical dryness without producing any substantial change in the appearance of one face when the other face is restrained against expanding and contracting, and having a moisture content in the vicinity of the fiber saturation point, to a core member sufficiently dry

and sufficiently bulky to permit the latter to absorb the moisture in the glue and some of the moisture in the veneer.

4. A method of manufacturing a veneered board-like product at ordinary room temperature and without the application of sustained pressure which consists in gluing a sheet of wood veneer so thin as to permit the moisture content thereof to be changed between limits of fiber saturation and practical dryness without producing any substantial change in the appearance of one face when the other face is restrained against expanding and contracting, and having a moisture content in the vicinity of the fiber saturation point, to a core dry enough and bulky enough to absorb the moisture of the glue and some of the moisture in the veneer, using a glue which sets by drying.

5. The continuous method of manufacturing a board-like veneered product which consists in progressively laying upon a comparatively dry core of pulp board coated with glue a sheet of wood veneer wound upon a roll, thin enough to permit the moisture content thereof to be changed between limits of fiber saturation and practical dryness without producing any substantial change in the appearance of one face when the other face is restrained against expanding and contracting, and a moisture content high enough to keep the veneer pliable while being unrolled, and applying pressure as the veneer is laid on said core so as to press it firmly against the latter.

6. A board-like material comprising a core of pulp board and a facing of wood veneer glued to the core, said veneer having a thickness small enough to permit the moisture content to be changed between limits of fiber saturation and practical dryness without producing any substantial change in the appearance of one face when the other face is restrained against expanding and contracting.

7. A material comprising a thick core of pulp board faced on both sides with wood veneer glued to the same, said veneer having a thickness small enough to permit the moisture content to be changed between limits of fiber saturation and practical dryness without producing any substantial change in the appearance of one of its faces when its other face is restrained against expanding and contracting.

In testimony whereof, I sign this specification.

ARMIN ELMENDORF.