Aug. 13, 1974 PAUL P. L. CHENG 3,829,337

JOINTLESS CONSTRUCTION METHOD OF THE WOODEN PRODUCTS

Filed Nov. 12, 1971 4 Sheets-Sheet 1

FIG. 1

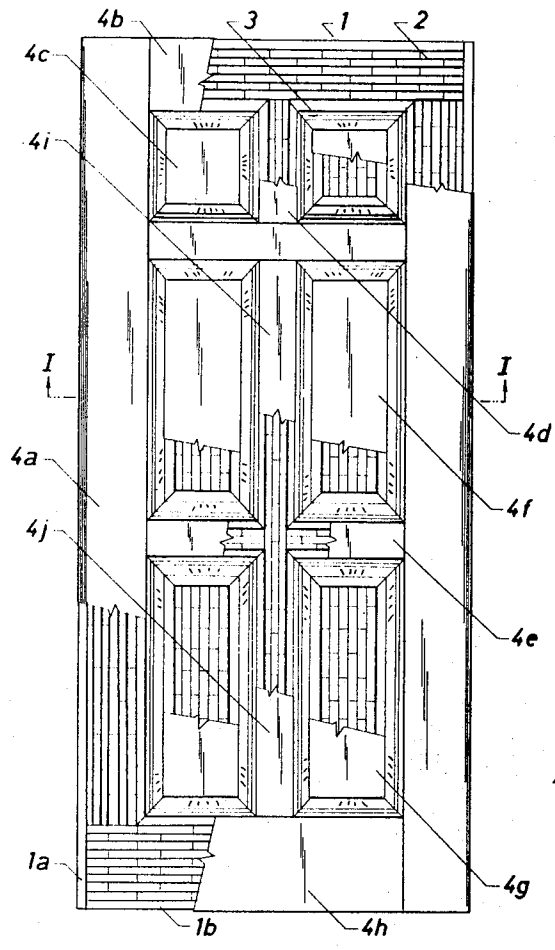
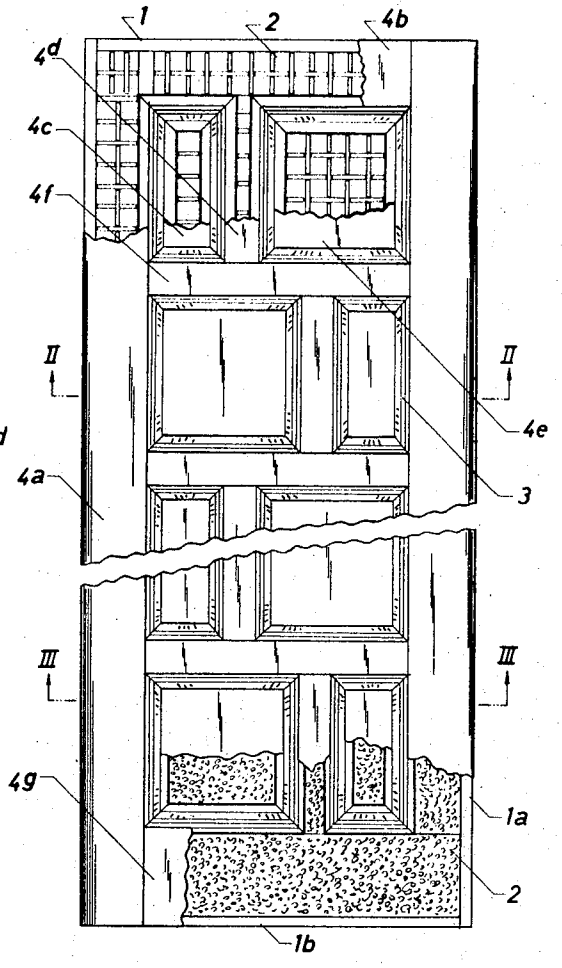


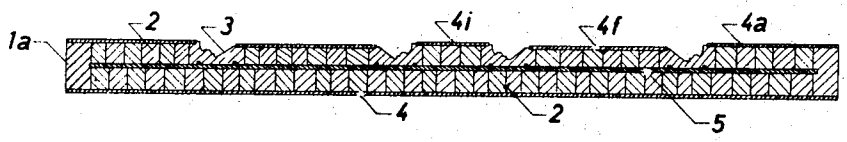
FIG. 2



JOINTLESS CONSTRUCTION METHOD OF THE WOODEN PRODUCTS

Filed Nov. 12, 1971 4 Sheets-Sheet 2

FIG. 3



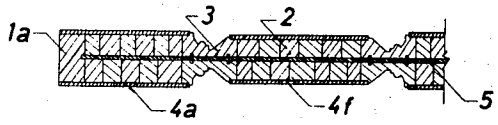


FIG. 4 I - I

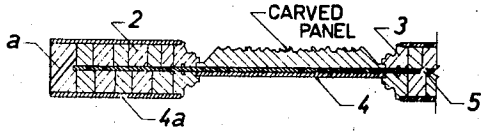


FIG. 5 I - I

FIG. 6

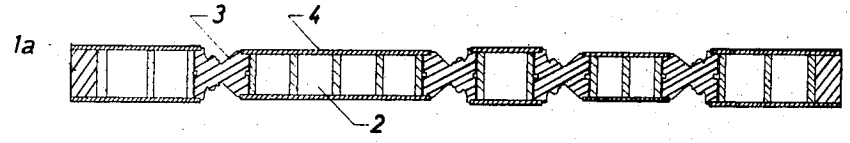


FIG. 7

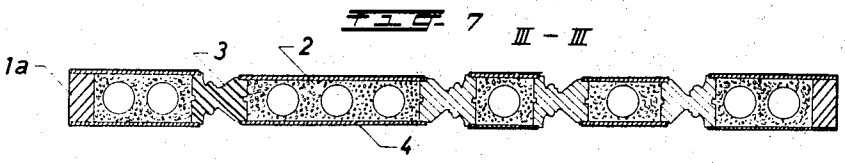


FIG. 17

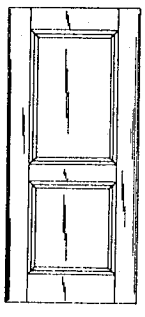


FIG. 8

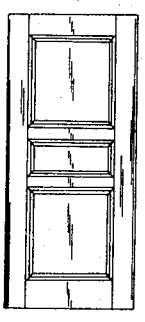


FIG. 18

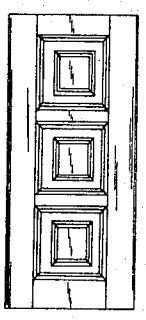
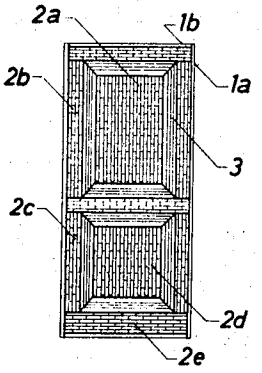


FIG. 9



Aug. 13, 1974 PAUL P. L. CHENG 3,829,337

JOINTLESS CONSTRUCTION METHOD OF THE WOODEN PRODUCTS

Filed Nov. 12, 1971 4 Sheets-Sheet 3

FIG. 10

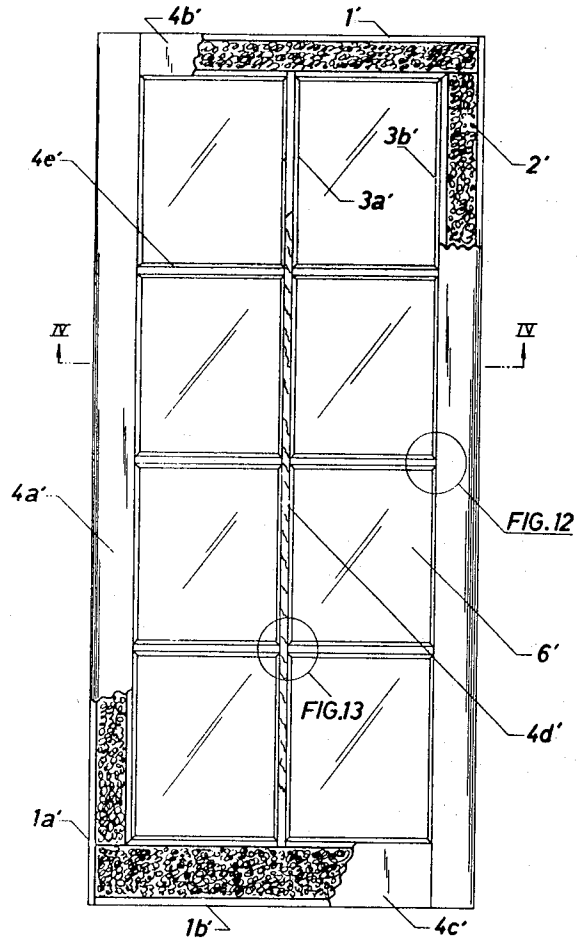


FIG. 11

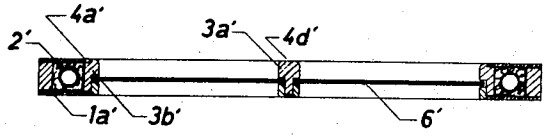


FIG. 12

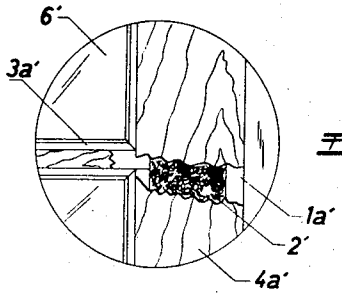
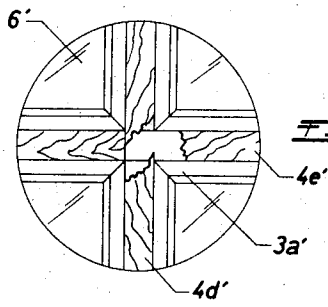


FIG. 13



Aug. 13, 1974 PAUL P. L. CHENG 3,829,337

JOINTLESS CONSTRUCTION METHOD OF THE WOODEN PRODUCTS

Filed Nov. 12, 1971 4 Sheets-Sheet 4

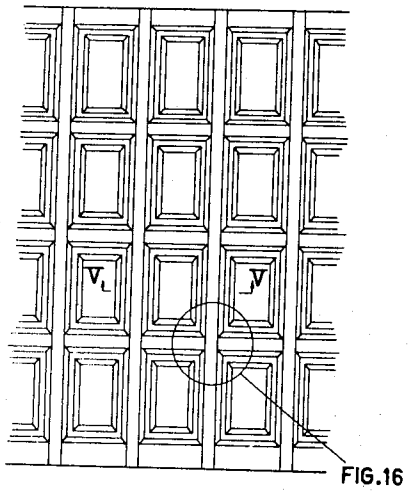


FIG.16

FIG. 14

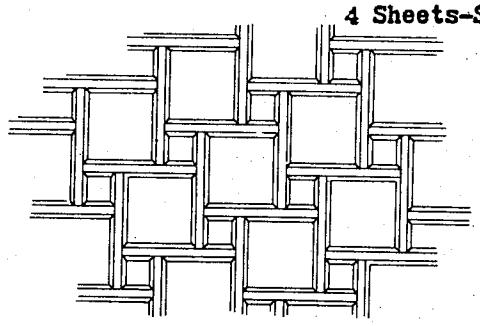


FIG. 19

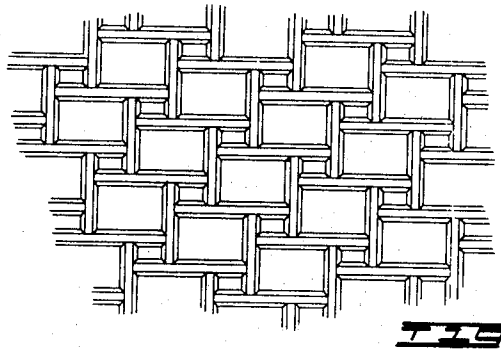


FIG. 20

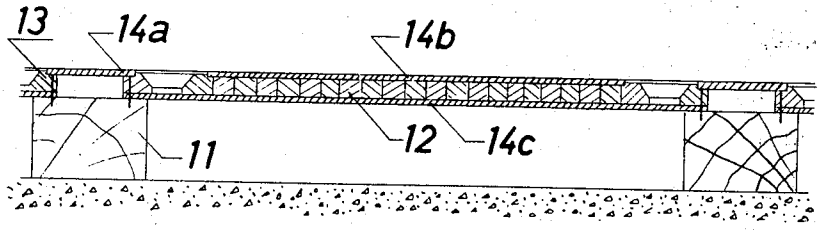


FIG. 15 V-V

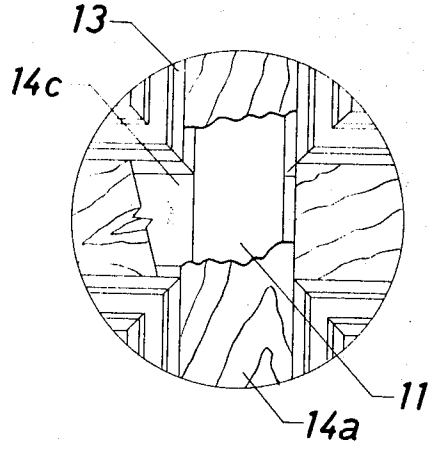


FIG. 16

United States Patent Office 3,829,337 Patented Aug. 13, 1974

3,829,337

JOINTLESS CONSTRUCTION METHOD OF THE WOODEN PRODUCTS

Paul P. L. Cheng, Taipei, Taiwan, assignor to Fu Shing Mfg. & Lumber Co., Ltd., Taipei, Taiwan

Filed Nov. 12, 1971, Ser. No. 198,172
Int. Cl. B32b 31/04
U.S. Cl. 156—63 7 Claims

ABSTRACT OF THE DISCLOSURE

A jointless construction method for fabricating wood products, such as doors, windows and panels, in which exposed portions are made by gluing together a number of pre-sized plywood pieces or thin boards in combination with wood mouldings, strips and/or carvings so as to obtain panels in a large variety of patterns and also capable of inserting glass, lourve blinds, or other attachments, and the inner hidden empty spaces being either densely filled (solid core) or sparsely filled (hollow core) with low grade lumber, plywoods, chipboards, etc., which are glued mutually to the exposed members and overlappedly at their connections to secure rigidity and durability and to form a compact unit.

BACKGROUND OF THE INVENTION

Wooden doors and wall panels now widely used, such as the flush door having either solid or hollow core, are fabricated by gluing togther an entire sheet of plywood or multiple layers of veneer on each surface. There are also V-grooved plywood wall panellings which comprise a number of grooved plywoods directly nailed to a wall.

The construction of these products is simple and without application of mortise, tenon or dowel joints. Low grade lumber, plywoods, chipboards, etc. may be utilized as inner core material, in the case of flush doors. These products may be manufactured simply and at low cost. However, they have a number of shortcomings, such as plain and monotonous appearance, and rapid obsolescence.

On the other hand, doors and wall panels made according to the traditional wood joinery method using solid wood for stiles, rails and panel boards to produce decorative panels in a variety of patterns, are highly valued. However, this method of construction is almost prohibitive economically. This is because the high quality of wood required limits the type of wood used, most of which are scarce. It is also disadvantageous not to be able to utilize low grade lumber for core stock. Furthermore, the mortise, tenon and dowel joints tend to loosen and deform with passage of time.

As a result, wood window sashes have been gradually replaced by metallic ones. Although there are flush doors with attached mouldings and/or carved surfaces for imitation of traditional stile and rail construction, they are far from being satisfactory imitations.

SUMMARY OF THE INVENTION

This invention aims to resolve the above problems and provide a unique construction method that facilitates the utilization of small sized members and low grade wood from any species of wood material.

The invention encompasses a construction method for making wood products, such as wood doors, windows and wall panels whose exposed portions are made by gluing together a number of pre-sized plywoods or thin boards in combination with mouldings, strips, etc. and whose inner hidden spaces may be either densely filled (solid core) or sparsely filled (hollow core) with low grade lumber, plywoods, chipboards, etc., which are overlappedly glued

with the exposed members at their connecting parts to secure the rigidity and durability of the product.

BRIEF DESCRIPTION OF DRAWING

FIG. 1 depicts a partial illustrated front view of an illustrative embodiment of a six-panel door constructed according to this invention;

FIG. 2 depicts a partial illustrated front view of an illustrative embodiment of an eight-panel door constructed according to this invention;

FIG. 3 and FIG. 4 depict transverse sectional views of the embodiment of FIG. 1, taken along line I—I, illustrative of the construction of inner hidden portions and related different arrangements for surface patterns;

FIG. 5 depicts a transverse sectional view of FIG. 1 taken along line I—I, illustrating the construction of the inner hidden portions when carved panels are provided as the exposed portions;

FIG. 6 depicts a transverse sectional view of FIG. 2, taken along line II—II;

FIG. 7 depicts a transverse sectional view of FIG. 2, taken along III—III;

FIGS. 17, 8 and 18 are three common examples of surface patterns of doors constructed according to the invention;

FIG. 9 depicts an illustrated front view of FIG. 17, demonstrating the arrangement of the inner core stock;

FIG. 10 depicts a partial illustrated front view of another illustrative embodiment of an eight frame light window sash constructed according to this invention;

FIG. 11 depits a transverse sectional view of FIG. 10 taken along line IV—IV;

FIGS. 12 and 13 depict partial enlargements of FIG. 10, illustrating details of the connections;

FIGS. 14, 19 and 20 depict three examples of common wall panel patterns constructed according to this invention;

FIG. 15 depicts a transverse sectional view of FIG. 14 taken along line V—V; and

FIG. 16 depicts a partial enlargement of FIG. 15 illustrating the details of the connections.

DESCRIPTION OF PREFERRED EMBODIMENT

In the following description the same numerals denote the same or similar parts. First, the figures will be described and then the method of construction will be described.

Turning to FIG. 1, there is depicted an illustrative door constructed according to this invention. Outer frame **1** is formed by lumber strips **1***a* and **1***b*. Core stock **2** is formed by low grade lumber strips which is densely filled in the inner empty space. Panel frames **3** are formed by wood mouldings. Surface skin **4** is formed by pre-sized plywoods or thin boards **4***a*, **4***b* . . . **4***j*.

In a similar manner, in FIG. 2, there is depicted an illustrative door constructed according to this invention. Outer frame **1** is formed by lumber strips **1***a* and **1***b*. Core stock **2** is contained in the inner empty space, either as sparsely filled with low grade lumber strips (as shown in the upper part of FIG. 2) or densely filled with tabulated chip core (as shown in the lower part of FIG. 2). Panel frames **3** are formed by wood mouldings. Surface skin **4** is formed by pre-sized plywoods or thin boards **4***a*, **4***b* . . . **4***g*.

The cross sectional features can be better appreciated by turning to FIGS. 3, 4 and 5. For added strength a padding board **5** may be used, as shown for example in FIG. 3. The external patterns may be varied as shown, to be placed on one side (FIG. 5) or on both sides (FIG. 4) of the door. The door thus comprises surface skin **4**, or panel frames **3**, core stock **2**, and in some cases padding board **5**, in the arrangement depicted. Tubulated chip

core or hollow lumber core may be used to replace the lumber core **2**, for obtaining weight reduction.

In a similar manner, the corresponding cross sectional views of the embodiment of FIG. 2, are shown in FIGS. 6 and 7, and are self-explanatory. In FIG. 6, the internal filling is not solid, whereas in FIG. 7, the filling is substantially solid.

Other examples of surface patterns may be seen from FIGS. 17, 8 and 18. Also, the internal construction can be seen in greater detail in FIG. 9. Again, these figures are self-explanatory.

The invention can be used to produce a variety of wood products. Turning to FIG. 10, there is depicted a window sash arrangement constructed according to this invention. Outer frame **1'** is formed by wood strips **1***a'* and **1***b'*. Core **2'** is formed by densely filled chip core in the empty space. Glass frames **3'** are formed by wood mouldings **3***a'* and **3***b'*. Surface skin **4'** is formed by plywood strips or thin boards **4***a'*, **4***b'* . . . **4***c'*.

The cross section of the window sash is similar to the cross sections of the doors, as can be seen from FIG. 11, which shows the embodiment of FIG. 10 taken along section line IV—IV. The details of the connections can be seen from FIGS. 12 and 13. These figures are, again, self-explanatory.

The invention can also be used to produce wall panelling. FIGS. 14, 19 and 20 show three embodiments of wall panels having different patterns. These panels may be put up using ordinary tools at a construction site. FIG. 15 depicts a cross section of the embodiment of FIG. 14 as put up and installed. FIG. 16 shows the details of the connections of FIG. 14. The panel may be attached to wall stud **11** by means of nails or the like. Core stock **12** is formed by low grade wood strips which are densely filled in the inner empty space of the raised panel. The panel frames **13** are formed by wood mouldings. Surface skin **14***a* and **14***b* are formed by plywood strips or thin boards. Base sheets **20** are formed by pre-sized plywoods or thin boards.

MANUFACTURING PROCEDURES

As previously described, there are four main categories of members required for the manufacture of the product according to this invention:

(A) Wood strips, denoted for example as **1**, **1***a*, **1***b*, **1'**, **1***a'* **1***b'* in the drawing, are accurately surfaced to the required shape and cut to the required length. These are to be fabricated for outer frames in the case of doors, window sashes or similar products.

(B) Wood mouldings, denoted **3**, **3***a'*, **3***b'* in the drawing, are machine moulded to the desired shape and cut to the required length, with precise angles and ends. These are fabricated for panel frames, insertion of glass, louvre blinds, or other attachments.

(C) Plywoods or thin boards, denoted **4**, **4***a*, **4***b*, **4'**, **4***a'* . . . in the drawing, are accurately pre-sized to the desired sizes and patterns. These are used for surface skin of the product.

(D) Low grade strips, denoted **2**, **2'** in the drawing, and other plywood strips or chip boards, tubulated or solid strips, as specified, are accurately cut to the required sizes according to the depth of the internal empty space of the product.

For manufacturing the two embodiments of FIGS. 1 and 2, namely doors, the following procedure was used:

Step 1.—Frames were formed by gluing together with suitable glue, appropriate sized and shaped mouldings (category (B) above). The frames may be used to hold carvings, louvre blinds, etc., if applicable. The inner empty space between the exterior (See FIGS. 3, 4, 5) was filled and glued with specified core stock (category (D) above), thereby to form panels. Then both sides were glued with plywoods (category (C) above).

Step 2.—The panels processed under step 1, were arranged to form a desired pattern. The outer edge was formed with strips **1** (category (A) above) using suitable glue. Then the empty spaces between panels and the outer edge frame were filled and glued with specified core stock (category (D) above).

Step 3.—Plywoods (category (C)) were then glued onto both sides of the proper positions to form the final product (see FIGS. 17, 8, 18, 9).

For manufacturing the embodiment of FIG. 10, i.e. an eight panelled light window sash, the following procedure was followed.

Step 1.—The glass frames **1** were formed by gluing together with suitable glue applicable shapes and sizes of mouldings (category (B) above). Plywood strips were glued to both sides and overlappedly at the connections of the mouldings. (See FIGS. 12 and 13.)

Step 2.—Outer frames **1** were formed using strips **1** (category (A) above) with suitable glue. Then all of the empty spaces were filled and glued with core stock **2** (category (D) above).

Step 3.—Plywood strips **4** (category (C) above) were glued to both sides at proper positions to form the final product.

For manufacturing the embodiment of FIGS. 14, 19, 20, i.e. wall panels, the following procedure was followed.

Step 1.—Frames were made by gluing together applicable shapes and sizes of mouldings **3** (category (B) above) with suitable glue, to obtain raised panels and outer edges, both of which may then be glued or nailed to plywood. The inner empty space of the panel was filled with core stock **2** (category (D) above) and glued. Then, plywood **4** was glued on the top of the raised panel to form the panel unit denoted group (A) component.

Step 2.—Then group (B) components were formed by gluing together plywood strips of category (C) above, thereby to form stile plywood. Also, group (C) components were formed by gluing together plywood strips of category (C) and thereby to form rail plywood.

To lay out the wall panel at a job site, the following procedure is used.

Component (A) is nailed onto wall studs (see FIG. 15) one after another along the lapped edges accurately spaced in vertical and horizontal distances between panels.

Thereafter the empty spaces between panels may be filled and glued with core stock **12** as specified. Plywood strips **14***a*, **14***b*, **14***c*, under component (B) is glued onto the lapped edges of the mouldings **13** along the vertical space between the panels.

Finally, plywood strips **14***a*, **14***b*, **14***c* under component (C) are glued onto the lapped edges of the moulding **13** along the horizontal space between the panels.

Advantageously, small size wood members of any species may be used as raw material for all of the exposed surfaces and substantial amounts of wood waste, such as low grade lumber, plywoods and chipboards, etc., may be used for filling the inner empty space. Therefore, the cost of materials is low. It is possible to select from a wide range of species and wood can be utilized to the fullest extent thereby achieving high recovery and utilization of raw material.

Although the exposed surfaces of this product comprise a number of pre-sized plywoods or thin boards with wood mouldings, strips, etc., it does not look any different from an identical product that was constructed with solid lumber stile, rail and panel board according to conventional wood joinery method. The same beauty and capability are achieved with this new product, such as panels of various patterns and insertion of glass, louvre blinds and other attachments.

Since the connecting portion of all members are glued together to form a compact complete unit, instead of being connected by mortise, tenon or doweled joints, the strength of the wood members is unimpaired as would be the case were mortise, dowel or other holes were used. Since, the inner members are interlinked and intricately

glued with the outer members, this product has high rigidity and durability. Deformation and loosening of the joints do not occur.

Another advantage attained by this invention is that a number of different surface patterns may be arranged as desired. It is simple to adjust the shape of the cross section and end angle of the wood mouldings. Also, the length of the mouldings with corresponding size of the pre-sized plywoods may be adjusted as desired. One may arrange longitudinally curved mouldings instead of straight mouldings by using corresponding curved plywoods. It is possible to arrange the new product with the same variety of surface patterns as usually made by conventional joinery method. It is also possible to arrange on the new product a large variety of sizes, shapes such as square, rectangular, hexagonal, polygonal and other irregular shapes for surface patterns.

All of the members can be made in accordance with a variety of drawings and specifications as desired and be assembled in conformity with the appropriate process. Thus, large scale production is feasible.

As to wall panels, all members may be fabricated in groups of components ready for assembly at a job site. The components will have precise and interchangeable parts, and themselves be interchangeable. Assembling the panels will be simple and not require more than simple tools and can be done by any non-skilled worker.

The above described embodiments are only illustrative of the invention. Numerous modifications and variations would be evident to one skilled in the art. All such modifications and variations are to be considered to be within the spirit and scope of this invention.

What is claimed is:

1. Method of constructing wooden doors, windows, wall panel components and the like product having their exposed surfaces in a number of alternately recessed levels and projected ledges with selected wood grain directions mutually composed into various patterns without the application of any mortise, tenon or dowel joints comprising the steps of

(A) forming wood mouldings to desired shapes and sizes;

(B) gluing said mouldings selectively together to form inner frames;

(C) forming a plurality of panels by placing wood core stock under each of said inner frames and gluing said core stock together and to said inner frames;

(D) arranging a plurality of said panels in a desired pattern;

(E) placing an outer wood frame about said pattern leaving a space between said wood frame and said panels;

(F) filling the empty space between said panels and said outer frame with additional core stock and gluing same together; and

(G) placing wood sheets over the exposed surfaces of the core stock and gluing said sheets thereto.

2. Method of claim 1, wherein said inner frames are arranged on both sides of said product with an inner support means positioned therebetween.

3. Method of claim 1, wherein said inner frames are shaped to hold glass panes, louvre blinds or other attachments.

4. Method of claim 1, wherein said inner frames are arranged on one side of said product and a flat wood sheet is glued to the other side thereof.

5. Method of claim 1, wherein the empty space between said panels and said outer frame are substantially filled with said core stock.

6. Method of claim 1, wherein the said spaces between said panels and said outer frame are partially filled with said core stock.

7. Method of claim 1, wherein a flat wood sheet is glued within each of said inner frames.

References Cited

UNITED STATES PATENTS

2,944,305	7/1960	Avery	144—309 N
1,863,800	6/1932	Loetscher	156—182
937,430	10/1909	Evans, Jr.	244—309 N
3,168,763	2/1965	Gilbert	161—44
2,825,674	3/1958	Prase	156—182
1,911,374	5/1933	Loetscher	144—309 N

FOREIGN PATENTS

662,864	5/1963	Canada	144—309 N
596,825	8/1959	Italy	144—309 N

DANIEL J. FRITSCH, Primary Examiner

U.S. Cl. X.R.

144—309 N, 309 Q, 314 R, 314 A, 315 R, 315 A; 156—182