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(19) **United States**(12) **Patent Application Publication**
Posselt(10) **Pub. No.: US 2007/0294967 A1**(43) **Pub. Date: Dec. 27, 2007**(54) **SYSTEM OF INTERLOCKING WALL AND
CORNER COMPONENTS FOR
CONSTRUCTION OF BUILDINGS****Publication Classification**(51) **Int. Cl.***E04B 1/38* (2006.01)*E04B 2/70* (2006.01)(52) **U.S. Cl. 52/233**

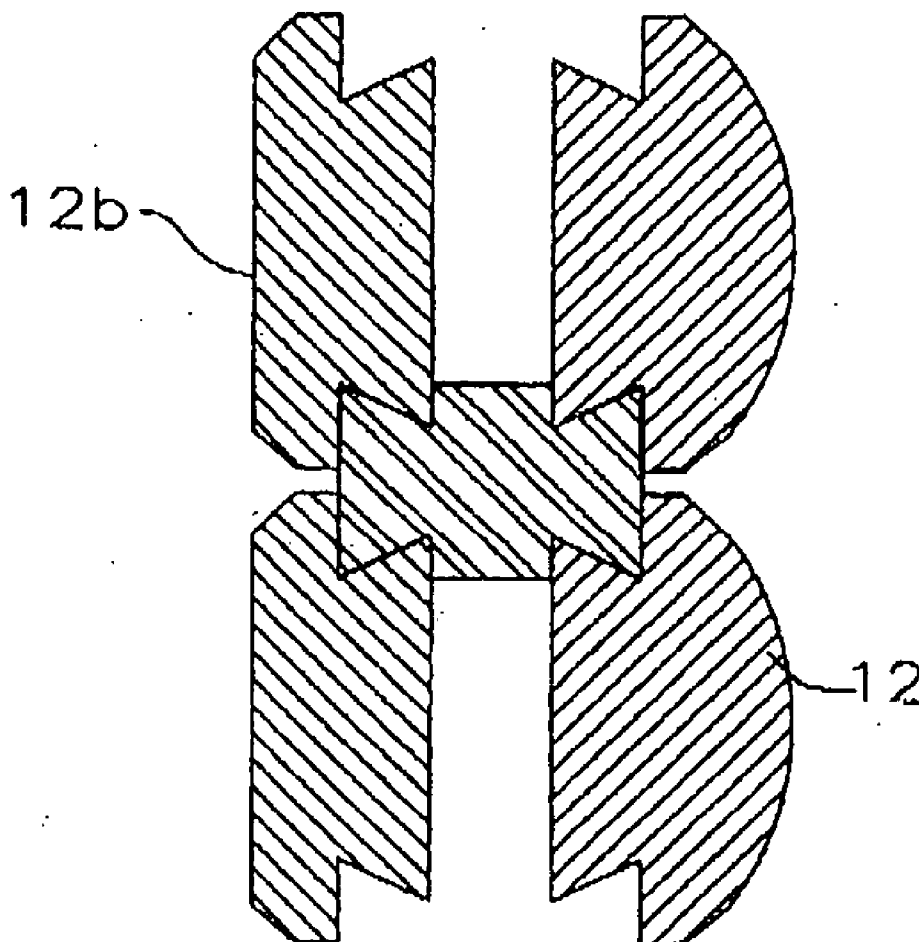
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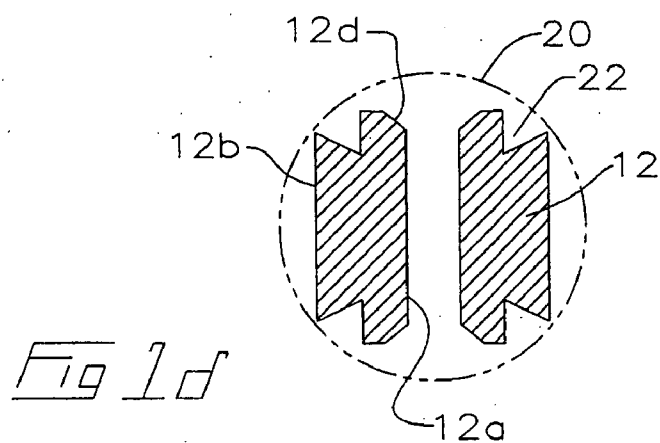
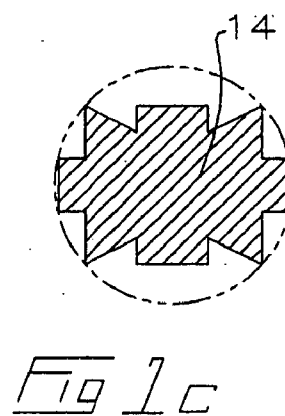
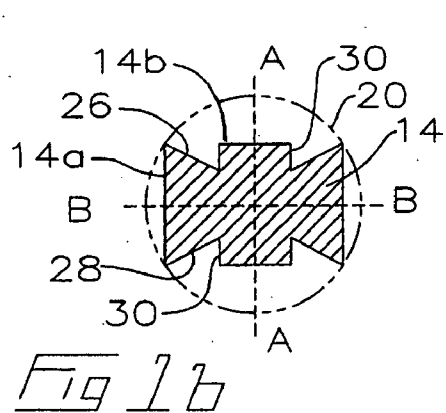
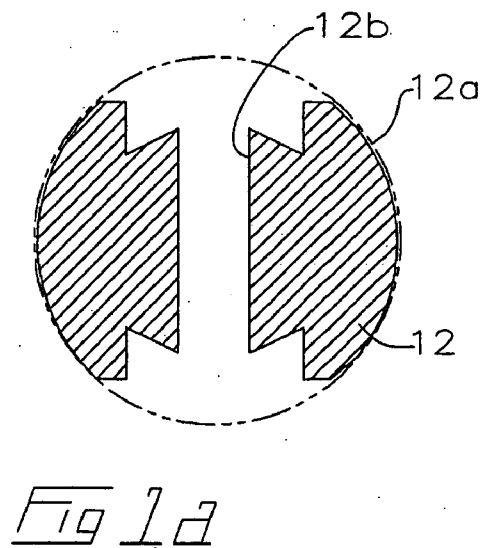
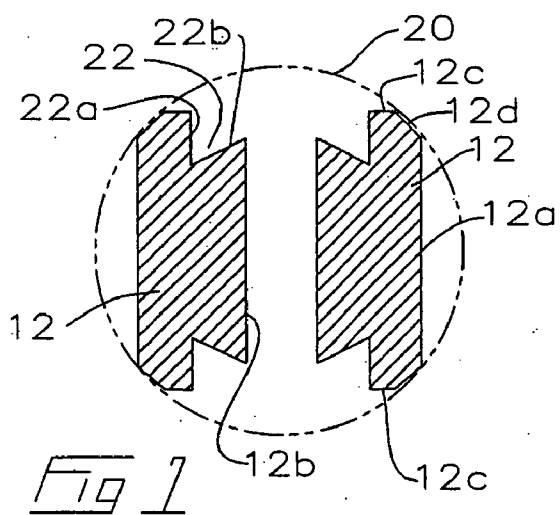
ABSTRACT

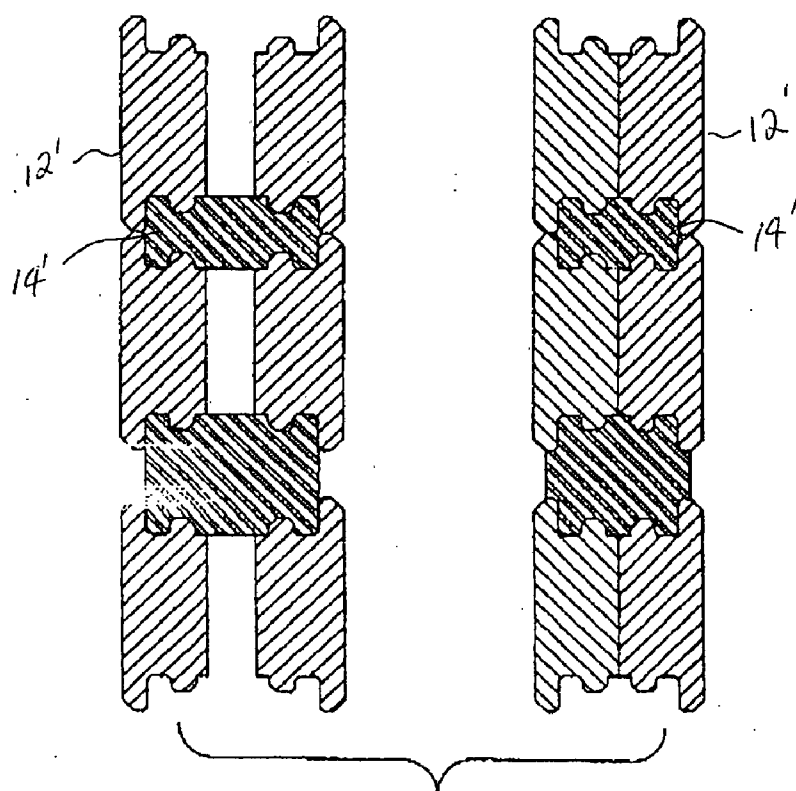
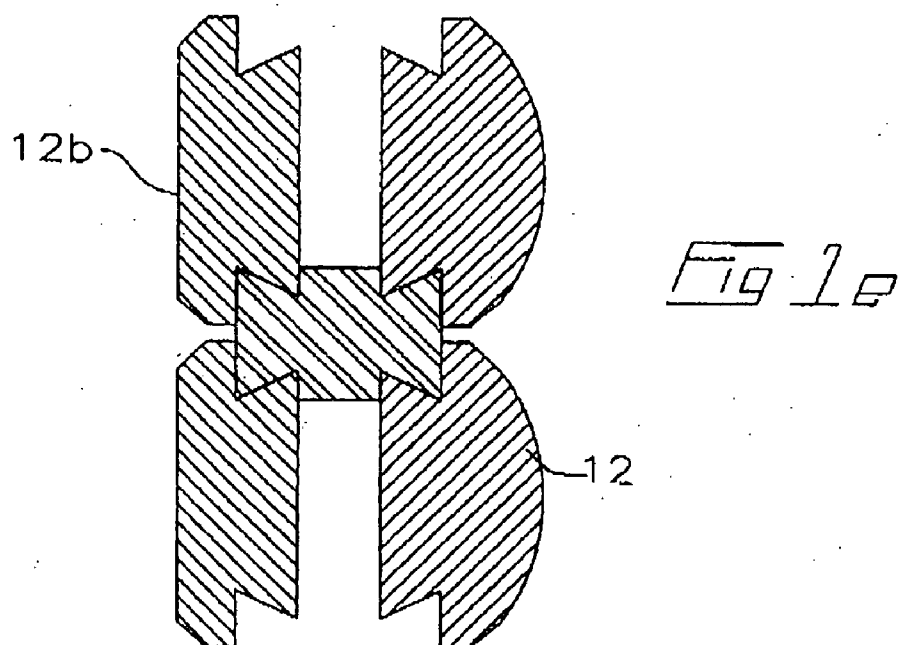
A system of interlocking wall and corner components for construction of a building include a plurality of elongate key members and a plurality of elongate side members. The key members are arranged as horizontal pairs of parallel upper and lower key members sandwiching therebetween pairs of parallel side members. The pair of parallel upper and lower key members form therebetween a pair of dove-tail joint female receiver sockets. Opposed facing sides of the pairs of the parallel side members have a corresponding pair of laterally inwardly disposed dove-tail joint male members for mating into dove-tail engagement in the female receiver sockets to form a dove-tail joint. The pairs of key members and the pairs of side members form elongate horizontal beams mountable one on top of another to form a vertical array of wall layers.

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ANTONY C. EDWARDS**SUITE 200 - 270 HIGHWAY 33 WEST
KELOWNA, BC V1X 1X7 (CA)**(21) Appl. No.: **11/896,566**(22) Filed: **Sep. 4, 2007****Related U.S. Application Data**(63) Continuation-in-part of application No. 10/793,847,
filed on Mar. 8, 2004.(60) Provisional application No. 60/453,212, filed on Mar.
11, 2003.





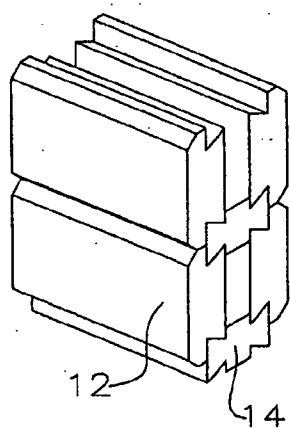


Fig 2

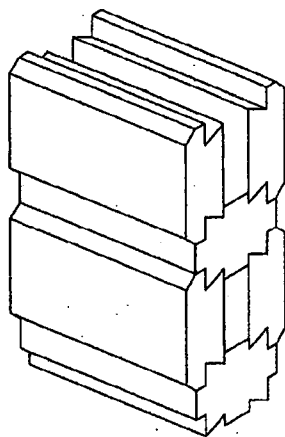


Fig 2a

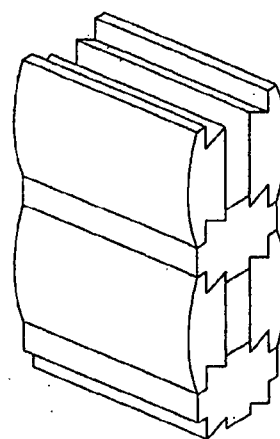


Fig 2b

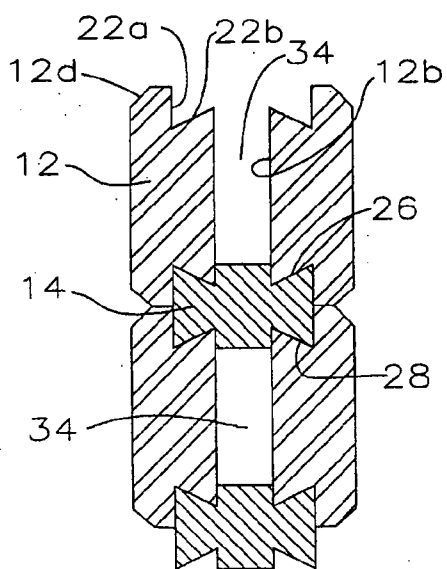


Fig 3

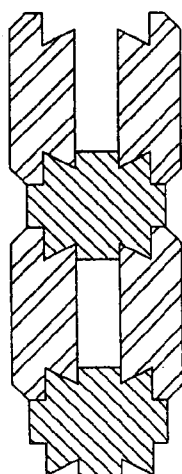


Fig 3a

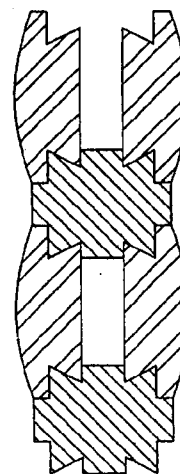
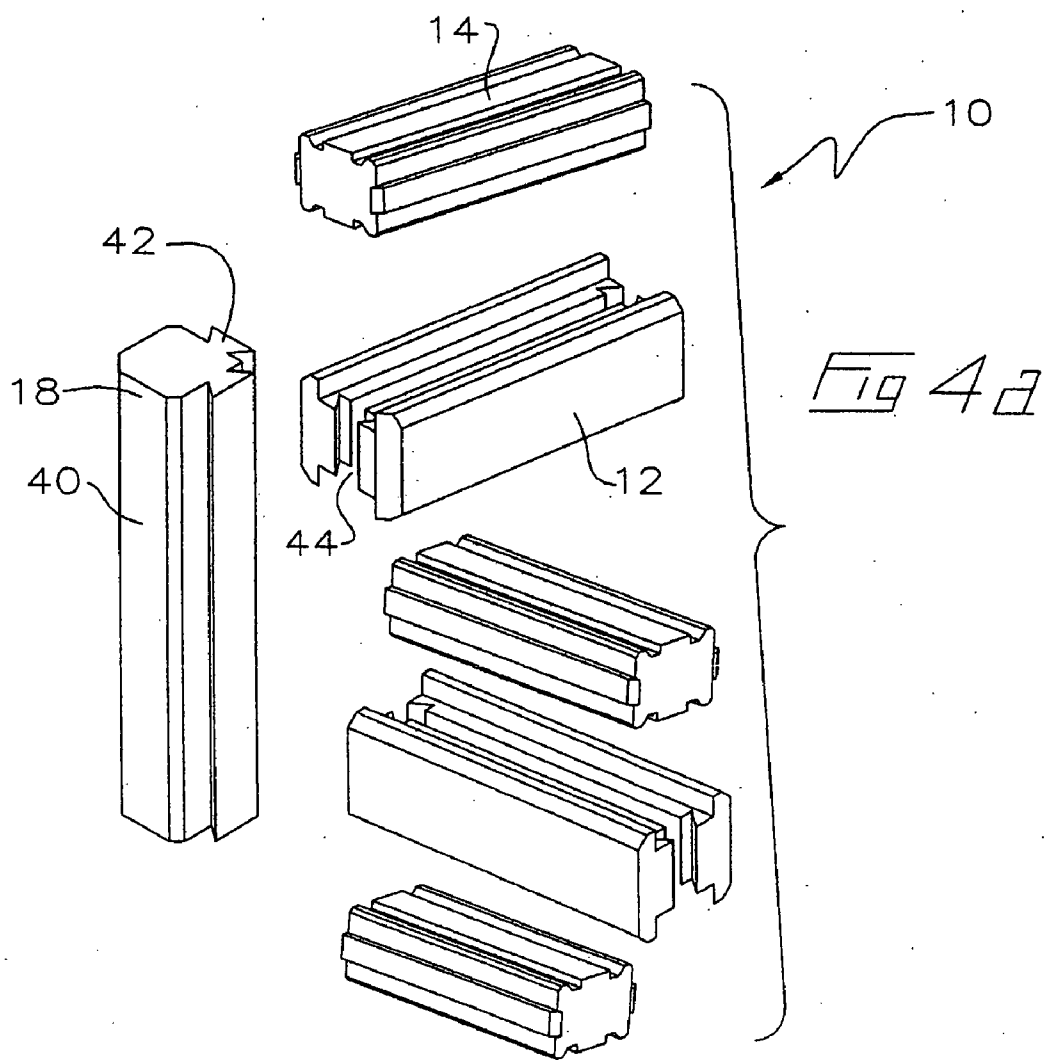
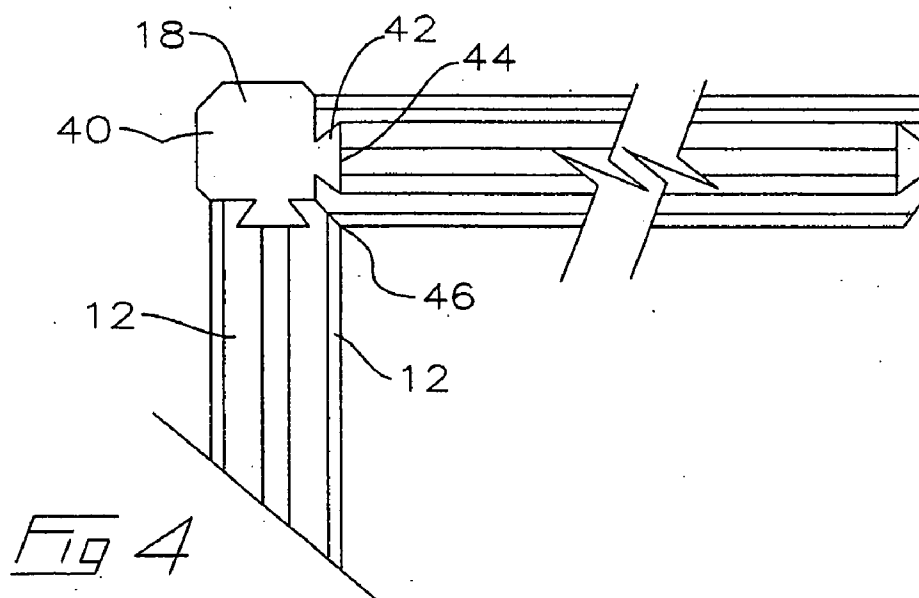


Fig 3b



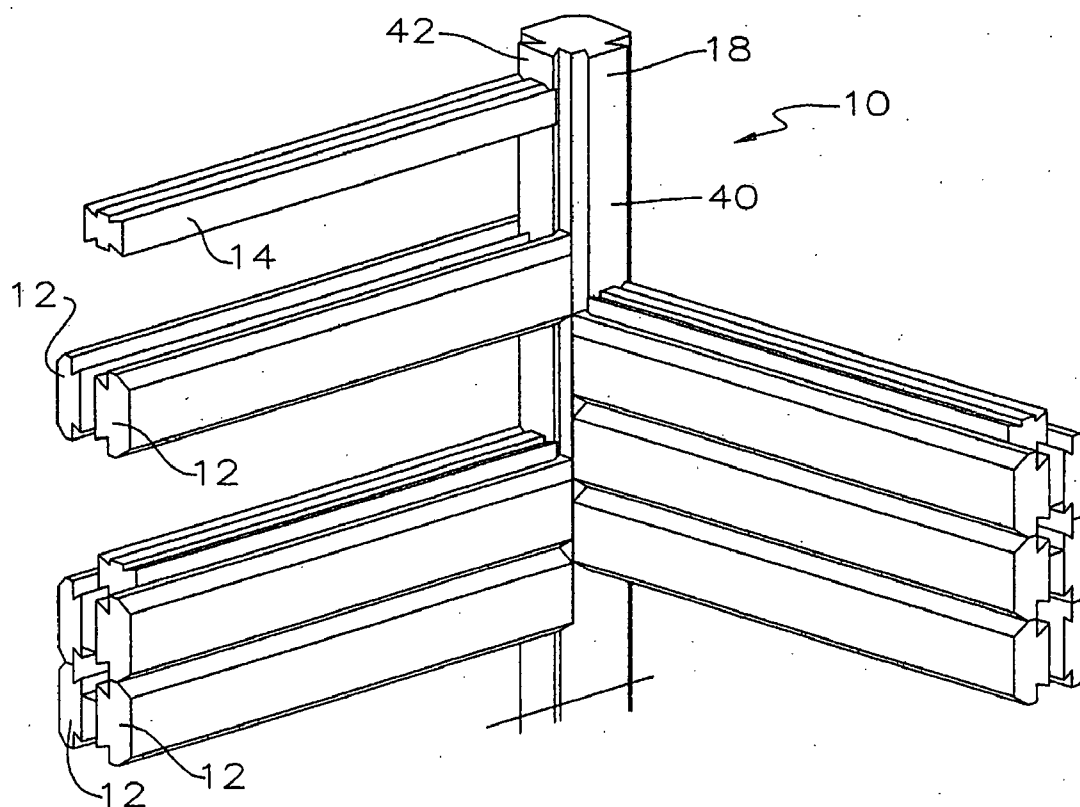
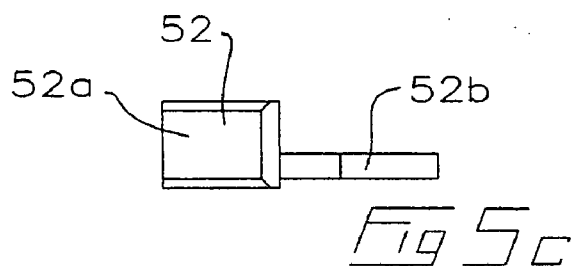
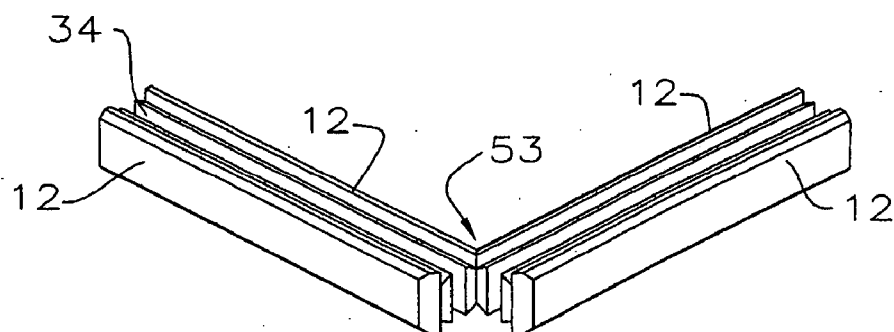
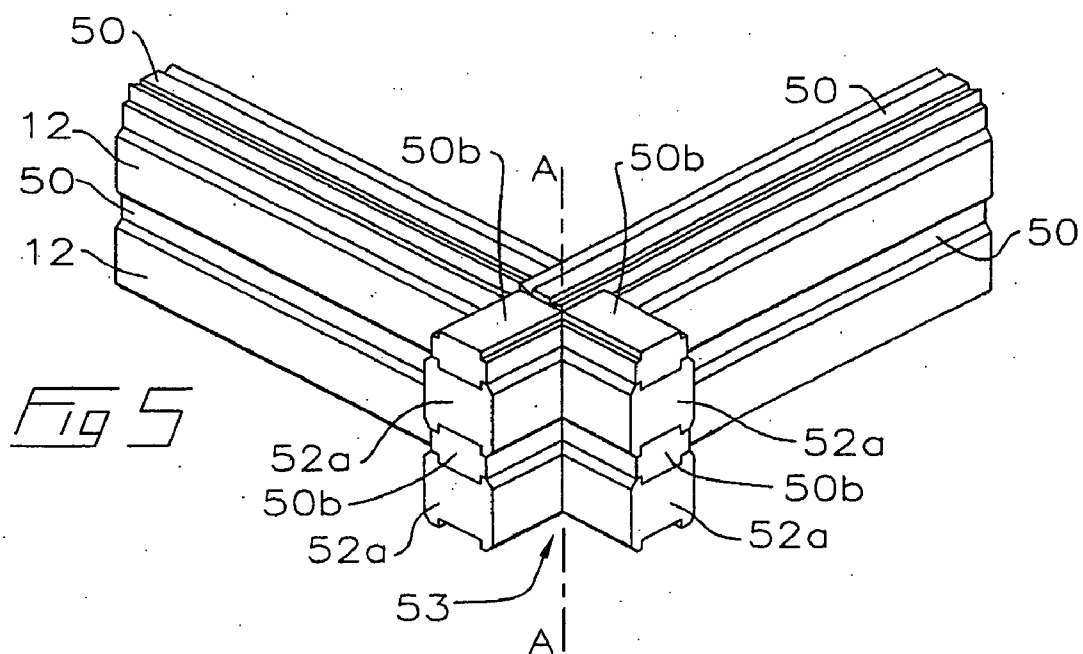
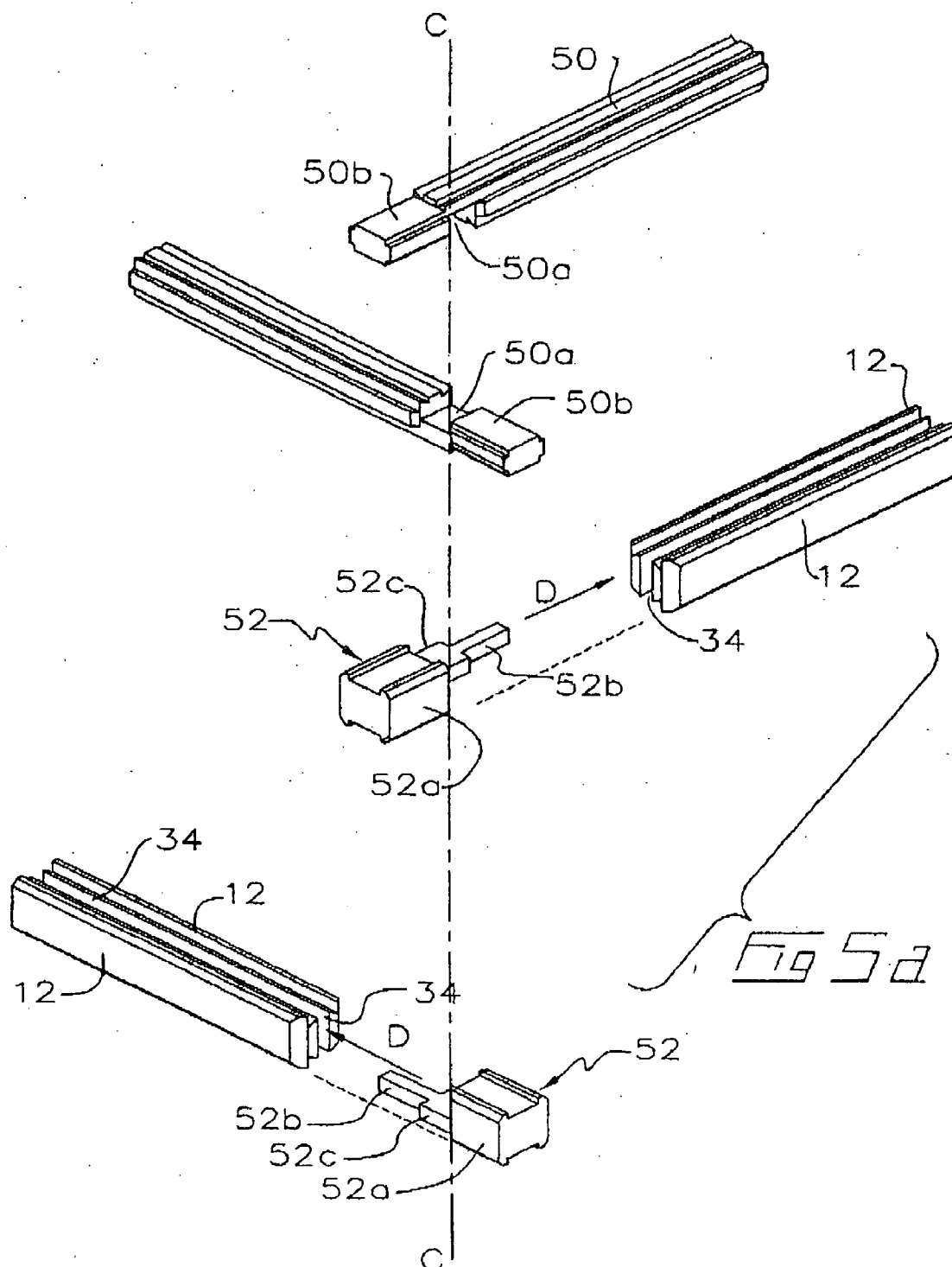
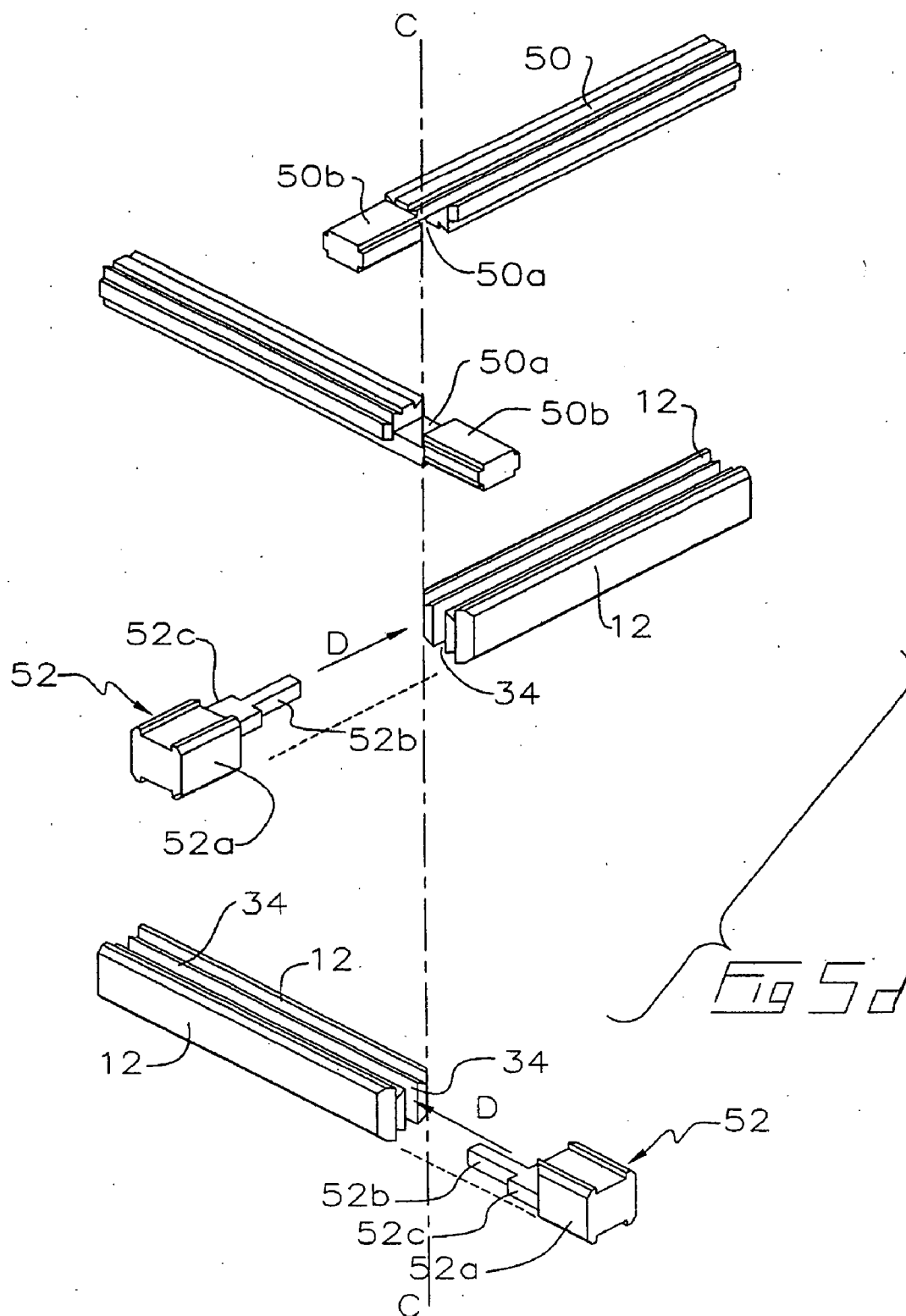
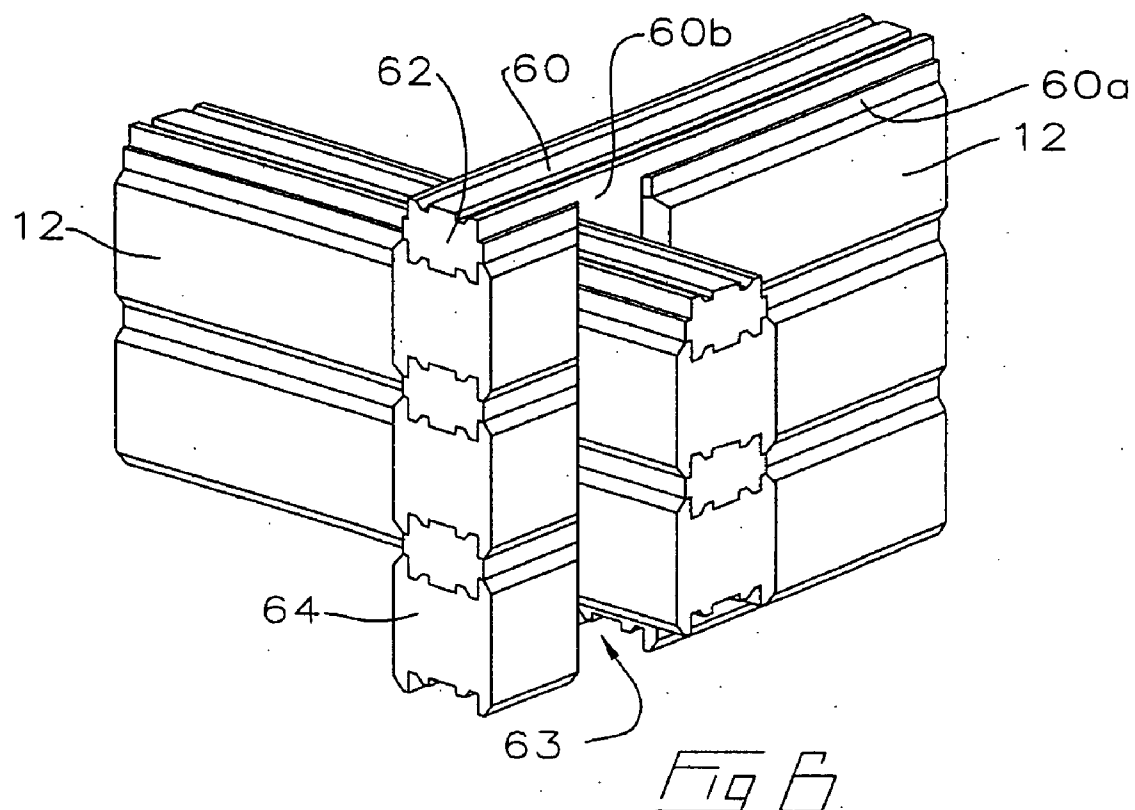


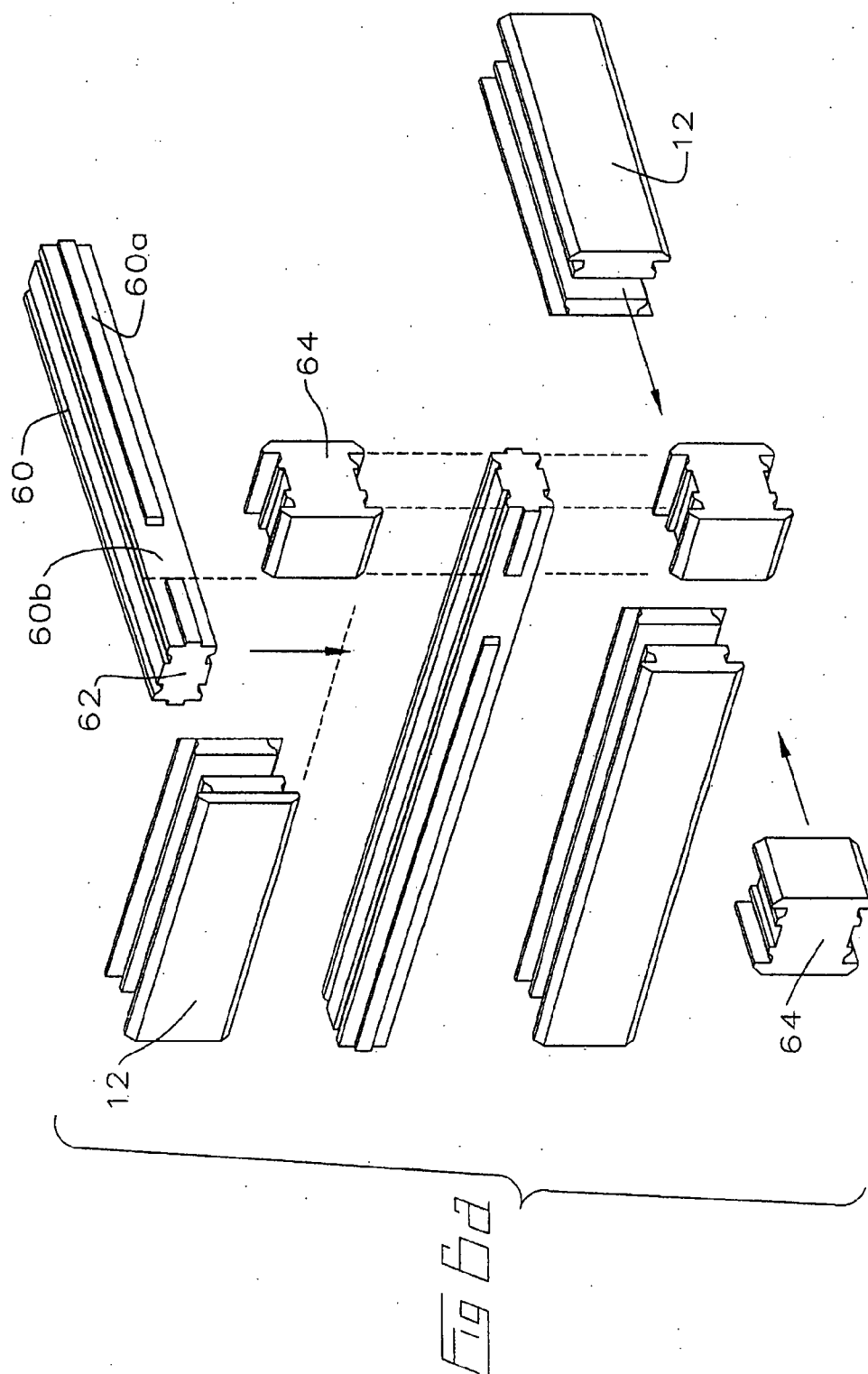
Fig 4b











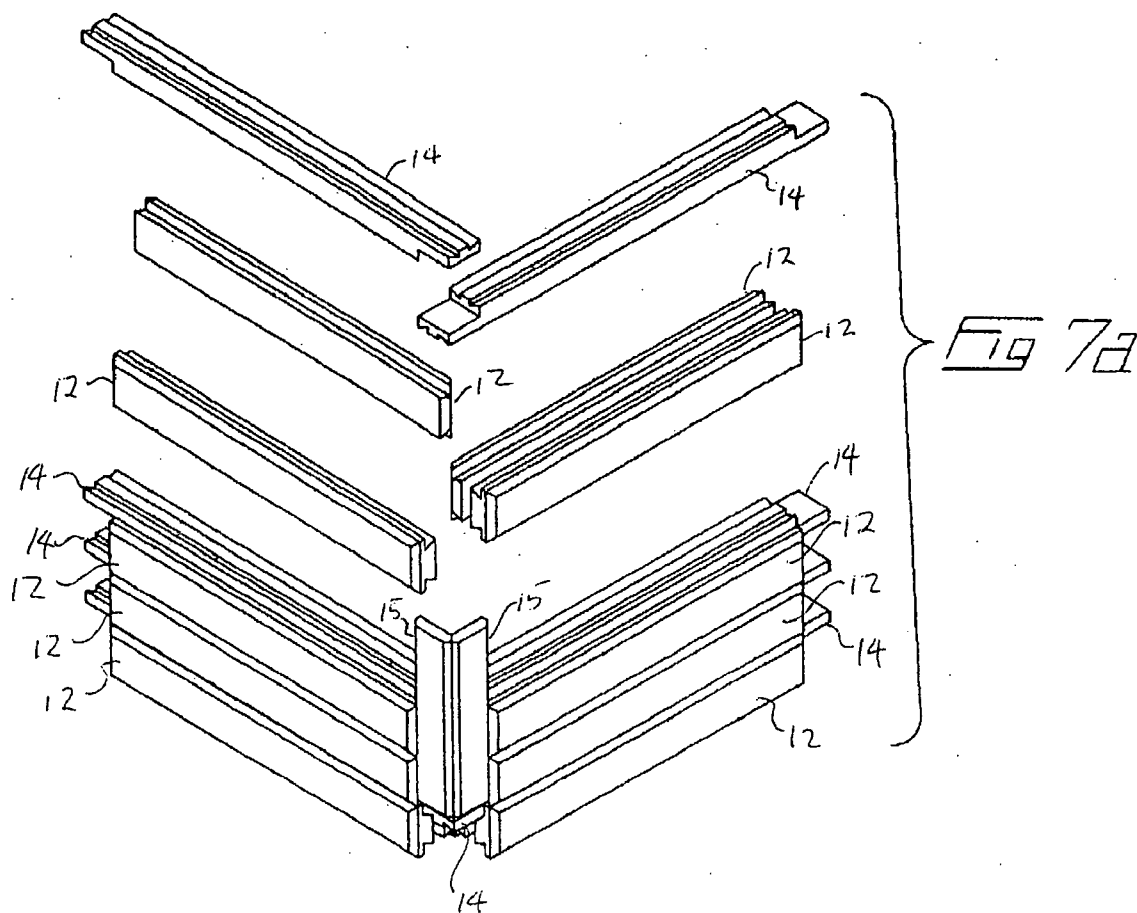
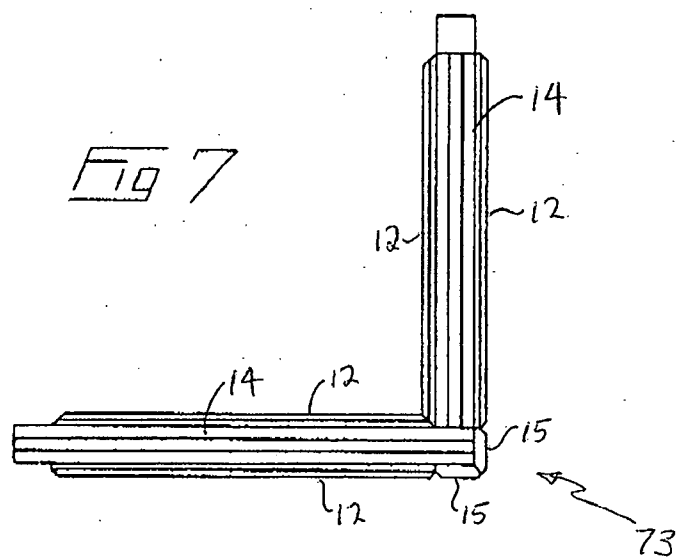




Fig. 8i

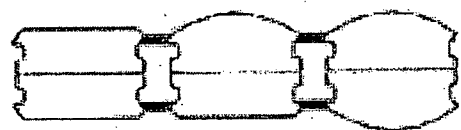


Fig. 8h

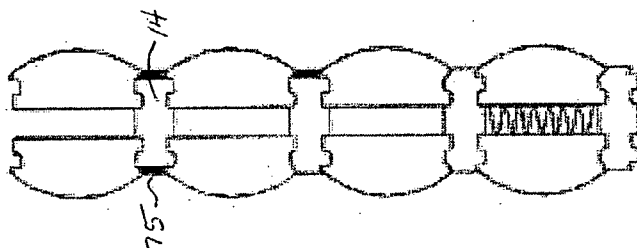


Fig. 8g

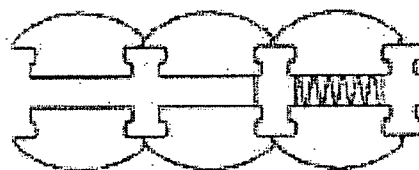


Fig. 8f

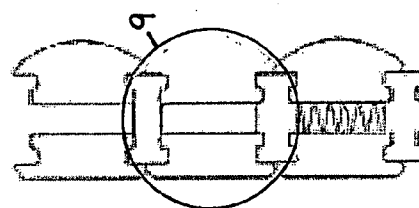


Fig. 8e

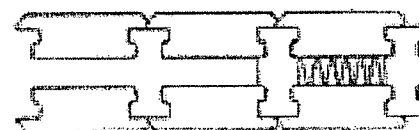


Fig. 8d



Fig. 8c



Fig. 8b

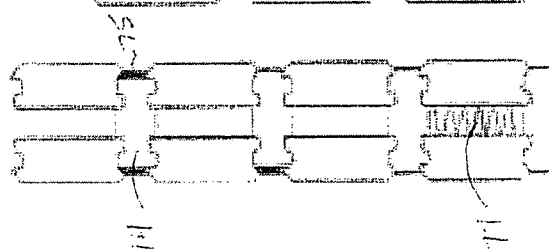
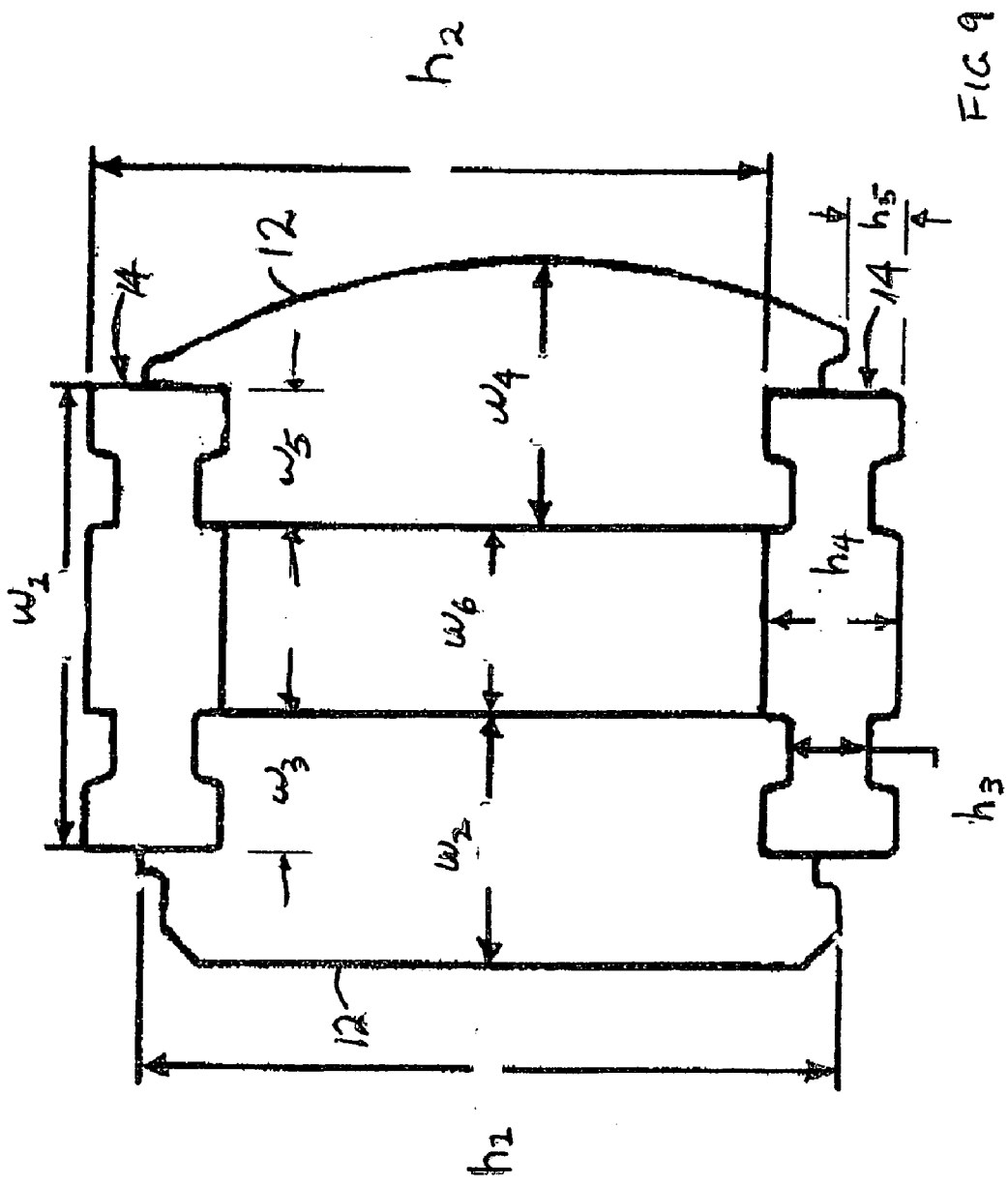


Fig. 8a



SYSTEM OF INTERLOCKING WALL AND CORNER COMPONENTS FOR CONSTRUCTION OF BUILDINGS

CROSS REFERENCE TO RELATED APPLICATION

[0001] This application is a Continuation-in-Part of U.S. patent application Ser. No. 10/793,847 filed Mar. 8, 2004 which claims priority from U.S. Provisional Patent Application No. 60/453,212 filed Mar. 11, 2003 entitled System of Interlocking Wall and Corner Components for Construction of Buildings.

FIELD OF THE INVENTION

[0002] This invention relates to dimensionally stable wall and corner components for the construction of buildings which simulate solid log construction buildings.

BACKGROUND OF THE INVENTION

[0003] Solid log construction buildings are desirable as residences in many countries; however the expertise is not generally widely available for either their manufacture or construction. Further, relatively large diameter logs suitable for log home construction generally are costly. In addition, conventional log building construction contains intrinsic difficulties which are material dependent and which require specific solutions. The well-known problems associated with the log mass are handling and transportation. Settling and drying of the logs after building construction often results in warping and checking thereby creating a reduced aesthetically pleasing and thermally efficient structure.

[0004] In the prior art applicant is aware of U.S. Pat. No. 6,389,765 which issued May 21, 2002 to Hautala for a Corner Joint. Inner and outer wall elements are kept in a parallel aspect by internal spacers and corner elements are alternatively fitted between intersecting wall elements in a ninety degree overlapping orientation. The corner elements have a head, which is positioned outside and parallel to one pair of wall elements and a tongue which project between the wall elements. The tongue has notches formed thereon to accept and securely retain wall elements from the intersecting wall.

[0005] The applicant is further aware of U.S. Pat. No. 5,577,357 which issued Nov. 26, 1996 to Civelli for a Half Log Siding Mounting System which illustrates fascia siding pieces for application to the exterior of a flat building wall. These siding pieces have upper and lower notches which engage an elongated retaining piece with complimentary shaped edges. The retaining piece is firmly secured to the exterior side of the building thereby providing the illusion of a log structure.

[0006] Applicant is also aware of U.S. Pat. No. 4,503,648 which issued Mar. 12, 1985 to Mahaffey for a Lightweight Composite Building Module which discloses modules for a wall of a building including for each module a pair of spaced elongated wooden side boards joined by a wooden top board. In one embodiment the wooden top boards fit into notched corners formed in the side boards, and in an alternative embodiment the side walls and top wall have a dove-tail connection therebetween. The modules are secured together with bolts and the cavity within the modules may be

filled with foam. Mahaffey teaches that when constructing the modules, jigs are used for holding the side boards and top and bottom boards in place while the foam is inserted into the cavity.

[0007] In view of the deficiencies in the prior art, it is an object of the present invention to provide dimensioned wall and corner components for a building, which upon assembly simulate a log building without limitations such as imposed by the overall length of the log.

[0008] It is also an object of the present invention to efficiently utilize as much of a log as practical in the manufacture of components and to create larger appearing timber components from small logs.

[0009] A further object of the invention is to manufacture building components that will suit the availability of raw logs.

SUMMARY OF THE INVENTION

[0010] The present invention is a self-supporting wall, which comprises a plurality of elongate, horizontally disposed side wall members which are interlocked with and supported by an elongate key member. Additional corner members are designed to finish off between the lapped horizontal side wall and key members to create an aesthetically pleasing corner. It is understood herein that reference to orthogonally oriented corner alignment is meant to include orientations other than ninety degrees, as the construction according to the present invention is not so limited. Both the side wall members and the elongate key may be manufactured in standard lengths and cut on site with simple hand tools to accommodate doorways and window openings.

[0011] In one embodiment not intended to be limiting the elongate key member forms a "dumb-bell"-like shape in lateral cross section resulting in upper and lower paired sloping faces which slope inwardly toward the center of the elongate key member, and opposed upper and lower vertical faces.

[0012] Elongate side wall members are interleaved in layers between the key members to form a wall of hollow beams, where the side members are stood on edge and mounted to inner and outer edges of each key member. The sloping notches of the key members mate with complimentary and corresponding notches formed intermediate of the inner and outer face of the side wall members. The weight of a sidewall member when installed upon the edge of a key member results in the side wall member sliding toward the wall centreline, thus inhibiting separation of the wall members. The vertical faces of the key member maintain a parallel separation of the side wall members to create a void or cavity therebetween.

[0013] In summary, the present invention may be characterized as a system of interlocking wall and corner components for construction of a building. The system includes a plurality of elongate key members and a plurality of elongate side members, wherein a horizontal pair of parallel upper and lower key members lying in a corresponding pair of vertically spaced parallel horizontal planes sandwich therebetween a pair of parallel side members. The pair of parallel side members lie in a corresponding pair of parallel, laterally spaced apart, vertical planes.

[0014] Each key member is symmetric about its corresponding horizontal plane, with the exception of laterally extending channels or notches formed near the ends of key members used to form overlapping corner embodiments, as better described below. Each symmetric face of each key member, that is, each face of the oppositely disposed upper and lower faces of each key member, when assembled in opposed facing relation to an opposed facing symmetric face of the other key member in the pair of parallel upper and lower key members, form therebetween a pair of joint female receiver sockets for mating therein of a corresponding pair of laterally inwardly disposed joint male members on the opposed facing sides of the pair of parallel side members. When so mated the pair of key members and the pair of side members form an elongate beam. The female receiver sockets and the male members may form interlocking joints, for example tongue and groove joints, herein collectively referred to as interlocking joints.

[0015] An array of horizontal beams form a wall, wherein each pair of adjacent beams share a common key member therebetween. The interlocking joints formed between pairs of adjacent key members urge the corresponding mated pair of side members laterally inwardly of the beam so as to snugly seat the male members into the female receiver sockets of the interlocking joints. Advantageously, the key members are substantially dumb-bell shaped in lateral cross section.

[0016] Each side member in the pairs of parallel side members has a thickness when viewed in lateral cross section therethrough. Each key member has a first width when viewed in the lateral cross section. The sum of substantially one half of the thickness of both of the side members in the pairs of parallel side members is substantially equal to at least one half of the first width. Thus a cavity formed between the pairs of laterally inwardly disposed joint male members and correspondingly between the pairs of key members has a second width when viewed in the lateral cross section which is no greater than substantially equal to or is less than the one half of the first width.

[0017] The sum of the first width and the sum of substantially one half of the thickness of both of the side members provides a total width of each of the horizontal beams which is substantially equal to a total height of each of the horizontal beams. Thus the lateral cross section may be substantially dimensionally square.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018] FIG. 1 is, in end view, side wall members according to an embodiment having planar exterior faces.

[0019] FIG. 1a is, in end view side wall members having convex exterior faces.

[0020] FIG. 1b is, in end view, one embodiment according to the present invention of an elongate key.

[0021] FIG. 1c is, in end view, an alternative embodiment of elongate key.

[0022] FIG. 1d is an alternative positioning within a log of the formation of the side wall members of FIG. 1.

[0023] FIG. 1e and 1f are end views of embodiments of side wall assemblies according to one aspect of the present invention.

[0024] FIG. 2 is an isometric end view of one form of side wall assembly according to the present invention.

[0025] FIG. 2a is an isometric end view of an alternative form of side wall assembly according to the present invention.

[0026] FIG. 2b is the side wall assembly of FIG. 2a using side wall members having a convex exterior face.

[0027] FIG. 3 is an end view of the side wall assembly of FIG. 2.

[0028] FIG. 3a is an end view of the side wall assembly of FIG. 2a.

[0029] FIG. 3b is an end view of the side wall assembly of FIG. 2b.

[0030] FIG. 4 is a plan view of one form of corner assembly according to the present invention.

[0031] FIG. 4a is an exploded isometric view of the corner assembly illustrated in FIG. 4.

[0032] FIG. 4b is an isometric view, partially exploded of the corner assembly of FIG. 4.

[0033] FIG. 5 is an isometric view of an alternative form of corner assembly.

[0034] FIG. 5a is an exploded isometric view of the corner assembly illustrated in FIG. 5, exploded along vertical alignment axis C-C.

[0035] FIG. 5b is an isometric view of a pair of abutting side members of FIG. 5.

[0036] FIG. 5c is a side view of the corner element of FIG. 5.

[0037] FIG. 5d is the exploded view of FIG. 5a showing alignment of the side wall elements during assembly.

[0038] FIG. 6 is an isometric view of an alternative form of corner assembly.

[0039] FIG. 6a is an exploded isometric view of several of the components of FIG. 6.

[0040] FIG. 7 is a plan view of an alternative form of corner assembly.

[0041] FIG. 7a is an exploded isometric view of the components of FIG. 7.

[0042] FIG. 8a is an end view of further embodiments of the present invention.

[0043] FIG. 8b is an end view of further embodiments of the present invention.

[0044] FIG. 8c is an end view of further embodiments of the present invention.

[0045] FIG. 8d is an end view of further embodiments of the present invention.

[0046] FIG. 8e is an end view of further embodiments of the present invention.

[0047] FIG. 8f is an end view of further embodiments of the present invention.

[0048] FIG. 8g is an end view of further embodiments of the present invention.

[0049] FIG. 8*h* is an end view of further embodiments of the present invention.

[0050] FIG. 8*i* is an end view of further embodiments of the present invention.

[0051] FIG. 9 is an enlarged portion of FIG. 8*e* with dimension lines added.

DETAILED DESCRIPTION OF EMBODIMENTS OF THE INVENTION

[0052] With reference to the drawing figures, wherein similar characters of reference denote corresponding parts in each view, the interlocking wall and corner construction 10, for example as illustrated in FIG. 4*b*, includes side wall members 12, elongate key members 14 and corner finishing members 18.

[0053] As may be readily understood by reference to FIGS. 1, 1*a*-1*d*, a log 20, illustrated in broken outline, has a generally circular cross section which reduces in cross sectional area from its butt to its tip. Side wall members 12 are formed, for example cut or milled, from the outer side portions of the log. This avoids inclusion of heart wood from the log, thereby reducing checking or splitting of side wall members 12 during drying. Members 12 may be manufactured with the exterior face 12*a* being either planar as illustrated in FIGS. 1 and 1*d*, or convex as illustrated in FIG. 1*a*. Members 12 have opposite inside faces 12*b* and edges 12*c*. Planar exterior face 12*a* has chamfers 12*d* on opposite vertically spaced apart edges 12*c*. Side wall members 12 may be manufactured in convenient lengths and may be trimmed and abutted end-to-end during wall manufacture. The vertically spaced apart edges of inside edges 12*b* include notches 22. Notches 22 each include a first face 22*a* and a second sloping face 22*b*. For assembly of a wall, first face 22*a* is generally vertically disposed.

[0054] Key members 14 may be manufactured from smaller diameter logs, or from a portion near the reduced cross sectional area tip of larger logs, so as to better utilize the available timber. Members 14 have a 'bow tie'-shape in lateral cross section. The 'bow tie'-shape includes parallel outer faces 14*a* and a medial body having oppositely disposed ridges 14*b* extending between the outer faces. Paired sloping faces 26 and 28, formed on either side of medial body ridges 14*b*, slope generally from the extremities of outer faces 14*a* toward the vertical centerplane A of key 14. Sloping faces 26 and 28 terminate at vertical side faces 30 on either side of ridges 14*b*. Vertical faces 30 define the width of ridges 14*b*. Key members 14 are symmetric, with the exceptions noted below, on either side of vertical plane A and horizontal plane B.

[0055] As may be seen illustrated in FIGS. 3, 3*a* and 3*b*, side wall members 12 are stacked vertically upon horizontal key members 14 with notches 22 snugly and matingly engaging sloping faces 26 and 28 of key members 14. The natural tendency of stacked side wall members 12, due to their mass and the force of gravity, when positioned with notches 22 mated on sloping faces 26 and 28, is to slide inwardly of key members 14 until inside faces 12*b* or edges 12*c* abut vertical faces 30 or outer faces 14*a* respectively. Cavity 34 is thereby created between faces 12*b*, between which insulation or services may be conveniently placed. The interior and exterior faces of the wall constructed of

members 12 may be flat or convex when viewed in end-on cross section, or, as seen in FIG. 1*e*, a combination of flat and convex, where the flat face may be to the interior of the building.

[0056] In FIG. 4, 4*a* and 4*b*, a corner post 40 is mounted to side members 12 by means of dovetail joints. Post 40 has projecting tails 42 formed on adjacent sides. Side members 12 are vertically chamfered so that the chamfers when in opposed facing relation cooperatively form a socket 44. Tails 42 fit snugly into sockets 44. Key members 14 are trimmed so as to abut projecting tails 42 when the key members are mounted onto the side members. The mating inside corners of the inside side members are further chamfered as at 46 allowing a close tolerance inside cover fit.

[0057] As depicted in FIGS. 5, 5*a*, 5*b*, 5*c* and 5*d*, key members 50 have a notch 50*a* formed in one face, leaving a short end projection 50*b* extending therefrom. An orthogonally aligned pair of key members 50 are interlocked by mating opposed facing notches 50*a*. A key member layer is thereby formed for the corner. Side members 12 are mounted onto, so as to be sandwiched between layers of orthogonally aligned pairs of key members 50, so that notches 50*a* are aligned along axis C. Separate end pieces 52 each have an end block 52*a* and an offset tongue 52*b*, offset from the vertical center of the end block as better seen in FIG. 5*c*. Tongue 52*b* is insertable respectively under and over cross-interlocked notches 50*a* of orthogonally mated upper and lower pairs of key members 50 so as to extend in direction D into voids 34 between the side members until shoulder flanges 52*c* engage the ends of side members 12. Tongue 52*a* is offset into proximity to one face of end block 52*a* so that a pair of end pieces 52 may be mounted with the shoulder flange 52*c* of one orthogonally overlapping the shoulder flange 52*c* of the other, thus allowing the assembly of the snug mounted corner 53 of FIGS. 5 and 5*b*. End piece 52 and key members 50 may be mounted together with nails, dowels, adhesives and/or any other suitable fastening means to form corner 53.

[0058] FIG. 1*f* illustrates variations of the present invention in which the locking joint between wall members 12' and horizontal key 14' may be minimally affected by lumber shrinkage as the members dry after assembly.

[0059] FIGS. 6 and 6*a* illustrate key members 60 each having a pair of oppositely disposed laterally projecting ribs 60*a* located medially of the sides. Ribs 60*a* are interrupted, as at 60*b*, near the end 62 of each key member 60. As side wall members 12 are mounted in overlapping succession on successive key members 60 so as to build up corner 63, members 12 orthogonally abut key members 60 within area 60*b*. End portion 62 of key 60 extends outwardly of the overlapping joint of corner 63. End blocks 64 are mated with ends 62 of key members 60 and mounted thereto with nails, dowels, adhesives or other suitable means.

[0060] In FIGS. 7 and 7*a* a variant corner assembly is illustrated for corner 73. In the corner assembly of corner 73 the overlapping key members 14 are tied together by vertical end boards 15, which may be nailed, dowelled or otherwise secured or fastened in place.

[0061] In a further embodiment, the timber elements, as shown in FIGS. 8*a*-8*i* allow for distinctively different wall profiles employing tongue-and-groove or other substantially

dove-tail joints. Chinking **75** may be incorporated on the inside and outside or one side only by simply trimming one edge of a full key member **14**. Wall element dimensions can be made any size but may be approximately three inches by seven inches to four and a half inches by nine inches. This combined with a full key member **14** and two inch insulation/service space can create a wall width of up to eleven inches and an effective stacking height of up to twelve inches per course of timbers. By using different key width the insulation/services space can be increased or eliminated altogether. A timber/log siding or panelling can be installed on framed walls without visible fasteners, creating a more realistic look. Several wood species interior/exterior combinations are possible. The average insulation R value for a wall with six inches of wood and two inches of polystyrene insulation **77** is about the same as that of a six inch framed wall with fibreglass insulation. The advantage of three inches or more wood on the interior of the insulation is that it provides a heat sink as experienced in log homes during spring and fall weather conditions.

[0062] The present invention offers stability over the prior art due in part to the relative dimension of the components so that the components are interlocking and stable without the need for further fastening by means of bolts, jigs or the like. Thus in one embodiment which in applicant's experience provides improved stability when building a structure from such sidewall members **12** and key members **14**, and as seen in FIG. 9, the modular structures according to the present invention have certain characteristic dimensions which when combined as described and claimed herein provide for improved stability over prior art structures. In particular, in one embodiment, the height dimensions h and width dimensions w in FIG. 9 may be as follows:

height (inches)	width (inches)
$h_1 = 7.56$	$w_1 = 5.0$
$h_2 = 7.31$	$w_2 = 2.75$
$h_3 = 0.87$	$w_3 = 1.38$
$h_4 = 1.5$	$w_4 = 2.88$
$h_5 = 0.625$	$w_5 = 1.44$
	$w_6 = 2.01$

[0063] Thus in one aspect the stability of the structure comes from the relative width dimensions where for a certain width w_1 of key member **14**, and where width w_3 is substantially one half the width of width w_2 , and where the width w_5 is substantially one half the width of width w_4 the sum of widths w_3 and w_5 are no less than one half of width w_1 . Thus what this amounts to is that each of the side members **12** protrude into the space or cavity **34** between key members **14** by at least one quarter of the width w_1 of each of the key members **14** so that the remaining cavity **34** defined between side members **12** and key members **14** has a width w_6 is no greater than one half of width w_1 of key members **14**. In a further aspect, the total height dimension for the beam cross section roughly equals the total width of the beam, where the total height is substantially the sum of one half the thickness of each of the pair of key members **14** summed with the height h_1 of the side members **12**. Thus the total height H may be expressed as $H=h_1+2 \times h_5$. The beam in cross section is thus approximately dimensionally square.

[0064] As will be apparent to those skilled in the art in the light of the foregoing disclosure, many alterations and modifications are possible in the practice of this invention without departing from the spirit or scope thereof. Accordingly, the scope of the invention is to be construed in accordance with the substance defined by the following claims.

What is claimed is:

1. A system of interlocking wall and corner components for construction of a building comprising:

a plurality of elongate key members and a plurality of elongate side members, wherein said key members are arranged as horizontal pairs of parallel upper and lower key members lying symmetrically in a corresponding pair of vertically spaced parallel horizontal planes, said pairs of parallel upper and lower key members sandwiching therebetween pairs of parallel side members, and wherein said pairs of parallel side members lie in a corresponding pair of parallel, laterally spaced apart, vertical planes,

and wherein each said key member having symmetric faces, being each face of oppositely disposed upper and lower faces of each said key member, when assembled in opposed facing relation to an opposed facing said symmetric face of a second key member in said pair of parallel upper and lower key members, form therebetween a pair of joint female receiver sockets,

opposed facing sides of said pairs of said parallel side members having a corresponding pair of laterally inwardly disposed joint male members for mating into engagement in said female receiver sockets to form a joint, wherein, when so mated, said pairs of key members and said pairs of side members form elongate horizontal beams mountable one on top of another to form a vertical array of wall layers comprising a wall,

and wherein each said side member in said pairs of said parallel side members has a thickness when viewed in lateral cross section therethrough and wherein each said key member has a first width when viewed in said lateral cross section, and wherein the sum of substantially one half of said thickness of both of said side members in said pairs of said parallel side members is substantially equal to at least one half of said first width so that a cavity formed between said pairs of laterally inwardly disposed joint male members and correspondingly between said pairs of key members has a second width when viewed in said lateral cross section which is substantially equal to or less than said one half of said first width.

2. The system of claim 1 wherein the sum of said first width and said sum of substantially one half of said thickness of both of said side members provides a total width of each of said horizontal beams and wherein said total width is substantially equal to a total height of said each of said horizontal beams whereby said lateral cross section is substantially dimensionally square.

3. The system of claim 2 wherein each said key member is, along a length thereof, substantially symmetric about its corresponding said horizontal plane.

4. The system of claim 2 further comprising laterally extending channels formed adjacent ends of said key mem-

bers, said notches for forming overlapping corners between adjacent said beams in a single said wall layer.

5. The system of claim 3 wherein in said vertical array of said horizontal beams, vertically adjacent said beams in vertically adjacent said wall layers share a common said key member therebetween.

6. The system of claim 2 wherein said pairs of joint female receiver sockets include sloping faces on each said key member sloping inwardly from opposite sides of said key members and downwardly towards said corresponding horizontal plane so that said joints urge the corresponding mated said joint male members laterally inwardly of said horizontal beams so as to snugly seat said joint male members into said female receiver sockets.

7. The system of claim 4 further comprising separate end pieces, said end pieces for sandwiching between said ends of said key members when mounted in said vertical array.

8. The system of claim 7 wherein each end piece of said end pieces has a tongue extending cantilevered from an end thereof, said tongue for mating insertion into said cavity between said pair of key members and said pair of side members.

9. The system of claim 2 wherein ends of said key members include notches so that adjacent said key members

in a single said wall layer form a corner when overlapped at their ends so as to overlap said notches.

10. The system of claim 9 further comprising vertical end boards mountable to ends of said key members for tying said key members together.

11. The system of claim 2 wherein ends of said side members include vertically extending notches so that said pair of parallel side members form vertical joint female receiving sockets at the ends of said pair of parallel side members.

12. The system of claim 11 further comprising at least one post having at least two vertically extending joint male members mountable into said vertical joint female receiving sockets so as to brace between adjacent said beams in a single said wall layer.

13. The system of claim 12 wherein said post is a corner post and said at least two vertically extending joint male members include two orthogonally oriented male members.

14. The system of claim 2 wherein said key members are substantially dumb-bell-shaped in lateral cross section.

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