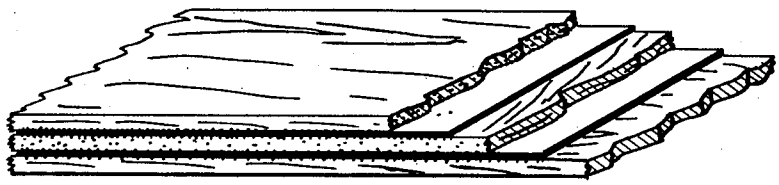
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WOOD PLY CONSTRUCTION

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WOOD PLY CONSTRUCTION

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This invention relates to a new article of manufacture, and more particularly to a veneer construction unit involving wood plies bound by an adhesive using a vegetable hemi-cellulose-containing material as a base. Our co-pending applications filed under Serial Numbers 652,692; 696,544; 696,545; and 698,428 all relate to adhesives analogous to the herein-described adhesive.

The art of making waterproof glues from various materials has been known for a long time; thus casein, blood albumen, vegetable protein-containing materials and synthetic resins are in common use. Each of these mentioned materials has some disadvantage peculiar to itself. Casein is costly and lacks uniformity; blood albumen is not available in large quantities and require heat for the best results; vegetable proteins are also quite costly and only one or two species are commonly available; while synthetic resins are both costly and must be applied under great heat and pressure. There is, accordingly, a great demand, particularly in the veneer industry, where a large quantity of glue is consumed, for a new glue that would be very cheap and at the same time strong and waterproof.

By waterproof, in this connection, it is not meant that glues thus chracterized will resist the action of water indefinitely, but it is meant that they are waterproof in the sense in which the term is used in the veneer industry, viz., that a panel can be soaked in cold water for seventy-two to one hundred hours, or in boiling water for eight hours without separation.

We have now discovered that such material as the hulls and pods of legumes, coffee bean pods, pits of dates, cottonseed hulls and other natural sources of hemi-cellulose, when subjected to proper treatment, can be converted into a waterproof adhesive that will satisfy the rigid requirements of veneer and plywood making. The requisite raw material may be derived from a number of sources at a very low cost and the treatment of such material is relatively simple and inexpensive and does not require an elaborate plant to manufacture or use, as is the case where hot pressing is required, so that as a result we are able to produce a satisfactory product at a much lower cost than has heretofore been possible.

To accomplish the foregoing and related ends, the invention, then, consists of the combinations hereinafter fully described and particularly pointed out in the claims, it being understood that such constitute but several of the ways in which the principal of the invention may be used.

The drawing illustrates, diagrammatically, a portion of a panel in which an adhesive material formed by a vegetable hemicellulose, and containing an excess of caustic alkali and carbon bisulphide, has been used, and illustrating particularly the fact that the adhesive penetrates into the wood of the panel.

We have found that the hulls and pods of the legumes, coffee bean hulls (commonly called by producers "coffee parchment"), date pits, and cotton seed hulls all constitute an admirable raw material for our purpose, but we prefer to use the hulls of coffee beans and of cottonseed because of the sources that are available. The before mentioned materials are first ground to a suitable mesh and when treated with certain chemicals, or other substances, we make therefrom a very satisfactory glue that meets the requirements of the veneer trade fully and is in many respects better than the usual glues now on the market and much less expensive than any of the present water-resisting adhesives. We do not, however, wish to limit ourselves to the materials hereinbefore mentioned but claim the use of any natural material in which the hemi-cellulose forms the principal adhesive constituent. In the use of a natural material which is high in hemi-cellulose, such as the before mentioned materials, there are no expensive separation process or purifications necessary.

We have also discovered that one of the reasons for the secure bond between the wood plies in a panel in which our glue is used is on account of the softening effect of the wood fibres along the surfaces of the wood exposed at the glue line, by the considerable excess of caustic alkali and carbon bisulphide contained in the glue. This softening permits a better penetration of the glue into the cells of the wood and therefore produces a stronger adhesion than would be possible without this softening effect. Further, the acid content of the wood, such as tannic acid, acetic acid, etc., commonly present in timber gives a natural acid treatment to the partially viscosized wood fibres adjacent to the glue line and also to the hemi-cellulose viscose used as a binder. This acid treatment by the natural acids in the wood renders the glue bond practically insoluble in water. The addition of acids to viscose is a well-known method of regenerating cellulose, while this natural acid method gives practically the same effect without the addition of chemicals.

The vegetable hemi-cellulose-containing material is first ground to 8 or 10 mesh and is steeped in a 16 to 24 percent caustic solution for one or two hours, then this mass is submitted to a pres-

sure of about two-to four-hundred pounds per square inch. The pressure applied would depend on the amount of material being pressed, the larger amounts requiring the higher pressure. This leaves about 150% to 200% (of the original weight of the meal) of caustic solution in the material. The glue base is thus kept in this condition until it is required for use. The mass is then treated with carbon bisulphide, in the amount of about 25% of the original weight of the dry meal used, for about four hours, and is then diluted with about 150% (dry meal) of water and 20% caustic soda. Other materials may be added to decrease the time required for the glue to set.

The particular order in which the several ingredients are mixed together in the formula may be varied, and it is not necessary that the manufacture of the adhesive be completed in a continuous single operation, but, as a matter of practice, we have found it desirable in certain cases to mix only certain of the ingredients initially and then add others just before the glue is required for use.

After the glue is ready for use, it is then spread on the plies of wood or veneer by suitable means, and the plies of glued and unglued veneers assembled as is customary in a veneer or plywood factory, and then pressure is applied by suitable means, and this pressure is retained for six or more hours by either leaving the stack of glued panels in the press or by means of retaining clamps.

Other modes of applying the principle of our invention may be employed instead of the one above explained, change being made in regard to the process herein disclosed or the materials employed in carrying out such process provided the stated ingredients and steps are the equivalents of the stated ingredients or steps we employ.

Having, therefore, described our invention, what we claim and desire to secure by Letters Patent, is—

1. As an article of manufacture, a veneer construction unit comprising a plurality of wood plies bound together by a vegetable hemi-cellulose-containing adhesive which contains a sufficient excess of caustic alkali and carbon bisulphide to soften the wood fibres along the glue line whereby the natural acids of the wood react on the cellulosic materials to form a waterproof bond.

2. In a laminated construction unit, wood in plural layer form bound resistantly against water separation by the reaction products of the natural acids in the wood with a composition which includes a vegetable hemi-cellulose-containing material as its principal adhesive ingredient together with an excess of caustic alkali and carbon bisulphide, whereby said excess of caustic alkali softens the wood fibres adjacent the glue line and said carbon bisulphide partially viscosizes the said softened wood fibres, and whereby the hemi-cellulose and said partially viscosized fibres are acted on by the natural acids in the wood to neutralize the excess caustic alkali and thereby to increase the water resistance of the glue line, and to regenerate the cellulose of the fibres.

3. As an article of manufacture, a veneer construction comprising a plurality of wood plies bound together by an adhesive which includes the reaction products of the natural acids in the wood with a vegetable material whose principal adhesive ingredient is hemi-cellulose together with an excess of caustic alkali and carbon bisulphide, said excess of caustic alkali being adapted to soften the wood fibres adjacent the glue line and said carbon bisulphide being adapted to partially viscosize the said softened wood fibres, and the natural acids in the wood being adapted to neutralize the excess caustic alkali to increase the water resistance of the glue line and to regenerate the cellulose of the fibres.

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