

UNITED STATES PATENT OFFICE

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PROCESS OF GLUING

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17 Claims. (Cl. 144—309)

This invention relates to the art of gluing, and more particularly the gluing of wood and the formation of plywood.

The present application is a continuation in part of the co-pending applications of Theodore Williams Dike, Serial No. 456,813, filed May 28, 1930, issued March 29, 1932, as Patent No. 1,851,952 and Serial No. 565,929, filed September 29, 1931, issued March 29, 1932, as Patent No. 1,851,954.

An object of the invention is the provision of a gluing procedure whereby the gluing may be effectively and expeditiously performed.

Another object is the provision of a procedure whereby adhesive bases in powdered or other discrete-particle form may be readily and effectively utilized.

Other objects of the invention will in part be obvious and will in part appear hereinafter.

The invention accordingly comprises the several steps and the relation and order of one or more of such steps with respect to each of the others thereof, which will be exemplified in the process hereinafter disclosed, and the scope of the application of which will be indicated in the claims.

The invention contemplates the provision of an adhesive base at the glue line in powdered or other discrete-particle form. By procedures of this nature, many of the difficulties heretofore existing in the formation of plywood and the gluing of wood and other materials may be overcome, and in accordance with the present invention such processes may be facilitated and rendered particularly effective.

It is to be understood that the term "wood" as used herein, includes not only natural wood, but also artificial woods, and that the term "plywood" is used to designate a laminated product composed of substantial layers of material and including one or more layers of wood.

In accordance with the invention, various types of adhesive base material may be utilized, for instance proteinous materials such as casein, soya-bean flour, other oil seed flours, segregated or isolated proteins from oil seed flour, blood albumen, other albuminous material, etc.

In some instances starch may be employed, as may also in some cases animal glue, and in certain instances various other types of materials

which will serve to form a bond, as for instance, under pressure, or heat and pressure.

In the uniting of relatively dry members, such, for instance, as commercially dry veneers, it is necessary to supply a liquid. In a variety of procedures, moreover, it is of advantage to utilize materials having chemical properties which assist in imparting a desired degree of plasticity to the powder.

In accordance with the invention, there is provided at the glue line in addition to the adhesive base, a material having desirable properties, such material preferably consisting of or being contained in a liquid. The use of a liquid having a high boiling point is of advantage, particularly when heat is utilized in the bonding. Desirably also, the material consists of an organic chemical of a nature such that the plasticization of the adhesive base is facilitated.

As materials which may be utilized, reference may be made to phenol, the cresols, and creosote oil. In certain instances, beta-naphthol and alpha-naphthol may be utilized. Glycerol and diethylene glycol are also examples of organic plasticizers with a high boiling point which may be employed. In certain instances also urea may be used. Acetic and phosphoric acids also assist plasticization in some cases.

If the material utilized is a solid at ordinary temperatures, it may be applied in such form, but is preferably utilized in a liquid condition, for instance, in solution or in a hot, melted state.

The material may be supplied at any suitable stage or stages of the procedure, a desirable practice being to apply the material in liquid form to a surface to be incorporated, as, for instance, a wood ply, to apply an adhesive base in powdered form, and thereafter to apply the material in liquid form. In the application in liquid form of materials which are solid at ordinary temperatures the same may be applied in solution in a suitable liquid, for instance, water, or in certain instances in a melted state. Another liquid may be supplied at any desired stage of the procedure, if desired.

The members having been assembled, the assembly is subjected to bonding conditions, as, for instance, pressure, or heat and pressure. Preferably in many cases heat well above the 212° F. is utilized, and in such instances, especially, the

use of a liquid having a high boiling point is desirable. The pressures utilized in the formation of plywood may in a number of cases lie in the neighborhood of 200 pounds per square inch, and may vary from about 40 to 300 pounds or higher. Heat, if utilized, may desirably range, for instance, from 160° to 365° F.

In carrying out the invention for the formation of plywood, phenol crystals liquefied by the addition of 10% of water may be sprayed on to a wood ply, a proteinous adhesive base in powdered form dusted on, and liquefied phenol again applied, another wood ply superposed and coated in a similar manner, and a third ply superposed on the second, after which the assembly is subjected to heat and pressure, as for instance, in a hot-plate plywood press. Phenols, other than phenol itself, may desirably be utilized, for instance cresols, pure or mixed.

Creosote oil may desirably be utilized as a spray, or a plywood core may be dipped in creosote oil, a proteinous adhesive base in powdered form, for instance, soya-bean flour, powdered casein, or blood applied, and the panel hot-pressed. A wide number of other variations may be resorted to.

In the gluing of dry plies, the liquid serves the function of providing a fluid medium for the plasticization of the powder, and also, when certain materials, for example, phenol, cresols, glycerol, diethylene glycol, etc. are present, promotes or accelerates the plasticization which, as will be understood, involves transforming the adhesive into a fluid or semi-fluid state. In certain instances also urea may be used. Acetic and phosphoric acids also assist plasticization in some cases. The latter function is of particular advantage with difficulty plasticizable materials, such as powdered casein or soya-bean flour, and especially when dense wood or the like is being glued. In the gluing of wet plies, this latter function, in particular, is of advantage in certain cases.

It is also to be observed that a liquefied phenol has a greater affinity for many adhesive bases than has water. This facilitates the taking up of the liquid by the powder. This feature, among other advantages, permits the application of the liquefied phenol prior to the application of the powder without the further application of liquid in certain instances wherein such further application would otherwise be desirable.

The invention is particularly adapted for the uniting of members having a fairly dense consistency, as, for example, members composed of natural wood.

Since certain changes may be made in carrying out the above process without departing from the scope of the invention, it is intended that all matter contained in the above description shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the following claims are intended to cover all of the generic and specific features of the invention herein described, and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

Having described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. The process of gluing, which comprises applying an adhesive base in discrete-particle form to a surface to be incorporated, supplying also a liquid having a high boiling point, assembling and subjecting to heat and pressure.

2. The process of gluing, which comprises applying an adhesive base in discrete-particle form to a surface to be incorporated, supplying also a liquid containing a phenol, assembling and subjecting to bonding conditions.

3. The process of gluing, which comprises applying an adhesive base in discrete-particle form to a surface to be incorporated, supplying also a liquid containing a phenol, assembling and subjecting to bonding conditions.

4. The process of gluing, which comprises applying an adhesive base in discrete-particle form to a surface to be incorporated, supplying also a phenol, assembling and subjecting to bonding conditions.

5. The process of gluing, which comprises applying an adhesive base in discrete-particle form to a surface to be incorporated, supplying also phenol, assembling and subjecting to bonding conditions.

6. The process of gluing, which comprises applying an adhesive base in discrete-particle form to a surface to be incorporated, supplying also creosote oil, assembling and subjecting to bonding conditions.

7. The process of gluing, which comprises applying an adhesive base in discrete-particle form to a surface to be incorporated, supplying also an organic plasticization promoter, assembling and subjecting to bonding conditions.

8. The process of gluing, which comprises applying a proteinous adhesive base in discrete-particle form to the surface to be incorporated, supplying also a liquid having a high boiling point, assembling and subjecting to heat and pressure.

9. The process of gluing, which comprises applying a proteinous adhesive base in discrete-particle form to the surface to be incorporated, supplying also an organic plasticization promoter, assembling and subjecting to bonding conditions.

10. The process of gluing, which comprises applying a proteinous adhesive base in discrete-particle form to the surface to be incorporated, supplying also a liquid containing a phenol, assembling and subjecting to bonding conditions.

11. The process of gluing, which comprises applying a proteinous adhesive base in discrete-particle form to the surface to be incorporated, supplying also a liquid containing a phenol and having a high boiling point, assembling and subjecting to heat and pressure.

12. The process of gluing, which comprises applying to a wood member an organic plasticization promoter in a liquid condition, applying also an adhesive base in discrete-particle form, associating another wood member and subjecting to bonding conditions.

13. The process of gluing, which comprises applying to a wood member a liquid containing a phenol and having a high boiling point, applying also an adhesive base in discrete-particle form, associating another wood member, and subjecting to heat and pressure.

14. The process of forming plywood, which comprises applying to the surface of a wood ply an adhesive base in discrete-particle form, supplying also a liquid having a high boiling point, forming an assembly including the coated ply, and subjecting to heat and pressure.

15. The method of forming plywood, which comprises applying to the surface of a wood ply an adhesive base in discrete-particle form, supplying also a liquid having a high boiling point,

forming an assembly including the coated ply and at least one other wood ply, and subjecting to heat and pressure.

16. The method of forming plywood, which comprises applying to a wood ply a proteinous adhesive base in discrete-particle form, supplying also a phenol in liquid condition, forming an assembly including the coated ply and at least

one other wood ply, and subjecting to bonding conditions.
17. A process of gluing, which comprises applying a proteinous adhesive in dry powder form to a surface to be incorporated and plasticizing the adhesive by means of a phenol in liquid condition.

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CERTIFICATE OF CORRECTION.

Patent No. 1,923,922.

August 22, 1933.

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It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, line 84, claim 3, strike out the article "a" second occurrence; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 24th day of October, A. D. 1933.

(Seal)

F. M. Hopkins
Acting Commissioner of Patents.

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