United States Patent [19]

Difazio

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[45] **Jan. 22, 1974**

[54] **CORED INSULATED DOOR**

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[73] Assignee: **Acorn Products Company,** Detroit, Mich.

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[21] Appl. No.: **216,053**

[52] **U.S. Cl.** **52/619,** 52/573, 52/620

[51] **Int. Cl.** **E04b 1/68,** E04b 2/28

[58] **Field of Search** 52/615, 619, 620, 573, 398, 52/399, 403

[56] **References Cited**

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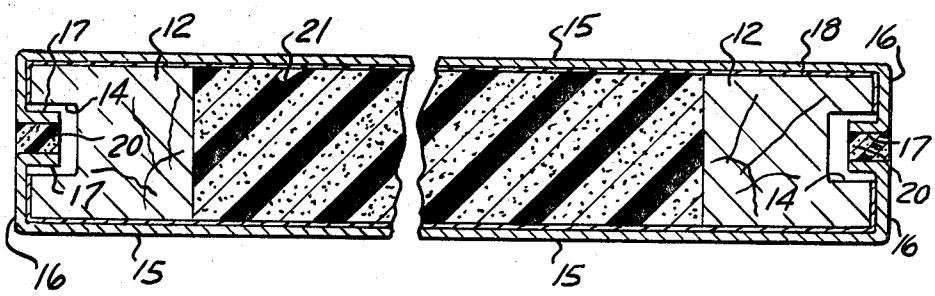
Primary Examiner—Henry C. Sutherland

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[57] **ABSTRACT**

A slab door formed of a wood frame having a wide, deep, vertically extending groove formed in the exposed edges of each of the opposite vertical frame stiles, and each face of the frame being covered by a thin sheet of metal whose opposite vertical edges are bent into flanges covering the stile edges and loosely extending into their adjacent groove. The adjacent pair of flange portions within each groove are spaced apart and bonded together by a plastic filler material. Thus, a rigid slab unit is formed by the sheets of metal bonded together at their vertical edge flanges and adhesively secured to the frame, with the sheets being thermally insulated from each other by the plastic material which also seals the vertical edges of the slab against moisture penetration.

1 Claim, 6 Drawing Figures



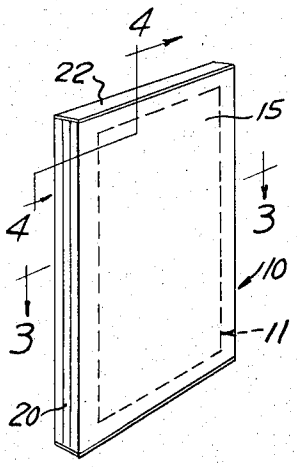


FIG. 1

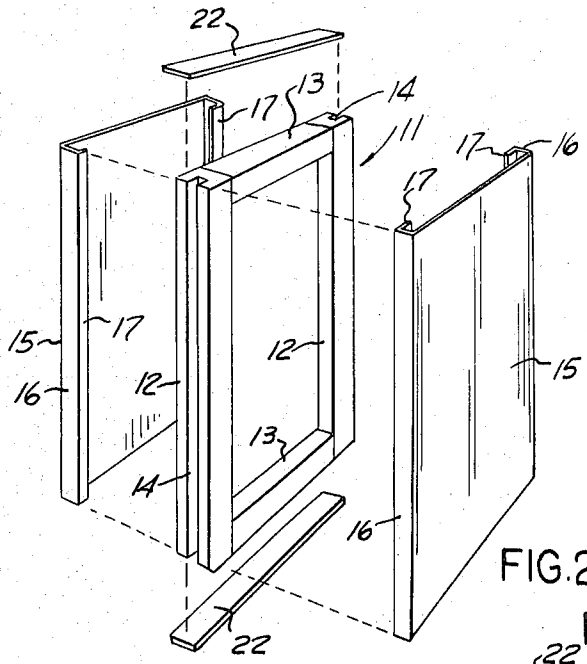


FIG. 2

FIG. 3

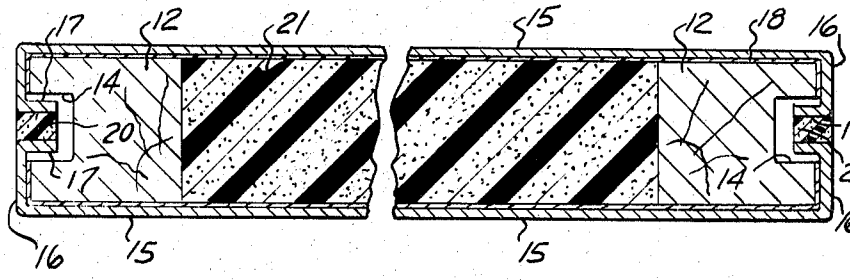
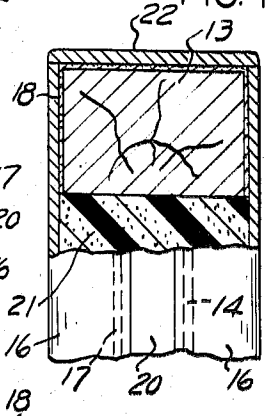


FIG. 4



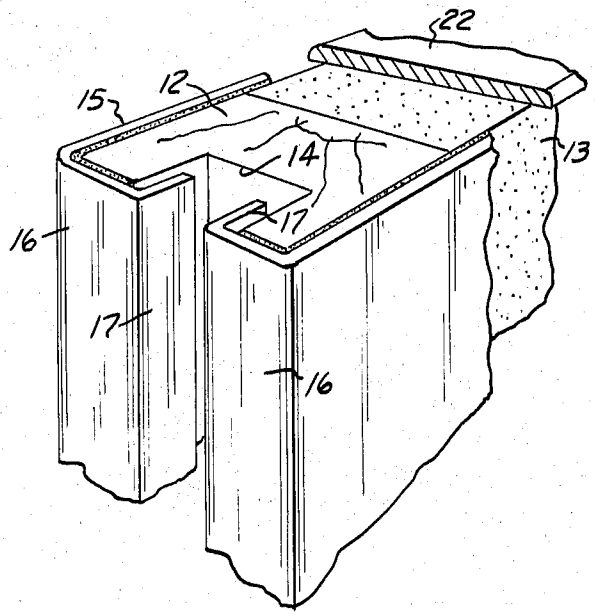


FIG. 5

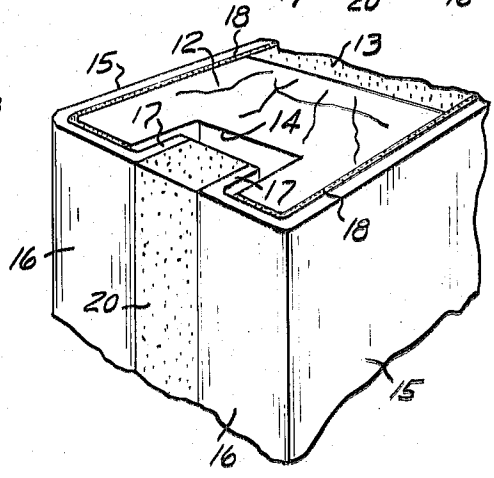


FIG. 6

CORED INSULATED DOOR

BACKGROUND OF INVENTION

The invention herein relates to an improvement of the type of slab doors illustrated, for example in the Patent to Pease, No. 3,153,817 issued Oct. 27, 1964. In this type of construction, a slab door is formed of a wood frame with a sheet metal facing on the opposite sides of the door and with the interior of the frame, between the sheets of metal, filled with a foamed plastic material. The opposite edges of the sheets are bent into flanges around the vertical exposed edges of the frame stiles and are bent into vertically extending channels formed in the stiles. The purpose of such groove is to space the edges of the sheet metal facings away from each other to prevent heat transfer and thereby form a thermal seal.

In such type slab door construction, it is necessary to accurately dimension the sheet metal edge flanges as well as the grooves in the stiles in order to assemble and hold the parts together. Moreover, the parts are movable relative to each other under heavy strain or load so that the slab unit is not as rigid as would be desirable. In addition, the groove forming gap between the sheet metal facings, tends to accumulate dirt and moisture which ultimately works its way between the sheet metal facings and the wood frames thus causing decaying of the slab unit.

Thus, the invention herein relates to an improvement in the foregoing type of slab door construction which obviates many of the above problems.

SUMMARY OF INVENTION

The invention herein contemplates forming a rigid slab door unit out of a wood frame covered with sheet metal facings, with the opposite edges of the sheet metal bent into flanges fitted into vertically extending grooves formed in the stiles of the wood frame. The grooves are made relatively wide and deep, with wide dimensional tolerances and the flanges loosely fit into them. Thereafter, the adjacent facing portions of each pair of flanges are bonded togehter with a strong, positively acting bonding material to thus not only seal the groove, but also rigidly interconnect the sheet metal facing pieces together. In addition, the sheet metal facings are adhesively secured to the wood frame so that the entire unit is rigid, sealed together to prevent moisture penetration and the opposite sheet metal facing pieces are thermally insulated from each other.

With this construction, wide dimensional tolerances are permissible in forming the flanges and grooves, eliminating the need for accurate construction, while still insuring a rigid slab unit.

These and other objects and advantages of this invention will become apparent, upon reading the following description, of which the attached drawings form a part.

DESCRIPTION OF DRAWINGS

FIG. 1 is a perspective view of a slab door unit.

FIG. 2 is a slightly enlarged disassembled perspective view of the parts forming the slab door.

FIG. 3 is an enlarged cross-sectional view taken in the direction of arrows 3—3 of FIG. 1.

FIG. 4 is an enlarged, partially cross-sectioned view taken in the direction of arrows 4—4 of FIG. 1.

FIG. 5 is an enlarged perspective view of the upper left hand corner of the slab unit as illustrated in FIG. 1, but with the bonding material not yet installed, and

FIG. 6 is a view similar to FIG. 5, but showing the complete bonding installation.

DETAILED DESCRIPTION

The slab door unit **10** is formed of a wood frame **11** which comprises vertical wood stiles **12** joined to upper and lower horizontal wood stiles **13** to form the rectangular inner frame. Additional rails may be provided for reinforcement, as necessary, and for mounting of locks, handles and the like.

Grooves **14** are formed in the vertical, opposite or exposed outer edges of the stiles and extend the full height of each of the stiles.

The opposite faces of the frame **11** are covered with thin sheet metal pieces **15**, each having its opposite edges bent into edge flanges **16** terminating in inwardly extending, bent edge flange portions **17** which are approximately parallel to the plane of the sheet metal.

The metal sheets are adhesively bonded to the wood frame by means of a suitable adhesive **18** and their edge flange portions **17** each extend into their adjacent groove **14**. As illustrated in FIGS. **3** and **5**, the edge flange portions **17** are loosely inserted within the grooves with the grooves being deeper and wider than the flanges so as to readily compensate for misalignment or inaccuracies in dimension.

After assembly of the sheet metal facing pieces adhesively upon the frame, the space between the bent edge flange portion **17** at each of the opposide edges of the slab is filled with a thermoplastic bonding filler material **20** to fill the space from top to bottom of the door and from side to side of the space between the flange portions. The thermoplastic bonding material **20** is characterized by being relatively viscous or gummy and self-bonding or adhering to the metal flange portions. A number of commercially available plastic materials may be used, as for example from those selected among the polyurethanes which may be manually applied while viscous, like a strip of rope, and which will cure and bond firmly to the sheet metal to form a strong joint therewith. Another suitable plastic is an epoxy based material, which is thermosetting. An example of such material is commercially available from Products Research & Chemical Corporation, and identified by the trade designation of RE-150-61, which is characterized by air curing in roughly 24 hours at room temperature to form a hard, solid filler.

Where desired, the slab may be filled with a suitable foam plastic filler **21** within the frame and between the metal sheets and bonded thereto to thereby further rigidify and solidify the slab. In addition, upper and lower cap strips **22** are adhesively or mechanically fastened to the upper and lower edges of the slab, namely the exposed upper and lower edges of the respective rails **13**.

To manufacture the foregoing slab unit, first the frames are formed out of suitable wood strips with the stiles grooved and thereafter the sheet metal facing pieces are applied. The bonding material is then inserted within the space between the adjacent flange edges for solidifying and bonding thereto. Where the foam filling is applied within the slab interior, it may be applied by inserting unfoamed beads of foamable polyurethane or the like plastic which may then be foamed in place by the application of heat to the completed

slab for expansion and filling the spaces within the slab and bonding to the metal.

The complete slab unit is rigid, with the metal facings bonded together at their edges to provide a rigid exterior skin but with the bonding material providing a wide thermal joint between the opposite surfaces of the slab to reduce heat transfer therebetween, as well as to seal the edges against moisture penetration.

Having fully described an operative embodiment of this invention, I now claim:

1. In an insulated sheet metal slab door formed of a rectangular shaped wood frame comprising a pair of vertical stiles joined together at their upper and lower edges by horizontal rails, with the opposite vertical exposed edges of the stiles each having a central vertical groove extending the full height thereof, and each of the opposite vertical faces of the frame covered by a thick sheet of metal, which sheets overlap and are adhesively secured to the faces of the stiles and rails, and with the opposite edge portions of each of the sheets bent approximately perpendicular to the planes of the sheets to form edge flanges overlapping their adjacent stile exposed edges up to the groove, the improvement comprising:

each of the free edges of said flanges being bent approximately perpendicularly thereto and inwardly relative to their respective stiles to form a flange edge portion arranged approximately parallel to the plane of the sheets and loosely inserted within its adjacent stile groove, with the grooves having side walls which are roughly parallel to said flange edge portion and with the grooves being of sufficient width so that the adjacent flanges edge portions are horizontally spaced apart from each other a considerable distance, and each flange edge portion is also spaced a considerable distance away from its adjacent groove side wall;

and with the grooves being of sufficient depth so that said edge portions terminate at a considerable distance away from the bottoms of their respective grooves;

and with the space between each pair of flange edge portions being substantially filled with a heat insulating plastic material which is positively bonded to the opposing faces of said pairs of flange edge portions for the full height of the stile and substantially the full depth of said flange edge portions, with the flange edge portions being otherwise free of and spaced away, by open spaces, from the side walls and bottoms of the grooves;

and upper and lower end cap strips secured to and enclosing said horizontal rails and said vertical stiles;

and plastic material bonded to the opposing sheet metal faces, filling the space between the sheets and within the frame;

whereby a rigid structural slab unit is formed of the two sheets of metal secured together, along their vertical flange edge portions, and adhesively secured to the frame, and wherein the plastic material forms a heat insulating joint between the adjacent vertical edges of the sheet and also seals the vertical edges of the slab including the stiles and the grooves therein against moisture penetration.

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