Sept. 16, 1952 C. B. HUIZENGA 2,610,369

DOOR CONSTRUCTION

Filed June 10, 1949

Fig. 1

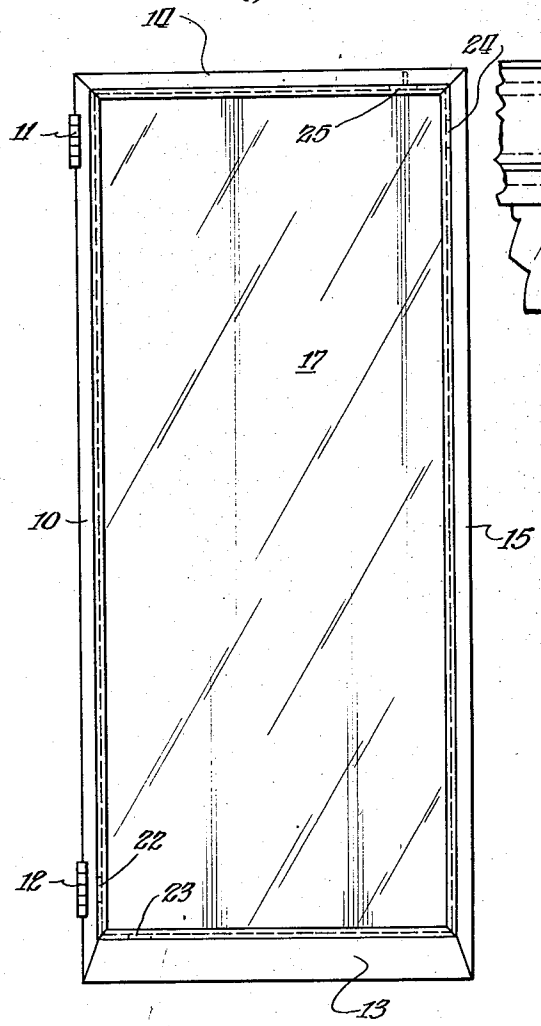


Fig. 2

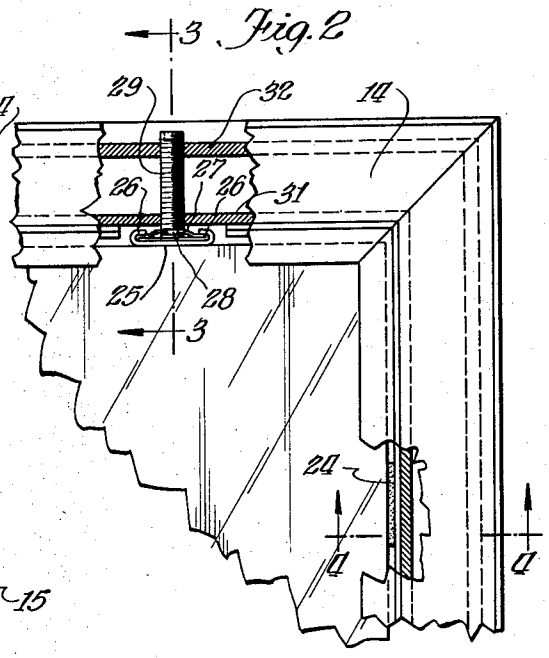


Fig. 3

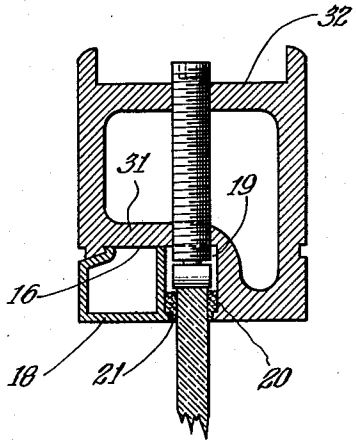
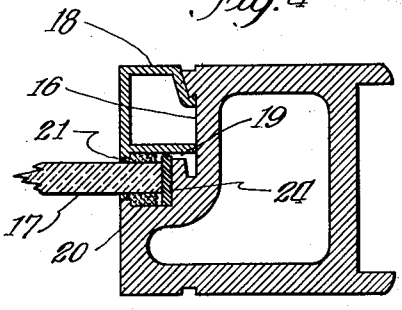


Fig. 4



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Patented Sept. 16, 1952 2,610,369

UNITED STATES PATENT OFFICE

2,610,369

DOOR CONSTRUCTION

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Application June 10, 1949, Serial No. 98,279

3 Claims. (Cl. 20—38)

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The present invention relates to door frames and has as its general aim the provision of an improved construction adapted to support a relatively large and heavy plate of glass in a frame having very narrow structural rails, yet having the several parts so constructed and related that the door is not unduly subject to sagging and may be quickly and easily adjusted to eliminate any sagging that should develop in use.

In the prior art it has been the universal practice in constructing door frames to provide a frame designed to avoid, so far as possible, any mechanical load or strain on the glass, since it has been heretofore believed that any load imposed on the glass would lessen the resistance of the glass to breakage. The present applicant has learned, however, that such is not the case, and has discovered that when the rails comprising the marginal structure of a glazed door are designed according to these teachings and the glass mounted therein in a firm but semi-resilient manner, the glass itself may be employed as a structural member and subjected to a substantial load without weakening it.

In the present teachings the glass is employed as a diagonal beam extending from the lower corner of the door on the hinge side to the upper corner on the outer side, with the marginal edges of the pane secured in metal channels but held out of contact with the metal by resilient glazing compound, and it has been found that when the glass plate is so mounted, it acts as a compression beam to support the weight of the door, yet does so without setting up any strains that tend to crack or break the pane.

In the preferred form of the invention illustrated in the drawings of this specification:

Figure 1 is a front elevational view of a door according to these teachings;

Figure 2 is an enlarged fragmental elevational view of the upper outward corner of the door illustrated in Figure 1, showing the junction between the rail on the outer or locking side of the door with the top rail, the view being partially broken away to illustrate the manner in which the glass is secured;

Figure 3 is a detail sectional view through the top rail showing an adjustable shim as contemplated by this invention, the view being taken substantially on the plane of the line 3—3 of Figure 2; and

Figure 4 is a detail sectional view through the rail on the outer or locking side of the door, the view being taken substantially on the plane of the line 4—4 of Figure 2.

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A door according to these teachings is ordinarily of rectangular form, having an inner or hinge side rail 10 mounted on supporting hinges 11 and 12, so that the rail 10 supports the entire door structure. The rail 10 has a bottom rail 13 secured at its lower end and extending outwardly in a direction generally parallel to the floor line, and a top rail 14 similarly disposed at its upper end. The outboard or locking side of the door comprises an outer rail 15 extending vertically between the top and bottom rails 14 and 13. In the practice of the invention these rails may be made of various materials, but in the preferred embodiment of these teachings they comprise extruded metal shapes of generally hollow configuration, as illustrated in Figures 3 and 4, and are ordinarily provided with a rabbet 16 on one side to permit the plate glass sheet 17 to be put in place, after which a metal molding 18 is applied and secured by screws or otherwise to maintain the marginal edges of the glass sheet 17 in a channel 19 extending around the entire inner edge of the frame structure.

In the prior art it has been common practice to secure the marginal edges of the glass in a channel of the frame by putty applied to fill the channels, but it has been learned that with this practice it is extremely difficult, if not impossible, to provide a door having narrow rails yet capable of maintaining level, non-sagging alignment. The present invention departs from prior teachings by suspending the glass in what may be termed a "free floating" mounting, where its edges are spaced from the frames around the entire margin of the pane, and are contacted only by relatively soft shims at the lower inner corner of the frame and at the outer upper corner. Thus the weight of the glass and frame, acting downwardly on the outer or unsupported lock side of the door, is carried to a substantial extent by the glass plate itself, which functions as a diagonal beam acting in compression between the inside lower corner and outside upper corner of the structure. In carrying out these teachings, it is preferable to provide glass mounting shims of soft lead, which is sufficiently solid to withstand the compression load, yet not so hard as to be apt to chip or damage the edges of the pane. These shims are mounted in pairs, located at the inside lower and outside upper corners of the channel 19 between the glass 17 and the rails 10, 13, 14 and 15. As seen in Figure 1, a fixed shim 22 is mounted near the lower end of the inner rail 10, while its coacting shim 23 is located at right angles thereto on the lower rail 13 near its inner end. A sta-

tionary shim 24 is mounted near the upper end of the outer rail 15, while an adjustable shim 25 is mounted near the outer end of the top rail 14. As shown, the shim 25 consists of a lead pad having its opposite ends 26 reversely bent over a supporting clip 27 rotatably mounted on an annular groove 28 formed in a machine screw 29, which is threaded through the opposite walls 31 and 32 of the top rail.

When the door is to be installed, the marginal frame comprising the rails 10, 13, 14 and 15 may be hung on the hinges 11 and 12 prior to the insertion of the glass. The glass pane is then placed in position and loosely secured by applying the removable molding 18 around the entire inner edge of the frame, inserting glazing springs on each side of the glass at spaced points, and applying glazing compound. It is to be noted, however, that the actual edges of the glass do not contact the metal frame at any point. The edges of the glass are sealed against the entrance of wind, dust, rain, etc., yet the glass is spaced away from the metal surfaces of the rail by the shims 22—23 at the lower inside corner of the door and the shims 24—25 at the upper outer corner thereof. The opposite face surfaces of the glass are held out of contact by the glazing springs, and by the resilient glazing compound which is applied as at 20 and 21.

The alignment of the door may be established by adjusting the screw 29, turning it inwardly until the rails 13 and 14 assume a true horizontal position without perceptible sag. The yieldable nature of the glazing compound allows it to flex sufficiently to permit adequate adjustment in this respect. Also, since the glazing compound does not enter between the edges of the glass and the bottom surfaces of the channels 19 of the frame rails, any sagging that may later develop, even after long continual use, may be corrected by again turning down the screw 29 to lift the frame rails with respect to the glass plate. This may be accomplished without materially disturbing the glazing compound applied at the points 20 and 21, since there is relatively little movement at these points and the compound itself is sufficiently yieldable to permit the movement required.

From the foregoing it will be seen that the present invention departs from prior teachings in that, instead of attempting to avoid applying any strains whatsoever in the glass plate of a glazed door, it deliberately utilizes the glass as the primary load carrying structural member. The glass is mounted in free floating position, supported only at diagonally opposite corners of the frame, so that it functions as a compression strut extending diagonally upward from the inner and lower corner to the outer and upper junction of the rails. By this expedient it is feasible to use rail structures that are less rigid than heretofore required and, consequently, may be made very much narrower to give improved styling and increased visibility, yet retain the necessary physical strength for accurate alignment.

In addition, the present teaching avoids difficulties of maintenance and permits easy re-adjustment of the alignment of the door structure which, in prior art constructions, has been accomplished only by entirely removing the glass and its retaining moldings, scraping out excess putty, realigning the door by application of external braces. and replacing the glass, putty and moldings after the adjustment has been made.

The form of the invention illustrated in the drawings of this disclosure is believed to be ideally suited to an explanation of the principles of the present invention, since it comprises a preferred embodiment now in commercial manufacture. It is not to be overlooked, however, that the precise details of construction and exact arrangement of parts illustrated may be varied somewhat without sacrifice of all of the advantages inherent in the inventive thought, and that modifications of the present teachings will be apparent to those skilled in the art. It is, therefore, pointed out that the teachings of this disclosure are for purposes of illustration rather than of limitation, and that the inventive concept extends equally to any variation or modification thereof within the terms of the appended claims.

Having thus described my invention, what I claim as new and desire to protect by United States Letters Patent is:

1. A door construction consisting of a rectangular frame having a vertical inner frame rail, with top and bottom rails supported wholly by said vertical inner frame rail and extending outwardly from the top and bottom of said inner rail, and an outer rail extending vertically between the outer ends of said top and bottom rails and supported wholly thereby; all of said rails having a channel along their inside edges; a rectangular sheet of plate glass received in and spaced from the bottom of said channel, and coacting sets of edge contacting glass supports diagonally disposed adjacent opposite corners of said glass, with one set of said edge contacting supports adjacent the junction of the lower end of the inner rail and the inner end of the bottom rail, and another set adjacent the junction of the upper end of the outer rail and the outer end of the top rail, whereby the glass is secured between said supports to function as a free floating diagonal compression member from the lower inner corner to the upper outer corner of the door; together with mechanical adjusting means for at least one of said supports to raise or lower the outer side of the door.

2. A door construction consisting of a rectangular frame having a vertical inner frame rail, with top and bottom rails supported wholly by said vertical inner frame rail and extending outwardly from the top and bottom of said inner rail, and an outer rail extending vertically between the outer ends of said top and bottom rails and supported wholly thereby; all of said rails having a channel along their inside edges; a rectangular sheet of plate glass received in and spaced from the bottom of said channel, together with glass retaining molding extending throughout the length of said channel of said rails; coacting sets of glass supporting shims diagonally disposed adjacent opposite corners of said glass, said shims consisting of a lower pair of relatively soft pads in the glass channel adjacent the lower end of the inner rail and the inner end of the bottom rail, and an upper pair of relatively soft pads in the glass channel adjacent the upper end of the outer rail and the outer end of the top rail, whereby the glass is supported between said shims to function as a free floating diagonal compression member from the lower inner corner to the upper outer corner of the door; together with mechanical adjusting means for at least one of said shims to adjust

its contact with the glass and raise or lower the outer side of the door.

3. A door construction consisting of a rectangular frame having a vertical inner frame rail, with top and bottom rails supported wholly by said vertical inner frame rail and extending outwardly from the top and bottom of said inner rail, and an outer rail extending vertically between the outer ends of said top and bottom rails and supported wholly thereby; all of said rails having a channel along their inside edges; a rectangular sheet of plate glass received in and spaced from the bottom of said channel, coacting sets of glass supporting shims diagonally disposed adjacent opposite corners of said glass, said shims consisting of a lower pair of relatively soft pads in the glass channel adjacent the lower end of the inner rail and the inner end of the bottom rail, and an upper pair of relatively soft pads in the glass channel adjacent the upper end of the outer rail and the outer end of the top rail; together with resilient glazing compound

between the opposite faces of the glass sheet and the edges of the glass channel whereby the glass is freely supported between said shims to function as a free floating diagonal compression member from the lower inner corner to the upper outer corner of the door, together with mechanical adjusting means for at least one of said shims to adjust its contact with the glass and raise or lower the outer side of the door.

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