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LOW DENSITY PARTICLE BOARD CORE DOOR

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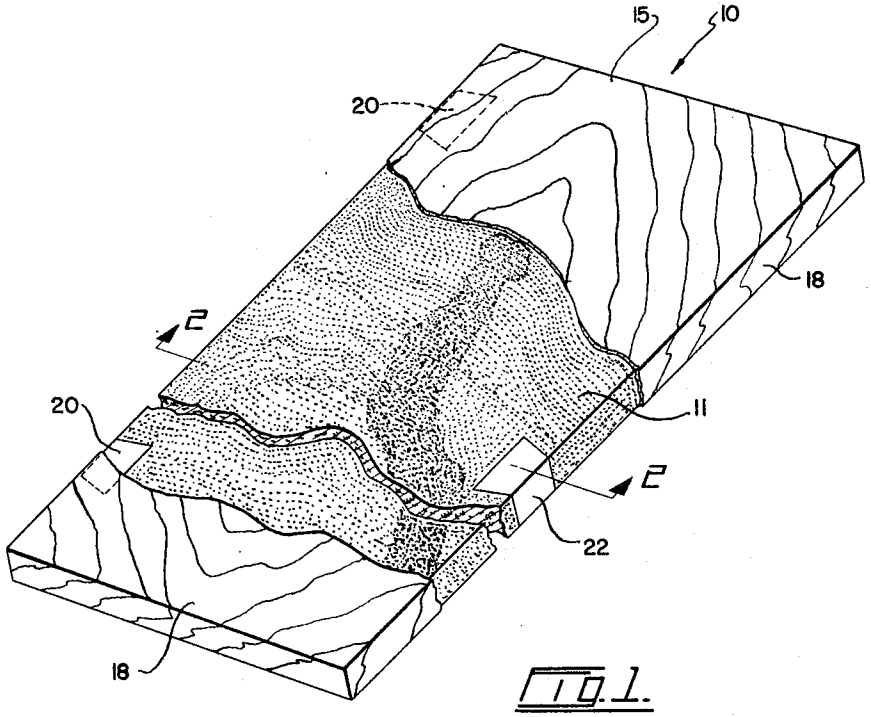


FIG. 1.

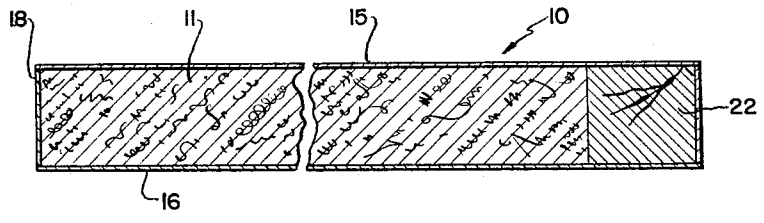


FIG. 2.

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LOW DENSITY PARTICLE BOARD CORE DOOR

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This invention relates to improvements in flush doors.

An object of the present invention is the provision of a flush door of very simple construction, inexpensive as compared to the flush doors now on the market, lighter in weight than the prior doors while retaining sufficient strength for its purpose, and substantially warp and twist proof.

The most common type of flush door on the market is made with a wooden frame, either solid or hollow, faced with plywood. These doors are expensive because of the wood framing and plywood necessary for their construction. Solid particle board core doors are available, but the cores of these doors have the usual particle board density with a specific gravity ranging from 0.6 to 0.8, and have double veneer facings. These doors are very heavy and are expensive due to the cost of the particle board core and the two-ply veneer covering the faces.

A door according to the present invention is constructed from a solid particle board core of low density without wood framing, and having single veneer faces without any crossbanding veneers therebeneath. Hinge and lock blocks, preferably formed of wood, can be inserted in the low density core in order to provide adequate screw and lock strength at the necessary points. Although not absolutely necessary, it is preferable to provide single veneer facings along the edge of the door. These doors are very light, even lighter than the usual hollow core doors, and very much lighter than the particle board core doors now on the market. The present doors are very much cheaper than either the hollow core doors or the particle board core doors on the market due to the much lower cost of the facings, the elimination of wood framing, and the lower cost of the low density particle board core.

The term "wood particles" as used throughout this specification and in the appended claims is intended to include particles, chips, shavings, flakes, strands and the like of the type used in the manufacture of particle boards and flake boards.

A door according to the present invention comprises a solid low density core of small wood particles pressed and bonded together with adhesive, said core being faced with a single thickness of wood veneer adhesively secured thereto, said veneer forming a smooth unbroken facing for the core, and co-operating with the core to provide dimensional stability in and prevent warping and twisting of the door. The low density core used in this invention has a specific gravity of from 0.20 to 0.50. It is preferable also to edge the core with a single thickness of wood veneer. The veneers used range in thickness from about 1/60 inch to about 1/8 inch. The best results are obtained when the particles near the surface of the core are of such a size that they would pass through about a 5 mesh (Tyler) standard screen but would be retained on about a 30 mesh screen.

This core can be made of wood particles of any species and shape. However, for best results, the particles near or at the surface of the core cannot be too large, nor can they be too fine. It has been found that particles which do not pass through a 5 mesh (Tyler) standard screen are in general too coarse, and particles which pass through a 30 mesh (Tyler) standard screen are in general too fine for best results. Furthermore, the particles near or at the surface of the core should not be more than about 0.15 inch in maximum thickness.

Any suitable adhesive, such as a water solution of urea formaldehyde or phenol formaldehyde resin, may be used for bonding the wood particles to each other. If phenol formaldehyde resins are used, a weather resistant, exterior product results. An adequate amount of adhesive for bonding the wood particles is from about 3% to about 10% of the wood, based on dry weight of adhesive. If desired, a small amount of petroleum wax, from about 0.5 to about 2% based on the wood, may be added in emulsion form with the adhesive to give added moisture resistant properties.

One way of applying the adhesive to the wood particles is to spray the adhesive into a tumbling drum containing the particles. Such a drum causes the particles to tumble or fall through a mist or fog of the adhesive so that the surfaces of the particles are lightly coated therewith. The coating is such that the particles may be handled and moved through mat forming equipment without unduly sticking together. An example of a method of producing these cores is as follows. The particles are directed onto a metal caul by a suitable forming apparatus to give an even mat. A sufficient mat thickness is used which will give the desired core thickness at the required density when the hot pressing operation is finished. Another caul is laid on the top of the mat. Water is previously sprayed on the inner caul surfaces (5 to 15 gms. per sq. ft.) to give a more rapid pressing cycle and to harden the core surfaces. The mat, with cauls on each side, is placed in a hydraulic hot press and pressed to the desired thickness at 300° to 400° F. with rapid application of pressure as follows:

(1) Maximum pressure (up to 200 p.s.i.) is applied as rapidly as possible (30 seconds to 2 minutes) until the desired thickness (controlled by stops) is obtained.

(2) After the desired thickness is obtained, the steam is allowed to escape by gradually and consecutively reducing the pressure down to 50 p.s.i., 25 p.s.i. and then 0.

(3) The rate of decrease of pressure from the maximum to 50 p.s.i. and 25 p.s.i., holding time, if any, at these pressures, and the rate of the final pressure release depend on the moisture content of the mat, the thickness and specific gravity of the final core, the type of bonding resin, etc. For a core of 1⅜ inch final pressed thickness and 0.28 specific gravity, the following schedule for reducing the pressure has been used:

2 minutes to reduce pressure to 50 p.s.i.,
Pressure held at 50 p.s.i. for 2 to 4 minutes,
1 minute to reduce pressure to 25 p.s.i.,
Pressure held at 25 p.s.i. for 3 minutes, and
2 to 3 minutes to reduce the pressure to 0.

The thick particle core of 0.20 to 0.50 specific gravity obtained as above is trimmed and fitted with wedge shaped wooden lock and hinge blocks, and then sanded both sides, followed by veneering with hardwood or softwood veneers of from 1/60 to 1/8 inch thickness on both faces and edges.

It has been found that very thin veneers can be bonded to the low density core described, without the use of additional cross banding veneers underneath. The core, even though low in density, provides a solid, smooth, even base for the veneer so that there is no buckling, cracking or raising, as would be the case if a hollow, corrugated, or other non-homogeneous type of core were used. Any suitable adhesive can be used to adhere the veneer faces and edges to the core, such as contact cements, casein, latex, urea formaldehyde or phenol for-

maldehyde resins, with appropriate cold or hot pressing. The pressure used to adhere the veneers to the core should not exceed the compressive strength of the core, and stops are usually used to retain the desired thickness. A veneering pressure of 50 p.s.i. has been used in the case of cores of 0.25 specific gravity.

An example of the present flush door is illustrated in the accompanying drawings, in which,

FIGURE 1 is a perspective view of the panel, with part of the veneer facing broken away to show the core thereof, and

FIGURE 2 is an enlarged cross section taken on the line 2—2 of FIGURE 1.

Referring to drawings, **10** is a flush door made up of a solid low density core **11** which comprises small wood particles pressed and bonded together with a suitable adhesive. Core **11** has sheets of thin wood veneers **15** and **16** applied to and completely covering each of its opposite faces by means of a suitable adhesive so that the veneers are secured to the core throughout the opposite faces thereof. The edges can be filled and wood grain printed or a strip of thin wood veneer **18** can be adhesively applied to each of the four edges of the core completely to cover said edges.

It is preferable to embed wedge-shaped hinge blocks **20** in the core materials adjacent one edge of the core, and to embed a wedge-shaped lock block **22** in the core adjacent the opposite longitudinal edge thereof. The wedge shape of these blocks and the veneer facings firmly retain the blocks in place within the door. Alternatively, other screw and lock holding devices can be embedded during the manufacture of the core.

As stated above, the specific gravity of core **11** preferably ranges from 0.20 to 0.50, and the thickness of the word veneer ranges from about 1/60 inch to about 1/8 inch. The adhesive prebonding the wood particles of the core preferably ranges from about 3% to about 10% of the wood, based on dry weight of the adhesive.

A door constructed as described above is very light in weight, free from warping tendencies, perfectly smooth in appearance, and inexpensive in comparison with other types of doors. Slamming and impact tests have shown that this door has sufficient strength to perform satisfactorily in normal use. Exposure tests at high humidity (21 days at 70 degrees F. and 90% R.H.) have shown no raising or roughening of even the thinnest veneer surfaces by the particles constituting the core beneath. This performance is the result of the fact that a low density core is used so that the springback of the particles caused by high moisture conditions is minimized by the low pressures used in pressing the core.

What we claim as our invention is:

1. A door comprising a solid low density core of from 0.20 to 0.50 specific gravity of small wood particles pressed and bonded together with adhesive, the particles near the surface of the core being of such a size that they would pass through about a 5 mesh (Tyler) standard screen but would be retained on about a 30 mesh screen, said core being faced with a single thickness of wood veneer ranging in thickness from about 1/60 inch to about 1/8 inch adhesively secured thereto, said veneer forming a smooth unbroken facing for the core and cooperating with the core to provide dimensional stability in and prevent warping and twisting of the door.

2. A door as claimed in claim **1** wherein the core is further edged with a single thickness of thin wood veneer adhesively secured to the core and forming a smooth unbroken edging for the core.

3. A door as claimed in claim **1** including hinge and lock blocks embedded in the said core near the edges thereof.

4. A door as claimed in claim **1** wherein the said adhesive which bonds the particles together is about 3% to about 10% of the wood based on dry weight of the adhesive.

5. The method of producing a door having a solid low density core, which comprises mixing small wood particles and adhesive, said adhesive being from about 3% to 10% of the wood based on dry weight of adhesive, pressing the mixture in a press to a desired thickness at temperatures from about 300° to about 400° F. at pressures ranging up to about 200 p.s.i. and for times of 8 to 16 minutes to produce a core of about 0.20 to about 0.50 specific gravity, and facing said core with a single thickness of wood veneer ranging from about 1/60 inch to about 1/8 inch thickness, said veneer being bonded to the core throughout the faces thereof by an adhesive.

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