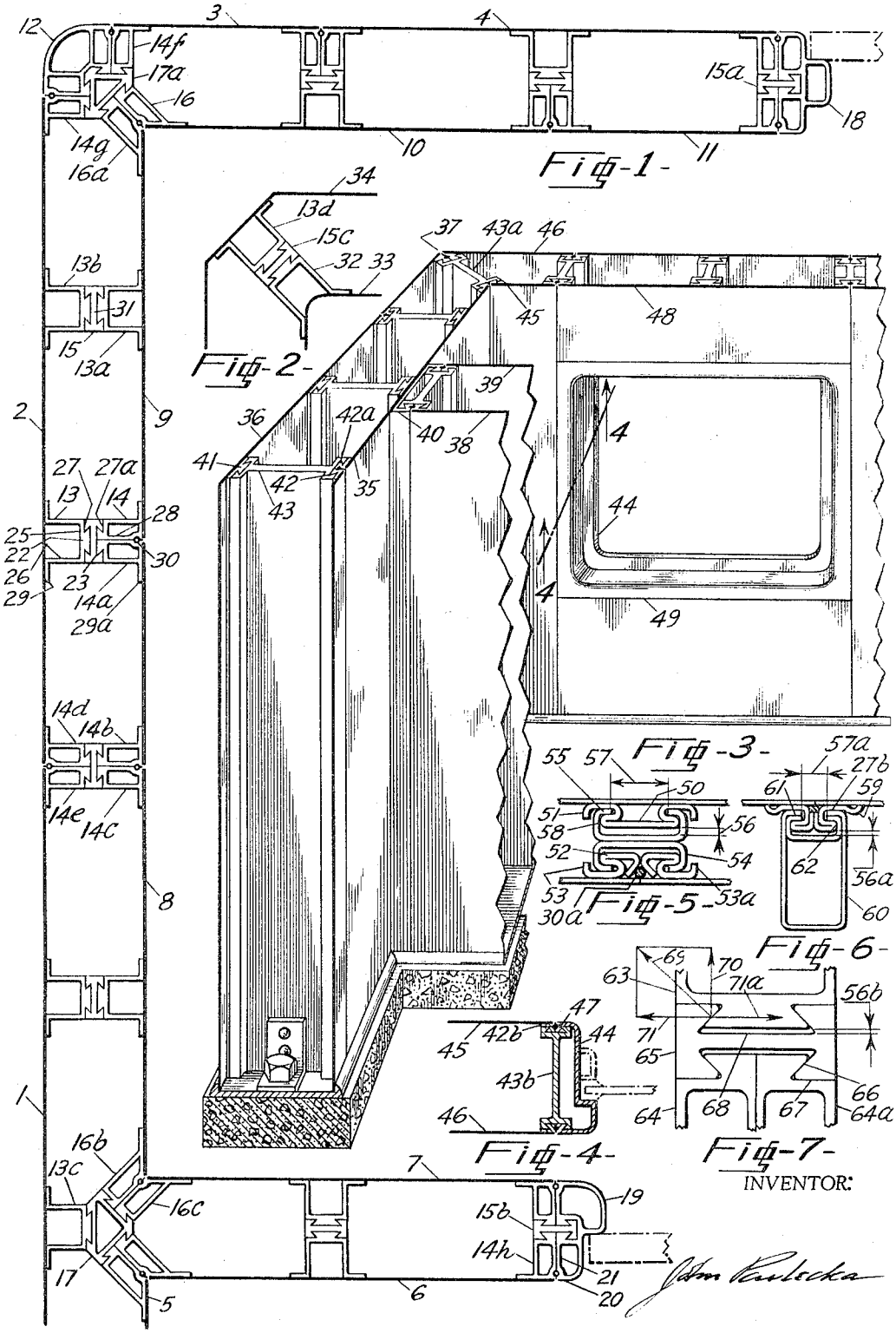
Jan. 10, 1967 J. PAVLECKA 3,296,760

INTERLOCKED PANEL STRUCTURE

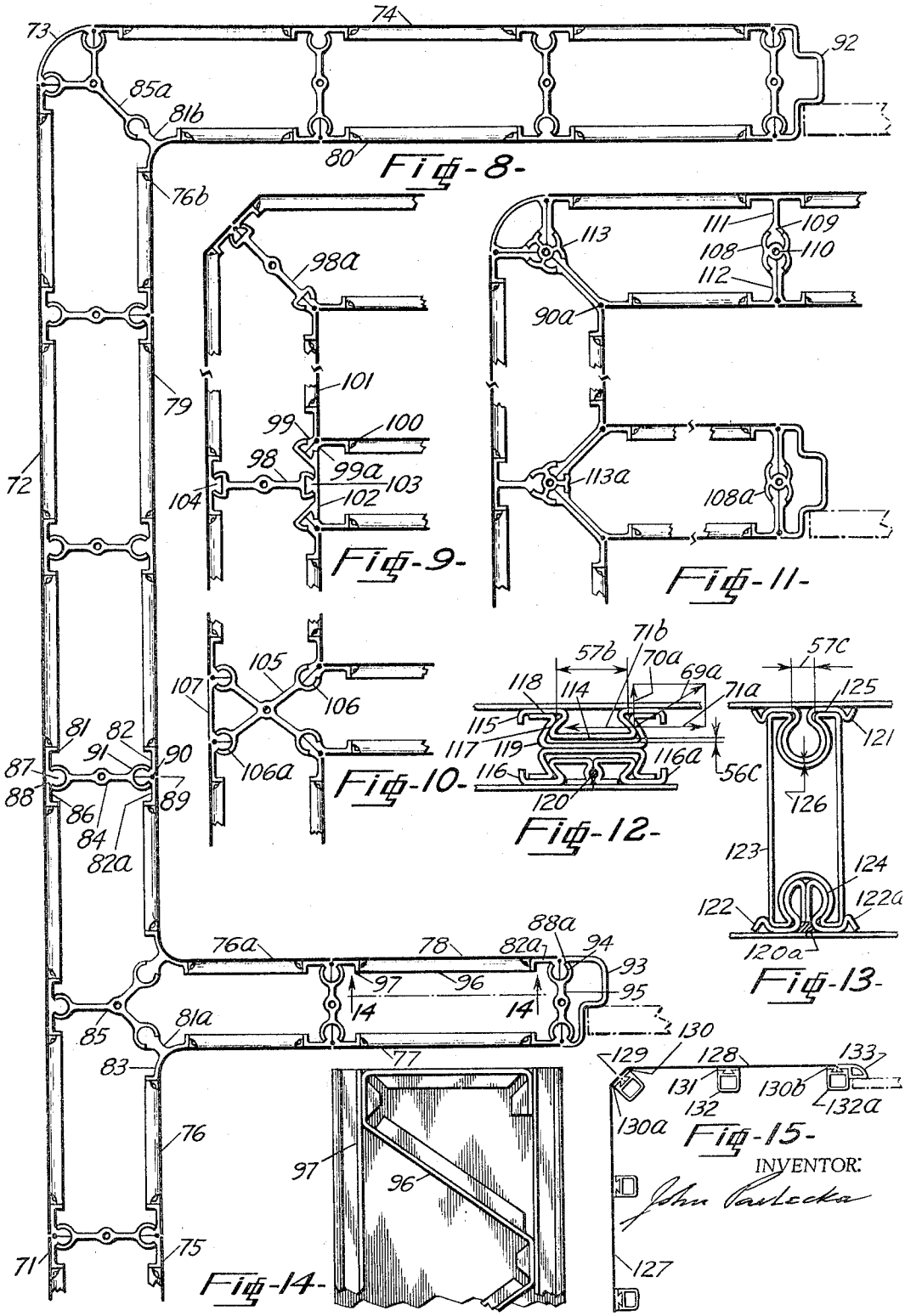
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INTERLOCKED PANEL STRUCTURE

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INTERLOCKED PANEL STRUCTURE

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This invention relates to novel hollow wall structure, a subcombination of which is usable also as a single-file wall, assembled of panel units by interlocking linear keys or keying members, and which is applicable to walls, partitions and floors of houses and buildings, decks, railroad car and van bodies, furniture, etc., and also to miniature replicas thereof used as toys.

The disclosure of this invention is a continuation-in-part of my application No. 326,391, filed December 17, 1952, and abandoned September 30, 1964.

One object of this invention is a hollow wall structure, normally inaccesible interiorly, which is fabricated with full accessibility as a number of panel units by processes such as resistance welding and adhesive bonding, and is assembled by means of linear keys or keying members slid endwise into a mortise and tenon engagement with the panel units not only for securing them into unity but also for providing the necessary stress members for the shell formed by them.

Another object resides in a wall structure for which a requisite smooth and flawless exterior is obtained by making use of the widest available sheets for panel units forming it, by constraining the panel units in an edge-to-edge alinment at their parting lines preferably by forces initially induced therein, and by eliminating all rivet, screw and nail heads from their exterior.

Another object is the use of panels of extreme thinness in the structure of this invention for making metallic and synthetic panels feasible from the standpoint of cost, by a combination of engagement at reentrant flanks and abutment of stringers on the panels with linear keys or keying members at shoulders and ledges distant from the panels to the exclusion of any other surfaces or location, and by preferably inducing preloading forces at the engagement and abutment surfaces.

Another object resides in devising a wall structure which possesses hitherto unavailable properties of the panel parting lines occurring, by choice or by chance, at any one modular interval, of panels of different modular widths compatibly associable with one another that any one modular interval, and of the panel parting lines in a hollow wall occurring indiscriminately coincidentally or non-coincidentally in the wall sides, all of such results being achieved by stringers of two equivalent types in combination with their modular spacing whereby they can be keyed together indiscriminately one type in opposition to either the same type or to the other type at any one interval.

Another object resides in curvilinear or bulbous reentrant flanks on the mortise and tenon formations of the stringers of the aforementioned two types and on the linear keys or keying members, which flanks in combination with the aforementioned abutment shoulders and ledges afford a more cohesive and immobile union of parts made of sheet material.

Another object is a complete plan of hollow walls for a house or building, assembled of panel units interlocked in adjoining and in spaced apart facing or everlapping relationships by linear keys or keying members to form straight runs and L- and T-intersections therebetween, to which end stringers of intermediate and edge types are provided on the panel units at modular intervals, of which each two of the latter type jointly constitute an equivalent of the interlocking formations of one of the former type, the intersections being formed by means of the same two stringer types, of which at least those on the inner wall side are inclined on their panel units diagonally across the intersection.

Yet another object resides in embodying a terminal member, such as a door or window frame, or a transverse member for securing a partition wall to a peripheral wall, in the wall structure above mentioned or in a single-file wall, by means of one linear key or keying member in engagement and abutment with identical interlocking and ledge formations on a panel unit or units and on the adjoining terminal member.

Another object is a wall structure as set forth in the preceding paragraphs in which the linear keys or keying members that interlock the panel units at both the L- and T-intersections are of an identical cross-section with three mortised and shouldered profile extremities.

Another object is a water- and air-tight panel wall by means of a sealing strip between juxtaposed stringers on each two meeting panels, the strip being compressed by cohesion of the stringers due to their engagement with and abutment at ledges and shoulders against a linear key or keying member.

Another object of this invention is to further render thin panels practicable for a wall by means of braces attached to their inward face and to lateral flanges on the stringers for coaction of the stringers in stress resisting.

The manner of realizing the above and other useful objects and results is disclosed first with reference to all the embodiments shown in the drawings which form a part of this specification, and then with detail reference to each of them.

In all embodiments of this invention at least one row of panel units, referring to as "panels," constitutes a single-file wall of a utility building, or a floor, roof, etc., and in most embodiments two such walls are combined to form a hollow wall such as is most useful for house and building construction because in it can be concealed all wiring, piping, heat ducts and insulation; linear keys or keying members interlock the panel units by means of stringers thereon in their adjoining and spaced apart facing relationships, and by a relatively immobile engagement with the stringers give rise to principal stress members for the wall.

The panel units consist basically of relatively thin sheets of any suitable material, and stringers as auxiliary stress members extending lengthwise on them at modular intervals; the stringers are integral with the panels by being either formed of the same material in one piece with them, or are extruded or rolled separately and attached to the panels permanently; one type of the stringers extends on the panels at and along their edges and is referred to as the "edge" type or "juxtaposed" type because two such stringers extend in juxtaposition to each other on each two panels meeting at a parting line; on panels of multiple modular widths one or more of "intermediate" type stringers extend on the panels at equal intervals from their edges.

The linear keys or keying members have a constant cross-section which has one profile extremity in opposed alignment with one intermediate stringer, or with each two juxtaposed edge stringers, and an interlocked union between these parts is effected by a slidable engagement of a reentrant mortise in the key with a conforming tenon, or two half-tenons complementing each other, on the respective stringers. The reentrant mortise and tenon formations can be of either the tongue-and-groove type, or the dovetail type, or of the bulbous type, or of a combination of the latter two types.

One novel principle making the panel unions in adjoining and in spaced apart facing relationships possible by identical linear keys or keying members is that of equivalency of the tenons on the intermediate stringers with the combined half-tenons on the edge stringers; this

equivalency of the keying tenon and half-tenons on the two stringer types, in combination with the modular spacing of the stringer types, accomplishes hitherto unavailable useful results in that the panels can be of different modular widths and such panels can be associated compatibly with each other to form a wall of any predetermined length, the panel parting lines can occur at random or by design at any one modular interval, the panel parting lines in both panel rows of a hollow wall can occur indiscriminately in either a coincident or a non-coincident relationship, and the number of different sections and components for such solution of all problems of panel wall assembly is reduced to a minimum.

Besides their interlocking function for the panels in cooperation with the linear keys or keying members, the stringers cooperate further with the keys for providing principal stress members for the panels and the structure, and in order to perform that function effectively certain novel features are embodied in their union; the concept is to constrain the stringers immovably as a single body by means of the keys and thus create unitary stress members the section modulus and moment of inertia of which are increased with the square and third power, respectively, over a sum of their individual sectional properties; to this end, the linear keys or keying members are formed with shoulders at the full width of their profile extremities alongside the mortise therein; the stringers are formed with ledges astride their tenons and half-tenons, which ledges are raised away from the panel surface by being carried on walls of the stringers or on their flanges; in their interfitted condition, the keys and the stringers abut each other shoulders-against-ledges at the corners defined by their maximum width, and under bending strain due either to lateral or axial external loading and consequent deflection or even a minute amount they will abut each other forcibly for cooperative resistance to stresses.

For implementing the foregoing principle of constraining the parts relatively immovably certain structural features are embodied in them including, first, a positive engagement of the reentrant or undercut portion of the stringer tenon, or combined half-tenons, with the like portion of the linear key mortise, and a positive abutment of the respective ledges and shoulders, which conditions are obtained by providing a clearance between the crest of the tenon, or of the combined half-tenons, and the bottom of the mortise; second, the reentrant shape of the mortise and tenon formations is made obliquely inclined to the shoulders and ledges whereby under strain it produces one wedging force component normal to them and urges the parts into abutment thereat, and produces a transverse wedging force component which, together with its reactive component, urges each two juxtaposed stringers into cohesion with each other; third, convex reentrant flanks on the stringer tenon and combined half-tenons, and matching concave flanks in the key mortise will reduce the acute angle between the flanks and the shoulders and ledges for increased wedging action and abutment at the shoulders and ledges; and fourth, the mortise in the key is constricted in its free shape at its throat between the marginal shoulders whereby upon a slidable engagement with the stringer tenon, or two combined half-tenons, it will be sprung to its full width and grip the tenon flanks with an initial preloading force.

One construction vital to a panel wall structure is an L-intersection between walls at a corner, and a T-intersection in midspan of one wall with another; both of these intersections are assembled from panel units forming portions of the walls by means of the two equivalent stringer and keying formation types as used in the walls; for this function, the stringers on the panels in a single-file wall and on the inner panel row in a hollow wall are inclined to their panels so that they carry their ledges crosswise of a diagonal plane through both the L- and the T-intersections; linear keys or keying members either of the same profile as in the walls may be employed at the intersections, or for greater strength three- and four-profile extremity members may be used, and such three-extremity members may be identical at both intersection types.

Another vital construction in a wall structure are various transverse or terminal members, such as door and window frames, or an abutment member at the juncture of one wall at right angles to another without an intersection structure common to both of them; the integration of such members into the wall is effected by means of half-tenon and ledge bearing edge type stringers on the panels in juxtaposition to half-tenons and ledges therealong on the members, and engaged jointly by one linear key or keying member.

For rendering the subject structure air- and watertight, resilient sealing strips are lodged between the juxtaposed edge stringer at the panel parting lines; their sealing function proceeds from their compression due to the stringers lateral engagement with the linear keys or members, and due to the stringers abutment at ledges against the keys or members; additionally, laterally exerted preloading forces are provided for intensifying the stringers abutment and seealing strip compression.

The foregoing innovations and others implement the novel overall concept of the disclosed structure which comprises (1) walls and intersections assembled of panels interlocked by linear keys or keying members at modular intervals therein, which keys or members can be alike both in the walls and intersections; (2) panels of different and/or the same modular widths compatibly associable with one another randomly or by plan at coincident and non-coincident parting lines; (3) thin metallic or synthetic panels and stringers thereon of two equivalent types in a mortise and tenon interlock with linear keys or members, either one type with the same type, or with the other type in opposition to each other, and in a ledge-to-shoulder abutment with the keys or members at a distance from the panels for relief of stresses in the thin panels and for constrainment and coaction of the parts as unitary principal stress members for the structure; and (4) linear keys or keying members having reentrant mortise profile extremities and abutment shoulders therealong, in a slidable engagement at lateral or oblique reentrant flanks with tenons or combined half-tenons on the stringers, and means for inducing abutment at their shoulders with lands or ledges on the stringers either initially or under strain due to external loads.

The manner of realizing the above structural principles is illustrated by a number of embodiments thereof in the drawings, in which:

FIG. 1 is a plan view of a wall structure for a house or building with L- and T-intersections and terminal members, interlocked by linear keys having two- and three-extremity profiles.

FIG. 2 is a modified L-intersection construction alternative to the one in FIG. 1.

FIG. 3 is a perspective view of a wall embodying linear keying members of an elongated profile, and employing a terminal member for effecting the juncture of a partition with a peripheral wall.

FIG. 4 is a cross section through the window frame of FIG. 3 at a location designated by 4—4.

FIG. 5 is a union of an intermediate type stringer with two juxtaposed edge type stringers on respective three panels, by reentrant mortise and tenon formations of the tongue and groove species.

FIG. 6 is a variant of the union of FIG. 5 applicable to a single-file wall, floor, or roof.

FIG. 7 is an end view of three stringers keyed together in opposed and juxtaposed relationships at obliquely reentrant flanks on a dovetail mortise and tenon, and abutted at ledges against shoulders on the keying member or key.

FIG. 8 is a plan view of a wall structure analogous to

that in FIG. 1 with differences in the profile proportions of the stringers and keys or keying members, and in the bulbous shape of the tenons and mortises; also, braces on the panels are shown alternating between lateral stringer flanges.

FIG. 9 shows modified constructions of the L- and T-intersections of FIG. 8, employing the same keying members as in the walls.

FIG. 10 is another modification of the T-intersection with a four-extremity key profile instead of the trifurcate one of FIG. 8.

FIG. 11 shows a modification of the wall of FIG. 8 in that tall stringers are interlocked by linear keys of a minimal cross-section.

FIG. 12 is an end view of dovetail-shaped stringers and linear key the reentratn flanks of which have a curvilinear shape.

FIG. 13 is an interlocked and shoulder-to-ledges abutted union of stringers and a keying member by means of bulbous tenons and mortises, similar to those in FIGS. 8 and 10.

FIG. 14 is a face view of a panel from the wall in FIG. 8 showing braces attached to the panel and to the stringers.

FIG. 15 is a plan view of a portion of a single-file wall with an L-intersection and a terminal member therein.

The structure of FIG. 1 represents house or building walls and intersections therein constructed of panel units in adjoining and in spaced apart facing or overlapping relationships; panel rows **1–4**, **5–6**, and **7–11**, with a corner post **12** in the outer row at an L-intersection, constitute a peripheral wall to which a partition wall is joined at a T-intersection; all of the panels are assembled into the rows by intermediate type stringers **13** paralleling the lengthwise panel edges at modular intervals therefrom, and by edge type stringers **14–14***a*; the latter fall into juxtaposition with each other at the panel parting lines, and jointly amount to an equivalent of an intermediate type stringer in the matter of the interlocking formations thereon; because of this principle the two stringer types can cooperate in permutative opposition either one type with the same type, as **13***a*–**13***b* and **14***b*–**14***c*, **14***d*–**14***e*, or with the other type, as **13**, **14–14***a*, all of which combinations are interlocked by identical linear keys or keying members **15** to function as studs in the wall; one novel result achieved by permutative use of the two stringer types is that the panels of different modular widths will fit together compatibly, and another result is in that the panel parting lines can occur at any one interval at random or by choice and become either coincident or non-coincident in the two panel rows.

The L- and T-intersections between meeting walls are created from the panel units which form the walls, and whether the panel units are continuous through the intersection or meet angularly thereat at a parting line the stringers on at least the inner row panel or panels are directed diagonally toward the center of the intersection; thus, at both the L- and T-intersections a pair of juxtaposed edge stringers **16–16***a* and two pairs of **16***b*–**16***c*, respectively, stand on their angularly related panels at a plane laid crosswise of the intersections; at the T-intersection a normal stringer **13***c* on the outer row panel **1** and the two pairs on the inner rows are interlocked by a linear key **17** of a profile having three extremities with keying formations on each one; at the L-intersection edge stringers **14***f* and **14***g* on the converging outer row panels are juxtaposed to the tubular post **12** which is formed with keying formations complemental to those on each of the stringers, and is interlocked therewith and with the inner row stringers **16–16***a* by a key **17***a* having three keying extremities and being identical with the key at the T-intersection.

Door and window frames **18** and **19** are examples of transverse terminal members and have a profile consisting of sides **20** which meet the spaced apart panels of a wall in flush continuity, and on opposed webs **21** bear keying formations which jointly conform to those on one lateral half of one linear key **15***b*; these formations and the webs **21** are juxtaposed to edge stringers **14***h* on the opposite panels, and are engaged jointly with them by the key **15***b*.

The interlocking formations carried on the intermediate stringers **13** have the form of a central reentrant tenon **22**, and of one half thereof **23** on the edge stringers **14**, on the post **12** and on the terminal members **18** and **19**; these tenons and half-tenons are carried on a cross-web **25** between walls **26** and corners thereon located beyond the width of the tenon and the combined half-tenons; along both sides of the intermediate stringer tenon and along one side of the edge stringer half-tenon extend ledges **27** on the cross-webs, which ledges include the corners at the full intermediate stringer or combined edge stringer width; both stringer types are attached to the panels by respective flanges **29** and **29***a*, which flanges in the edge stringers reach to the panel edges and thereat support a wall **28**; sealing strips **30** are lodged in lengthwise grooves in these walls of each pair of edge stringers, and are compressed by an engagement of the stringers half-tenons with one of the keys **15** and by the stringers abutment at their full width and ledges **27***a* thereat against corresponding shoulders on the key.

The key cross-section consists of a web **31** in keys **15**, and of three such webs in keys **17** and **17***a*; on each side of the web in the keys **15** and on the outer side thereof in the latter keys runs a reentrant mortise, and astride of it shoulders which form corners at the full key width; in their engagement with the stringers, the key mortises engage the stringer tenons and combined half-tenons at their reentrant flanks while the key shoulders and the respective stringer ledges **27** and **27***a* confront and abut each other corner-to-corner, thus giving rise to virtually a unitary stress member at each modular interval into which stresses are transferred from the panels through the relatively large area of the stringer flanges.

The structure of FIG. 1 can be modified as shown in FIG. 2 by employing the same linear key or keying member **15***c* at the L-intersection as in the walls, between stringers **32** and **13***d* diagonally inclined on their respective inner and outer row panels **33** and **34**; another modification resides in that either one or both of the panel rows can be continuous through the intersection by a substitution of one panel for the two meeting ones in FIG. 1 in the inner row, and/or for the two panels and the post **12** in the outer row; such a substitution of one panel for two, or vice versa, is of course one of the novel results of the two equivalent stringer types, but in the modified construction of FIG. 2 it has the added advantage in that the inner panel or panels can be formed to a radius to provide a cove corner, as panel **33** does, or be broken at two locations to provide a beveled corner, as the outer panel **34** does.

The linear keys of FIGS. 1 and 2 have a minimal profile characterized by a thin central web, and when made of a heat non-conducting material, function as insulators against heat transfer through the wall; for wide walls and where severe loading occurs, as in the lower floors of a building, the proportions between the stringers and the keys can be modified by stringers of a low height and by keys of an elongated profile, as in the wall structure of FIG. 3; in its panel rows **35** and **36**, with parting lines **37** therein, form the inner and outer sides of a peripheral wall and an L-intersection therein; a partition wall formed by panel rows **38** and **39** abuts the first wall and is secured to it by a terminal member **40** which meets the rows **38** and **39** at two opposite parting lines and forms a short continuation thereof to a transverse web through which it is attached to one inner row panel **35**; the panel parting lines, such as **37**, in FIG. 3 and in most other figures, are shown for identification as gaps in the panel rows even though the panels, or the panels

and terminal members, meet edge-to-edge, and the abutment shoulders and ledges on the parts constrain them in that condition, and means, disclosed hereinfurther, are provided to urge them forcibly into abutment with each other.

The panels have intermediate stringers **41** and edge stringers **42–42***a* of a minimal height on them, bearing ledges directly on their attaching flanges and a reentrant tenon therebetween; each pair of the edge stringers bears an equivalent of the ledges and tenon on one intermediate stringer; interlocking the two stringer types in opposition of either one type with the same type, or with the other type, are keying members **43** of an I-beam profile, with shoulders at the maximum width of their profile ends, and with a reentrant mortise between the shoulders; the members confront and abut with their shoulders the stringer ledges while being in a mortise and tenon engagement with the stringer tenons and combined half-tenons.

At the L-intersection, one diagonally positioned keying member **43***a* is in engagement with edge type stringers which bear their ledges and combined half tenons at right angles to a diagonal plane through the intersection in congruity with the member, similarly as the ledges and tenons on the intermediate type stringers in FIG. 2.

A terminal member **44**, analogous to the member **40** which effects the juncture of the partition and peripheral walls, represents a vertical side of a window frame; its profile, shown in FIG. 4, includes a transverse web, parallel flanges thereon in alinement with panels **45** and **46** at their edges, a half-tenon **47** on each flange in juxtaposition to edge stringer **42***b* on each panel, and a flat land next to each half-tenon for abutment with a keying member **43***b* thereat; this member is one of the modularly located members in the wall, and engages panels **48** and **49** above and below the member **44** in continuity of one with another.

Besides the dovetail mortises and tenons on the keys and stringers in FIGS. 1–4, other interlocking reentrant formations are contemplated in combination with the disclosed abutment shoulders and ledges therealong, and other improvements are in purview for relative immobility of the parts, relief of stress concentration in the panels, and for lateral cohesion of the edge stringers and panels thereof. In the union of FIG. 5 a laterally grooved tenon **50** on an intermediate stringer **51**, and half-tenon **52** on edge stringers **52–53***a*, are in engagement with a linear key **54** whose tongues **55** fit into the stringer groves and are in abutment with ledges therealong at a distance from the panels, which ledges in this embodiment are provided by the stringer flanges; in order to insure that the engagement takes place in the grooves between the flanges and the underside of the tenon **50** and half-tenons **52**, and that the abutment takes place against the ledges or flanges along the grooves and not, as in conventional such unions, at the underside of the tenons and at their crest, a clearance **56** is provided by design between the tenon crest and the bottom of the key mortise; due to this clearance of at least a few thousandths of an inch, the engagement of the parts is confined to the key tongues **55** in the stringer reentrant grooves; the importance of this construction rests in that contact, engagement and abutment are virtually impossible to obtain simultaneously at three superimposed surfaces slidably assembled, and should the fit between the tenon crest and the mortise bottom be the tightest one, no abutment could occur between the shoulders on the key tongues **55** and the stringer ledges or, in this instance, flanges, thus permitting lateral sway at the neck of the tenon **50** as the weakest portion of the union.

As a further means of obtaining utmost rigidity from the tongue and groove union of FIG. 5, the distance **57** between the tongues **55** is made greater than the width of the tenon neck whereby the lateral engagement of the key **54** with the stringers will take place at the sides **58** of the stringer tenon **50** and half-tenons **52**; moreover, by forming the key with its mortise sides initially deflected towards each other, the free distance **57** will be somewhat smaller than in the engaged condition; as a result, the key will grip the tenon sides **58** with a preloading force which will be particularly effective in urging the edge stringers **53–53***a* and their panels into cohesive unity with each other, and will subject a sealing strip **30***a* between them to compression.

The same principles of obtaining improved coaction of the interlocked parts as a unitary stress member as in FIG. 5 are applied in FIG. 6 to a union of stringers **59** by a linear key in the form of a stud **60** in a single-file wall or a joist in a floor; the same clearance **56***a* as in FIG. 5 is relied upon to insure that the tongues **61** of the keying member engage the stringers between their flanges and the underside of the half-tenons, and that the shoulders on the tongues abut against ledges **27***b* provided, in this case, by the flanges at a distance from the panels; and the same initially constricted mortise is relied upon to insure a tight hold of the keying member on the tenon flanks **62** for cohesion of the stringers and compression of a sealing strip between them; in its assembled distended condition **57***a* the mortise throat is out of contact with the tenon neck by a predetermined clearance for insuring engagement at the flanks **62**.

Even more effective is an engagement of stringers **63** and **64–64***a* in FIG. 7 with a linear key **65** at obliquely reentrant flanks **66** of dovetail shape in combination with abutment shoulders and ledges **67**, this being an enlarged view of the union shown throughout FIGS. 1–4; for effecting abutment at the shoulders and ledges **61**, a predetermined clearance **56***b* of a least a few thousandths of an inch is provided between the tenon crest and the mortise bottom **68** beyond and astride the flanks **66**; when subjected to horizontal bending forces, or to vertical axial forces, the stringers and the key will deflect and produce a binding force **69** at the flanks, a component **70** of which normal to the shoulders and ledges **67** will urge them into abutment with each other, and another component **71** acting laterally will have an equal but opposite reaction **71***a* which, together with its counterpart at the opposite flanks of the stringers **64–64***a* will urge them into abutment with each other; abutment produced initially at the shoulders and ledges **67** will react against the flanks **67** and tend to wedge the parts together in the same way as the binding force **69** acting at the flanks.

Interlocking formations of a shape which combines the advantages of the angularly reentrant type of FIGS. 1–4 and 7 with those of the constrictive tongue and groove type of FIGS. 5 and 6 is the curvilinear reentrant type shown in any one of FIGS. 8–13; in FIG. 8 a complete wall organization for a house or building consists of outer panel rows **71–74** and inner panel rows **75–77** and **78–76***a*–**79–76***b*–**80**, with intermediate type stringers **81** and juxtaposed edge stringers **82–82***a* at modular intervals on them; the L- and T-intersections are assembled on the same panels that form the walls, the inner row panels **76** at all corners being continuous through the intersections and being curved to form a cove thereat in the manner disclosed in FIG. 2; intermediate stringers **81***a* mounted on these panels have flanges **83** conforming to the panel curvature and are placed in a diagonal direction through the center of the intersection; the outer corner at the L-intersection is occupied by a panel or extrusion **73** which carries on it edge type stringers at two right angle planes in juxtaposition to like stringers on the converging panels **72** and **74**.

The linear keys or keying members are of two profiles, similarly as those in FIG. 1 but elongated as those in FIG. 3; one profile, **84**, has two extremities, and the other one, **85**, has three and, similarly as in FIG. 1, is distinguished in that it is identical on the keying members **85** and **85***a* at both intersections. The stringer profile includes attaching flanges **86** and a tenon **87** which has a circular or bulbous shape with reentrant convex flanks, and along them ledges **88** approximately radial to the flanks; the edge stringers **82–82***a* have each the profile

of one lateral half of the stringer **81** so that jointly they become an equivalent thereof at all parting lines **89**, whereat a sealing strip **90** is lodged between them.

Both of the keying member types **84** and **85** have a circular reentrant mortise in each profile extremity **91** sized for a slidable engagement with the stringer tenon or combined half-tenons, and along its throat run shoulders matching the stringer ledges **88** for abutment therewith.

Terminal members, such as door and window frames **92** and **93** have parallel sides meeting the panels and bearing half-tenons **94** and ledges **88***a* therealong in juxtaposition to like formations on panel edge stringers **82***a* for joint engagement by a keying member **95**.

Due to elimination of stress concentration in the panels by the stringers the panels can be of thin sheet material, in which function the stringers cooperate with each other through transverse braces **96**, shown in face view in FIG. 14; the braces are bonded or welded to the panels, and are secured to lateral flanges **97** raised along the stringer attaching flanges.

The structure of FIG. 8 can be modified as shown in FIG. 9 for use of identical keying members **98** and **98***a* at both intersections, similarly as in FIG. 8, except in that the members are of the same profile as used in the walls; this is accomplished at the L-intersection in the manner shown previously in FIG. 2 by employing a diagonally inclined stringer or stringers of either type on both the inner and outer panel rows; at the T-intersection, diagonally placed stringers **99**–**99***a* on each pair of panels **100**–**101** meeting in the corners thereat are engaged by mortises in a transverse linear key or member **102** which carries a tenon **103** in opposition to a wall tenon **104**, and one of the keying members **98** engages both of them.

Another modification in FIG. 9 concerns the mortise and tenon shape, which is disclosed more particularly with reference to FIG. 12.

In FIG. 10 a modified keying member **105** replaces the trifurcate member **85** of FIG. 8 at the T-intersection; it has a cruciform profile with four reentrantly mortised profile extremities and shoulders thereon, two in engagement and abutment with combined stringer half-tenons **106** on the inner corner panels at an inclination thereto, and the other two with two pairs of half-tenons **106***a* on the outer panel row, and specifically on a narrow panel or extrusion **107** and two adjoining panels in that row.

As evident from FIGS. 1 and 3, the linear keys or keying members can vary dimensionally from a profile with a thin web between two mortised profile extremities to one with an elongated web between two widely spaced apart such extremities; in FIG. 11 are shown linear keys performing the same engagement and abutment functions as the keying members **84** and **85** in the wall of FIG. 8 but reduced to a minimal section; the wall and partition keys **108** and **108***a* have bulbous mortises in their profile extremities, shoulders **109** therealong, and a central web with a hole **110** for anchoring the wall to a sill or foundation by tie rods. The tall stringers include a tenon carrying web **111** which in the edge stringers is offset to one side of the parting line plane.

At the intersections, identical keys **113** and **113***a* include the same three mortised profile extremities as the keys **85** and **85***a* in FIG. 8, arranged around a central hole for a tie rod. In this embodiment of tall stringers their abutment with the keys at shoulders and ledges **109** is of particular importance for constrainment of the stringers and panels in unity at the parting lines and for compression of a sealing strip thereat.

The mortise and tenon shape in the union of FIG. 12, already shown in FIG. 9, is basically dovetail, with flanks pertaining to a bulbous shape; tenon **114** on a stringer **115**, and combined half-tenons equivalent to the tenon on stringers **116**–**116***a* have obliquely reentrant convex flanks **117** and ledges **118** therealong; linear key **119**, made up of two rolled sections, has concave mortise flanks matching the stringer flanks **117**, and shoulders matching the ledges **118**; the convex and the concave flanks form an acute corner with the respective stringer ledges and key shoulders, which corner may be sharp on extruded sections, as in FIGS. 8, 9 and 11, or rounded off by a small radius on sheet metal sections, as in FIGS. 12 and 13; abutment of the shoulders with the ledges is produced by their coaction with the oblique flanks **117** in the same manner as in the union of FIG. 7; similarly as there, in order to give effect to such abutment, the tenon crest **114** is out of contact at its full width between and preferably beyond its corners with the mortise by a predetermined clearance **56***c*, even if of a few thousandths of an inch; abutment is obtained initially by making the mortise throat slightly narrower so that it becomes distended at assembly to a width **57***b* greater than the neck of the tenon by a predetermined clearance to insure that the mortise will engage the tenon and the combined half-tenons with a force at their flanks **117**; in use, a deflection of the parts under external forces, acting either alone or in conjunction with internal forces due to an initial snug fit, produces a binding force **69***a* at the flanks **117**, one component **70***a* of which urges the key shoulders against the stringer ledges **118**, and another component **71***a* has an equal but opposite reaction **71***b* which, with its counterpart at the other flanks, urges the stringers **116**–**116***a* into abutment with each other for cohesion and compression of a sealing strip **120** between them.

The foregoing structural innovations are equally applicable to the circular mortises and tenons disclosed in FIGS. 8 and 10, and shown on a larger scale in FIG. 13 as applied to sheet metal stringers **121** and **122**–**122***a*, and to a keying member **123**; the tenon and the half-tenons on these stringers are interfitted with a mortise **124** in both profile ends of the member, and respective ledges and shoulders **125** are provided for abutment of the stringers with the member; such abutment is essential not only to prevent oscillation of the parts relative to each other because of angular looseness, but also to obtain their coaction as a unitary stress member, and to hold the stringers **122**–**122***a* and their panels tightly together; abutment is induced primarily by the obliquity of the curvilinear mortise and tenon flanks **124**, in which respect the circular shape, the same as the convex-concave shape of the flanks in FIG. 12, is of particular advantage over a plain dovetail shape, and even though the reentrant angle between the flanks and the shoulders and ledges on the circular tenons and mortises of FIGS. 8–10 is shown to be about 90 degrees, such angle can be considerably more acute as shown in FIG. 13; in order to insure that abutment take effect at the shoulders and ledges **125**, the parts are sized to be out of contact with each other by a predetermined clearance beyond and astride the flanks **124** between the mortise bottom and the tenon crest, which clearance is at its maximum at **126** so that abutment at the shoulders and ledges **125** will obtain regardless of variations in manufacturing tolerances thereat and beyond the flanks **124**.

Abutment, because of this construction, may also be obtained initially in the same manner as disclosed in FIG. 12 by a nominal constriction of the mortise throat whereby its distention to a width **57***c* as assembly not only removes it from contact with the neck of the tenon and of the half-tenons by a predetermined clearance, but produces a snug slidable hold on the tenon flanks **124** and consequent reaction forces normal to the shoulders and ledges **125** according to a force diagram analogous to that in FIG. 12.

The two equivalent stringer types keyed together by a linear key or keying member in the three-stinger unions of FIGS. 5, 7, 12 and 13 represent the basic components which, being capable of the disclosed permutative relationships, make it possible to assemble a complete hollow wall of any plan and extent from panels of different modular widths; moreover, the means disclosed in those unions for rendering the interlocked parts cohesive and

cooperative as unitary stress members, and the reinforced panels and stringers disclosed in FIGS. 8 and 14, make it practicable to produce such a wall, or a single-file wall, economically from thin metallic or synthetic panels and parts.

The hollow or cavity wall disclosed in the preceding figures is a combination of two single-file walls which coact with each other through the two equivalent stringer types for additional advantages, particularly in the matter of the compatibility of panels of different modular widths in adjoining and spaced apart facing or overlapping relationships at randomly coincident and non-coincident parting lines, thereby producing a normally inaccessible structure not otherwise possible. The subcombination of either the inner or the outer panel row in any one of the hollow walls herein disclosed can be used as a single-file wall, floor, deck, etc.; such a wall shown in FIG. 15 consists of a row of panels of which **127–128** meet at a corner parting line **129**, and are beveled thereat to accommodate stringers **130–130*a*** next to a diagonal plane through the parting line; both of the stringers are equivalent to an intermediate stringer **131** for engagement with keying members **132** by means of mortise and tenon formations thereof, and for abutment at ledges and shoulders therealong. A terminal member **133** is made a part of the wall by means of a half-tenon and a flat land therealong side-by-side with an edge stringer **130*b***, and a keying member **132*a*** is slid into engagement and abutment with both of them.

It has already been pointed out that because of the equivalency of one tenon with two half-tenons, and of the stringers bearing them, two panels can be used interchangeably with one panel, and vice versa, in all of the embodiments disclosed; furthermore, any of the disclosed constructions, subcombinations and panel unions can be substituted in or applied to other embodiments or products, whether shown or not in the drawings, within the scope of the appended claims.

The claims define the disclosed panel wall structure and its subcombinations according to the following index:

Subject Matter	Claim or Claims
1. A panel-linear key or keying member mortise and tenon union.	1–6.
2. A two-panel union	7–16.
3. A three-panel union	17.
4. A panel and braces between interlocked unions thereon.	18, 24.
5. A single-file panel wall	19, 20.
6. A terminal member union with a panel or with two spaced apart panels.	21 (also 19, 23, 37).
7. A hollow panel wall	22, 23, 25, 26.
8. An L- or a T-intersection between panel walls	27, 29 (also 31–37).
9. A T-intersection between hollow walls	28, 30 (also 27, 29, 31–34, 37).
10. Hollow panel walls and intersections therebetween.	31–37.

I claim:

1. In a structure, a panel unit, a tenon extending lengthwise, on said panel unit and having obliquely reentrant flanks, a linear key or keying member having a mortise and obliquely reentrant flanks therein in a slidable engagement with said tenon flanks, said tenon flanks being convex and said mortise flanks being concave, ledges and marginal corners thereon extending on said panel unit along said tenon flanks and forming acute corners therewith, and shoulders and marginal corners thereon extending on said key or member along said mortise therein, said shoulders being in contiguity with said ledges at and between said acute corners and said marginal corners for abutment therewith.

2. In a structure, a union of a panel unit with a linear key or keying member as set forth in claim 1, said tenon and said mortise having a substantially circular shape, and said respective convex and concave flanks and said acute corners at said ledges being provided by the reentrant portions of said shape.

3. In a structure, a panel unit, a tenon extending on said panel unit and having obliquely reentrant flanks thereon and a neck formed by said flanks, a linear key or keying member having a mortise with a throat and obliquely reentrant flanks inwardly thereof and being in a slidable engagement of said mortise with said tenon at said flanks thereof, lands extending on said panel unit along said tenon neck, shoulders extending on said key or member along said mortise throat therein in contiguity with said lands, said mortise throat being out of contact with said tenon neck by a predetermined lateral clearance for making said engagement take effect at said oblique flanks, and said mortise being out of contact with said tenon by a predetermined clearance beyond said flanks thereof for making abutment take effect under strain at said shoulders and lands.

4. In a structure as set forth in claim **3**, said mortise throat being normally constricted and being distended by said engagement with said tenon for a snug hold of said mortise flanks on said tenon flanks and due to the obliqueness thereof for abutment of said key or member shoulders with said panel unit lands.

5. In a structure, a panel unit continuous around a corner between two right-angle portions thereof, a linear key or structural keying member extending along said corner at a distance therefrom and having a longitudinal reentrant mortise at a plane diagonally through said corner, and a reentrant tenon extending as a part of said panel unit thereon at said corner, said tenon being inclined to said panel portions by reaching to said key or member at said diagonal plane and being in a slidable engagement with said mortise thereof.

6. In a structure, a panel forming two right-angle sides of a wall and a cove corner therebetween, a stringer extending on said panel and having a profile including attaching flanges conforming to said cove corner and a reentrant tenon at a plane diagonally through said corner and ledges extending along said tenon astride said plane, a linear key or structural keying member extending along said panel at a distance therefrom and having a reentrant mortise at said diagonal plane in a slidable engagement with said tenon, and shoulders extending on said key or member along said mortise therein in contiguity with said stringer ledges.

7. In a structure, two panel units meeting with each other at a parting line, tenons reentrant on the side away from each other having a neck and being carried thereon each on one panel unit at and along said parting line, lands extending on said panel units along both tenon necks, a linear key or keying member having a lengthwise mortise therein, said mortise and said tenons having flanks thereon and being in contiguity with each other thereat, said mortise having a bottom opposite said tenons and having a throat at said tenon necks and being out of contact with said tenons at said bottom and at said throat by a predetermined clearance, shoulders extending on said linear key or keying member astride said mortise throat thereof and being in contiguity with said panel unit lands for alinement thereof with each other and abutment of said key or member therewith, said mortise throat being constricted in the free condition thereof and being distended by said contiguity of said mortise flanks with said tenon flanks for a preloaded slidable engagement thereat.

8. In a structure as set forth in claim **7**, a resilient sealing strip lodged between said tenons in the proximity of said panel unit parting line, said sealing strip being subjected to compression by said linear key or keying member mortise flanks preloaded engagement with said tenon flanks.

9. In a structure as set forth in claim **7**, said tenon flanks and said mortise flanks being obliquely reentrant, said linear key or keying member shoulders being urged into abutment with said panel unit lands by the obliquity of said mortise and tenon flanks and said preloaded engagement thereat.

10. In a structure, two angularly disposed panels in a

wall meeting with each other at a parting line, stringers extending on said panels at and along said parting line, a linear key or keying member extending at and along said parting line at a distance therefrom, reentrant mortise and tenon means carried lengthwise on said stringers and on said key or member in a slidable engagement with each other, ledges carried on said stringers along said mortise and tenon means at a distance from said panels, and shoulders extending on said key or member astride said mortise and tenon means in contiguity with said ledges for abutment therewith, said mortise and tenon means in engagement with each other and said ledges and shoulders in contiguity therealong being carried by said stringers and key at right angles to a diagonal plane through said panel parting line.

11. In a structure, two panel units meeting with each other at a parting line and being disposed at right angles to each other between the faces thereof, tenons reentrant on the side away from each other extending on said panel units at and along a plane through said parting line, said plane being inclined diagonally to said panel units, and a linear key or keying member extending along said parting line at a distance therefrom, said key or member having a reentrantly mortised profile extremity crosswise of said diagonal plane and being in a slidable engagement of said extremity with said tenons.

12. In a structure, two panels meeting with each other at a parting line, stringers extending on said panels at and along said parting line, a linear key or keying member extending in opposition to said stringers, tenons reentrant on the side away from each other and ledges therealong carried one on each of said stringers, said key or member having a reentrant mortise in a slidable engagement with both stringer tenons, shoulders extending along said mortise in contiguity with said stringer ledges, said tenons and said mortise having obliquely reentrant flanks for inducing wedging forces under strain and thereby urging abutment at said shoulders and ledges and urging abutment of said stringers with each other, said stringers having walls and lengthwise grooves therein at a plane through said parting line, and a sealing strip lodged in said grooves and compressed by said stringers due to said abutment thereof at said shoulders and ledges and due to said abutment thereof with each other.

13. In a structure, two panels meeting with each other at a parting line, stringers extending on said panels at and along said parting line, tenons having obliquely reentrant flanks on the side away from each other converging to a neck and being carried thereby longitudinally on said stringers, ledges carried on said stringers along said tenon neck at a distance from said panels, a linear key or keying member having a mortise and obliquely reentrant flanks therein, said key or member being in a slidable engagement at said mortise flanks thereof with said tenon flanks, and shoulders extending on said key or member along said mortise therein in contiguity with said stringer ledges, said key or member mortise being out of contact with the crest of said tenons between said flanks thereof by a predetermined clearance and being out of contact with said tenon neck by a predetermined clearance.

14. In a structure, a union of two panels as set forth in claim 13, and means for subjecting said stringers to lateral pre-loading forces by said linear key or member at said obliquely reentrant tenon flanks and thereby inducing an initial abutment frontally between said key or member shoulders and stringer ledges and inducing an initial abutment of said stringers laterally with each other.

15. In a structure, a union of two panels as set forth in claim 13, said obliquely reentrant flanks of said stringer tenons being convex, said linear key or member mortise flanks being concave, and said flanks including an acute corner with said shoulders and ledges at said tenon neck.

16. In a structure, two panel units meeting with each other at a parting line, tenons reentrant on their sides away from said parting line forming a neck between said sides, flat lands extending on said panel units along said tenon neck, a linear key or keying member having a reentrant mortise and being in a slidable engagement thereof with said tenons, said mortise having a throat, and shoulders extending on said key or member along said mortise throat and being in contiguity with said lands along said tenon neck, said mortise and said tenons combined having a bulbous shape, said mortise being out of contact of said throat thereof with said tenon neck.

17. In a structure, two panel units meeting with each other at a parting line, a third panel unit coextensive with said parting line at a distance from said two panel units, a longitudinal reentrant tenon having a neck and extending on said third panel unit, longitudinal half-tenons reentrant on the side away from each other and having necks extending on said two panel units at and along said parting line, lands extending on said panel units along said tenon neck and along said half-tenon necks, a linear key or keying member having a mortise in each of two profile extremities thereof, both mortises having a throat and a bottom and being reentrant inwardly of said throat and being in a slidable engagement one with said tenon and the other one with said half-tenons, and shoulders extending on said key or member along each mortise throat thereof in contiguity with said panel unit lands, said mortises being out of contact by a predetermined clearance at said throat thereat with said tenon neck and half-tenon necks and being out of contact by a predetermined clearance at said bottom thereof with said tenon and both half-tenons across the whole width thereof.

18. In a structure, a panel, at least two stringers coextensive at a distance from each other on said panel, each of said stringers carrying a reentrant tenon thereon, a linear key or keying member extending in opposition to each stringer and having a reentrant mortise in a slidable engagement with said stringer tenon, means for abutment of said key or member with said stringer along said tenon for coaction therewith as a unitary stress member, flanges attached to said panel forming a part of each stringer, a lateral flanges extending on each of said stringer flanges marginally, and braces secured to said panel inbetween said stringers and secured to said lateral flange on each stringer.

19. In a structure, modularly wide panel units in a row meeting with each other at parting lines, a terminal member extending at a parting line next to one of said panel units, reentrant tenons extending at intermediate modular intervals on those of said panel units wider than one module, half-tenons reentrant on the side away from each other extending on said panel units and on said one panel unit and on said termial member therealong at and along said parting lines and jointly forming an equivalent of one intermediate tenon, linear keys or keying members extending in opposition one to each tenon and one to each two half-tenons on said panel units and terminal member and bearing a reentrant mortise in a slidable engagement therewith, and means for abutment of said keys or members with said panel units and with said terminal member, said abutment means being carried on said keys or members and on said panel unit along and by the side of said tenons and half-tenons at a distance from the panel unit inward face.

20. In a structure, modularly wide panel units in a row meeting with each other at parting lines, reentrant tenons extending on those of said panel units wider than one module intermediate said parting lines at modular intervals apart from said parting lines and from each other, half-tenons reentrant on the side away from each other extending on said panel units at and along said parting lines, each two of said half-tenons being jointly equivalent to one intermediate tenon for indiscriminate occurrence of said parting lines at any one modular interval, linear keys or keying members extending one in opposition to each tenon and one to each two half-tenons and bearing a reentrant mortise in a slidable engagement therewith,

lands extending along said tenons and said half-tenons on said panel units, shoulders extending on said keys or members along said mortise therein in contiguity with said lands, and means for inducing abutment of said keys or members with said panel units by forces normal to said shoulders and lands thereof and for inducing abutment of said panel units with each other by forces lateral to said half-tenons thereof due to external loading strain and/or internal preloading.

21. In a structure, two spaced apart panels facing each other and having coextensive edges, a terminal member having sides meeting said panels at said edges and having a transverse connecting web therebetween, stringers extending on the facing sides of said panels, a half-tenon carried on each stringer at a plane through said panel edges and being reentrant on the side away therefrom, a ledge extending along said half-tenon on said stringer, half-tenons reentrant on one side extending on said terminal member in juxtaposition to said stringer half-tenons, a flat land extending on said terminal member along each half-tenon thereof, a linear key or keying member interjacent said panel edges, said key or member having a reentrant mortise in each of two profile extremities and being in a slidable engagement of each mortise jointly with one stringer half-tenon and one terminal member half-tenon, and shoulders extending on said key or member profile extremities along said mortise therein in contiguity with each stringer ledge and terminal member land.

22. In a structure, panel units meeting at parting lines in two spaced apart facing rows, said panel units being of modular widths and certain among them being of modular widths different from others, said parting lines in both rows occurring coincidentally at certain modular intervals and non-coincidentally at others, reentrant tenons extending on said panel units intermediate said parting lines at modular intervals apart therefrom and from each other, half-tenons reentrant on the side away from each other extending on said panel units at and along said parting lines, each pair of said half-tenons being equivalent to one intermediate tenon, and linear keys or keying members interjacent said panel unit rows, said keys or members having reentrant mortises in two opposite profile extremities thereof in a slidable engagement with said tenons apart from said parting lines, with one tenon and a pair of half-tenons at said non-coincidental parting lines, and with two pairs of said half-tenons at said coincidental parting lines.

23. In a structure, rows of panels units and linear keys or keying members in permutative engagement with tenons and pairs of half-tenons thereon as set forth in claim 22, and a terminal member extending across said rows at two coincidental parting lines, one half-tenon in each of two pairs thereof at said parting lines extending on each panel unit and the other one on said terminal member, and one of said keys or members being in a slidable engagement of said mortises thereof with said two pairs of half-tenons.

24. In a structure, rows of panel units and linear keys or keying members in permutative engagement with tenons and pairs of half-tenons thereon as set forth in claim 22, said panel units being of thin stock, lands carried on said panel units at a distance from the inward face thereof along said tenons and pairs of half-tenons, shoulders extending on said keys or members astride said mortises thereof in contiguity with said lands, and means on the face of said panel units in each interval between said lands along coextensive tenons and half-tenons for bracing said thin stock thereof and transferring stresses into said tenons, half-tenons and keys or members.

25. In a structure, panels meeting at parting lines in two spaced apart facing rows, said panels being of a modular width and certain of them being of a modular width different from the others, said parting lines occurring coincidentally in both rows at certain intervals and non-coincidentally at others, stringers and reentrant tenons thereon extending on said panels at intermediate modular intervals apart from said parting lines and from each other, stringers and paired half-tenons thereon reentrant on the side away from each other extending on said panels at and along said parting lines, each pair of said half-tenons being equivalent to one intermediate tenon, said tenons and stringers thereof extending at certain intervals in opposition to each other on both panel rows, others of said tenons and stringers thereof extending in opposition to said paired half-tenons and stringers thereof at said non-coincidental parting lines, certain of said paired half-tenons and stringers thereof extending in opposition to like half-tenons and stringers at said coincidental parting lines, lands extending on said stringers along said tenons and half-tenons thereof at a distance from said panels, linear keys or keying members having a reentrant mortise in each of two profile extremities thereof, said keys or members being in a slidable engagement of both mortises thereof with said tenons and/or half-tenons on both panel rows in said permutative opposition of one to another, shoulders carried on said keys or members astride said mortises thereof in contiguity with said stringer lands, and means for inducing abutment of said keys or members with said stringers at said shoulders and ledges by forces normal thereto and inducing abutment of said half-tenons and stringers thereof with each other by forces lateral thereto due to external loading strain and/or internal preloading at the reentrant portions of said tenons and half-tenons.

26. In a structure, panels meeting at parting lines in two spaced apart facing rows, said panels being of a modular width and certain of them being of a modular width different from others, said parting lines occurring coincidentally in both rows at certain intervals and non-coincidentally at others, stringers and reentrant tenons thereon extending on said panels at intermediate modular intervals apart from said parting lines and from each other, stringers and paired half-tenons thereon reentrant on the side away from each other extending on said panels at and along said parting lines, each pair of said half-tenons being equivalent to one intermediate tenon, said tenons and stringers thereof extending at certain intervals in opposition to each other on both panel rows, others of said tenons and stringers thereof extending in opposition to said paired half-tenons and stringers thereof at said non-coincidental parting lines, certain of said paired half-tenons and stringers thereof extending in opposition to like half-tenons and stringers at said coincidental parting lines, said tenons and said paired half-tenons being obliquely reentrant at flanks converging to a neck thereunder, ledges carried on said stringers along said tenon and half-tenon neck at a distance from said panels, linear keys or keying members having an obliquely reentrant mortise in each or two profile extremities thereof, said keys or members being in a slidable engagement of both mortises thereof with said tenons and half-tenons on both panel rows in said permutative opposition of one with another, shoulders carried on said keys or members astride said mortises thereof in contiguity with said ledges, said keys or members being wider between said shoulders thereof than said tenon and half-tenon necks by a predetermined clearance in the engaged condition, and said mortises in said keys or members having a bottom and being out of contact therewith beyond said tenon and half-tenon obliquely reentrant flanks and therebetween by a predetermined clearance.

27. In a structure, panels in straight and angular spaced apart facing rows forming hollow walls and an intersection therebetween, at least one of said panels being continuous through said intersection, two others of said panels meeting at a parting line thereat, a linear key or keying member having a number of profile extremities one opposite each of said panel rows at said intersection, each of said extremities including a reentrant lengthwise mortise and shoulders therealong at a distance from the panel

row opposite thereto, a stringer and a reentrant tenon thereon and ledges along said tenon extending on each of said continuous panels, stringers and half-tenons thereon reentrant on the side away from each other and ledges along said half-tenons extending on each two meeting panels at and along said parting line thereof, said half-tenons being jointly equivalent to said stringer tenon, said key or member being in a slidable engagement of the mortises thereof with each tenon and two half-tenons on the stringers thereof and being in contiguity of said shoulders with said stringer ledges distantly from said panels, said key or member having at least one of said profile extremities thereof opposite to one of said angular panel rows in a direction diagonally therethrough and being in contiguity with said stringer ledges thereat crosswise of said diagonal direction.

28. In a structure, a hollow wall intersection construction as set forth in claim 27, three panel rows forming said intersection, one of said rows being straight at said intersection, two other rows being each angular between two faces thereof and having one face thereof spaced apart from said straight row and the other one from each other, said linear key or keying member having each of two of said profile extremities thereof opposite to one of said angular rows in a direction diagonally therethrough.

29. In a structure, panel units forming walls and two corners therein spaced apart from each other at an intersection of two walls, reentrant tenons extending on said panel units at and along said corners, said tenons being inclined to said panel units at a plane laid diagonally through each corner, and a linear key or keying member having two reentrant mortises in opposite profile extremities thereof and being in a slidable engagement thereof with said inclined tenons at both corners.

30. In a structure, panel units forming two spaced apart inner corners at a T-intersection of two walls, a straight panel unit row forming the outer side of one of said walls, reentrant tenons extending on said panel units at said corners, said tenons being inclined to said panel units at a plane laid diagonally through each corner, reentrant tenons extending on said straight panel unit row opposite said inner corners, and a linear key or keying member having reentrant mortises in two profile extremities thereof in a slidable engagement with said diagonally inclined corner tenons and having reentrant mortises in two profile extremities in a slidable engagement with said outer panel unit row tenons.

31. In a structure, panel units in spaced apart facing rows forming hollow walls and an L- and a T-intersection therebetween, reentrant tenons extending on said panel units in said walls and at said intersections in opposition to one another on said spaced rows and in juxtaposition on adjoining panel units in each row, reentrantly mortised linear keys or keying members in said walls and at said intersections in a slidable engagement with said tenons in opposition and in juxtaposition, said panel units forming the inner corners at both intersections and the outer corner at said L-intersection, those of said tenons extending on said inner corner panel units at both intersections being inclined diagonally to said panel units, those of said tenons at said outer L-intersection corner and on the outer panel unit row at said T-intersection being normal to said panel units, said keys or members at both intersections being of an identical profile, said keys or members being in said engagement with said diagonally inclined tenons at said inner corners with one mortised profile extremity thereof at said L-intersection and with two such extremities at said T-intersection, and being in said engagement with said normal tenons at said L-intersection outer corner and on said T-intersection outer panel unit row with two mortised profile extremities thereof at said L-intersection and with one such extremity at said T-intersection.

32. In a structure, panel units meeting with each other at parting lines and forming spaced apart straight and angular rows in hollow walls and intersections therebetween, reentrant tenons extending on said panel units at said parting lines and at intervals apart therefrom, those of said tenons extending on said angular panel unit rows at the inner corners at said intersections being inclined to said panel units thereof at a diagonal plane through each corner, linear keys or keying members interjacent said rows in said walls and at said intersections, each of said keys or members having at least two reentrantly mortised profile extremities and being in a slidable engagement thereof with said tenons apart from said parting lines and at said parting lines in opposition of one such location to the same location or to the other location on said spaced apart rows, said keys or members at said intersections having at least one profile extremity thereof directed diagonally into engagement with said inclined tenons at said corners thereat.

33. In a structure, modularly wide panel units meeting with each other at parting lines and forming spaced apart straight and angular rows in hollow walls and intersections therebetween, reentrant tenons extending on those of said panel units wider than one module at modular intervals apart from said parting lines, a pair of half-tenons reentrant on the side away from each other extending on said panel units at and along each parting line and being equivalent to one of said tenons, those of said equivalent tenons and half-tenons extending on the panel units at the inner corners of said intersections being inclined to said panel units at a diagonal plane through said corners, linear keys or keying members interjacent said panel rows in said walls and at said intersections, said keys or members having each at least two longitudinally mortised profile extremities in a slidable engagement with two opposite tenons apart from said parting lines, with two opposite pairs of half-tenons at coincident parting lines, with one tenon and one pair of half-tenons at non-coincident parting lines in said spaced apart rows, said keys or members at said intersections having each at least one profile extremity thereof directed diagonally into engagement with one of said equivalent inclined tenons and half-tenons thereat.

34. In a structure, walls and intersections therebetween constructed as set forth in claim 33, said intersections being of the L- and T-shapes, said linear keys or keying members at said intersections having each three reentrantly mortised profile extremities, one of said extremities being in engagement with one of said inclined tenon types at said L-intersection and with a tenon type normal to the outer panel unit row at said T-intersection, and two of said extremities being in engagement with said inclined tenon types at said T-intersection and with tenons normal to the angular sides of the outer panel unit row thereat.

35. In a structure, panels in spaced apart straight and angular rows meeting at parting lines and forming hollow walls and intersections therebetween, intermediate type stringers and a reentrant tenon thereon extending lengthwise on said panels at intervals apart from said parting lines, edge type stringers and half-tenons reentrant on the side away from each other extending on said panels at and along said parting lines and each pair thereof forming an equivalent of one intermediate type stringer and tenon, said two stringer types extending on said spaced apart rows the former type in opposition to the same type apart from said parting lines, the latter type in opposition to the same type at coincident parting lines, both types in opposition with each other at non-coincident parting lines, one of said equivalent stringer types extending on each of the angular panel rows at the inner corners of said intersections at a diagonal plane through said corners in opposition to stringers of either type on the outer panel row thereat, and linear keys or keying members having each at least two reentrantly mortised profile extremities and being in a slidable engagement thereof with said

tenons on said stringer types in said permutative opposition thereof on said panel rows, those of said keys or members at said intersections having one reentrantly mortised profile extremity thereof in a diagonal plane in opposite to each of said inclined stringer type thereat and in a slidable engagement with the respective tenon or half-tenons thereon.

36. In a structure, walls and intersections therebetween constructed as set forth in claim 35, one of said intersections being between two right-angle walls at a corner, two panels forming the outer sides of said walls at said corner and having said edge type stringers thereon at a distance from said corner at right angles to each other, a post complementing said panels at said corner and having two right-angle reentrant half-tenons thereon complementally to the half-tenons on said panel stringers in forming two pairs equivalent to two of said intermediate stringer tenons, and one of said linear keys or keying members having one reentrantly mortised profile extremity in a diagonal plane in opposition to said inclined stringer type at said inner corner and in a slidable engagement with the respective tenon or half-tenons thereon and having two other like extremities in opposition to and engagement with said pairs of stringer and post half-tenons.

37. In a wall structure, panels in spaced apart straight and angular rows meeting at parting lines and forming hollow walls and L- and T-intersections therebetween, intermediate type stringers and a reentrant tenon thereon and ledges along said tenon extending lengthwise on said panels at intervals apart from said parting lines, edge type stringers and half-tenons reentrant on the side away from each other thereon and ledges along said half-tenons extending at and along said parting lines and each pair thereof forming an equivalent of one intermediate stringer tenon and ledges, said two stringer types extending on said spaced apart panel rows in permutative opposition of two edge type stringer pairs at coincident parting lines, of one edge type pair and one intermediate type stringer at non-coincident parting lines, or two intermediate type stringers apart from said parting lines, stringers of one of said two types extending on the angular panel rows at the inner corners of said intersections and carrying the tenons thereof at an inclination to said rows next to a diagonal plane through said corners and carrying said ledges therealong astride said plane, a terminal member extending at and along the edges of two panels in one wall and having reentrant half-tenons and flat lands therealong complemental to said edge type stringer half-tenons and ledges therealong at said panel edges, and linear keys or keying members interjacent said walls and intersections having each at least two reentrantly mortised profile extremities and shoulders thereon and being in a slidable engagement of said extremities with said intermediate and edge type stringer tenons in said permutative opposition thereof in said walls and at said intersections and with said stringer and terminal member half-tenons, said keys or members being in contiguity of said shoulders with said stringer ledges and with said terminal member lands, those of said keys or members at said intersections having one reentrantly mortised profile extremity in said diagonal plane of said inclined stringer type thereat in a slidable engagement with the respective tenon or half-tenons thereon and being in contiguity of said shoulders with said stringer ledges astride said plane.

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UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,296,760 January 10, 1967

John Pavlecka

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 1, line 7, for "to novel" read -- to a novel --; line 30, for "alinment" read -- alinement --; line 45, for "that" read -- at --; line 63, for "everlapping" read -- overlapping --; column 2, line 32, for "referring" read -- referred --; column 3, line 35, for "or" read -- of --; column 5, line 16, for "reentratn" read -- reentrant --; column 6, line 65, for "its" read -- it --; column 7, line 46, for "52-53a" read -- 53-53a --; column 8, line 55, for "on" read -- of --; column 10, line 61, for "as" read -- at --; line 69, for "stinger" read -- stringer --; column 11, line 57, for "lengthwise, on" read -- lengthwise on --; column 14, line 40, for "flanges" read -- flange --; column 19, line 5, for "opposite" read -- opposition --.

Signed and sealed this 24th day of October 1967.

(SEAL)
Attest:

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