March 29, 1966 A. MANDELBAUM 3,242,629

DOORS

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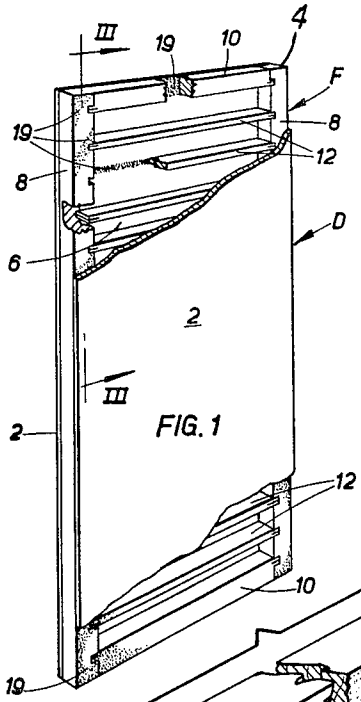


FIG. 1

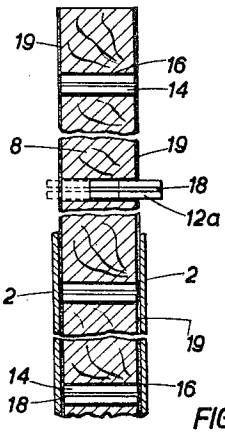


FIG. 3

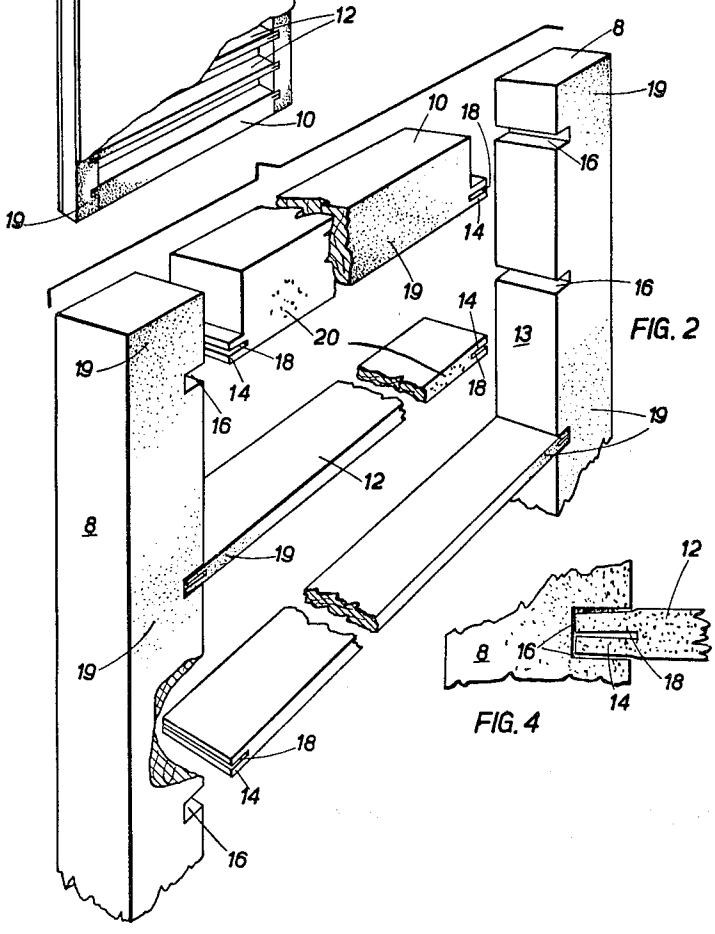


FIG. 2

FIG. 4

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DOORS

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The present invention relates to doors of the type commonly known as slab doors wherein a peripheral hollow sub-frame reinforced by a contained filler is sandwiched between a pair of panels which sheathe the frame and constitute the surface members of the door, and which may be of plywood or any other panel material suitable for doors of this type.

More particularly, the invention relates also to improvements in the frames for such doors as well as in the methods for making them.

Since the essential structure of a slab door is concealed behind the panels, manufacturers have, from time to time, resorted to certain economies in the construction thereof particularly in respect of the frame. Unfortunately, however, the stability of its frame is a major factor in the durability of a door as a whole. In consequence, economies effected by eliminating frame reinforcement were very often prejudicial to the resulting door.

As an example, wood reinforcement is generally preferred over other types in the frame under present consideration. However, reasons of economy have frequently dictated the replacement of wood reinforcement by other substances, for example, fibre board and paper "honeycomb." Such replacements were not, however, always on account of savings on material alone but also very often to save the labour involved in installing a reinforcing wood filler in the frame.

It is therefore a general object of the invention to provide a novel, simple and economical method of slab door manufacture which produces a durable, stable and strongly reinforced door, and permits the economical use of wood throughout the frame construction.

More particularly it is an object of the invention to provide an improved method of slab door manufacture permitting the simultaneous interfastening of all parts of the door, including the individual frame components, and the panelling sheathing the frame.

It is a further object of the invention to provide a method as aforesaid which permits a frame including a filler to be pre-assembled and held together frictionally while said frame is sheathed; the sheathing then serving also to interfasten the several parts of the frame to each other and to the panelling.

It is a further object of the invention to provide a method as aforesaid permitting a wooden filler to be embodied economically and effectively in said frame.

It is a further object of the invention to provide a method as aforesaid wherein the frame components are dimensioned and adjustable in the direction of the thickness of the door to enable them to be aligned in mutually flush relation before being interfastened by the sheathing of the frame.

It is a further object of the invention to provide a method as aforesaid permitting said frame components to be aligned in mutually flush relation during application of an adhesive thereto for the attachment of said sheathing, or during application of the sheathing itself.

It is also an object of the invention to provide a door manufactured by methods as aforesaid.

It is also an object of the invention to provide a frame for use in a door produced by the various methods of door making aforesaid.

The above and other objects are achieved in accordance with the invention by the provision of a slab door frame having frame members frictionally interconnected in frame formation, said frame members being equi-dimensional in the direction of the thickness of the frame and being movable in that direction for alignment in flush relation with each other while thus interconnected. A door is formed by sandwiching such frame between panels, said panels securing said frame members to each other.

The foregoing and other objects of the invention more or less broad than those above set forth will be apparent from the hereinafter following description of the elements, parts and principles constituting the invention, a preferred embodiment whereof is illustrated in the hereunto annexed drawing by way of example only wherein like reference devices refer to like parts throughout the several views and wherein:

FIG. 1 is a perspective view of a slab door in accordance with the invention, part of the panelling thereof being cut away to show the frame and parts being broken to expose structural details thereof;

FIG. 2 is an exploded view on a larger scale and in perspective showing certain parts of a frame for a slab door in accordance with the invention;

FIG. 3 is a section along the line III—III of FIG. 1 but on the same scale as FIG. 2 with broken and full lines illustrating alternative positions of one of the parts, and

FIG. 4 is a fragmentary view on a still larger scale showing an exemplary connection between two parts of the frame of FIG. 2 slightly loosened for the sake of clarity.

The slab door D of the invention consists essentially of the frame F sheathed by plywood panels **2—2**, being shown in FIG. 1 with one of the panels **2** partly broken away to reveal otherwise hidden structural details of the frame F.

The frame F, in its turn, comprises a hollow rectangular sub-frame **4** constituting the edges and ends of the door D, and a filler **6** contained therein, the members of the sub-frame **4** and the filler **6** being interfastened by and with the panels **2—2**.

More particularly, the sub-frame **4** is comprised of stiles **8—8** linked at each end in spaced parallel relation by rails **10—10**. Ribs **12** disposed between and parallel to the rails **10—10** also link the stiles **8** and constitute the filler **6** for the sub-frame **4**. The stiles **8—8**, therefore, constitute the longitudinal members or edges of the frame F while the rails **10—10** and ribs **12** are the transverse members thereof.

The stiles **8—8** and transverse member **10–12** are equi-dimensional in depth or in the direction of the thickness of the door and have frictional, tongue and groove interconnections, to be described, allowing relative movement therebetween in the direction aforesaid. Such relative mevement allows the stiles **8** and transverse members **10–12** to be aligned in flush relation to each other without disconnection, i.e. while still interconnected with each other, for a purpose which will appear.

Specifically, the confronting faces **13—13** of the stiles **8—8** are transversely grooved at intervals to provide housing for tongues **14** at the respective ends of each of the transverse members **10–12** spanning the frame F.

For convenience of reference the term "depth" is used in the present description and in the claims appended thereto to denote that dimension of the several elements which extends in the direction of the thickness of the door. Thus the depth of one of the rails **10** for example, is deemed to be the dimension between the opposed surfaces **20** thereof. To avoid confusion this is the only sense in which said term has been used herein.

The grooves **16** in the stiles **8—8** are continuous and extend across the full depth of the stiles, as will be apparent from FIG. 2, and the tongues **14** are preferably integral with and substantially continuous across the full depth of the transverse members **10–12** as shown.

For obviously advantageous reasons, each tongue **14** should fit relatively snugly in its groove **16** and in this embodiment this objective is achieved by rendering the tongue **14** resilient on the one hand and by slightly narrowing the groove **16** on the other. In the present instance, the tongues **14** are respectively rendered resilient by kerfing **18** which bifurcates the tongues **14** and imparts the requisite yielding properties thereto so that they, the tongues **14**, will be compressed slightly on entering the undersize grooves **16** somewhat as shown in FIG. 4 and will be retained therein by their own resilience. It should be observed here that the deformation of the tongue **14** of FIG. 4 has been exaggerated for obvious expository reasons.

Preferably, the saw kerf **18** in each tongue **14** is somewhat more extensive in the direction of the width of the door than the groove **16** which houses the tongue **14** and preferably the grooves **16** on each stile **8** are parallel to each other as shown.

The positioning of the tongues **14** on the rails **10—10** and of the co-operating grooves **16** in the stiles **8—8** is shown in FIGS. 1 and 2 and is such as to ensure that the ends and edges of the door, jointly forming the exterior perimeter thereof, are respectively flat, as shown, when the door is assembled.

It will now be seen that when the transverse members **10–12** are assembled with stiles **8—8** to form the frame F, their respective tongues **14** will be gripped more or less firmly by grooves **16** in which they are engaged, thus maintaining the parts in interconnected and interlocked relation. In addition, it will also be understood that notwithstanding the firmness of the grip aforesaid, these parts will yet retain a degree of movability sufficient to enable the tongues to be moved bodily along the grooves and to enable the said pre-sized transverse members **10–12** to be adjusted into an unstressed, precisely flush relation with each other and with the stiles **8—8** so that when the frame F is sheathed as illustrated in FIG. 1, the plywood panels **2—2** will effect total contact with the aligned and flush surfaces of all of the transverse members and stiles.

It will be apparent and it is noteworthy at this juncture that the frictional interlocking of stiles **8—8** with transverse members **10–12** vests the pre-assembled frame F with a degree of inherent stability which enables it to be handled as a unit notwithstanding that the parts are not actually interfastened together but only interconnected as aforesaid. It will also be apparent that once the stiles **8—8** and transverse members **10–12** have been brought into flush alignment they are frictionally retained in this condition by the frictional engagement between the tongues **14** and grooves **16**.

Conversely, the fact that the parts remain inter-engaged as aforesaid permits them to be inter-fastened with each other simultaneously and contemporaneously with the sheathing of frame F by panels **2—2**.

In the present example, the said panels **2—2** are secured to frame F by an adhesive; modern adhesives being able, as is well known, to form bonds equalling or even exceeding the inherent strength of the bonded substances.

The adhesive **19** may first be applied to the frame surfaces marked **20** on both sides thereof; panels **2—2** being then pressed into contact therewith; the frame F being held simultaneously under pressure to maintain it in assembly. Rib **12** has been partly broken away in FIG. 1 to show a strip of adhesive **19** on the panel **2** behind said rib whereby said frame surfaces **20** are thus secured to the panels **2—2** and the frame parts are securely interfastened with said panels **2—2** and, therethrough to each other.

The importance of the flush alignment of the parts will now be apparent, it being obvious that a part which is too low in the assembly will escape interfastening while a higher part may prevent others from being engaged and interfastened by panels **2—2**.

The flush alignment of the parts and the application of the adhesive **19** thereto may be effected in a single operation, if desired, for the sake of greater economies. In FIG. 3, a rib **12*a*** of the assembled frame F is shown by full lines and broken lines in two possible non-flush positions. If adhesive **19** is to be applied first to the right-hand face of the frame (as viewed in FIG. 3) the frame is initially laid with its left-hand face in contact with a flat surface. Consequently said rib **12*a*** in the broken line position would, by contact with said surface, be displaced from such position into a position wherein it is flush with the stiles **8—8**. Adhesive **19** may then be applied, for instance by roller, to all the aligned frame surfaces **20** on the right-hand face of the frame.

Conversely a rib **12*a*** in the full line position of FIG. 3 would be pressed back flush with the stiles **8—8** by contact with the adhesive roller, or it may be pressed back by contact with a panel **2** as the latter is applied to the frame F.

As a result, the plywood panels **2—2** in the door D sandwich the frame F and are secured thereto over the whole of the surfaces **20** and the corresponding surfaces on the opposite side of the frame thus providing a speedy, economical, and effective method of aligning and interfastening the frame members.

It will therefore be seen that the slab door D of the invention is possessed of relatively great strength due to the filling of frame F by the present filler **6**, and it will be equally obvious that notwithstanding the reinforcement provided by said filler **6**, its use need not add materially to the cost of the door D as a whole inasmuch as its component rails **10** and ribs **12** are not secured to stiles **8—8** individually and independently but are interfastened with each other concurrently with their interfastening to the panels **2—2** which sheathe frame F to complete door D.

It need hardly be emphasized that the sheathing of the door has been described herein as consisting of plywood panels by way of example only and that the panels **2—2** or either one of them may be formed of substances other than plywood, such as hardboard, or any other panel material suitable for doors of the present type.

While a particular embodiment of the invention has been described herein for the purpose of illustration, it will be clear that many modifications may be made therein without departing from the scope of the invention as defined in the appended claims.

What I claim is:

1. A slab door comprising:

Frame members interconnected in frame relation, said frame members including rails and stiles forming a sub-frame constituting the ends and edges of the door and enclosing a hollow space, and filling means disposed within said hollow space, and

Panels sandwiching and interfastening the respective frame members;

Said frame members being of equal depth and being interconnected by tongues formed on some of them frictionally engaged in grooves formed on others thereof;

Said tongues being integral with the frame members on which they are formed and being substantially continuous across the full depth thereof;

Said grooves being continous and extending substantially across the full depth of the frame members on which they are formed;

Said tongues being bodily slidable along said grooves, at the time of manufacture of the door, to positions wherein they are retained by the frictional engage-

ment between said tongues and said grooves, to procure alignment and frictional retention of said frame members in unstressed, precisely flush relation with each other and in total contact with said panels;

Said door ends and edges being respectively flat at least on the exterior perimeter of said door.

2. A slab door as claimed in claim 1, wherein:

Said tongues are kerfed to render them resilient.

3. A slab door as claimed in claim 1 wherein:

Said filling means includes ribs;

Said tongues being formed on said rails and said ribs;

Said grooves being formed in said stiles.

4. A slab door as claimed in claim 1 wherein:

Said grooves are disposed in parallel, spaced relation on said stiles.

5. A method of making a slab door comprising the steps of:

Interconnecting frame members consisting of stiles and rails in opposed relation to form the edges and ends of the door and to enclose a hollow space, said stiles and rails being of equal depth;

Forming matching tongues and grooves on said frame members to extend substantially continuously across the full depth of the frame members on which they are formed;

Said tongues and grooves interconnecting said frame members and being positioned to procure an exterior perimeter of said door wherein said ends and edges formed by said rails and stiles are respectively flat;

Assembling a filler including a plurality of ribs, said ribs being equal in depth to said stiles and rails;

Forming spaced, parallel grooves in an opposed pair of said frame members, said grooves extending continuously across the full depth of said members;

Forming tongues on said ribs extending continuously across the full depth thereof, said tongues on said ribs being frictionally engageable in said parallel grooves and slidable bodily therealong to permit the flush alignment of said ribs with said frame members;

Frictionally engaging said tongues on said ribs in said parallel grooves to install said ribs within said hollow space and link said opposed frame members;

Sandwiching said stiles, said rails and said ribs between panels and applying pressure to the assembly of stiles, rails, ribs and panels to ensure that said stiles, rails and ribs are aligned in precisely flush, unstressed relation with each other and in total contact with said panels, and

Interfastening said stiles, rails and ribs by securing said panels thereto.

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