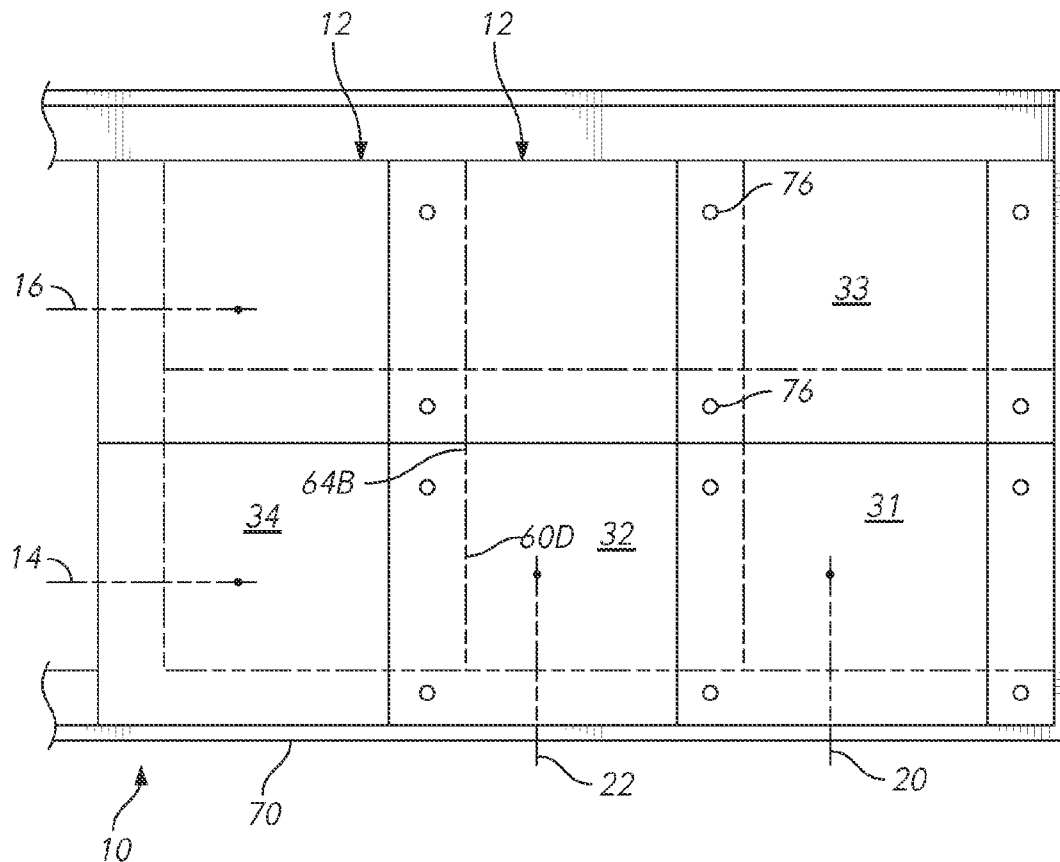




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(19) **United States**(12) **Patent Application Publication**
Tsambasis(10) **Pub. No.: US 2012/0227346 A1**(43) **Pub. Date: Sep. 13, 2012**(54) **WALL STRUCTURE**(52) **U.S. Cl. 52/481.1; 52/745.09**(76) **Inventor: Costa Tsambasis, Garden Grove, CA (US)**(21) **Appl. No.: 13/414,298**(22) **Filed: Mar. 7, 2012****Related U.S. Application Data**(60) **Provisional application No. 61/451,052, filed on Mar. 9, 2011.****Publication Classification**(51) **Int. Cl.**
E04B 2/32 (2006.01)
E04B 2/02 (2006.01)(57) **ABSTRACT**

A wall is constructed from many wall units (31, 32, 33) that are fastened together, with each wall unit having moderate width and height dimensions. Each wall unit includes a pair of parallel and aligned face plates (40, 42) and a middle plate (44) sandwiched between the face plates. The middle plate is offset a distance (Df, Du) from alignment with the face plates, to leave a first unit (31) with a pair of tongues (60A, 62A) that project forwardly (F) and upwardly (U), and to leave a pair of grooves (64A, 66A) at the rear and bottom of the first unit. A frontward projecting tongue (60B) of a second unit (32) projects into a groove (64A) in the first unit, and an upwardly projecting tongue (62A) of the first unit projects upward into a groove (66C) at the bottom of a third unit (33).



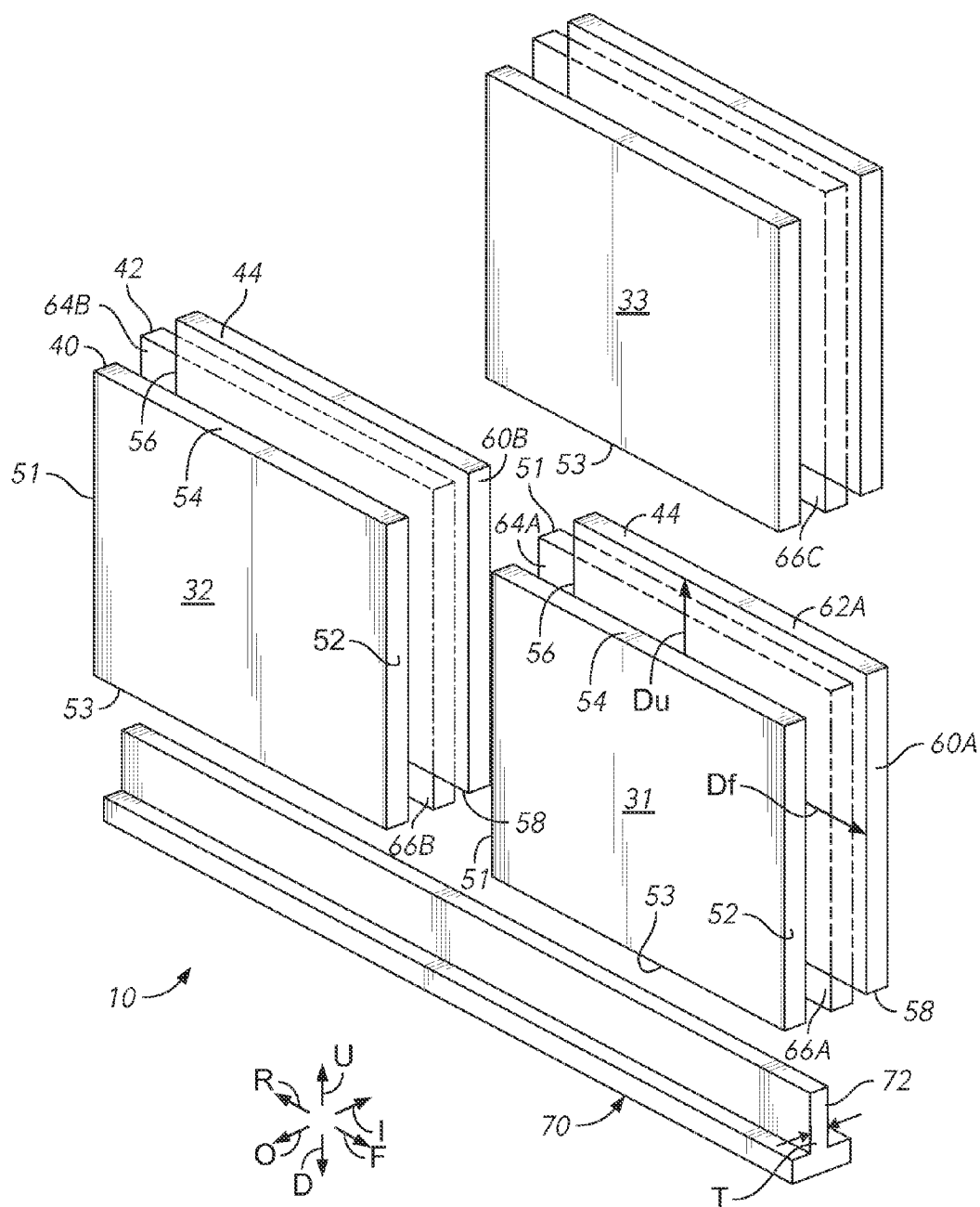


FIG. 1

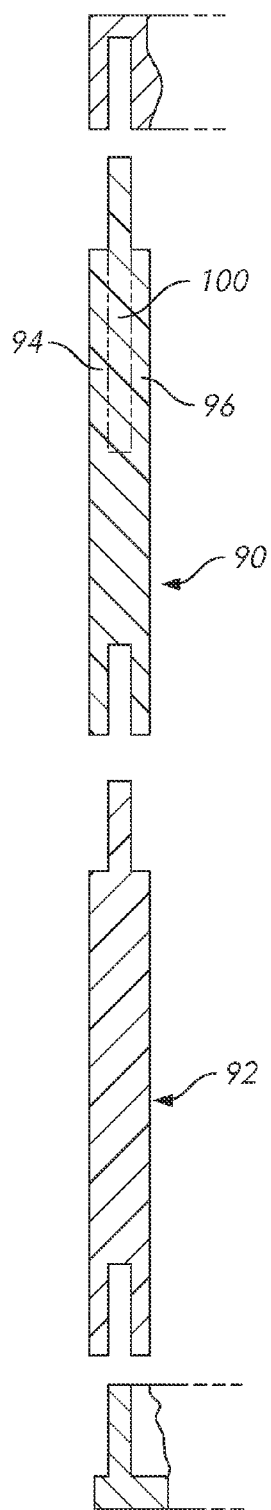


FIG. 4

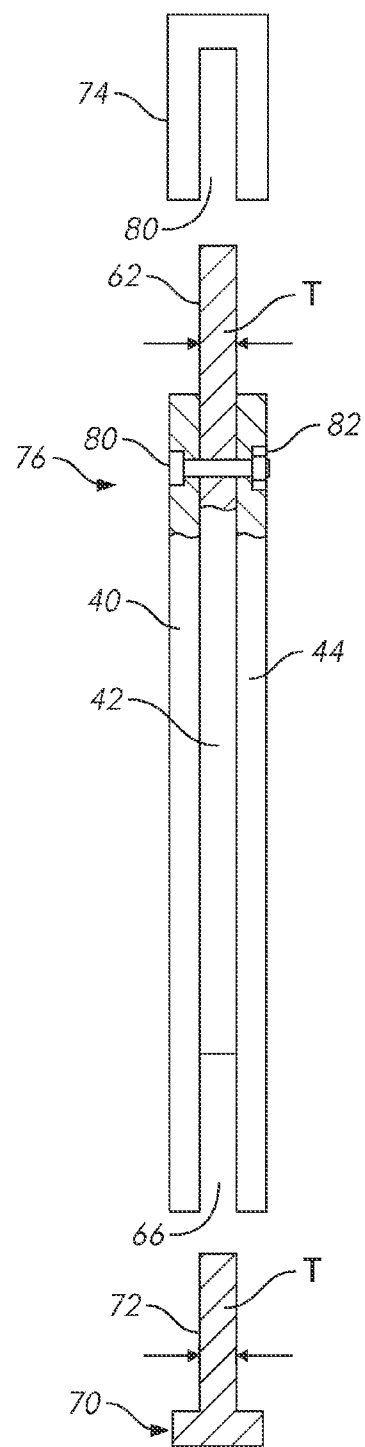


FIG. 2

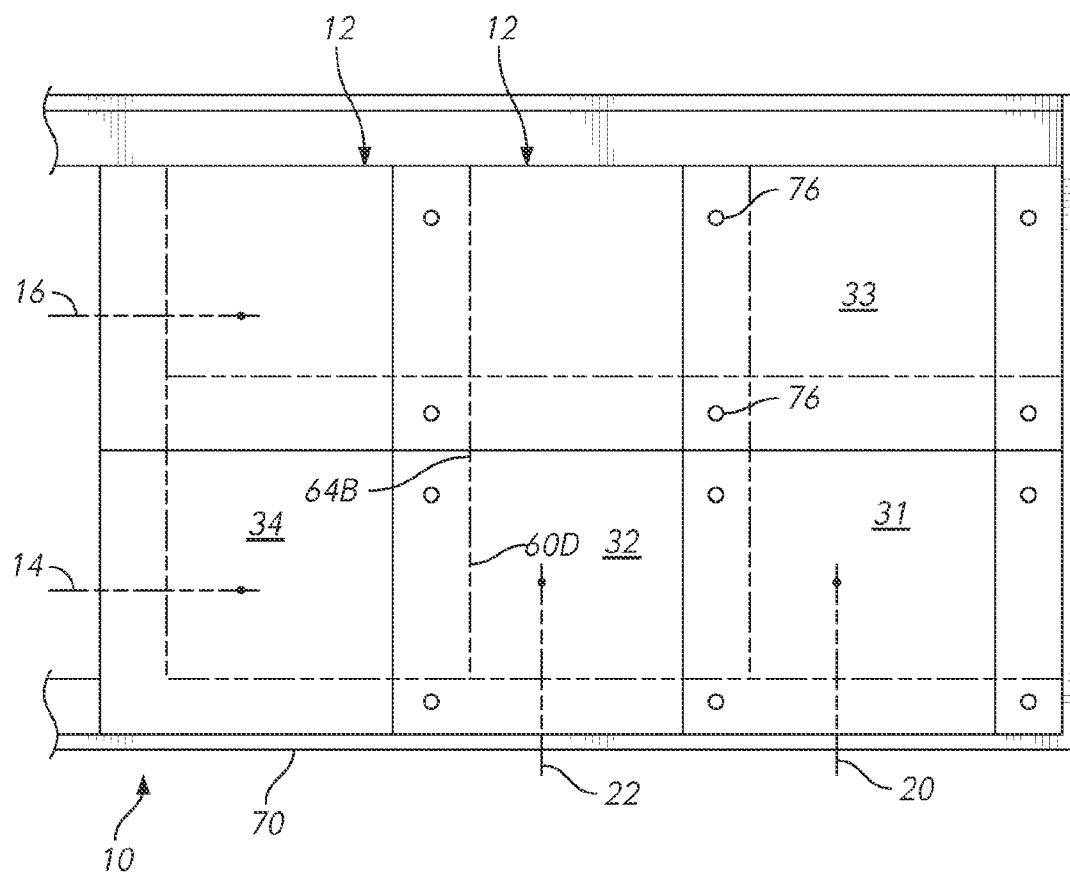


FIG. 3

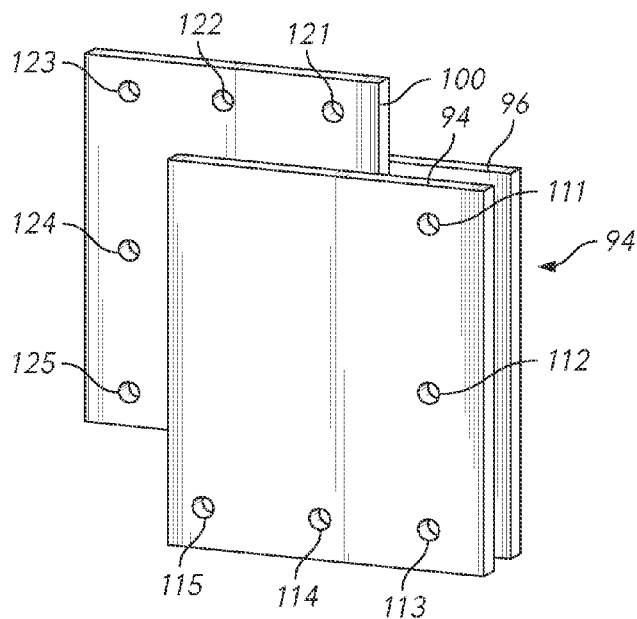


FIG. 5

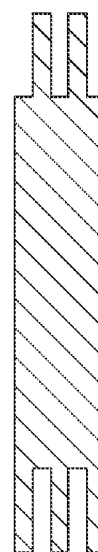


FIG. 8

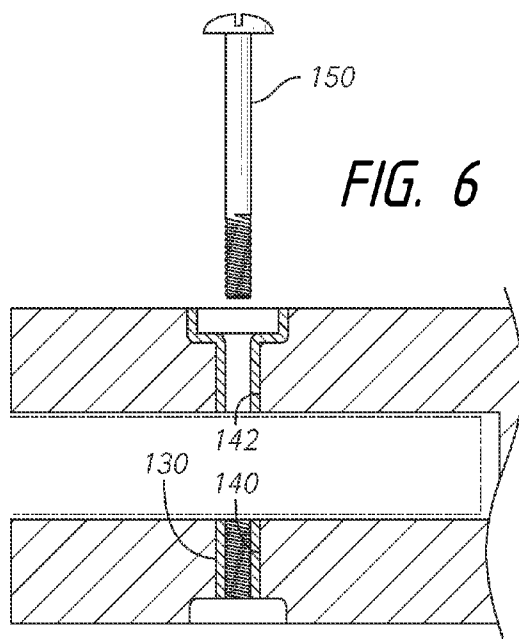


FIG. 6

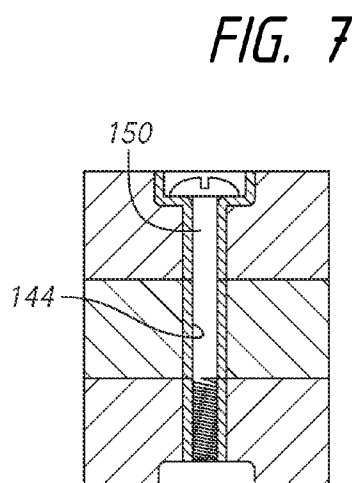


FIG. 7

WALL STRUCTURE

BACKGROUND OF THE INVENTION

[0001] A wall for a home or business may have a height of eight feet or more and a length of ten feet or more. One way to build the wall is by cutting wood boards to a length of eight or ten feet or more, transporting them to a site, and supporting the boards to extend vertically or horizontally while they are fastened together. In many situations, it would be desirable to construct a wall out of pieces of wood or units of much less than eight feet length.

SUMMARY OF THE INVENTION

[0002] In accordance with one embodiment of the invention, a wall structure is provided that is constructed from multiple wall units that are each of moderate size (less than 8 feet in length and in width). Each wall unit includes a pair of parallel and aligned outer, or face plates, and a middle plate that is sandwiched between the two face plates with the three plates fixed together. All plates are preferably of square shape and of the same size. The middle plate is not aligned with the face plates, but is offset from such alignment. Such offset results in the unit having a pair of projecting tongues and in having a pair of grooves opposite the tongues.

[0003] A wall structure is constructed by laying the wall units in horizontal rows and vertical columns. Each tongue of a wall unit projects horizontally or vertically into a groove of another wall unit, and the units are fastened together. The top and bottom wall units are preferably each joined to a joining beam that has a groove or tongue.

[0004] The novel features of the invention are set forth with particularity in the appended claims. The invention will be best understood from the following description when read in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0005] FIG. 1 is an exploded isometric view of a portion of a wall structure of the invention.

[0006] FIG. 2 is a sectional view of a wall structure and showing how wall structures are jointed to top and bottom joining beams.

[0007] FIG. 3 is a front elevation view of a portion of a wall structure of the invention.

[0008] FIG. 4 is an exploded sectional view of wall units of another embodiment of the invention wherein the face and middle plate regions have been integrally molded.

[0009] FIG. 5 is an isometric view of a wall unit of FIG. 4, showing fastener-receiving holes.

[0010] FIG. 6 is a sectional view of a portion of the wall unit of FIG. 5 with the bolt not yet installed.

[0011] FIG. 7 is a view similar to FIG. 6 with the bolt fully installed.

[0012] FIG. 8 is a sectional view of an alternative design of a wall unit.

DESCRIPTION OF THE INVENTION

[0013] FIG. 3 shows a wall structure 10 of the invention, which is formed from multiple wall units 12 that are arranged in rows such as 14, 16 and columns such as 20, 22. The construction of three of the wall units 31, 32, and 33 is shown in FIG. 1.

[0014] FIG. 1 shows that each wall unit such as 32, includes a pair of outer plates, or face plates 40, 42, and a middle plate

44 that is sandwiched between the face plates. In the embodiment shown in FIG. 1, each wall unit is constructed of three sheets of wood that are fastened facewise together. The plates are fastened together by adhesive that covers their adjacent surfaces, although other fastening means can be used such as screws and nuts. Each of the plates 40, 42, 44 is of rectangular shape, and preferably of square shape, with four preferably equal (within 10%) sides, or edges 51-54. The three plates of each unit are of the same size in width (F, R) and height (U, D). The face plates 40, 42 are aligned, in that their adjacent edges such as edges 51 of the two face plates 40, 42 of a wall unit are aligned (e.g. as seen when viewing along inward direction I). The middle plate 44 preferably is of the same dimensions as the face plates, but is offset from the face plates of the same wall unit. That is, the middle plate has a rear edge 56 that is recessed from the front edges such as 51 of the face plates 40, 42, and the middle plate has a bottom edge 58 that is recessed from the face plate bottom edges 53.

[0015] For wall unit 31, the middle plate is offset forwardly F from the face plates by an offset distance Df, and the middle plate is offset upwardly by distance Du from the face plates. This offsetting results in the middle plate forming forward and upward tongues 60A, 62A that project forward F and upward U from the rest of the unit. This also results in the forming of rearward and downward grooves 64A, 66A in the rearward and downward portions of the unit. When applicant refers to a part of any wall unit, applicant uses a number without a letter following the number. However, when applicant uses a letter (e.g. "A", "B", etc.) following a number, then applicant is referring to a part of a particular wall unit.

[0016] The wall structure 10 is constructed by laying the first and second units 31, 32 in the positions shown in FIG. 1. The forward tongue 60B of the second unit 32 is fully inserted into the rearward groove 64A of the first unit 31. The units 31, 32 are fastened together as by the use of adhesive applied to surfaces of the tongue 60B or by the use of bolts and nuts. In most cases the wall structure is more than two units wide (horizontally) and is at least two units tall, so another wall unit, shown at 34 in FIG. 3, is added by inserting its forward-projecting tongue 60D into a groove 64B (FIG. 3) of the second unit.

[0017] FIG. 1 shows a bottom joining beam 70 that has a tongue 72 of thickness T that fits into the bottom grooves 66 of thickness T of the wall units 31, 32, 34 to provide a continuous bottom surface of the wall structure. FIG. 2 shows a top joining beam 74 that has a beam groove 80 that receives the top tongues 62 of the uppermost wall units. FIG. 2 shows an example of a mechanical fastener 76 that includes a bolt 80 and a nut 82 that holds the three plates 40, 42, 44 of a wall unit together. Whether a beam such as 74 (FIG. 2) with a groove 80, or a beam 70 (FIG. 2) with a tongue is used at the top of the wall structure depends upon whether there is an even or odd number of rows of wall units.

[0018] In a wall structure of the type shown in FIG. 3 that applicant has designed, the face plates and middle plate of each unit were of 4 feet length and width, and the tongues of each unit projected 8 inches from the edges of the face plates. Each tongue (and corresponding groove) was 32 inches wide, which is more than half the width of each plate, for strength. This resulted in a wall structure of a height of 8 feet-9 inches. In another design, there were four rows of wall units, one on top of another, each with square face plates having a length of two feet per side, and with the middle plate projecting five inches beyond edges of the face plates. In both cases each of

the plates was of wood and had a thickness T of $\frac{7}{8}$ ths inch (0.875 inch). The tongues should project by at least twice, and preferably three times, the thickness of the tongue.

[0019] Thus, the invention provides a wall structure formed from individual plates or plate regions, each of a smaller width and height than the width and height of the entire wall structure. The plates or plate regions can comprise individual plates held together, or can comprise regions of a unitary molded or otherwise formed unit. The plates or plate regions are preferably of approximately square formation, that is, with a width and height that are within 10% of each other. The relatively small wall units make it easier to transport them and to hold them while they are being assembled. The terms “plate” and “plate region” are used interchangeably to mean the same item.

[0020] In another embodiment of the invention, the wall units are each molded in one piece, as shown for wall units 90, 92 of FIG. 4. This leaves a pair of face plate regions 94, 96 and a middle plate region 100 between them. These regions correspond to the face plates 40, 42 and middle plate 44 of FIG. 1. Each wall unit that has two face plate regions and a middle plate regions, can be molded of concrete, Styrofoam, corrugated aluminum, or any of a wide variety of material and can even be cut from a large block of wood. Also, it should be understood that while each wall unit is shown with two face plate regions and one middle plate region between them, it is possible to have more plate regions, such as is shown in FIG. 8.

[0021] As shown in FIG. 5, applicant prefers to leave holes 111-115 in the plate regions for receiving screws, or bolts, and to leave recesses to hold embedded nuts in another plate region, to facilitate assembly of the molded wall units. As shown in FIG. 5, each wall unit includes the face plate regions 94, 96 and the middle plate region 100. The middle plate region has a plurality of through holes, 121-125 with five holes shown. The first face plate portion 94 also has through holes 111-115. The second face plate portion 96 has corresponding holes that are threaded therein.

[0022] As shown in FIGS. 5, 6, and 7, a nut 130 is embedded in each second plate region hole 140. Wall units are assembled by aligning the holes 140, 142 of the two plate regions and the hole in the middle plate region 144 with each other and with the nuts 130 in a hole. Then, bolts 150 are inserted through the holes and threaded into the nuts 130. This fixes the horizontally and vertically projecting tongues of each unit to pairs of plate regions of another wall unit.

[0023] Although particular embodiments of the invention have been described and illustrated herein, it is recognized that modifications and variations may readily occur to those skilled in the art, and consequently, it is intended that the claims be interpreted to cover such modifications and equivalents.

What is claimed is:

1. A wall structure comprising:

a plurality of wall units (31, 32, 33) that each has a pair of face plate regions (40, 42, 94, 96) with primarily rectangular faces, the face plate regions extending parallel to each other and being spaced apart to leave a slot (64, 66) between the pair of said face plate regions, each wall unit having a middle plate region (44, 96) of approximately the same size as said face plate regions and that is sandwiched between and fixed to said pair of face plate regions, said middle plate region having a front edge (60A) that projects forwardly beyond front edges (52) of

said face plate regions to leave a rear slot (64A) between rear portions of said outer plate regions;

each pair of face plates of a first wall unit (31) having primarily parallel rear plate edges (51), and each middle plate region of a second wall unit (32) forms a tongue (60B) that projects forwardly into the rear slot (64A) of said first unit (31) and that is fastened to the outer plate regions of said first unit.

2. The wall structure described in claim 1, wherein:

said middle plate region (44) of said first wall unit (31) has a top edge (62A) that projects upward above upper edges (54) of said first wall unit face plate region to leave said first wall unit with an upwardly projecting tongue (62A) at its top;

said wall structure includes a third unit (33) that lies above said first unit;

a middle plate region (44) of said third unit is recessed upward from bottom edges (53) of the outer plate regions of said third unit to form a third unit bottom groove (66C) extending upward into a bottom of said third unit to receive said upward projecting tongue (62A).

3. The wall structure described in claim 1, wherein:

said wall units are arranged in rows (14, 16) and columns (20, 22), with each row extending primarily horizontally and each column extending primarily vertically;

the middle plate region (44) of each wall unit has approximately the same width and height as the width and height of face plate regions of the unit;

each of a plurality of said wall units that lies in a first column has a groove (64) in its rear (R) and a groove (66) in its bottom (D) and has a tongue (60, 66) that projects at a front and top of the wall unit, with each tongue of a wall unit (31) of said first column projecting rearward or upward into a groove of another unit.

4. The wall structure described in claim 1 wherein:

the face plate regions and middle plate region of each wall unit comprises a single integrally molded structure.

5. A wall structure, comprising:

a plurality of wall units that each has top, bottom, front and rear ends, and that each includes a pair of rectangular face plates (40, 42, 94, 96) and a rectangular middle plate (44, 100) that lies closely sandwiched between said pair of face plates and that is fixed to the face plates, the middle plate of each wall unit having approximately the same length and width as the corresponding face plates, but said middle plate is offset from said face plates to leave a pair of grooves (64B, 66B), a first of said wall units (31) having said grooves (64A, 66A) at rear and bottom ends of the wall unit that leave tongues (60A, 62A) projecting from front and top ends of the first wall unit, said grooves each having about the same thickness T as said tongues (60B, 62A) so the tongues of selected units can be inserted into the grooves (64A, 66C) of other unit(s) and fastened in place.

6. The wall structure described in claim 5, wherein:

said plurality of wall units includes a second unit (32), wherein said middle plate is offset both upwardly and rearwardly to form a forwardly projecting tongue (60B) that projects into the groove (64A) that lies at the rear end of said first wall unit.

7. The wall structure described in claim 6, wherein:

said wall structure includes a joining beam

said plurality of wall units includes a third unit (33), wherein said middle plate is offset both upwardly to leave a groove (66A) that receives a tongue (72) of said joining beam and to leave an upward tongue (62A) at the top of said first wall unit.

8. The wall structure described in claim 5, including:

a joining beam (70) that has an upwardly projecting tongue beam (72) that projects into grooves at the bottom of each of a plurality of said wall units including a groove (66A, 668) that lies at the bottom of said first and second unit,

9. The wall structure described in claim 5, wherein:

said face plates are each of square shape and said wall units are all of the same size.

10. The wall structure described in claim 5 wherein:

said face plates and said middle plate are integrally molded.

11. The wall structure described in claim 5 wherein:

said face plates and said middle plate, each comprises a separate plate of material, with said face plates and middle plate fastened together.

12. A method for constructing a wall structure out of multiple units, comprising:

forming a plurality of wall units that each has a pair of rectangular face plates (40, 42, 94, 96) and a middle plate (44, 100) that is sandwiched between the face plates, with the pair of face plates of each unit being aligned with each other, and with the middle plate not being aligned with the face plates of that unit but with each middle plate forming two tongues (62A, 60A) that project beyond edges of the face plates in two directions and leave two grooves (66A, 64A) that lie opposite said tongues and between said face plates;

assembling each wall unit including inserting one of the tongues (60B) of a second unit (32) forwardly (F) into a groove (64A) of a first unit (31) and inserting one of the tongues (62A) of said first unit into a groove (66C) of a third unit (33).

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