

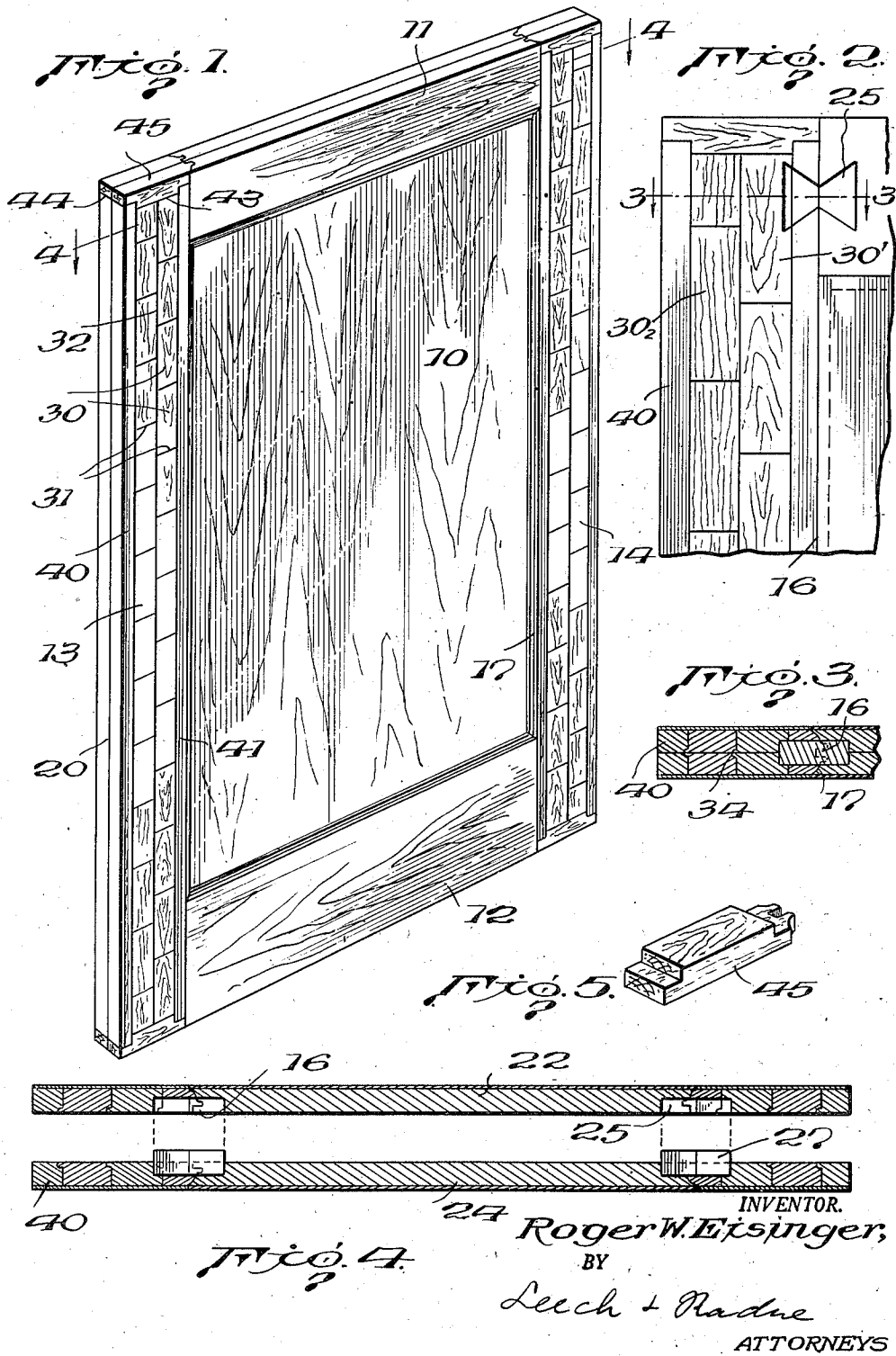
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R. W. EISINGER

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DOOR CONSTRUCTION

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DOOR CONSTRUCTION

Roger W. Eisinger, Washington, D. C.

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6 Claims. (Cl. 20—35)

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This invention relates to doors and particularly to wooden doors of panel construction.

It is a general object of the present invention to provide novel and improved wooden doors of the panel type and methods of manufacturing the same.

More particularly, it is an object of the invention to provide a door having desirable non-warping characteristics particularly adapting the same for use where one side is exposed to the weather and the other to the heat of the interior of a house or other building.

An important object of the invention consists in the construction of the rails and stiles of at least two laminae joined in planes parallel to the median plane of the door.

A further object of the invention consists in the capping of the end grain of the stiles with blocks in which the grain extends horizontally or at right angles to the grain of the cores of the stiles for the purpose of excluding moisture from and preventing the warping of these vertical members of the door.

As another object of the invention a method of forming doors is provided in which the stiles and rails are assembled completely and secured together without the panels and are then sawn into at least two sections on planes parallel to the median plane and subsequently reassembled with glue between the sections whereby strains in the several component parts of the frame are relieved.

An important feature of the invention consists in the manner of attaching the stiles and rails to each other by the use of blind butterflies or double dovetail connecting blocks.

Other and further objects and features of the invention will be more apparent to those skilled in the art upon a consideration of the accompanying drawing and following specification, wherein are disclosed several exemplary embodiments of the invention, with the understanding that such combinations and modifications of the same may be made as fall within the scope of the appended claims without departing from the spirit of the invention.

In said drawings:

Figure 1 is a perspective view of a single panel door constructed according to the present invention, the veneer covers being removed from the stiles to illustrate the composite structure of the same;

Figure 2 is a fragmentary view, on an enlarged scale, of the corner construction, showing one of the laminations from which the door may be assembled;

Figure 3 is a horizontal section taken on line 3—3 of Figure 2 and showing the butterfly inserts;

Figure 4 is a section taken on line 4—4 of Figure

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1 but showing the two sections of the door prior to gluing together; and

Figure 5 is a perspective view of one of the stile end-blocks.

5 The manufacturers of doors for dwellings and for similar construction have experienced great difficulty in assembling a wooden door of the panel type which will not be subject to serious warping or distortion particularly in the winter and when located where one side is exposed to the elements, or, at least, to the low outdoor temperatures, while the other side is subjected to the relatively high temperature and low humidity inside of the building. The greatest difficulty seems to occur in the lock edge stile which is held closed only at one point near the center of the door. This stile tends to assume a bowed condition with the convex side out, permitting the lock to engage the keeper but withdrawing the top and bottom of the stile from the face of the rebate stop or molding and permitting the entrance of cold drafts.

In order to overcome this serious fault it is proposed to eliminate the warping, first, by preventing the entrance of moisture into the end grain of the stiles where it is normally exposed at the top and bottom ends of the same. This eliminates the expansion on the outer surface where the moisture is available and prevents the outer face of the door becoming longer than the inner face to cause the warping. It is proposed, secondly, to eliminate initial strains both in the stile and rail portions of the door by forming these of two or more laminae which may, if desired, be taken from the same piece of lumber or from entirely different pieces. In accordance with the first form of this second proposal, the door is completely framed up, but without the panels, and is resawn along the median plane and, after certain treatment, is glued together again with the panels assembled in position. This sawing normally results in the sections taking unequal curves lengthwise of the stiles and convex to the cut surfaces. When the parts are glued together under pressure between flat cauls these curves are taken out and the tensions resulting from the same are made use of to hold the stiles straight and flat.

In a further endeavor to eliminate warping and twisting of the stiles and rails, if desired, they are made up from a plurality of blocks arranged in end to end relation with the grain extending lengthwise of the assembled member. It is preferred that each stile have a core made up of at least two rows of end to end arranged blocks and each row is arranged to have exposed on one face a different grain, i. e., edge or face, than the other row. If each row is composed of two layers then the blocks are arranged so that the edge grain of each is exposed to the face grain of another and so on, insuring against any multiplication of

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warping effort on the part of any individual block.

Referring now to the drawings for better understanding of the invention and first to Figure 1, there is shown by way of example a single panel door, although, of course, the invention is equally as applicable to doors having multiple panels either of the horizontally arranged type or those which are divided both vertically and horizontally into a plurality of panels. Such a panel is shown at 10 and may comprise a single piece of wood or a laminated structure as desired. The panel is completely surrounded as by top and bottom rails 11 and 12 and stiles 13 and 14. The inner edge of each of the frame elements 11 to 14, inclusive, is channeled as at 16 to loosely receive the panel edge which may be reduced in thickness as is common for the purpose. In keeping with standard practice, it is preferred to have the panel unsecured in these grooves so that it is free to expand and contract without splitting. For the purpose of appearance, the inner edges of the rails and stiles are also molded as at 17 to a pleasing contour.

In order to assemble the rails and stiles into a frame surrounding the panel, the ends of the rails are molded to counterparts of the grooves and moldings on the inner edges of the stiles to provide a close fit adapted to be glued in the customary manner for holding these parts together. Normally, in standard constructions, dowels are used to reinforce these joints. Other means are provided in accordance with the present invention as will be later described.

In accordance with one method of practicing the present invention the rails and stiles of either solid or built-up construction are made and assembled as just described omitting the panel so as to form an open frame. This frame is then sawed into two or more similar sections, preferably along a median plane as at 20 in Figure 1. In Figure 4 such an arrangement is shown having two sections or laminae 22 and 24 exactly equal and opposite. It will be observed that the sawing divides the panel receiving groove 16 into two parts, so that, when the sections are separated, the panel may be laid in position and the parts then reassembled and glued. This obviates the necessity of gluing up the joints between the rails and stiles while the panel is in position.

It will be recalled that no dowels were used in the joints between the rails and stiles. When the sections are sawed apart, however, mortises 25 are cut into each section at each joint. These are of butterfly shape and may be defined as double dovetails. They span the joint as clearly seen in Figure 2 with the narrowest or neck portion in line with the junction of the two parts of the door frame. These are blind mortises of less depth than the half section of the door and are in exact alinement in the two sections so that they can be assembled over dovetail blocks 27, as shown in Figure 4. After the panel is positioned in the lower section, these dovetail blocks are glued and forced into position in this section. Glue is then spread on the sawed surface of one or both sections and the second one is positioned above the first and pressed into position forcing the extending portions of the dovetail blocks into the mortises of the upper section. This completes the door construction except for any edge trimming which may be necessary. It will be noted that the dovetail blocks not only securely lock each rail section to each stile section but also assist in holding the two halves of the door frame together.

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It will be clear that it is not essential to first build up a full thickness frame and then saw it in two. Each of the sections 22 and 24 shown in Figure 4 may be independently assembled from thin lumber and later joined together to form a finished door.

It is preferred to at least make the stiles of a composite section and the rails may also be made in this manner if found necessary but they are not so likely to warp and, because of their shorter lengths, have much less effect on the final shape of the door.

In Figure 1 it will be seen that the finish veneer is left off of the stiles, exposing the core which is composed of a plurality of blocks 30 arranged end to end with the grain running in the direction of the length of the stile. Two rows of these blocks side by side are illustrated and the glue joints 31 between the ends of the blocks are staggered in the two rows to increase the strength of the stile. Quite naturally the joint 32 between the rows is securely glued with approved waterproof glue.

As seen in Figure 3, the joints between the rows of blocks may include tongue and groove connections 34 to assist in holding the rows straight during the gluing and to provide some additional strength because of the extended glued surface. In order to provide a satisfactory outer edge for the stile where it is exposed to view and to permit the same to be trimmed readily to adjust the size of the door, a moderately thick finishing strip 40 is glued in position also with the use of a tongue and groove joint if desired. The inner edge of each stile is likewise composed of a solid strip since the edges of this are exposed. This strip 41 receives the molded shape and the groove 16 for the panel.

In order to insure against the exposure of the end grain of the strips 40 and 41 and the blocks 30 at the heads and bottoms of the stiles, the core is shorter than the overall height of the door, and the blocks 30 are cut off horizontal, as at 43. Preferably the strips 40 and 41 are slightly longer and are also cut off horizontal as at 44. A properly shaped block 45 is then secured across this broken end surface. This block has its grain length horizontal and either at right angles or parallel to that in the rail and at right angles to the grain of the stile core, and, being securely glued in position, effectively seals off any exposed end grain in the stile and excludes moisture from the stile to prevent it from warping.

The whole core made up of the blocks, the strips and the end cross grain blocks, is covered on the front and back faces with a suitable veneer which naturally matches the wood of the strips 40 and 41 as nearly as desired.

When the door is made up with composite stiles and rails, without being sawn in two and reassembled, it is proposed to form one row of the blocks 30 with all face grain exposed, as shown at 39' in Figure 2, while the second row has all edge grain exposed as at 39''. If, however, the door is to be made up in half thickness sections and assembled in the manner illustrated in Figure 4, then, it is proposed to have the blocks on each face with the grain exposed as just described but with the positions of the grains interposed on opposite faces. This insures then that each block has each of its glued faces attached to a grain different therefrom.

It will be understood that the door with the composite stiles and rails can be used as made

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up as shown or can be sawed in two on a median plane and reassembled as heretofore described making use of the butterfly blocks to reinforce the joints.

I claim:

1. In a door stile, in combination, a core composed of two rows of wood blocks, each row having all the blocks therein arranged and glued in end to end relation and with all edge grain exposed on the same face, the rows being glued in side by side relation with edge grain secured to face grain and the end to end joints staggered, continuous edge strips glued to the two edges of the core, a block covering the whole of each end of the stile and having its grain extending transverse to the length of the stile to cover all end grain therein, and veneer covering the faces of the core, the strips and the end blocks.

2. A door stile as claimed in claim 1 in which each of said rows of blocks is composed of two layers with the joints in layers staggered, the edge grain of one layer being glued to the face grain of the other.

3. A door stile as claimed in claim 1 in which each of said rows of blocks is composed of two layers parallel to the plane of the door, the joints in one layer being staggered in relation to the other, the edge grain of one layer being glued to the face grain of the other, each row having a different grain exposed on one face of the core.

4. A door stile formed of wood with the grain extending longitudinally thereof, a block glued to each end of the stile to close off the end grain and having its grain extending in the direction of the thickness of the stile and veneer covering both sides of the stile and of the blocks.

5. A door composed of stiles, rails and at least one panel, each stile formed of wood with the

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grain extending longitudinally, a block glued to each end of the stile to close off the end grain and having its grain extending transversely to that in the stile, each corner junction of rail and stile comprising an interfitting abutment of end rail grain to longitudinal stile grain and to cross block grain, the rail and stile assembly comprising an integrated structure composed of two layers of wood glued together along the median plane of the door, each of said layers having a half groove at its inner edge forming a channel in the assembly receiving the panel edges.

6. The door as defined in claim 5 in which each of the stile rail junctions includes a spanning butterfly block blind-mortised therein across said abutment and across said median plane.

ROGER W. EISINGER.

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