Dec. 11, 1951 G. S. GREEN ET AL 2,578,240

NONWARPING TRUSSED DOOR

Filed May 11, 1949

Fig. 1

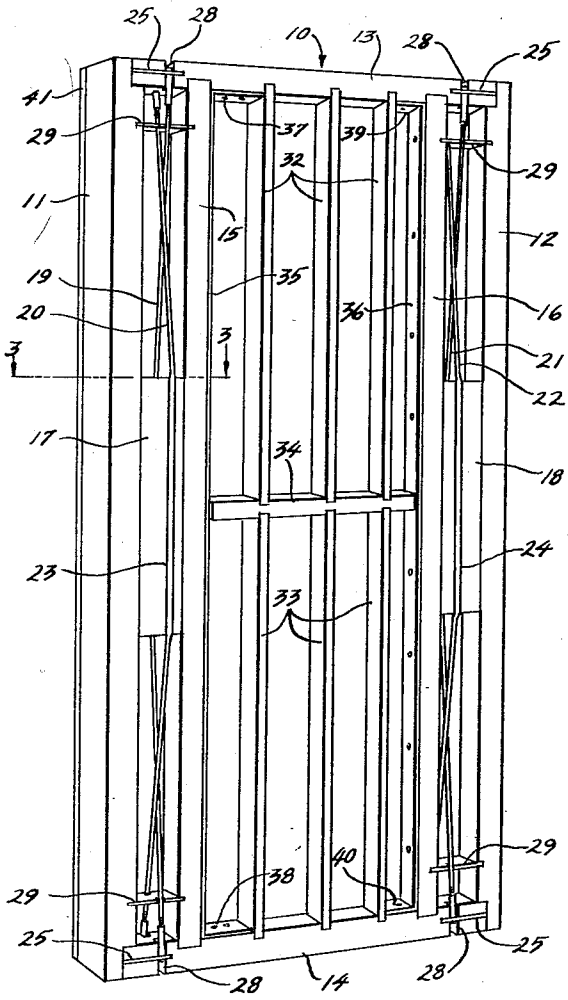


Fig. 2

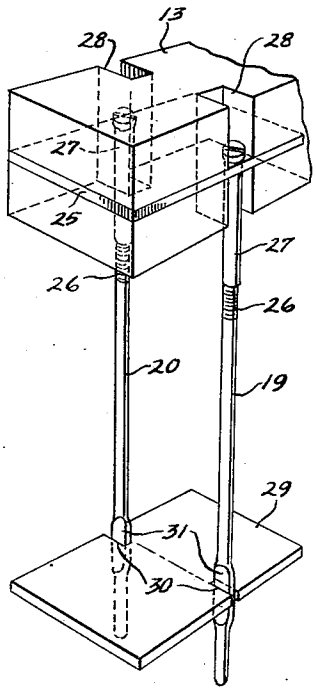
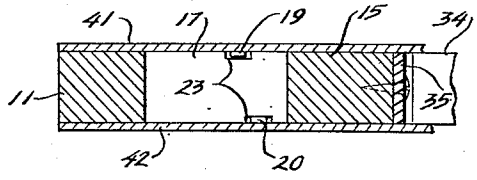


Fig. 3



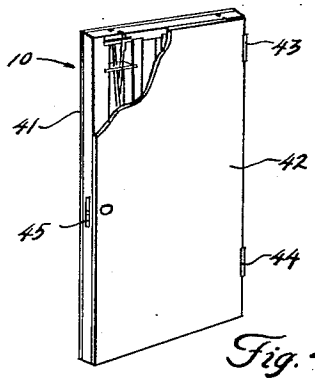


Fig. 4

INVENTOR.
GEORGE S. GREEN
LAWRENCE F. HOWATT
BY
H. G. Manning

Patented Dec. 11, 1951

2,578,240

UNITED STATES PATENT OFFICE

2,578,240

NONWARPING TRUSSED DOOR

George Schuyler Green, Cape Elizabeth, Maine, and Lawrence F. Howatt, Belmont, Mass.

Application May 11, 1949, Serial No. 92,694

5 Claims. (Cl. 20—38)

1

This invention relates to doors, and more particularly to a flush-type wooden door which is provided with adjustable means for counteracting warping stresses in said door.

Heretofore, a disadvantage of flush type wooden doors has been their tendency to warp under certain conditions. Even though the manufacturer might take great care to use well seasoned material, an inherent warping tendency was likely to develop frequently, so that it was not always possible to predict what the behavior of the doors would be after installation.

Furthermore, doors are frequently installed at locations in which their opposite faces are subjected to unequal conditions of moisture or temperature, thus causing the doors to warp despite the fact that they may have been made of well-seasoned wood.

Accordingly, one object of this invention is to provide a door which includes one or more adjusting devices which are adapted to maintain stresses in the door which are equal and opposite to warping stresses that may occur therein.

Another object is to provide a door of the above nature in which the adjusting devices are adapted to bend the door laterally of its plane, whereby the door may be held flat or selectively bent so as to conform to a warped door jamb.

Another object is to provide a door of the above nature in which the adjusting devices are entirely concealed and are so arranged as to avoid interference with the trimming and fitting of the door or with the installation of door hardware.

Another object is to provide a door of the above nature in which the adjusting devices comprise tension members which are so arranged as to provide a truss action which will restrain bending or warping of the door.

A further object is to provide a door of the above nature which will be simple in construction, inexpensive to manufacture, easy to install and adjust, compact, ornamental in appearance, and very efficient and durable in use.

With these and other objects in view, there has been illustrated on the accompanying drawing one form in which the invention may conveniently be embodied in practice.

In the drawing,

Fig. 1 is a perspective view of the improved door as it would appear with one face covering removed so as to show the interior construction.

Fig. 2 is a fragmentary view of a corner portion of the door on an enlarged scale, showing how the tension members are anchored.

Fig. 3 is a cross-sectional view taken on the line 3—3 of Fig. 1.

Fig. 4 is a perspective view of the door on a reduced scale, partly broken away, showing the door hardware applied thereto.

2

Referring now to the drawing, in which like reference numerals denote corresponding parts throughout the several views, the improved flush type door is provided with a rectangular frame 10 comprising a pair of stiles 11, 12, which are rabbeted at their inner corners so as to receive the ends of a top rail 13 and a bottom rail 14.

The frame 10 is also provided with a pair of inner stiles 15, 16 which are disposed in spaced parallel relation to the stiles 11, 12, and are secured at their ends in slots in the top rail 13 and the bottom rail 14.

In order to serve as bases for latch mechanism or other door hardware which may be mortised or otherwise attached at central edge portions of the door, provision is made of elongated lock blocks 17, 18, which are centered between the rails 13, 14, and are secured between the stiles 11, 12, and 15, 16, respectively. It will be noted that the provision of the lock blocks 17, 18 at both edges of the door will render the door reversible for purposes of installation, so that the latch mechanism may be applied to either edge of the door, while the vertical extent of said lock blocks will permit a substantial range in the height at which the latch mechanism may be applied.

In order to counteract warping tendencies and otherwise control bending of the door, the opposite vertical edge portions thereof are provided with adjusting devices comprising tension members or wires 19, 20, and 21, 22, respectively, which are disposed between the outer stile 11 and the inner stile 15, and between the outer stile 12 and the inner stile 16, respectively. The central portions of the wires 19, 20 are preferably flattened and are disposed in shallow vertical grooves 23 formed in opposite faces of the lock block 17, respectively, while the central portions of the wires 21, 22 are similarly flattened and are disposed in shallow vertical grooves 24 in opposite faces of the lock block 18.

In order to permit the wires or tension members 19, 20, 21, 22 to exert lateral forces upon the respective lock blocks 17, 18, said wires are disposed in crossing relationship above and below the respective lock blocks, and are secured to end portions of the top and bottom rails 13, 14 in such a manner that the ends of each wire are anchored adjacent one face of the door, while the central portion of the wire is bowed over its respective lock block and lies adjacent the opposite face of the door.

In order to anchor the ends of the wires 19, 20, 21, 22, the ends of the top and bottom rails 13, 14 are horizontally slotted midway of their thickness so as to receive four identical apertured metal anchor plates 25, one of which will be described with reference to Fig. 2. The ends of the wires 19, 20 are provided with screw threads

26 which are engaged by headed female anchor screws 27 extending inwardly through the apertures of the anchor plate 25—the sides of the rail 13 being provided with vertical side slots 28 to accommodate said screws 27, and also to permit access to the screw heads and thus permit manual adjustment of the wires 19, 20, as by means of a screw driver.

It will be noted that the anchor screws 27 are disposed in respectively offset relationship longitudinally of the rail 13, this arrangement being for the purpose of maintaining the crossing portions of the wires 19, 20 separated so as to avoid any noise that might otherwise result from vibration of the wires 19, 20 if said wires should lie in contact with each other.

Thus, it will be seen that the screws 27 may be turned in appropriate directions so as to tighten the wire 19 and loosen the wire 20, or vice versa, this operation resulting in a lateral force upon the lock block 17 for bending the door. However, in order to prevent the wires 19, 20 from twisting while the screws 27 are being adjusted, provision is made of horizontal guide plates 29, one of which is secured to the stile 11 and the inner stile 15 inwardly of the top rail 13 (Fig. 2), the facing surfaces of said stiles preferably being slotted to receive and hold the ends of said guide plate. The opposite edges of the guide plate 29 are provided with offset rectangular slots 30 which slidably and non-rotatably embrace flattened portions 31 of the wires 19, 20.

It will be understood that four of the guide plates 29 will be provided, one in each corner portion of the door for engaging flattened portions of the respective wires and thus preventing the wire ends from rotating during adjustment thereof by means of the screws 27.

The door shown herein is of the flush type, and is provided with a core structure in the form of a plurality of vertical upper and lower reinforcing members or strips 32, 33, which are secured above and below an intermediate rail 34, said strips being secured in slots in said rail 34, in the top rail 13, and in the bottom rail 14.

As a further deterrent against warping, the door may, if desired, be provided with a pair of rigid vertical metal members or bars 35, 36, which are secured against the inner surfaces of the inner stiles 15, 16 by any suitable means, such as screws, and which have inturned ends 37, 38, 39, 40, secured to the inner surfaces of the top rail 13 and the bottom rail 14.

The frame 10, the lock blocks 17, 18, the inner stiles 15, 16, the reinforcing strips 32, 33, and the intermediate rail 34 are of equal thickness and are so secured that their opposite edges are disposed in parallel planes, whereby flat coverings 41, 42 of any suitable material, such as plywood, may be applied thereto. The component parts of the door may be secured together by any suitable means, such as nails and glue.

Operation

In installation, the door herein disclosed may be fitted in the usual manner by trimming or planing the ends and edges of the door.

It will be noted that the anchor plates 25 and other metal parts in the door are located a substantial distance inwardly from the outer edges of the door, so that approximately one-third of the thickness of the stiles 11, 12 and of the rails 13, 14 may be trimmed away if necessary during the operation of fitting the door.

Hinge butts 43, 44 may be applied to one edge

of the door, while a latch mechanism 45 may be mortised into the opposite edge of said door.

All of the adjusting screws 27 preferably will have been so adjusted by the manufacturer as to hold the door perfectly flat. However, if the door is found to require adjustment at the time of installation, one or more of the screws 27 will be turned in the appropriate direction so as to bend the door as desired.

The tightening of any particular screw will, of course, reduce the concavity of the face of the door which is adjacent that particular screw.

Thus, for example, if the door is found to be warped so that the door covering 42 is concave, the tension member or wire 19 will be tightened by turning one or both of the screws 27 at its ends, thus drawing the lock block 17 (as seen in Fig. 1) toward the observer and forcing the top and bottom rails 13, 14 away from the observer. During this operation it may be found desirable to decrease the tension in the wire 20 slightly by adjusting the one or both of the screws 27 at the ends of said wire.

It will be understood that the wires 19, 20 may be adjusted so as to control bending of the door adjacent the stile 11, while the wires 21, 22 may be adjusted in a similar manner to control the warping of the door adjacent the stile 12. Inasmuch as the adjusting screws 27 are readily accessible, the door may be readily adjusted so as to overcome a warping tendency at any time subsequent to installation.

While the wires or tension members 19, 20, 21, 22 (and also the metal reinforcing members 35, 36) will tend to prevent warping of the door, it will be understood that warping stresses cannot be entirely resisted by non-adjustable reinforcing members because of the physical principle that any stress is necessarily accompanied by a strain. In the present invention, when warping occurs, it will merely be necessary to adjust the tension of one or more of the wires 19, 20, 21, 22 by means of the adjusting screws 27, thus furnishing the additional force necessary to bring the door back into a flat condition.

In some instances, it may be desired to employ the wires 19, 20, 21, 22 to produce a controlled warping of the door, as for example when it is desired to make the door fit against a warped door jamb. In this event, the screws 27 may be easily adjusted so as to make the door fit the jamb in the desired manner.

As an alternative arrangement, the door may be so constructed that the tension members or wires 19, 20, 21, 22 are disposed in non-crossing and approximately parallel relationship, whereby adjustment of said wires will produce a bending effect which is merely the result of tension changes adjacent opposite faces of the door.

While there has been disclosed in this specification one form in which the invention may be embodied, it is to be understood that this form is shown for the purpose of illustration only, and that the invention is not to be limited to the specific disclosure, but may be modified and embodied in various other forms without departing from its spirit. In short, the invention includes all the modifications and embodiments coming within the scope of the following claims.

Having thus fully described the invention, what is claimed as new, and for which it is desired to secure Letters Patent, is:

1. In a door, top and bottom rails, an outer stile, an inner stile spaced from said outer stile, a lock block secured between said stiles, a pair of sub-

stantially coextensive tension members, and means anchoring opposite ends of each member respectively to said top rail and to said bottom rail between said stiles, said tension members embracing said lock block and being held in oppositely bowed positions thereby, said anchoring means comprising devices for independently varying the tension in said tension members, whereby a warping tendency in the door may be counteracted.

2. The invention as defined in claim 1, wherein said top and bottom rails are engaged in rabbets in said outer stile, whereby the reaction of said tension members may be efficiently taken by said outer stile.

3. The invention as defined in claim 1, in which said anchoring means comprise an anchor plate mounted in a horizontal slot in one of said rails and having a pair of apertures, said one rail having vertical slots providing access to said apertures, and a pair of headed screws engaged in said apertures and having threaded engagement with adjacent ends of said tension members, whereby the tension in said tension members may be independently adjusted for bending the door.

4. The invention as defined in claim 1, in which said anchoring means comprise an anchor plate mounted in a horizontal slot in one face of said rails and having a pair of apertures adjacent opposite faces of the door, said one rail having vertical slots providing access to said apertures, and a pair of headed screws engaged in said apertures and having threaded engagement with adjacent ends of said tension members, said tension members crossing between said anchor plate and said lock block, whereby the tension in said tension members may be independently adjusted for bending the door.

5. The invention as defined in claim 1, in which central portions of said tension members are disposed in slots in opposite faces of said lock block, said door further including door coverings secured to opposite faces of said stile, said rail, and said lock block.

GEORGE SCHUYLER GREEN.
LAWRENCE F. HOWATT.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
138,611	Callanan	May 6, 1873
275,832	Lockwood	Apr. 17, 1883
819,876	Gifford	May 8, 1906
942,955	Bane	Dec. 14, 1909
1,239,582	Filzer	Sept. 11, 1917
2,078,207	Page et al.	Apr. 20, 1937
2,089,865	Voss	Aug. 10, 1937
2,368,935	Lodwig	Feb. 6, 1945