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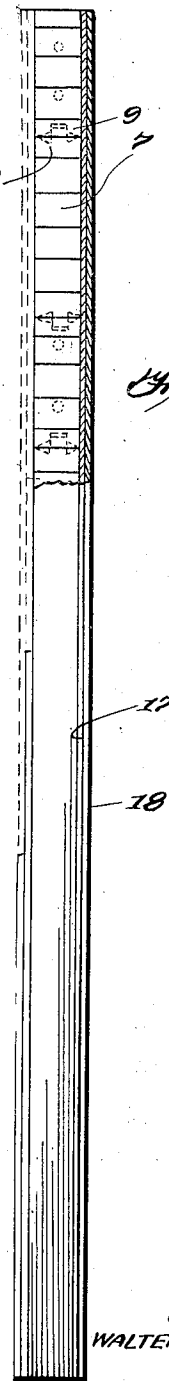
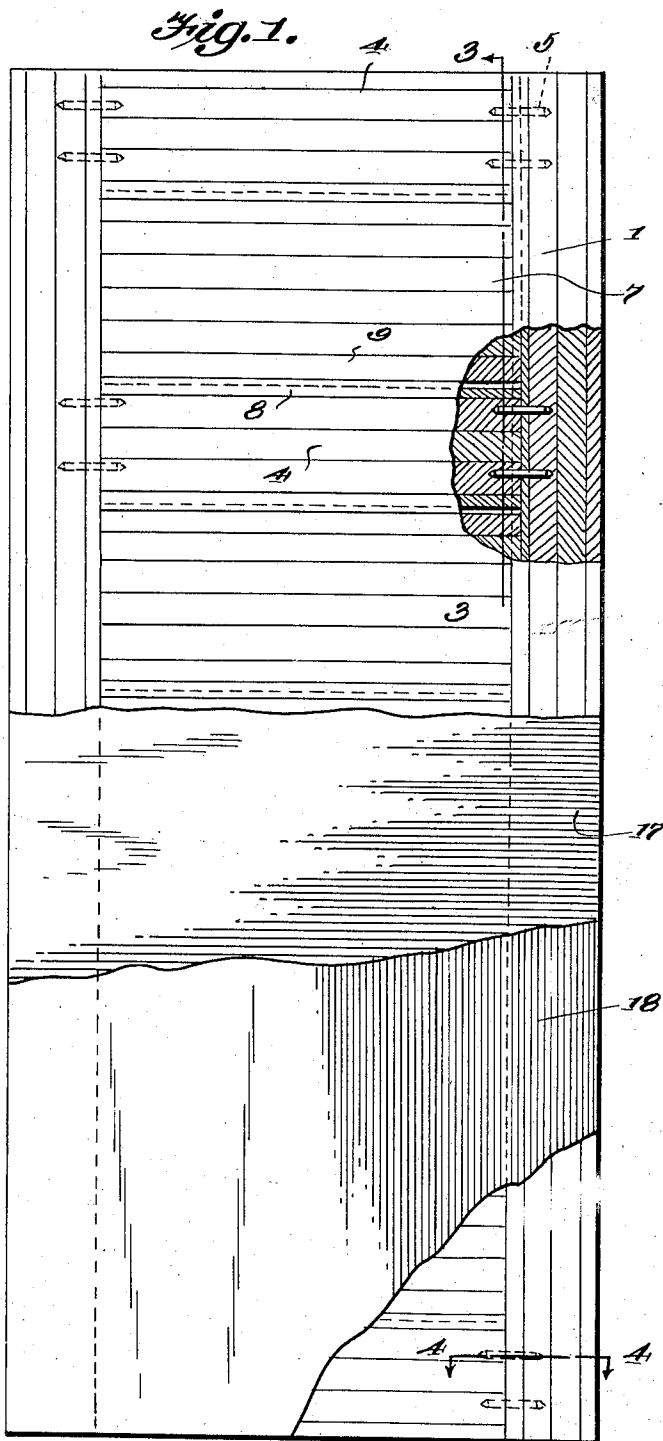
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1,919,702

FLUSH DOOR

Filed May 6, 1931

2 Sheets-Sheet 1



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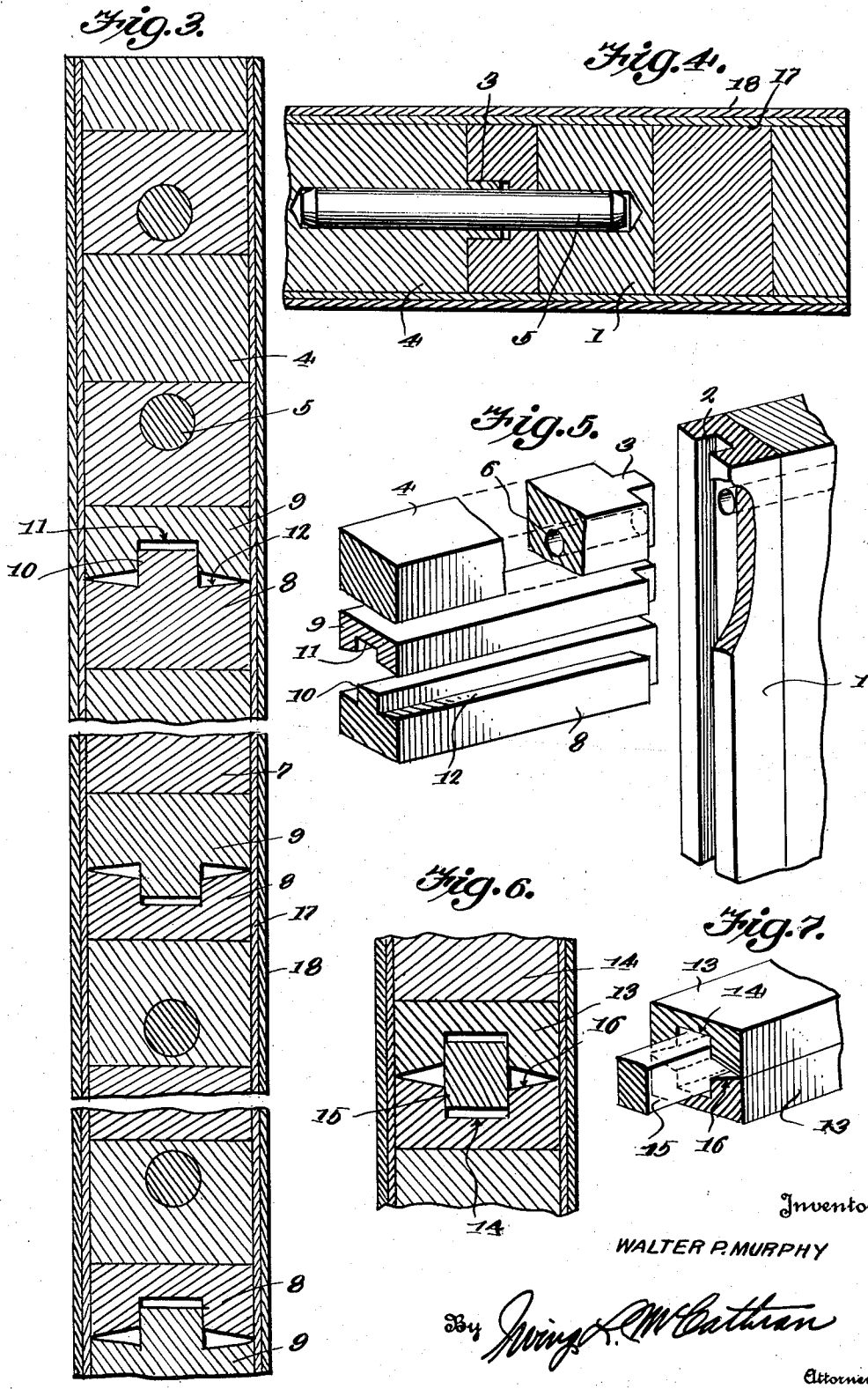
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UNITED STATES PATENT OFFICE

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FLUSH DOOR

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This invention relates to flush doors and has for its object the production of a simple and efficient moisture control expansion joint for use in the construction of flush doors, partitions, or other forms of wood working whereby the structure embodying this moisture control expansion joint will not warp and get out of shape.

Another object of this invention is the production of a flush door partition, or other form of wood working having a core consisting of alternate fixed and unattached cross rails which have a possible expansive action within nor along the longitudinal stiles and within and along the same plane as the veneer surface which covers the core and at the same time will not expand laterally against the plane of the veneer.

With these and other objects in view this invention consists of certain novel constructions, combination and arrangement of parts as will be hereinafter fully described and claimed:

In the drawings:

Figure 1 is a plan view of a flush door construction partly broken away to show the various layers going to make up the door, a portion of the core structure being shown in section;

Figure 2 is an edge elevation of the door shown in Figure 1, certain parts thereof being broken away and shown in section;

Figure 3 is a section taken on line 3—3 of Figure 1;

Figure 4 is a section taken on line 4—4 of Figure 1;

Figure 5 is a detail perspective view of a portion of the core stiles, and a fragmentary perspective view of the cross rails showing the structure of the expansion joint;

Figure 6 is a transverse sectional view through a modified form of the expansion joint; and

Figure 7 is a perspective view partly shown in section showing the structure of the modified form of the expansion joint also illustrated in Figure 6.

By referring to the drawings, it will be seen that 1 designates the core stiles of a flush door, each of the stiles being provided

with a vertically extending channel or groove 2 for the purpose of receiving the projecting tongue 3 of the core cross rails 4 and 7. Certain of these cross rails 4 are tied to or secured firmly to the core stiles 1 by means of dowel pins 5 which enter transversely and tightly into the core stiles 1 and into suitable dowel pockets 6 formed in the cross rails 4 as shown clearly in Figure 5 of the drawings.

In building the flush door, it is preferable to anchor the cross rails 4 to the core stiles 1 by means of the dowel pins 5 as shown clearly in Figures 1 and 3 of the drawings, alternating with a floating or unsecured cross rail 7 mounted between the fixed cross rails 4, these cross rails 7 having suitable tongues fitting within the grooves or channels 2 formed in the core stiles 1, and in this way permitting a slight expansive movement longitudinally within the channels or grooves 2. This arrangement of fixed cross rail 4, unsecured cross rail 7, fixed cross rail 4 and unsecured cross rail 7 is continued throughout the length of the door with the widths of the cross rails 7 being so arranged that there are fixed cross rails 4 at the top and bottom edges of the door core.

Abutting the anchored or secured cross rails 4 between them and cross rails 7, there is provided a specially constructed expansion joint which consists of a pair of abutting sections which are referred to for convenience as a male section 8 and a female section 9. The male section 8, attached to cross rails 7, is provided with a longitudinally extending centrally arranged tongue 10 which is adapted to fit within the longitudinally extending centrally arranged groove 11 formed in the female section 9 attached to cross rails 4. The abutting faces of the male and female sections 8 and 9 of the expansion joint are dished inwardly from the outer side edges of the sections of the joint thereby producing inwardly inclined walls 12 which walls incline from the outer side edges of the male and female sections toward the tongue or groove formed in the respective sections.

From the description and by carefully

considering Figures 3 and 5 of the drawings, it will be seen that the male and female sections 8 and 9 of the expansion joint will only contact at their outer edges, thereby producing a relatively wide space inclining toward the longitudinal center of each section to permit a proper expansion and contraction of the male and female sections of the expansion joint. The tongue 10 of the male section is only of sufficient depth to fit within the channel or groove 11 of the female section and permit proper expansion and contraction without contact with the inner face of the channel formed within the female section.

In building the structure embodying the flush door, or other woodworking structures, it is preferable to provide an expansion joint at each edge where anchored and unsecured cross rails abut and as they alternate, there would be an expansion joint between all cross rails. However, the expansion joint may be placed at any point, extending from stile to stile. The preferable arrangement of cross rails is to alternate fixed and unsecured rails but they may be arranged in any combination or series as desired.

It is a well known fact that the physical properties of wood will cause the wood to absorb water when in contact therewith, and it is further a well known fact that wood will absorb moisture from the air as and when the humidity percentage increases and conversely wood will give off moisture as and when humidity percentage decreases. It is a further recognized fact that in the law of physics, wood increases in width when absorbing moisture and decreases in width when drying out or giving off moisture. The particular expansion joint which has been provided produces an open space into which the core following the line of least resistance may expand when and as it absorbs moisture without causing any variation of the outside dimension of the woodwork within which the joint is used such as the flush door illustrated. Furthermore, the particular structure which has been illustrated and described will provide for a uniform distribution of the expansion and contraction, the stresses and strains due to unequal absorption, and uncontrolled swelling and straining, and stresses and strains which are the primary cause of warping and twisting will be prevented or so minimized in effect as to produce an efficient article which is practically free from the tendencies and faults of warpage or twisting. The door or other article provided with the expansion joint described will remain straight under adverse conditions.

It should be further understood that the present invention provides for the anchor-

ing of a series of cross rails upon the core stiles and also provides for controlling the expansion of all the cross rails through the medium of an expansion joint between any or all of the cross rails, the cross rails which are interposed alternately between the secured or anchored cross rails being unglued, undoweled, and in no way secured against longitudinal movement within the groove of the core stiles, thereby producing semi-movable or expansive cross rails having possible slight floating or sliding action within or along the grooves of the stiles in which the tongues of the cross rails fit. This slight movement will assist in the proper expansion under the action of moisture, longitudinally of the stiles.

In Figures 6 and 7 there is shown a modified form of invention, wherein the expansion joint comprises a pair of similarly constructed panel sections 13, having registering longitudinally extending grooves 14 upon their adjoining faces in which is adapted to fit a spline 15 extending longitudinally of the sections 13. The adjacent faces of the sections 13 are inclined from the outer side edges of the sections toward the grooves or channels 14 as illustrated clearly in Figures 6 and 7 to provide inclined faces 16. The spline 15 is preferably of a suitable size to permit movement of the sections 13 relative to each other without jamming the spline 15 against the inner face of the channels or grooves 14.

Within the scope of the invention, the flush door illustrated may be provided with suitable panels or openings for glass, and a covering or casing for the core other than veneer or in addition to the veneer may be employed should it be so desired.

It should be understood that certain detail changes may be made in the mechanical construction without departing from the spirit of the invention so long as these changes fall within the appended claims and it is further desired to point out that the present device may be applied to other articles other than flush doors, partitions, and similar woodworking structures.

Furthermore, it should be understood that the principal feature of the present invention relates to the core construction of the door, partition, or other suitable woodworking structure, and in constructing a door the core is assembled as above described and illustrated, upon which a flush veneer, called the face veneer, may be placed. If it is desired, two veneers, the under one termed the cross banding as indicated by the numeral 17, may be employed, and over this may be placed the outer veneer 18.

Having described the invention, what is claimed as new is:

1. A structure of the class described comprising a core embodying side core stiles,

spaced cross rails anchored to said side core stiles, unanchored intermediate cross rails engaging said side core stiles arranged between said anchored cross rails, and an expansion joint interposed between and forming part of said anchored and said unanchored cross rails.

2. A core for woodworking structures comprising side core stiles, cross rails anchored in spaced relation upon said core stiles, unanchored cross rails interposed between said anchored cross rails, said side core stiles provided with longitudinal channels, said cross rails provided with tongues fitting in said channels, and an expansion joint interposed between the anchored and unanchored cross rails.

3. A core for woodworking structures comprising side core stiles, anchored cross rails, unanchored cross rails expansive longitudinally of said side core stiles interposed between said anchored cross rails, and an expansion joint compensating for the relative expansion of the cross rails with respect to anchored cross rails under the influence of moisture.

4. A non-warping flush door construction comprising side core stiles, core cross rails fixed to said side core stiles, said side core stiles provided with longitudinally extending grooves, a series of free core cross rails having tongues fitting in said grooves interposed between said fixed core cross rails, an expansion joint interposed between said fixed and free rails, and a covering for said door.

5. A non-warping flush door construction comprising side core stiles, spaced anchored cross stiles, free core cross rails interposed between the anchored cross stiles, an expansion joint interposed between said anchored cross stiles and free rails, said expansion joint comprising a pair of companion sections having their adjoining faces inclined from the outer side edges toward the center thereof, and with the outer side edges com-

ing flush together so as to provide a continuous unbroken surface for the application of veneers or other covering.

6. A non-warping flush door construction comprising side core stiles, spaced anchored cross stiles, free core cross rails interposed between the anchored cross stiles, an expansion joint interposed between said anchored cross stiles and free rails, said expansion joint comprising a pair of companion sections each having a dished-out portion formed upon the adjoining faces thereof.

7. A non-warping flush door construction comprising side core stiles, spaced anchored cross stiles, free core cross rails interposed between the anchored cross stiles, an expansion joint interposed between said anchored cross stiles and free rails, said expansion joint comprising a pair of companion sections, one section having a longitudinally extending tongue, the groove of one section being adapted to receive the tongue of the other section, said sections abutting along their longitudinal edges, and the adjacent faces of said sections being inclined from the side edges thereof toward the center to permit the sections to expand and contract relative to each other as the humidity increases or diminishes.

8. A non-warping flush door construction comprising side core stiles, cross rails anchored in cross relation upon said core stiles, unanchored cross rails interposed between said anchored cross rails, an expansion joint interposed between the anchored and unanchored cross rails, said expansion joint comprising a pair of companion sections each having a dished-out portion formed upon the adjoining faces thereof, said adjoining faces also having longitudinally extending grooves, a spline fitted in said grooves and having expansion movement therein for anchoring the sections of the expansion joint in assembled relation.

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