# United States Patent [19]

**Pavlecka**

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[45] **Dec. 25, 1973**


[54] **INTERLOCKED PANEL STRUCTURE**


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[52] **U.S. Cl.** ..... **52/206,** 52/481, 52/568

[51] **Int. Cl.** ..... **E06b 3/54,** E04b 5/52, E06b 1/04

[58] **Field of Search** ..... 52/241, 481, 568, 52/277, 204, 206



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*Primary Examiner*—Henry C. Sutherland



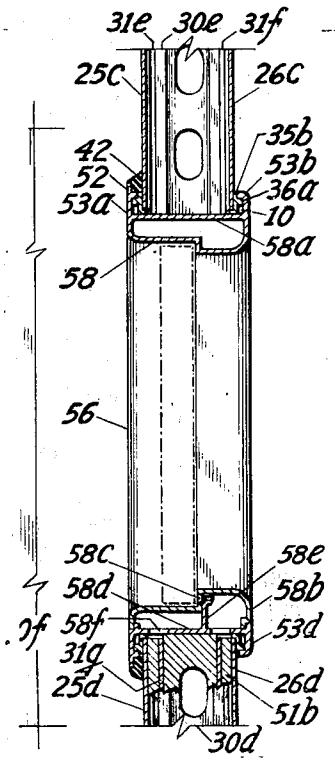
[57] **ABSTRACT**

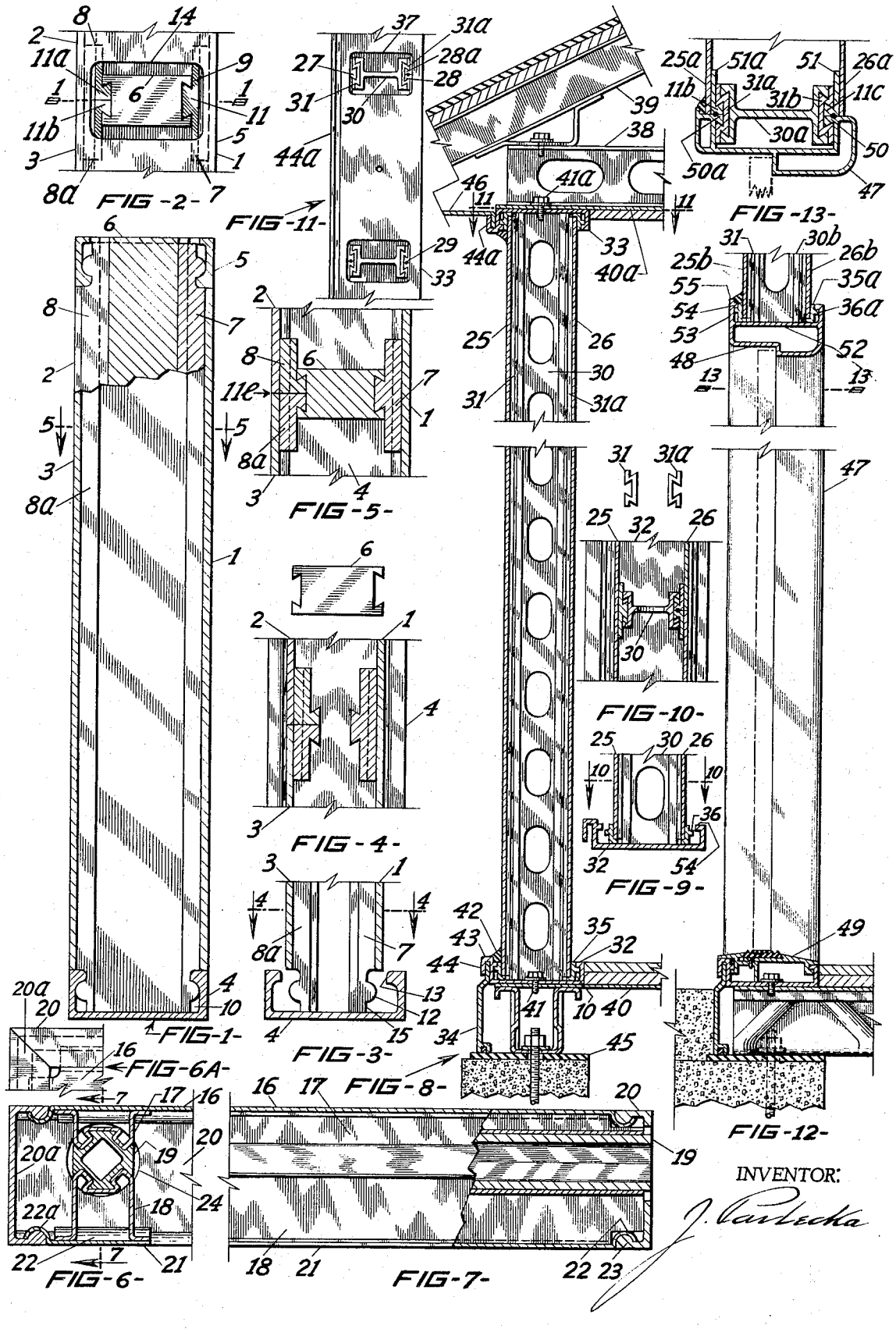
A structure for hollow walls, floors and flat roofs of houses, buildings, trailers, mobile homes, vans, containers, etc., in which two parallel rows of panels and door and window frames are locked into unity crosswise and lengthwise by keying members inserted slidably into interlocking means on the panels and on the jambs of the frames; moreover, top and bottom mounting boundary channels and door and window frame lintels are provided with laterally interfitable formations, and the panels with matching formations, the latter being entered at assembly inbetween the former; as the keying members—which may be the studs, joists, or rafters themselves or light-weight linear keys—are inserted into their interlocking engagement with the panels and the jambs, the panels are displaced laterally into a crosswise interfit with the channel and lintel formations, the keying members thus effecting a simultaneous three-dimensional interlock of all the components of the structure; clearance holes in the top channel and in the window lower lintel admit the keying members for insertion.

In floor and flat roof structures boundary channels as "headers" enclose all four outer sides, and both those at right angles to the keying members—be they the joists or raftes themselves or linear keys—and those parallel with them are interfitted laterally with the upper and lower deck panels as in the walls, i.e., by the keying members inserted inbetween the decks through openings in one of the channels.

The complete structure embodies weather seals at all vertical and horizontal seams; corner voids in the bottom channel and in the door and window lintels for receiving fallen-in particles; means on the channels for supporting or retaining peripheral basement and roof shroud members; and a window lower lintel divided into a panel engaging channel with keying member insertion openings therein, and a window sill as a cover therefor. Continuous and discontinuous species and subspecies thereof of the means for carrying the laterally interfitted formations on the panels are disclosed, as are inwardly offset such formations for a flush wall, floor or roof exterior surface.


**28 Claims, 29 Drawing Figures**




FIG-2-
FIG-11-
FIG-13-
FIG-1-
FIG-5-
FIG-4-
FIG-10-
FIG-9-
FIG-6A-
FIG-3-
FIG-8-
FIG-12-
FIG-6-
FIG-7-
INVENTOR:
J. Barlecka

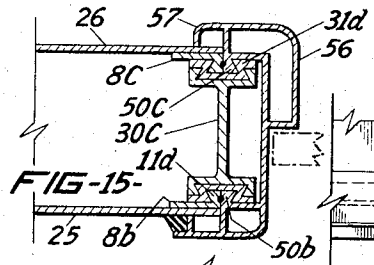



FIG-15-

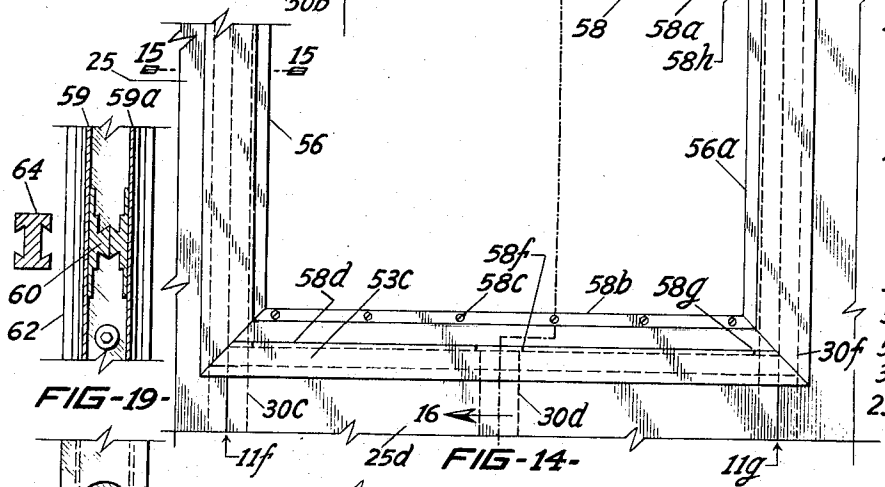



FIG-14-

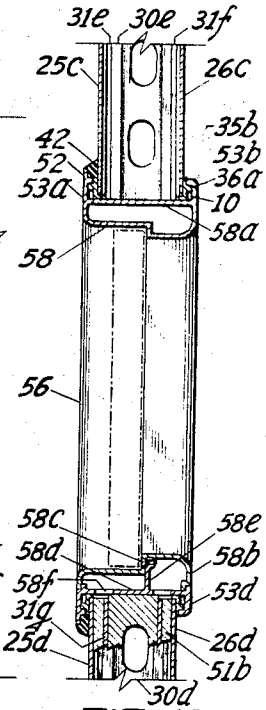



FIG-16-

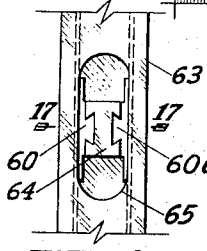



FIG-18-

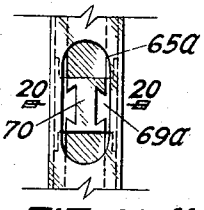



FIG-21

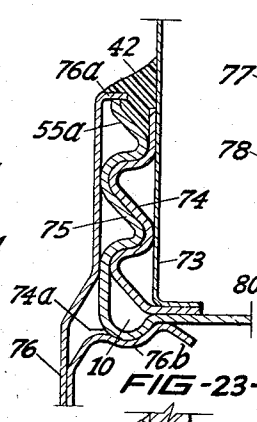



FIG-23-

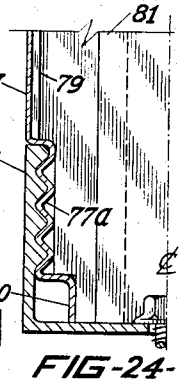



FIG-24-

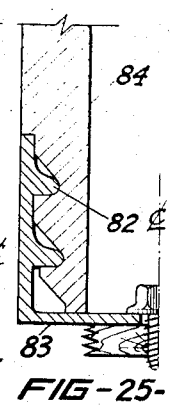



FIG-25-

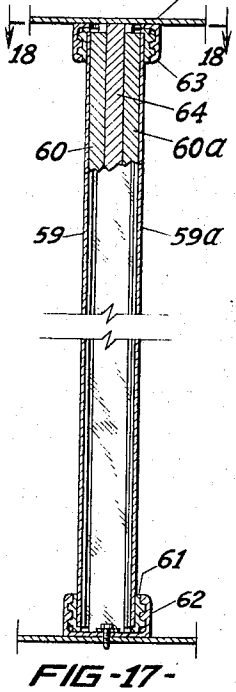



FIG-17-

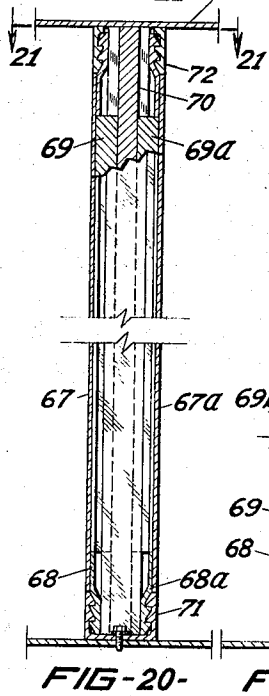



FIG-20-

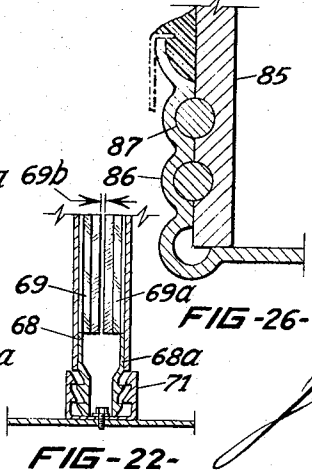



FIG-22-

FIG-26-

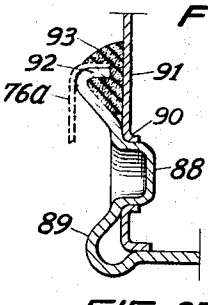



FIG-27-

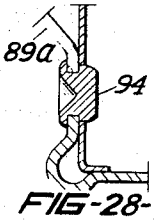



FIG-28-

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# INTERLOCKED PANEL STRUCTURE

This invention relates to a structure for hollow walls, floors and flat roofs for houses and other products in which facing panels are interlocked with each other and with door and window frames both crosswise and lengthwise, i.e., in facing and edge-to-edge relationships, by endwise inserted keying members, which members effect simultaneously a sidewise interfit and vertical interlock of the panels with top and bottom boundary channels and with door and window lintels in the walls and with four such channels around floor and flat roof structures.

The subject structure makes use of the interlocked panel walls of U.S. Pat. Nos. 3,012,639, 3,037,590, 3,184,013, 3,279,137, 3,296,759 and 760, and 3,304,677; distinguishing all of them are two equivalent types of reentrant mortise and tenon interlocking formations on the panels, or on stringers attached to the panels, one type extending at the panel edges and the other one at intervals apart therefrom, two of the former type on each two meeting panels, or on a panel and a door or window jamb, equalling one of the latter type. These two interlocking formation or stringer types, in themselves and particularly in combination with their equal or modular spacing on the facing panel rows, can fall into opposition of one type with either the same type, or with the other type, and thereby make possible the three basic and necessary two-, three- and four-panel joints in wall construction; anyone of these joints can appear, by chance or by choice, at anyone interval for assembling a wall of any extent, and with doors and windows taking the place of portions of any of the panels in the wall structure.

In all such structures, keying members having two reentrant mortise and tenon profile sides, and functioning as stress members, i.e., studs in walls, joists in floors, and rafters in flat roofs, interlock each panel joint and each panel-with-door or -window joint, by being inserted into engagement with the complementing mortise and tenon formations thereof, or with the stringers bearing the same; or, for facile assembly and for heat insulation, light-weight keying members in the form of linear keys are slid into a mortise and tenon engagement with the panels, the door and window jambs, and with the interjacent static studs or other stress members, as disclosed in a number of the above named patents. Also disclosed in them are several keying members and mortise and tenon types; the characteristic of the keying members for the purposes of the subject invention is that by their insertion they spread the facing panels apart to the full wall width from their initially loose and close positions.

It is an object of this invention to augment the utility of the above patented panel structures by embodying mounting or boundary channels in them for the vital function as "tracks" in securing walls to floors and ceilings, and for providing "headers" on all four sides of floor and flat roof structures, and by eliminating all driven-in and threaded-in channel-to-panel fasteners by virtue of causing the panels to interfit laterally with the channels concomitantly with the insertion of the keying members inbetween the facing panel rows.

Another object is to further augment the utility of the above prior patented wall structures wherein jambs of door and window frames are interlocked crosswise and lengthwise with adjoining panels by the keying members, by causing the panels below the window frames and above the door and window frames to be locked sidewise to the frame lintels in the act of inserting the keying members inbetween the facing panels.



Yet another object is to obtain a flush panel and channel exterior in the subject wall, floor and flat roof structure by inwardly offsetting the panel-with-channel interfitting means.

A number of useful objects are realized in that the structural components perform certain new functions in new ways, such as voids are formed in the wall bottom channel and in the door and window lintels for fallen-in particles that could interfere with the panel-with-channel interfit; the channels are formed with means for retaining a shroud member around the floor perimeter, and for supporting a soffit under a roof; the window lower lintel is divided into a channel perforated by openings for the keying member insertion therethrough, and a sill as a cover therefor; tubular door and window lintels embody the flanged panel interfitting portion thereof as a vital strength element; and continuous as well as discontinuous panel-with-channel interfitted means species are presented.

The hereinabove disclosed structure is illustrated in the drawings which form a part of this specification, and is described hereinfurther with reference to the following figures therein:

FIG. 1 is a cross-section through a wall in which panels, studs and boundary channels are interlocked three-dimensionally by the studs inserted into a mortise and tenon engagement with the panels.

FIG. 2 is a plan view of a portion of the wall of FIG. 1 with a three-panel joint interlocked by a stud for the insertion of which a hole is provided in the top channel.

FIGS. 3 and 4 are, respectively, vertical and horizontal cross-sections through the lower portion of the wall of FIG. 1, and represent the assembly stage before the insertion of the stud, shown in profile in FIG. 4, as the keying member.

FIG. 5 is a horizontal section as in FIG. 4 with the stud in place for the panel-to-panel crosswise and lengthwise unions and for the panel-with-channel sidewise interfit.

FIGS. 6, 6A and 7 are, respectively, a transverse section, a plan view of a corner portion, and a longitudinal section taken in part at the center plane 7—7 in FIG. 6, of a floor structure with closure channels on all four sides; a linear key interlocks stringers on the upper and lower deck panels to function as a joist, and causes a deck panel-with-channel interfit all around.

FIG. 8 is a vertical section through a house wall at a location midway between two studs.

FIGS. 9 and 10 are respective vertical and horizontal sections through the wall of FIG. 8 before the insertion of the interlocking keys shown in profile in FIG. 10.

FIG. 11 is a plan view taken in the plane 11—11 in FIG. 8 with the soffit therein removed.

FIG. 12 is a vertical section through a door frame in the wall of FIG. 8.

FIG. 13 is an enlarged horizontal section taken at 13—13 through the door frame jamb therein.

FIG. 14 is a face view of a window frame in the wall of FIG. 8.

FIG. 15 is an enlarged horizontal section at 15—15 through the window jamb in FIG. 14.

FIG. 16 is a vertical section through the window frame of FIG. 14 in two offset planes and in the direc-

tion 16—16 therein, and shows the panel-with-lintel interfit, a divided lower lintel for the interlocking key insertion, and a tubular section of both lintels.

FIG. 17 is a vertical section through a hollow wall or partition with studs as the keying members, the upper wall portion being sectionalized at the stud center plane 17—17 in FIG. 18.

FIG. 18 is a plan view of the wall of FIG. 17 at the level 18—18 therein.

FIG. 19 is a horizontal section through the wall of FIG. 17 before the insertion of the interlocking stud.

FIG. 20 is a vertical section through a wall or partition wherein inwardly offset panel-with-channel interfitted formations produce a flush wall exterior.

FIG. 21 is a plan view of the wall of FIG. 20 at the level 21—21 therein.

FIG. 22 is a vertical section through a partially assembled lower portion of the wall of FIG. 20 before the insertion of the interlocking stud. FIGS. 23–28 present divers shapes of the panel-with-channel interfitted formations; in FIG. 23 a peripheral shroud is snapped onto the channel flange; FIGS. 23, 26 and 27 show channel-to-panel weather seals; and in FIGS. 27 and 28 dowels are used for a discontinuous panel-with-channel interfit and lateral as well as vertical interlock.

The wall of FIG. 1 is assembled of facing panels 1 and 2–3 in any duplicate numbers, and interjacent studs 6 set in a bottom channel 4 and a top one 5; stringers 7 and 8–8*a* on the respective panels as well as the studs are formed with confronting abutment ledges and shoulders astride one or more reentrant mortise and tenon; the stringer type 7 extends at equal or modular locations apart from the panel edges with a dovetail tenon 11 thereon, and the other type 8 at the panel edges carries a half-tenon 11*a*, or, generally, one half of the number of tenons on 7. One of the teachings in the above cited patents is that the half-tenons 11*a* and 11*b* on each stringer pair 8–8*a* on each two panels meeting at a parting line 11*e* (FIG. 5) represent an equivalent of the tenon 11 on the intermediate type stringer 7, whereby the two stringer types are interchangeable with each other; one important result of this equivalency is in that a panel parting line can occur at anyone modular interval in a wall, and, furthermore, the panels can be of different widths which are multiples of that interval.

The two stringer types and their interchangeability, particularly in combination with their modular spacing, produce yet another useful result in that by either a planed or a random occurrence of anyone of the two types in opposition across a stud or keying member to either the same type, or to the other type, the three basic and necessary two-, three-, and four-panel joints can be assembled in a hollow wall; in FIGS. 2 and 5, as an example, a three-panel joint consists of the panels 1 and 2–3, locked compatibly together by the stud 6; a two- or a four-panel joint can be assembled, respectively, from two facing panels 1 with stringers 7 and tenons 11 thereon, or two pairs of panels 2–3 with stringers 8–8*a* and juxtaposed half-tenons 11*a*–11*b* thereon, locked into unity by duplicate studs 6. This planned or random permutative combining of the two stringer types yields such advantages as walls of any extent assembled from panels of the same or different modular widths, panel parting line locations in the facing panel rows independent of one another, and their locations either predetermined, or left to chance, or eliminated where not wanted.

The endwise inserted studs 6 interlock the panels 1 and 2–3 and their duplicates in two directions, i.e., crosswise and lengthwise of the wall; for rendering the wall unitary and rigid also in the third dimension, i.e., vertically, and, moreover, to secure it to other walls or structures, the aforementioned channels are employed; in some existing walls channels or "tracks" are attached to thick slabs by nails or screws, or split channels clamp solid slabs between their flanges by joining screws; such assembly procedures are time-consuming, costly because of the handwork involved, and the parts are held together only at isolated spots.

In the wall of FIGS. 1, 2 and 5 vertical immobility of the panels is effected by laterally interfitted means thereon and on the channels 4 and 5; the panels are provided with beads 12 (FIG. 3) on the ends of their stringers 7 and 8–8*a* which form a groove between their flank and the panel edge; conforming tongues or teeth 13 are carried on the channel flanges; at assembly, the stringer beads 12 enter freely into the channels in the absence of the stud or keying member 6; the upper channel 5 has an opening 14 (FIG. 2) over each stud location, and as the studs are inserted through it into an engagement of their mortises with the stringer tenons 11 and 11*a*–11*b*, the stringers and the panels are spread apart as shown in FIG. 5, whereby the stringer beads 12 fit under the channel tongues 13 and by a groove-and-tongue interfit lock the panels sidewise and vertically to the channels. This panel-with-channel locking is effected by the studs or keying members additionally to and concomitantly with their locking of the panels together crosswise and lengthwise, such three-dimensional unifying of the wall being accomplished by the single step of inserting the studs into their place.

For an unobstructed stringer-with-panel interfit a void 10 is created in the bottom channel corners by narrow stringer ends 15 in a vertical wall, and in both channels 4 and 5 when the structure is horizontal; particles that may have fallen into the channel or channels are swept into this void or voids by the stringers sidewise displacement by the studs 6.

In the upper channel 5 the stud 6 projects through the hole 14 to the channel top surface (FIG. 1) for a direct support of any load on the structure.

In horizontal applications such as in the floor in FIGS. 6, 6A and 7, the underside may be formed by discontinuous narrow panels or webs 21 of a limited span for installation of piping, wiring and air ducts under the upper deck or sub-floor 16; the supporting joists are composite of stringers 17 and 18, complemented as tubular stress members by the respective deck 16 and web 21, and of interlocking keys 19; the latter are of the tenoned type from the above cited U.S. Pat. No. 3,160,245, and from U.S. Pat. No. 3,160,249, but other key profiles from the cited patents can be used equally well; the profile of the key 19 and of the tall stringers 17 and 18 illustrates geometrical and dimensional variations from the corresponding parts in the wall of FIG. 1.

Closure channels such as 20 on two sides support the ends of the composite joists 17–19–18 as "headers" do in conventional floor structures, the improved difference being in that no "toe-nailing" of the joists to the "headers" is needed; moreover, two other channels such as 20*a* on the sides parallel with the keys 19 en-

close those sides, and the upper deck **16** is interfitted with all four channels while all of the lower panels as chordal webs of the stringers **18** are interfitted with the channels **20**, and the webs **21** on the extreme end stringers also with the channels **20a**.

The panel-with-channel interfitting means reside in that the deck **16** as well as the web **21** have inwardly offset marginal grooves **22** along two sides, and **22***a* along the other two, and the channels **20** and **20***a* have matching inner tongues or teeth **23** on their flanges; the identical channels **20** and **20***a* meet at diagonal planes at the corners, as shown in FIG. **6A**, in the absence of the keys **19** because the deck and web grooved ends **22** and **22***a* enter freely into the channels, as do the ends of the stringers **17** and **18** which abut the channel webs; the insertion of the keys **19** is effected through an opening **24** in the right-angle channel **20** at each key location; the keys displace the stringers **17** and **18** and the respective deck **16** and web **21** laterally into an interfit of their grooved marginal portions **22** and **22***a* with the tongues **23** on all four channels. These grooved panel portions represent the same inwardly offset interfitable means for a flush exterior as the grooved ends of the stringers **7** and **8–8***a* in FIG. **1**; the continuity of the grooved portions **22***a* on the web **21** and on all four sides of the deck panel **16** distinguishes this means as a species from the discontinuous grooved stringers of FIG. **1** and from the grooved web **21** at its end **22.**

One of the most useful applications of the three-dimensionally interlocked structure is to house walls; in FIGS. **8–16** wall panels are straddled by and locked not only to top and bottom closure and mounting channels but also to door and window frames. Panels **25** and **26** (FIG. **8**) bear stringers on them with dovetail tenons **27** intermediate the parting lines, and stringers with half-tenons **28** at the parting lines whereat such juxtaposed half-tenons **28–28***a* (FIG. **11**) form an equivalent of the tenon **27**, and include a weather strip **29** between them; these two stringer and tenon types can be combined permutatively on the facing panel rows to create the three basic two-, three-, and four-panel joints.

The interlocking in this structure is not performed by the studs **30** directly as in FIG. **1**, but by linear keys **31** and **31***a* which are slid into engagement with oversize mortises in the studs and with the stringer tenons **27** and **28–28***a*; the key type shown is from U.S. Pat. No. 3,296,759, but keys from others of the named patents could be substituted for it. The advantages of such light-weight keys rest in that they are easier to raise above the panels at assembly than the studs, and if made of a heat non-conductive material they function as insulators in the wall.

Both channels **32** and **33** have tongues **54** (FIG. **9**) on their inner flange side; the panels have moldings **35** (FIG. **8**) attached along their edges, and on them ridges **36** (FIG. **9**); at assembly, these ridges clear the channel tongues **34** as the panel ends fit into the channels astride the studs **30** (FIG. **9**), with the panel stringer tenons accommodated in the oversize stud mortises (FIG. **10**); when next the keys **31** and **31***a* are inserted inbetween the studs and the stringers (FIG. **11**), the panels in each row are locked edge-to-edge by means of their half-tenons **28–28***a*, both panel rows are locked to the studs **30** and thereby to each other by means of their tenons **27** and **28–28***a* in whichever of their three permutations they may be, and simultaneously, as the ridges **36** on the spread-apart panels **25** and **26** fit against the underside of the channel tongues **54**, the panels are locked to the channels vertically.

Clearance holes **37** in the top channel **33** (FIG. **11**) for the insertion of the keys **31** and **31***a* may be only large enough to admit each key, or, as in FIG. **11**, they may be of a size to clear the studs **30**; this allows the studs to project to the channel top face for supporting directly rafters **38** on a deck **40***a*, and a roof structure **39** on the rafters, by their full profile rather than by their thin web only if separate holes for the keys were used.

The panel moldings **35** and the ridges **36** thereon provide a continuous lengthwise interfit and sidewise engagement of the panels with the channels, and represent a distinct species of such engagement means from the stringers **7** and **8–8***a* in FIG. **1**, and from the grooved stringer ends **22** of the deck **16** and web **21** in FIG. **7.**

The vertically and sidewise integrated channels **32** and **33** in the wall secure it by screws **41** and **41***a*, respectively, to the floor deck **40** and roof deck **40***a* as the first and the last wall assembly steps. Another channel function is to contain a sealer **42** in a gutter between its ledge **43** and the panel **25.** Yet another channel function is to support or retain thin-wall closure members peripherally below and above the wall; a shroud **34** around the basement space under the channel **32** is retained in a slot formed by a channel flange **44** under the ledge **43**, and rests on a foundation mat **45**; the upper channel **33** has an identical flange **44***a* and slot, by which it supports a turned-down rim of a soffit **46.**

An important coaction between the panel moldings **35** and the channel **32** resides in that a recess under the molding ridge **36** (FIG. **9**) creates a void **10** in the channel corners, similarly as in the wall of FIG. **1**, into which any particles or objects that would obstruct the panel-with-channel interfit are swept.

The same interlock of the panels with one another and with the studs and the simultaneous interfit of the panels with the lower and upper channels by the insertion of the linear keys into their place, is made use of to assemble door and window frames into the wall of FIG. **8.** In FIG. **12** a door frame consists of two jambs such as **47**, a lintel **48**, and a threshold **49**; each jamb is formed with two dovetail half-tenons **50** and **50***a* (FIG. **13**) which complement like half-tenons **11***c* and **11***b* on edge type stringers **51** and **51***a* borne on wall panels **26***a* and **25***a*, respectively; the full dovetails so formed are engaged by the interlocking keys **31***a* and **31***b*, as is the stud **30***a*, which construction is the same as that of a four-panel joint, and its application to doors and windows is taught in the above cited patents.

Additionally, in the subject structure panels **25***b* and **26***b* (FIG. **12**) are positioned on a lintel web **52**, with moldings **35***a* and ridges **36***a* thereon borne on the panels, and flanges **53** and tongues **54** on the lintel; similarly as in FIG. **9** and **10**, studs **30***b* and the panels astride them fit inbetween the lintel tongues, whereupon the keys **31** and **31***a* (only **31** is numbered in FIG. **12**) displace the panels sidewise into an interfit of their ridges **36***a* with the channel tongues **54.** A lintel outer flange projection **55** and the panel **26***b* form a gutter for a sealing substance.

Lintels are subjected to bending by the load-bearing studs resting on them, for which condition they are best devised with a box section consisting of a channel web

52, a transom web 48, and side walls as extensions of the flanges 53.

The window frame of FIGS. 14–16 is assembled into the wall in the place of two panels in two four-panel joints at parting lines 11*f* and 11*g* in the near panel row; window jambs 56 and 56*a* have a channel section with dovetail half-tenons 50*b* and 50*c* (FIG. 15) on its flanges; stringers 8*b* and 8*c* on full-height panels 25 and 26 complement the jamb half-tenons with like half-tenons 11*d* astride a stud 30*c;* linear keys such as 31*d* lock the jambs to the wall panels and to the studs identically as in the door jamb union in FIG. 13.

The window upper lintel 58 (FIG. 16) and its integration into the wall correspond to the door lintel 48 in FIG. 12; panels 25*c* and 26*c* are set upon the lintel web 58*a* astride a stud 30*e* in its midspan, and astride studs 30*c* and 30*f* passing through clearance openings 58*h* in its ends (FIG. 14); keys 31*e* and 31*f* in the web midspan, and keys 31*d* (FIG. 15) at its ends cause ridges 36*a* on panel moldings 35*b* to interfit with the lintel flanges 53*a* and 53*b* under their tongues identical with the tongues 54 on the door lintel in FIG. 12. A void 10 in both lintel corners under the panel ridges 36*a* will receive particles fallen into the lintel. A lintel flange extension 52 forms a gutter with the panel 25*c* for a sealant 42. The stud supporting web 58*a* jointly with the transom web 58 and with the sides as extensions of the flanges 53*a* and 53*b* form an effective load-bearing lintel.

The lower lintel comprises a web 58*d* and flanges 53*d* thereon, inner tongues on which are laterally interfitted with ridges on moldings pertaining to low panels 25*d* and 26*d*, as they are in the upper lintel, in the presence of linear keys 31g in engagement with the panel stringers 51*b* and stud 30*d;* the distinctive features of the lower lintel reside in holes 58*f* in midspan of its web 58*d* for the insertion of the keys 31*g*, and clearance openings or recesses 58*g* in its ends for the studs 30*c* and 30*f* and for the insertion of the keys into engagement therewith and with the panel stringers thereat; inasmuch as these studs and keys have the height of the wall, like clearance openings 58*h* are provided in the ends of the upper lintel web 58*a*. In order to provide a window mounting lintel section conforming to that of the upper lintel and to the jambs, and in order to provide a cover for the clearance holes and openings in the lower lintel web 58*d*, a sill 58*b* corresponding to the upper lintel integral transom 58 abuts the lower lintel at three surfaces in the same direction; one is a wall 58*e* rising from the lintel web 58*d* to which the sill is secured by screws 58*c*, and the other two are projections on the web at its extreme width so that the sill sides astride the clearance holes and openings are aligned with the lintel flanges 53*d*.

The panel-with-channel interfit accomplished concomitantly with the panels interlock by studs as the keying members, as in the wall of FIG. 1, is particularly suited for narrow walls and partitions exemplified in the next two embodiments. In FIGS. 17–19 facing panels 59 and 59*a* have respective dovetail tenon stringers 60 and 60*a* on them, and along their top and bottom edges have moldings 61 with ridges on them; channels 62 and 63 have lateral teeth on their flanges between which the panels are entered at assembly, whereupon a stud 64 displaces the panels from their tenon-against-tenon positions in FIG. 19 into a ridges-with-teeth interfit with the channels at the full wall width in FIGS. 17 and 18.

The stud is inserted through an opening 65 in the upper channel 63, and projects through it to the underside of the subfloor 66 for supporting any loads thereon. In this embodiment and in others employing a single keying member or stud at each panel joint the thickness between the keying mortises therein need be only slightly less than the combined panel-with-channel interfitted depth for a panel-into-channel entry at assembly. Each panel can be replaced by two panels meeting at a parting line for creating three- and four-panel joints besides the two-panel joint in FIGS. 17–19, as taught in the above named patents and as already referred to in FIGS. 2 and 11.

A wall of particular utility has a flush exterior in FIGS. 20–22; panels 67 and 67*a* have toothed moldings 68 and 68*a*, respectively, attached to their inner face, with stringers 69 and 69*a* terminating at the molding flanges. The panels and their moldings enter the channels 71 and 72 inbetween matching teeth on their flanges (FIG. 22); a stud 70 is slid into a dovetail engagement with the stringer tenons through an opening 65*a* in the channel 72, thereby forcing the panels into a sidewise interfit of their moldings with the channel flanges. The stringers 69 and 69*a* need not abut tenon-against-tenon for entry into the channels as they do in FIG. 19, but can be loose within a clearance 69*b* (FIG. 22), in which case the stud web thickness is equal to that clearance plus the interfitted depth doubled. The inwardly mounted moldings 68 and 68*a* yield the same result of a flush exterior wall face as the grooved stringers in FIG. 1 and the grooved deck panel and the stringer web of FIGS. 6 and 7.

A large variety of the tongue-and-groove interfitted means of both the continuous and discontinuous types is practicable, as evinced by FIGS. 23–28. In FIG. 23 a sheet metal molding 74 on a panel 73 has a sawtooth interfit with a sheet metal channel 75; a channel corner bead 74*a* forms a trough 10 for fallen-in particles; the outer bead side in conjunction with an extension 55*a* of the channel flange serves additionally for snapping on a peripheral closure member 76 by means of a rim 76*a* and an indented spring 76*b;* this is alternative to mounting the shroud 34 and the soffit 46 of FIG. 8 by means of slots formed by rims 44 and 44*a* with the channel flange.

In FIG. 24 inwardly offset serrations 77*a* on a panel 77 align it flush with the channel side 78 in the manner of the single groove of FIGS. 6 and 7; a rabbetted stringer portion beyond its flange 79 in engagement with a keying member 81, urges the serrations into an interfit with the channel flange, and backs up a recessed panel end 80 which forms a void for fallen-in particles.

In FIG. 25 tongues 82 on a channel 83 interfit with a grooved and rabbetted panel 84 to produce a flush exterior when a keying member interlocks it with a facing panel and displaces it laterally at the same time as in all the herein disclosed structures.

In FIG. 26 round grooves both in a panel 85 and a channel 86 contain rods 87 which, by being bonded to either one of these members, provide a tongue-and-groove interfit with the other one when a keying member displaces the panel sidewise, as in the complete structures herein.

The rods **87** in FIG. **26** could be used also as a discontinuous interfit means of the class of the grooved stringers **7** and **8–8***a* of FIG. **2** and of the grooved stringer web **21** of FIG. **6**; this class also includes the devices of the next two figures.

In FIG. **27** a number of bosses **88** are drawn out of the channel flange **89**, and each panel **91** has apertures **90** which fit onto the bosses; an extension of the flange ends with a lip **92** turned towards the panel, on which lip rests a peripheral member **76***a*, and a sealing strip **93** is slipped over both of them; it is compressed by the panel **91** displaced laterally into its interfit with the boss **88**. A modification in FIG. **28** substitutes a pin or dowel **94**, clinched to the panel **98***a*, for the boss **88** of FIG. **27**.

I claim:

**1.** In a panel structure, two panels facing each other and bearing opposed interlocking means thereon, at least one keying member in a slidable engagement with said panels interlocking means, a channel having flanges along two panel edges, matching laterally interfitable means on said panels and on said channel flanges entered at assembly the former in between the latter, said panels displaced laterally by said keying member engagement being in an interfit with said channel flanges at said matching means thereof.

**2.** In the panel structure of claim **1**, said at least one keying member comprising a stress member interjacent said panels opposed interlocking means and bearing interlocking means in confronting positions thereto, and linear interlocking keys in a slidable engagement one with each panel and stress member interlocking means.

**3.** In the panel structure of claim **1**, said channel extending at right angles to said at least one keying member, a second channel having flanges along the panels edges parallel with said first named edges, matching laterally intefitable means on said panels and on said second channel flanges entered at assembly the former inbetween the latter, said panels displaced laterally by said keying member engagement being in an interfit of said matching means thereof with said second channel means, and one of said channels having a clearance hole over each said at least one keying member for the insertion thereof into said engagement.

**4.** In the panel structure of claim **3**, said at least one keying member being a stress member and having one end thereof abutting the continuous one of said channels and having the other end projecting through said clearance hole in the other channel to the outer surface thereof.

**5.** In the panel structure of claim **3**, two other channels having flanges along the panels edges on opposite sides parallel with said at least one keying member, matching laterally interfitable means on said panels and on said two other chanels flanges entered at assembly the former inbetween the latter, and said panels displaced laterally by said keying member engagement being in an interfit of said matching means thereof with said other two channels means.

**6.** In the panel structure of claim **3**, a third panel meeting one of said facing panels edge-to-edge and facing the other panel jointly therewith, interlocking means borne on said meeting panels comprising the halves of a divided interlocking means forming jointly an equivalent of said means on said other panel, matching laterally interfitable means on said third panel and on said first named channel flanges and on said second channel flanges entered at assembly the former inbetween both channels means, and said third panel displaced laterally together with said meeting panel by said keying member engagement being in an interfit of said matching means thereof with said channel means.

**7.** In the panel structure of claim **1**, said panels and said channel flanges forming a void under said matching interfit means thereof in the corners of said channel for fallen-in particles swept thereinto by said displaced panels.

**8.** In the panel structure of claim **1**, one of said channel flanges having an extension protruding above said panel-with-channel matching interfit means and forming a gutter with the panel thereat, and a sealer contained in said gutter.

**9.** In the panel structure of claim **8**, said channel extension being in the form of a lip turned toward said panel thereat, and a sealing strip mounted on said lip and compressed thereon by said laterally displaced panel.

**10.** In the panel structure of claim **1**, a peripheral thin-walled closure member extending along the channel outer flange, and means on said channel for holding said closure member in place by an interfitted engagement of a portion of said thin wall thereof with said channel.

**11.** In the panel structure of claim **10**, said channel having a rim along the outer flange thereof and forming a slot therewith open in the direction reverse to said flange, said closure member having a portion thereof fitted into said slot.

**12.** In the panel structure of claim **1**, said panel-with-channel matching lateral interfit means being discontinuous lengthwise of the structure on at least said panels.

**13.** In the panel structure of claim **12**, stringers extending on said panels and bearing said opposed interlocking means thereon, said stringers having ends projecting beyond said panels into said channel and bearing said lateral interfit means thereon.

**14.** In the panel structure of claim **12**, said panel-with-channel matching lateral interfit means residing in a number of dowels borne on each channel flange inner side, and each panel having apertures fitted onto said dowels.

**15.** In the panel structure of claim **1**, said panel-with-channel matching lateral interfit means being continuous along said panels and on said channel flanges.

**16.** In the panel structure of claim **15**, said panels having at least one outwardly open groove along the edges thereof, and said channel flanges having each at least one inner matching tongue thereon, said panels being in a continuous groove-and-tongue interfit with said channel flanges.

**17.** In the panel structure of claim **15**, moldings extending on said panels at and along the edges thereof, said moldings bearing said continuous lateral interfit means on said panels.

**18.** In the panel structure of claim **17**, said moldings bearing each at least one lengthwise ridge thereon, said channel flanges bearing each at least one lengthwise tongue on the inner side thereof, each said panel molding ridge being in an interfit with the underside of one channel flange tongue.

**19.** In the panel structure of claim **1**, said panel-with-channel flanges lateral interfit means being borne on said panels and on said flanges offset inwardly from the

panel exterior, and said channel flanges being substantially flush with said panel exterior.

**20.** In the panel structure of claim **17,** said moldings extending on said panels inward face, and said continuous interfit means being borne on said moldings offset inwardly from the panels outer face.

**21.** In the panel structure of claim **1,** stringers extending on said panels and bearing said opposed interlocking means thereof, at least one of said stringers having a flanged tubular section, one of said panels being of a limited span and forming the chordal web of said stringer tubular section.

**22.** In the panel structure of claim **3,** a cover member extending over said channel having said clearance hole over each said at least one keying member, said cover member having spaced apart sides standing on said channel and an interconnecting web above said channel and forming a tubular stress member therewith, and means for attaching said cover member to said channel.

**23.** In a panel structure, panels in two parallel rows meeting at parting lines in each row, two opposite panels in said rows being short in height and meeting the other panels in four-panel joints at coincidental parting lines in both rows, a lintel under said short panels, two jambs meeting said other panels at the lintel ends and therebelow at said coincident parting lines, said short panels and said jambs as well as said other panels bearing juxtaposed interlocking means thereon at said parting lines, at least one keying member in a slidable engagement with said panels and jambs juxtaposed interlocking means interjacent each two coincident parting lines, said lintel having a web and flanges thereon astride said two short panels, said web having clearance openings for each said at least one keying member, matching laterally interfitable means on said panels and on said lintel flanges entered at assembly the former inbetween the latter, said short panels displaced laterally by said keying member engagement being in a panels-with-lintel flanges interfit of said matching means thereof.

**24.** In the panel structure of claim **23,** a lower lintel between said jambs in a window frame, two low opposite panels in said rows meeting the other panels in said four-panel joints at said coincident parting lines, said low panels and said other panels bearing juxtaposed interlocking means thereon at said parting lines, each said at least one keying member being in a slidable engagement with said low panels and said other panels juxtaposed interlocking means, said lower lintel having a web and flanges thereon astride said two low panels, said web having clearance openings for each said at least one keying member, matching laterally interfitable means on said low panels and on said lintel flanges entered at assembly the former inbetween the latter, said low panels displaced laterally by said keying member engagement being in a panels-with-lintel flanges interfit of said matching means thereof.

**25.** In the panel structure of claim **24,** said two low panels bearing opposite interlocking means thereon intermediate said parting lines, at least one keying member in a slidable engagement with said panels intermediate interlocking means, said low panels displaced laterally by said keying member engagement being in a panels-with-lintel flanges interfit of said matching means thereof, said lintel web having a clearance opening around each said intermediate at least one keying member for the insertion thereof, a window sill having sides standing on said lintel web astride said clearance opening therein and having a web between said sides over said lintel web and forming a tubular member therewith, and means for attaching said sill to said lintel.

**26.** In the panel structure of claim **25,** said lower lintel having a wall standing on said web thereof and having projections on said web along said lintel flanges, said sill abutting said wall and said projections in the same direction, and threaded fasteners securing said sill to said lintel wall.

**27.** In a wall structure, panels in two parallel rows meeting with each other at parting lines in random coincidental and non-coincidental relationships in both rows, said panels bearing interlocking means thereon at intervals apart from said parting lines, said meeting panels bearing at said parting lines juxtaposed halves of interlocking means jointly equivalent of one full such means apart from said parting lines, said full interlocking means and said juxtaposed halves thereof giving rise in opposed permutation to two-, three- and four-panel joints, at least one keying member in a slidable engagement with said opposed interlocking means at each panel joint, a door frame between two coincidental parting lines in both panel rows, a window frame between two coincidental parting lines in both panel rows, said door frame and said window frame having the jambs thereof bearing halves of interlocking means juxtaposed to such means on the adjoining panels thereat and having a lintel comprising a web and flanges thereon, two short facing panels having edges between said parting lines in both rows and between said lintel flanges, said window frame having a lower lintel comprised of a web and flanges thereon, two facing low panels having edges between said two parting lines in both rows and between said lower lintel flanges, each said at least one keying member interjacent said coincidental parting lines being in engagement with said juxtaposed adjoining panels, short panels, door and window jambs interlocking means and under said window frame additionally with said low panels interlocking means; a top channel and a bottom channel having each a web and having flanges astride the horizontal panels edges, matching laterally interfitable means on said panels and on said top channel and bottom channel flanges and on said door lintel and window lintel and on said window lower lintel flanges and entered at assembly the panels inbetween said channel and lintel flanges, said panels displaced laterally by said keying member engagement being in a panels-with-channel flanges and panels-with-lintel flanges interfit of said matching means thereof, said top channel web and said lower lintel web having clearance openings therein at each panel joint for the keying member insertion therethrough, a window sill extending over said lower lintel web and said clearance openings therein, and means for attaching said sill to said lower lintel.

**28.** In the wall structure of claim **27,** said two short panels over said door lintel and over said window upper lintel and said two low panels under said window lower lintel bearing opposed interlocking means thereon for two-panel joints apart from said coincidental panel parting lines, at least one said keying member in a slidable engagement with each said two panels interlocking means, said short and said low panels displaced laterally by said keying member engagement being in a panels-with-channels flanges and panels-with-lintel flanges interfit of said matching means thereof, said top channel web and said window lower lintel web having clearance openings therein at each said two-panel joint for keying member insertion therethrough.

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