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INSULATED PANEL DOOR

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9 Claims

This invention relates to door structures for closing building openings or the like and is more particularly concerned with improvements in a wooden door of panel type construction.

It has long been the practice in the construction of buildings to provide doors of various designs which are fabricated at the mill and supplied to builders for installation in the desired openings. Such door structures are customarily furnished in predetermined sizes and frequently in a package or assembly which includes a pre-fabricated and sometimes pre-assembled mounting frame for installation in a roughed in opening in a building wall. When such doors are employed for closing an opening in an outside wall, there is, in most locations, a problem of providing adequate insulation against the passage of heat through the opening. Generally the door does not have sufficient insulating properties to be used alone and most often a storm door is considered necessary, especially in those areas where there is a winter period with low temperatures for an appreciable length of time. Some types of doors are now being installed which provide sufficient insulation to eliminate the need for a storm door. These door structures are, however, flush type, solid wood, metal or composite material doors which generally have uniform thickness. In the standard construction of a wooden panel door, especially for outside use, stiles and rails are of substantial thickness which leaves a wood section of approximately one-quarter inch at the juncture of the panel with the stile and rails. Under extreme cold temperatures it is possible for moisture to condense on the inside of this portion of the panel door or for frost to form thereon. The general object of the present invention is to provide a panel type wooden door in which the panels are so constructed that the overall insulation value of the door is comparable to that of a flush type solid wooden door having a thickness corresponding to the thickness of the stiles and rails.

It is a more specific object of the invention to provide a panel type door construction for closing an opening in a building wall in which wooden stile and rail members of substantial thickness are employed with panels of special construction which are of substantially lesser thickness and which are so constructed and installed in the stile and rail frame work that the door has substantially uniform insulating properties corresponding approximately to the insulating properties of a flush type solid wooden door having the same thickness as the stiles and rails.

It is a still more specific object of the invention to provide a panel type wooden door structure having stiles and rails of substantial thickness so as to provide adequate insulation properties and panel members set in the framework of the stiles and rails which are multiple construction with one of the plies being formed of a closed cell rigid foamed plastic material having a higher insulating value than wood and with the panels being sealed in the panel openings by strips of resilient foamed plastic which maintain the seal of a panel to the door frame work while allowing for some expansion and contraction of the panel.

It is another object of the invention to provide a paneled door of wood construction for closing an opening which is especially constructed and provided with magnetic edge seals so as to obtain a tight well insulated closure.

These and other objects and advantages of the invention will be apparent from a consideration of the door construction which is shown by way of illustration in the accompanying drawings wherein:

FIG. 1 is an elevation showing the interior face of a panel door installation; and

FIG. 2 is a partial cross section taken on the line 2—2 of FIG. 1 to an enlarged scale; and

FIG. 3 is a fragmentary cross section taken on the line 3—3 of FIG. 1 to an enlarged scale.

Referring to the drawings there is illustrated in FIG. 1 a panel type wooden door mounted in wooden framing in a wall opening which incorporates the principal features of the invention. While a particular panel design or arrangement is shown, it is contemplated that various other panel arrangements may be employed, the illustrated design being frequently used in door structures provided for colonial or traditional style home dwellings.

The door 10 is mounted in a frame 11 for swinging movement on hinges 12 in the opening 13 about the sides and top of which the inner margins of the framing 11 extends. The illustrated door structure is fabricated with stile members 14 and 15 connected by top, bottom and intermediate cross rails 16, 17 and 18, and with rectangular panel openings 20 of the desired number and shape depending upon the panel design employed. The panels 21 which are set in the openings 20 have the same construction, with the size and shape determined by the size and shape of the openings 20. Each of the panels 21, in the form shown, is constructed of the same materials and is mounted in the associated opening in an identical manner, as illustrated in FIG. 2 of the drawings. The stiles 14, 15 and cross rails 16, 17 and 18 may be formed of glued up sections and covered with a suitable veneer facing as shown at 22 and 23 in FIG. 2. The edges defining each of the panel openings are provided with a continuous groove 24 for receiving the marginal portions of the panel 21.

The panel 21 comprises three plies of material consisting of outer plies 25 and 26 of wood and an inner ply 27 of a material having a greater insulating value than wood. In addition, a vapor barrier forming member 28, in the form of a sheet or film material, for example metal foil or plastic film, is preferably sandwiched between the two wooden plies, 25 and 26 with the vapor barrier 28 between the interior wooden ply 25 and the center ply of insulat-
"hip raised" panel shaping, indicated at 25' and 26' at their margins with the edge portions thereof seated in the groove 24. The groove 24 is provided with a resilient top of foam plastic strip 29 to effect a seal between the marginal edge of the panel 21 and the bottom of the groove 24. The width of the groove 24 and the thickness of the panel 21 at the margin of the latter is substantially less than the thickness of the stile and rail members due to the shrinkage which may occur on the formation of the panel marginal portions at 25' and 26'. The insulating material constituting the panel center ply 27 is selected so as to provide at the thinnest panel section an insulating value approximating the insulating value of the thicker stile and rail. The insulating material employed is preferably a "closed cell" rigid foam plastic formed into a center ply 27 of substantial thickness which is laminated between the wood plies 25 and 26.

The door structure 10 is preferably prefinished on the exterior face thereof with a durable exterior finish having a high degree of impermeability to moisture. The interior face is preferably treated with a clear sealer to retard moisture intake after manufacture and before final job finishing which may then be conventional stain, paint or the like.

To secure the best seal possible between the door 10 and the frame 11 the door is provided about its side and top edges with an insert 30 of steel, or the like, to form an attachment or a dustproof weatherstrip 31 which is of special construction. The insert 30 is seated in a groove or recess 32 which is cut in the edge of the door 10, about the top and sides thereof. The weatherstrip 31 which is designed to extend along the top and the strike jamb 33 (FIG. 2) of the frame 11 is extruded integrally with a semi-rigid "PVC" vinyl stop cover 34 adapted to cover exposed faces of the stop member 35 which is secured to the jamb 33 as shown. The weatherstrip 31 comprises a tube portion 36 of rectangular cross section in which a magnetized strip 37 is encased and a flexible connecting tube portion 38 which mounts the same on the edge of the stop cover 34 confronting the edge of the door 10. A weatherstrip 40 (FIG. 3) of similar construction but having an insert 41 of compressible material is provided on the edge of the stop member 42 which extends along the hinge jamb 43. The weatherstrip 40 is extruded as an integral portion of a semi-rigid vinyl stop cover 44 for the stop member 42. The seal is completed by the use, at the bottom of the door, of a conventional threshold sealing assembly having compressible inserts or fingers of vinyl plastic or similar material.

While particular materials and specific details of construction are referred to in describing the form of the invention which is illustrated it will be understood that other suitable materials and equivalent structural details may be resorted to within the spirit of the invention.

1. A panel type wooden door which is constructed so as to provide a stile and rail frame with panel insert members set in panel openings in said frame and having uniform heat insulating properties, said door comprising wood stile and rail members of substantial thickness and panel insert members set in panel openings which are surrounded by the stile and rail members, said panel insert members having portions thereof with a thickness substantially less than the thickness of the stile and rail members, each of said panel members being formed at least in part of materials having heat insulating characteristics substantially greater than wood and being arranged so as to provide the portions thereof which have the least thickness with heat insulating properties approximating the heat insulating properties of the wood stile and rail members which are of substantially greater thickness and which surround the opening in which the panel insert member is mounted.

2. A panel type wooden door as set forth in claim 1 and the panel members each comprising a lamination with one of the plies having insulating properties substantially greater than the insulating properties of wood.

3. A panel type wooden door as set forth in claim 1 and each of said panel members comprising at least three plies of material with one of the plies constituting a core of rigid foam type insulating material.

4. A panel type wooden door as set forth in claim 1 and each of said panel members comprising a three ply insulating material which includes a core forming center ply of rigid foam insulation which is sandwiched between two outer wood plies.

5. A panel type wooden door as set forth in claim 1 whereof the panel members are laminations of relatively thin wood and insulating panel material with the insulating panel sandwiched between outer wood panels and with a vapor barrier forming sheet material disposed between the insulating panel and one of the wood panels.

6. A panel type wooden door as set forth in claim 1 and a resilient seal forming strip between the peripheral edge of each panel and the portions of the stile and rail members defining the associated panel opening.

7. A panel type wooden door which is constructed so as to provide the same uniform insulating properties, said door comprising a frame formed by wood stile and rail members of substantial thickness and panel members set in panel openings defined by the stile and rail members, the edges of the stile and rail members defining the panel openings having grooves of substantial depth in which the margins of the panels are seated, said panel members having marginal portions thereof outside of said grooves with a thickness substantially less than the thickness of the adjacent areas of the stile and rail members, said panel members being formed, at least in part, of materials having insulating characteristics substantially greater than wood and being arranged so as to provide the portions thereof which have the least thickness with insulating properties approximating the insulating properties of the thicker wood stile and rail members surrounding each opening in which a panel member is mounted and a seal forming member in said groove for sealing between the peripheral edges of the panel and the bottom of the groove.

8. A panel type wooden door as set forth in claim 7 and said panel members each comprising a three ply lamination which includes a core forming center ply of rigid foam plastic type insulating material which is sandwiched between two outer wood plies.

9. A panel type wooden door installation mounted in a frame wherein the door is constructed so as to provide the same uniform heat insulating properties, said door comprising stile and rail members of substantial thickness and having panel openings in which panel members are set, the edges of the stile and rail members which define the panel openings having grooves of substantial depth in which marginal portions of the panels are seated, said panel members having marginal portions thereof disposed outside of said grooves which marginal portions have a thickness substantially less than the thickness of the stile and rail members, said panel members being formed at least in part of materials having insulating characteristics substantially greater than wood and being arranged so as to provide the portions thereof which have the least thickness with heat insulating properties approximating the insulating properties of the thicker wood stile and rail members surrounding each opening in which a panel member is mounted, a resilient seal forming member in said groove for sealing between the peripheral edge of the associated panel member and the bottom of the groove, a magnetic type weatherstrip mounted along the top and sides of the frame in which the door is mounted and a ferrous metal strip on the corresponding edges of the door for cooperation with said magnetic weatherstrip to seal the door in the frame when it is closed.

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