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(54) **SELF GAPPING WOOD BASED PANELS**

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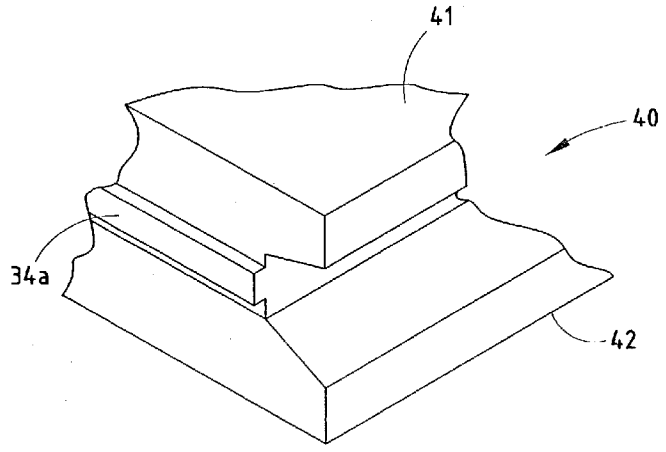
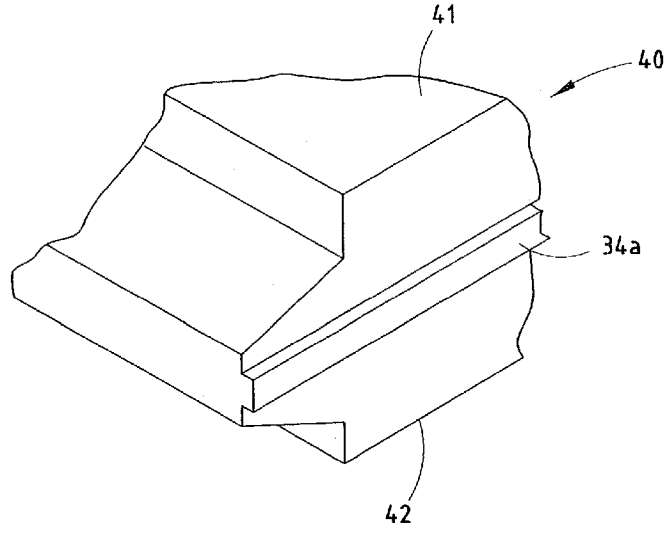
(52) **U.S. Cl.** **52/592.1**; 52/592.2

(57) **ABSTRACT**

A wood based panel having at least one spacer, spaced at intervals or continuously, on a square edge in which the spacer will deform or be forced into an adjacent panel when subjected to linear expansion forces.





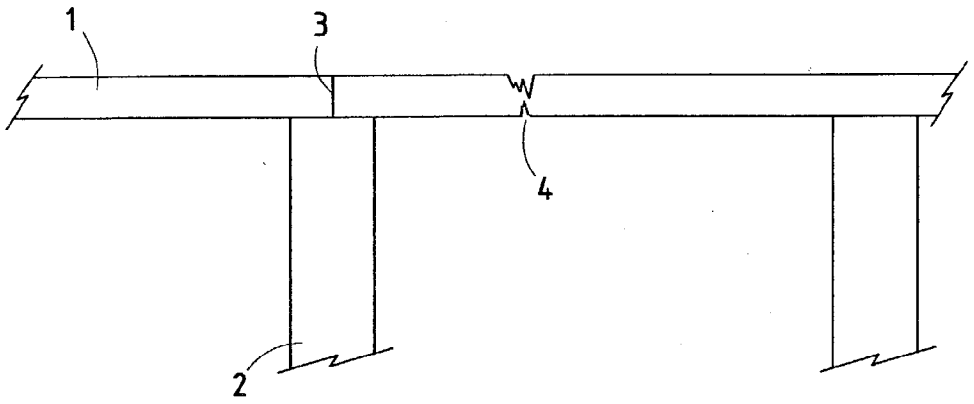


FIG. 1
(PRIOR ART)

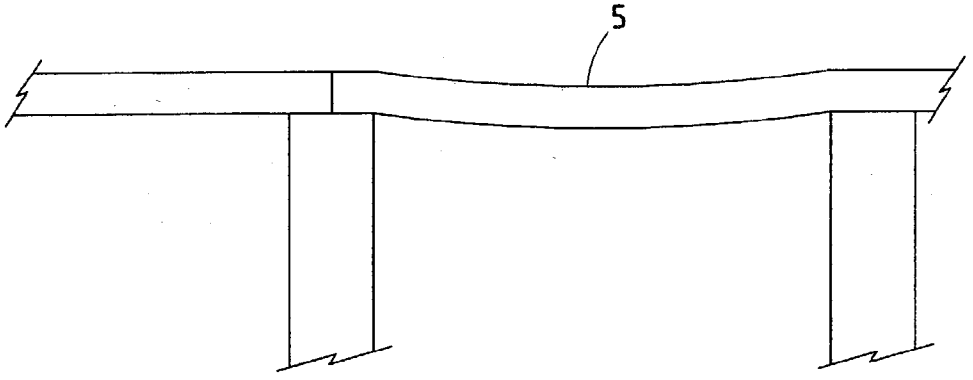


FIG. 2
(PRIOR ART)

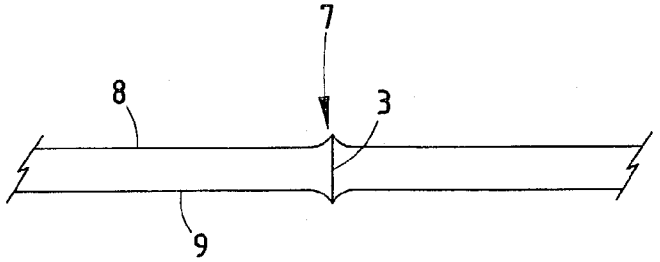


FIG. 3
(PRIOR ART)

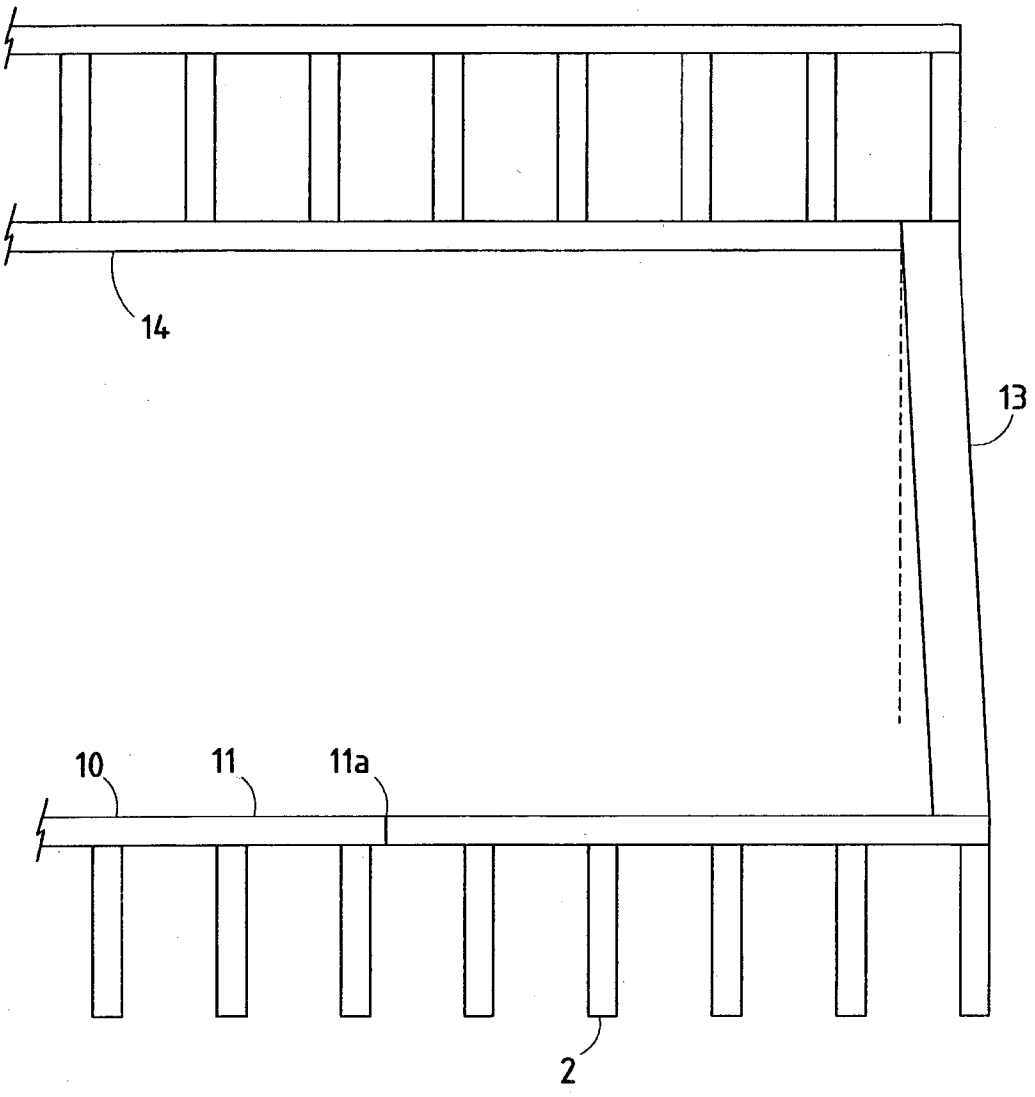


FIG. 4
(PRIOR ART)

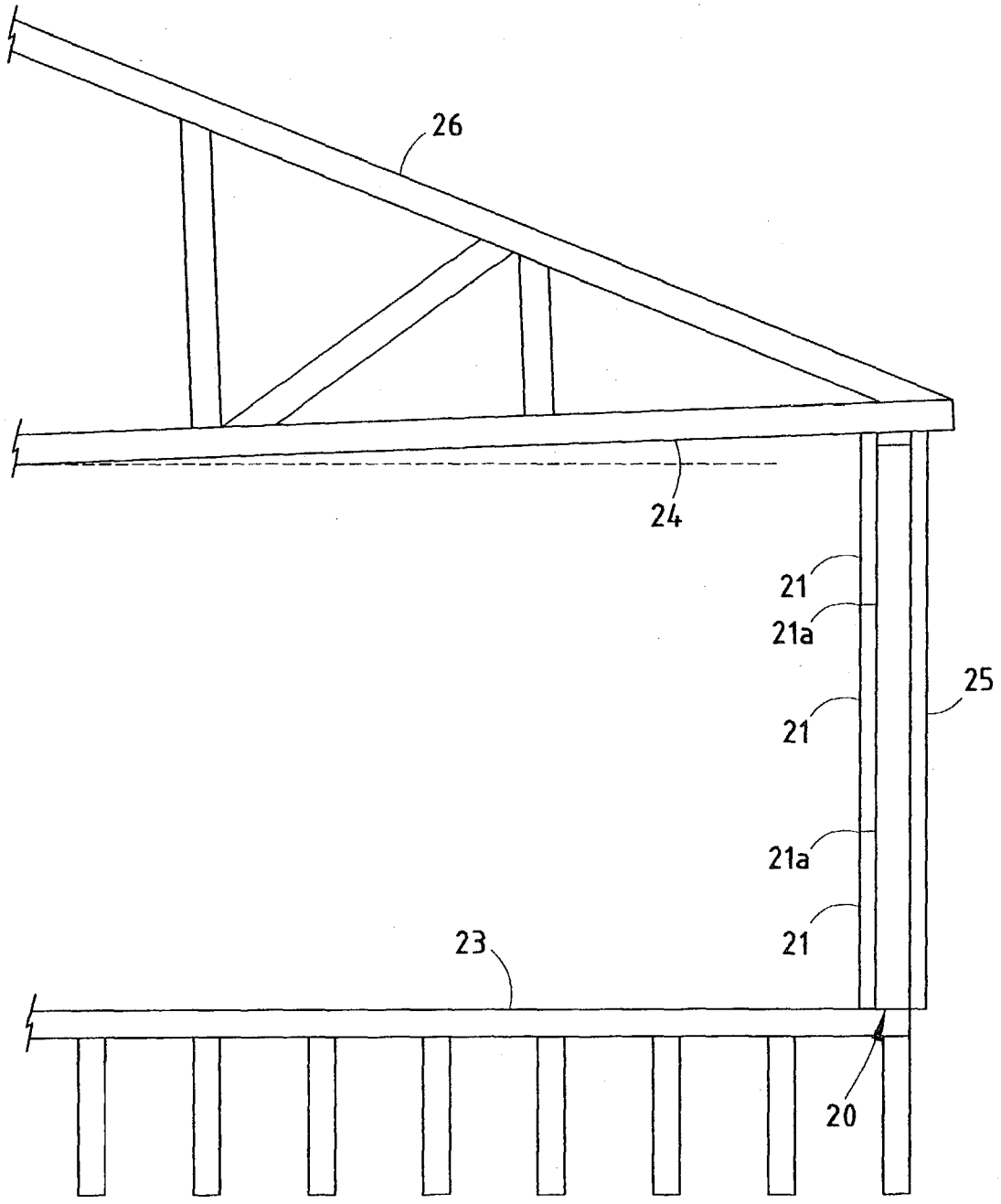


FIG. 5
(PRIOR ART)

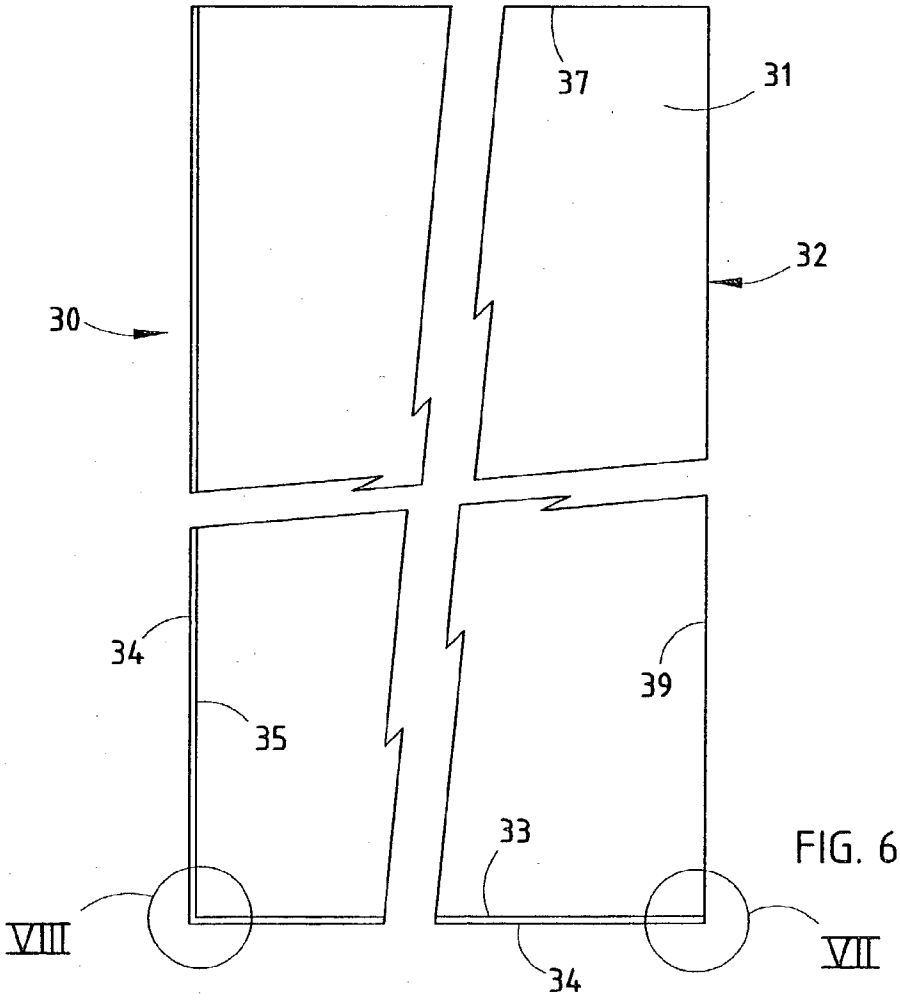


FIG. 6

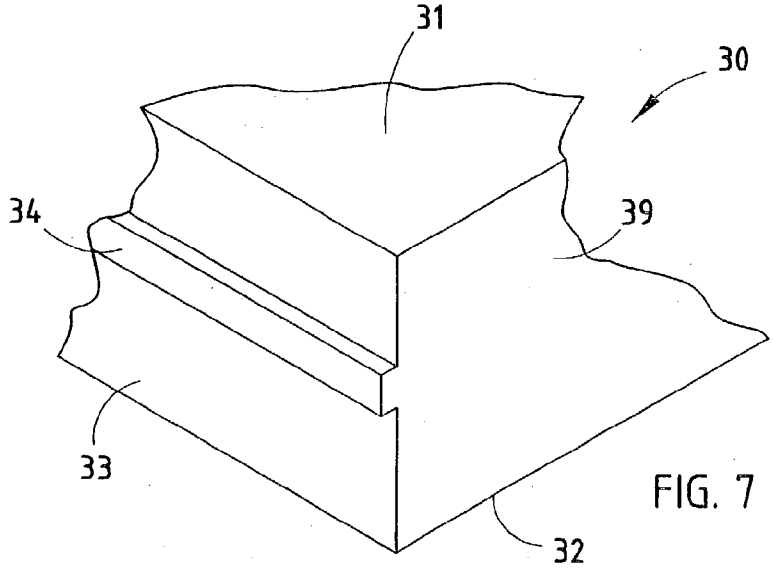


FIG. 7

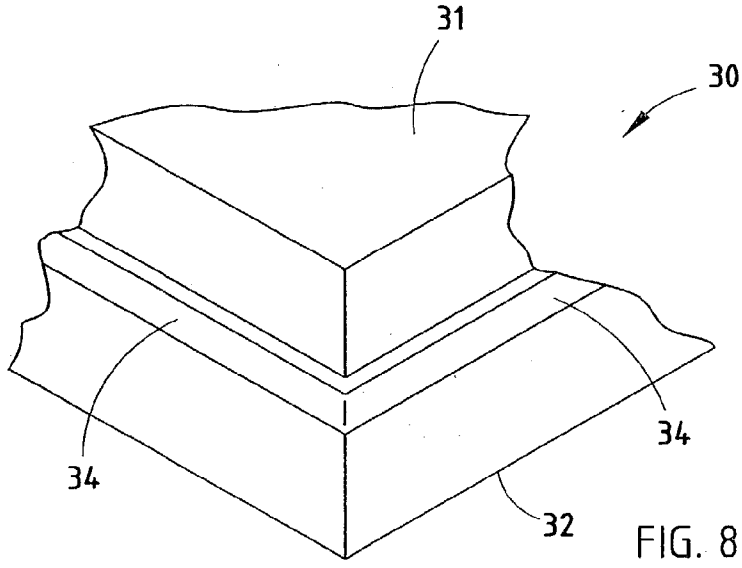


FIG. 8

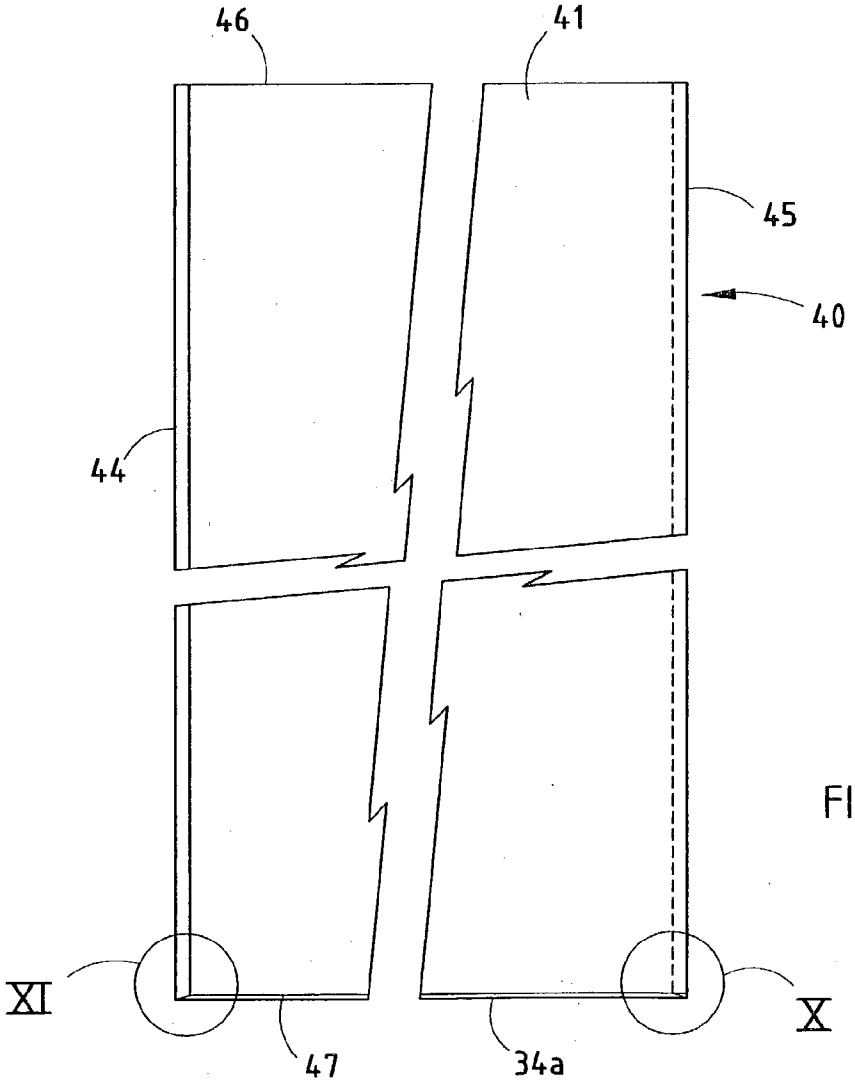


FIG. 9

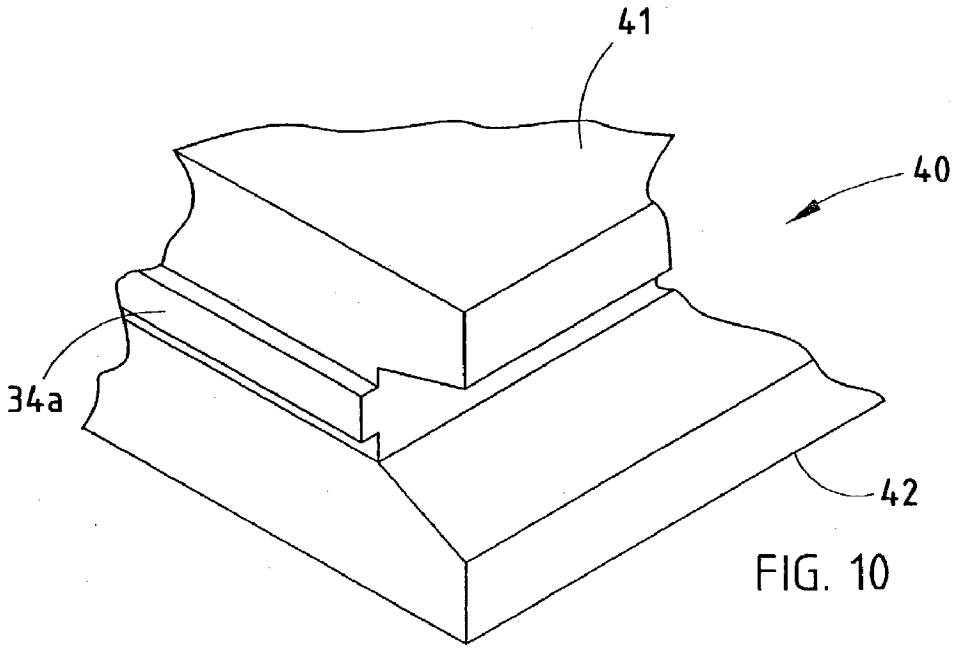


FIG. 10

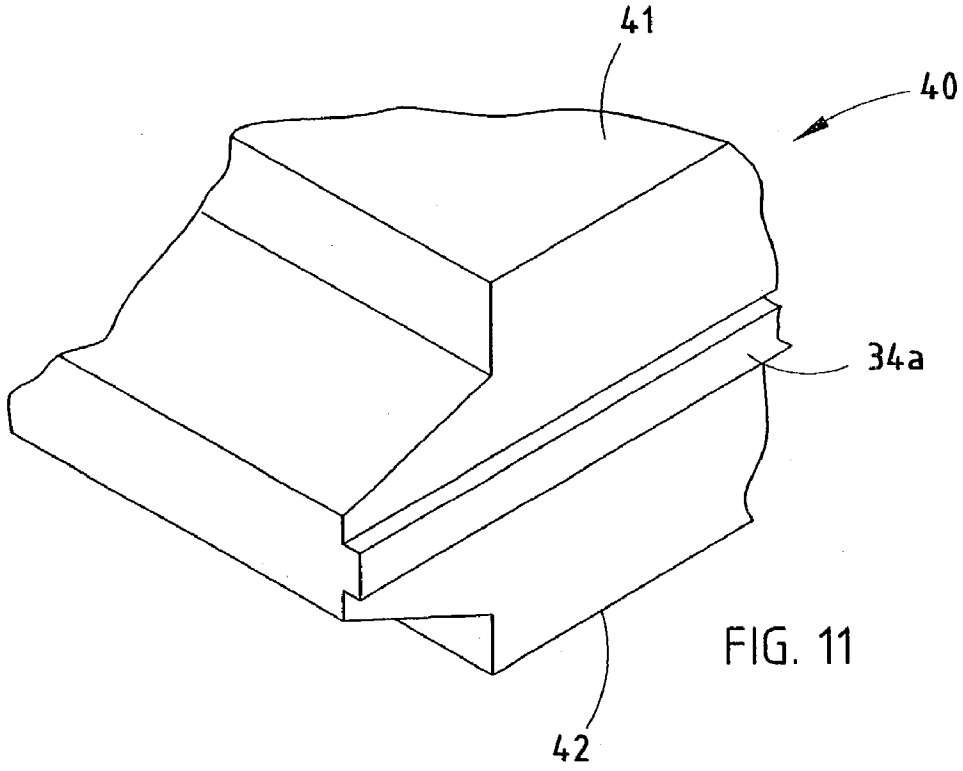


FIG. 11

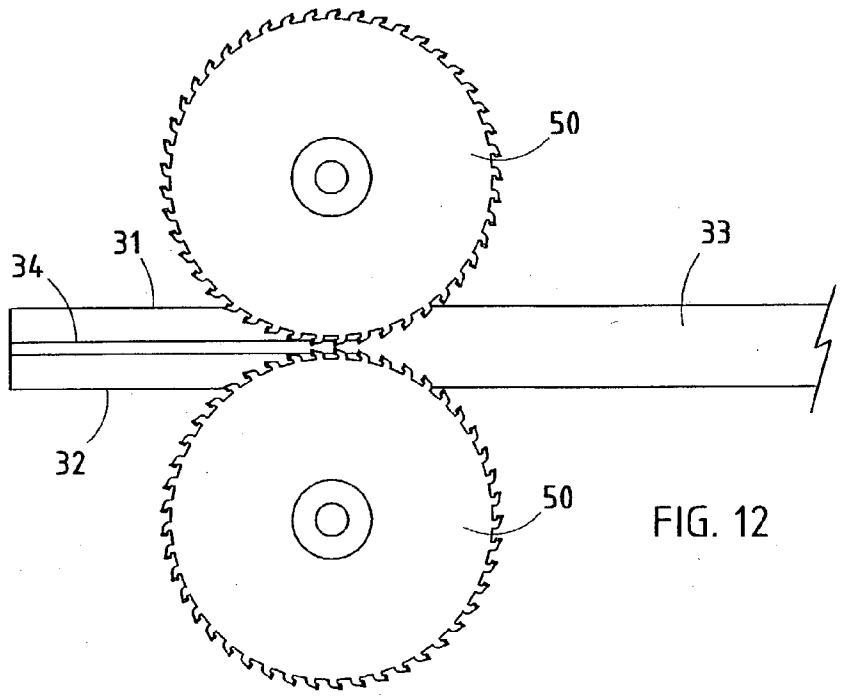


FIG. 12

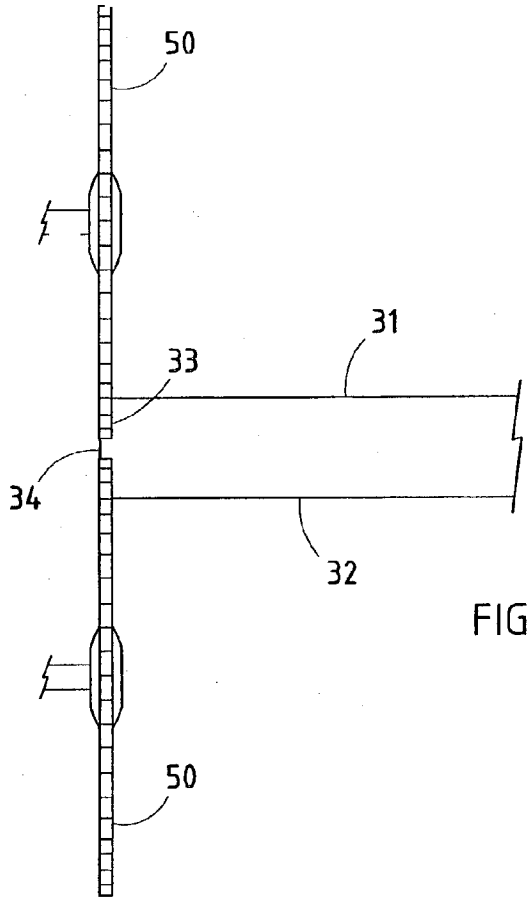


FIG. 13

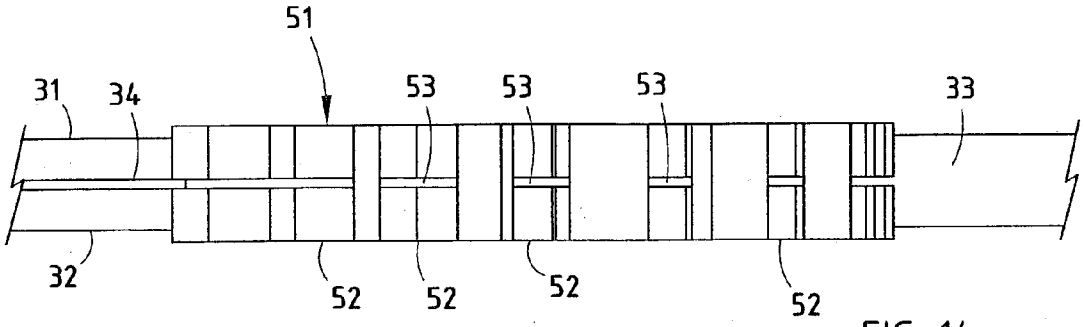


FIG. 14

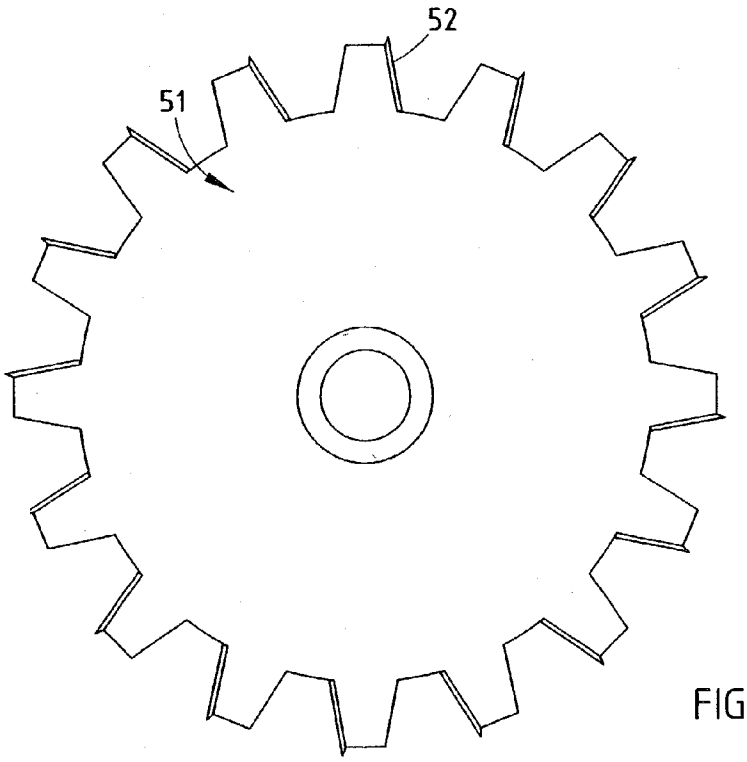


FIG. 15

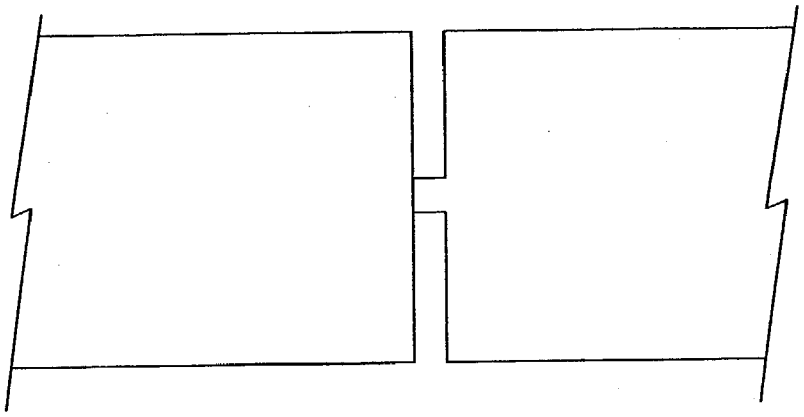


FIG. 16A

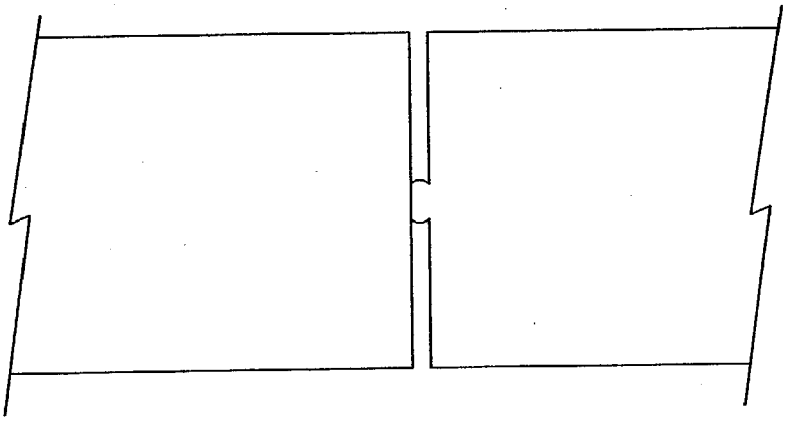


FIG. 16B

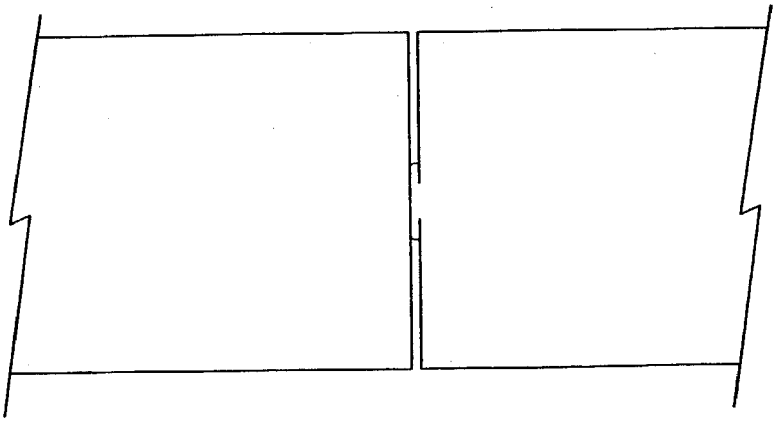


FIG. 16C

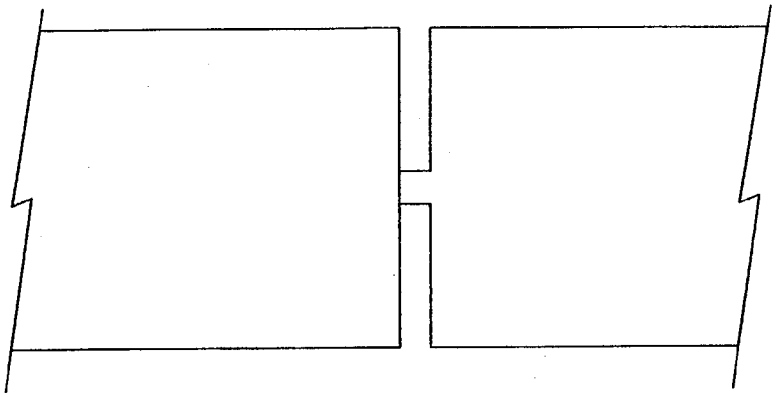


FIG. 17A

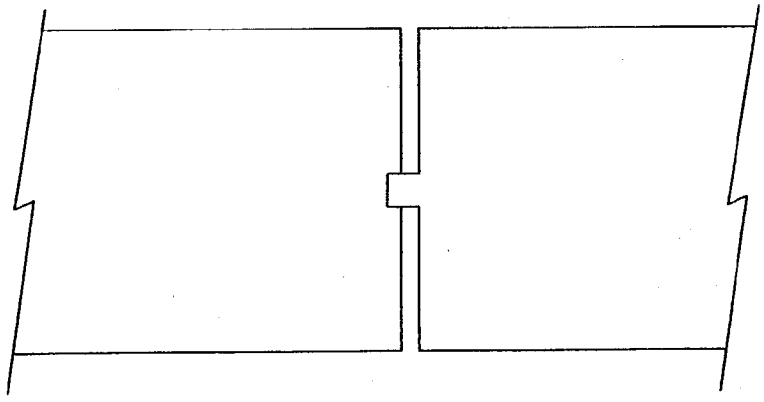


FIG. 17B

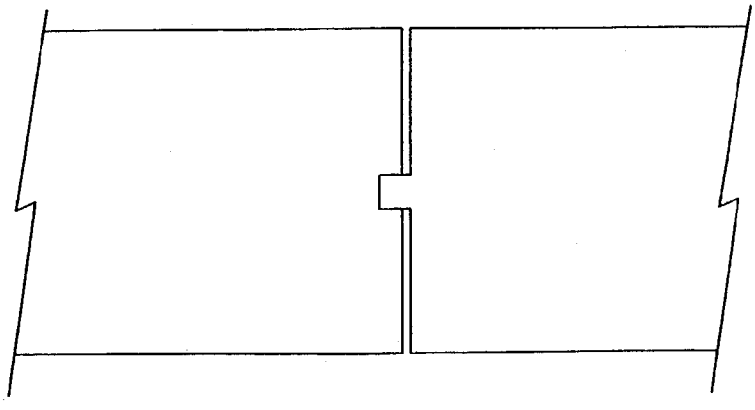


FIG. 17C

SELF GAPPING WOOD BASED PANELS

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of U.S. Provisional Application No. 60/354,471, entitled SELF GAPPING WOOD BASED PANELS, filed Feb. 5, 2002.

BACKGROUND OF THE INVENTION

[0002] The present invention relates to wood based panels used in building, cladding, and flooring.

[0003] All wood-based panel products will undergo dimensional changes when exposed to elevated moisture conditions. Most panels are put into service conditions at less than equilibrium moisture content. Consequently, there would be an uptake in moisture from the surrounding environment and "growth" in panel dimensions. The term used to describe this phenomenon is linear expansion, whereby physical dimensions (length and width) will grow with moisture uptake.

[0004] There are a number of consequences to linear expansion when panels **1** are fitted tightly together at joints **3** prior to expansion (see prior art FIGS. **1-5**):

[0005] 1) Panels **1** will buckle as at **4** somewhere along the unsupported span (**FIG. 1**);

[0006] 2) Excessive deflection as at **5** may result (**FIG. 2**), putting floors **10** out of level; and

[0007] 3) The upper **8** and lower **9** surfaces (top and bottom faces) of the panel **1** will flare out as at **7** at the panel-to-panel joint **3** in a release of forces (**FIG. 3**). This flaring **7** of panel edges at joints **3** is sometimes attributed wholly to edgeswell, where the uptake of moisture causes "expansion" in the vertical direction, but is more likely to be a combination of both. Flare-out **7** occurring prior to finishing the structure would necessitate sanding, adding additional cost to construction. Occurrence of edge flaring **7** after finishing would cause gypsum board (drywall) **21** to crack, exterior siding **25** to bulge out, floors **10** to bulge out, etc.

[0008] 4) Expansion of the floor panels may push walls **13** out of plumb (**FIG. 4**);

[0009] 5) Expansion of the wall system **20** might push floors **23**, ceilings **24** and roofs **26** off level (**FIG. 5**).

[0010] Given the above "expansion" characteristics and consequent impacts are well known, most manufacturers, their third-party certification agencies, and governing standards prescribe a minimum gap at panel joints to allow for linear expansion. The degree of gap stipulated is dependent on the inherent linear expansion character of the substrate (i.e., some panels will expand more than others).

[0011] Most claims and problems of the above nature presented to panel manufacturers arise from improper installation—the panels were not gapped as prescribed. Whether due to inexperienced installers, insufficient gapping from imprecise measurement tools, or time constraints in building schedules, proper gapping is not being done on all product installations.

[0012] In 1976, Pettersson et al. filed U.S. Pat. No. 4,095,913 disclosing a tongue and groove joint where the base of the groove is provided with one or more protuberances to space the tongue from the base of the groove. The protuberances are made to be deformable to permit the panels to swell without deforming the structure made from the panels. However, it is believed that this has never been commercialized.

[0013] Thus, problems associated with wood based panels being installed without proper spacing has persisted for many years without solution.

SUMMARY OF THE INVENTION

[0014] The wood based panel of the present invention includes a narrow spacer projecting, at least at spaced intervals, from at least one flat edge of the panel a specified distance. The spacer width is less than the thickness of the edge of the wood based panel, yet the width is sufficient to give the spacer enough strength to resist damage during handling and installation of the wood based panel. Upon linear expansion the spacer will collapse or be pushed into an adjacent wood based panel thereby allowing multiple wood based panels to be placed adjacent to one another and withstand the forces of linear expansion.

[0015] These and other features, advantages and objects of the present invention will be further understood and appreciated by those skilled in the art by reference to the following specification, claims and appended drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016] **FIG. 1** is an exploded view of buckling of prior art panels that occurs due to linear expansion;

[0017] **FIG. 2** is an exploded view of deflection of prior art panels that occurs due to linear expansion;

[0018] **FIG. 3** is an exploded view of flaring of prior art panels that occurs due to linear expansion;

[0019] **FIG. 4** is a sectional view of a prior art floor system that upon linear expansion has the capability to push walls out of plumb;

[0020] **FIG. 5** is a sectional view of a prior art wall system that upon linear expansion has the capability to expand the wall thereby pushing the ceiling/floor/roof out of level;

[0021] **FIG. 6** is a broken plan view of wood based panels of the preferred embodiment of the invention featuring two adjacent square edges and two adjacent edges having spacer;

[0022] **FIG. 7** is a fragmentary perspective view of area VII of **FIG. 6**;

[0023] **FIG. 8** is a fragmentary perspective view of area VIII of **FIG. 6**;

[0024] **FIG. 9** is a broken plan view of an alternative embodiment wood based panel having a square edge, a groove edge, a tongue edge and an edge with spacer;

[0025] **FIG. 10** is a fragmentary perspective view of area X of **FIG. 9**;

[0026] **FIG. 11** is a fragmentary perspective view of area XI of **FIG. 9**;

[0027] **FIG. 12** is a partial side view showing a method of manufacturing using a two saw blade system;

[0028] **FIG. 13** is a partial front view depicting a method of manufacturing using a two saw blade system;

[0029] **FIG. 14** is a partial view depicting a method of manufacturing using a single saw blade with grooved teeth;

[0030] **FIG. 15** is a side elevational view of a single saw blade with grooved teeth;

[0031] FIGS. **16**A-C are a series of drawings showing the progress of the spacer deforming or collapsing in response to linear expansion;

[0032] FIGS. **17**A-C are a series of drawings showing the progress of the spacer penetrating an adjacent panel in response to linear expansion.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENT

[0033] The product of the preferred embodiment of the invention, as shown in **FIG. 6**, is a wood based panel **30** comprised of a top surface **31** and a bottom surface **32** (not shown in **FIG. 6**). A relatively thin, narrow spacer **34** projects from edges **33** and **35** of panel **30**, while edges **37** and **39** are squared off, or flush (**FIGS. 6 and 7**). Spacer **34** is preferably continuous along the length of edges **33** and **35**, but may be interrupted so as to comprise plural spacers located at spaced intervals along said edges.

[0034] The wood based panel **30** may be constructed of, but is not limited to, the following; plywood, chip board, oriented strand board, medium density fiber board, or high density fiber board. The typical dimensions of the wood based panel **30** are four feet by eight feet. However, all of the panel dimensions listed below find use from time to time:

[0035] 3-foot by 6-foot

[0036] 3-foot by 9-foot

[0037] 4-foot by 8-foot

[0038] 4-foot by 9-foot

[0039] 4-foot by 10-foot

[0040] 4-foot by 12-foot

[0041] 8-foot by 8-foot

[0042] 8-foot by 12-foot

[0043] 8-foot by 16-foot

[0044] 8-foot by 24-foot

[0045] 12-foot by 24-foot

[0046] The wood based panel **30** will vary in thickness from about ¼ to about 1¾ inch. The most typical thicknesses will be about 7/16 to ⅞ inch.

[0047] The extent of the spacer **34** protrusion is a function of the code gap requirements where the wood based panel **30** is to be used. The spacer **34** protrusion typically extends from about 1/32 to ¼ inch form surface of edge **33** of panel **30**. Spacer **34** is narrower than the width of panel **30**. Spacer **34** should be sufficiently thick so as to not be broken off during shipping, but sufficiently narrow, and weak or sharp to collapse, or push into the adjacent panel when subject to linear expansion forces. The extent of spacer **34** thickness will typically be from a maximum ⅔ of the panel thickness to a minimum of 0.1 (1/10) inch. ⅔ of the panel thickness might especially be used for thinner panels. The optimum thickness for spacer **34** will vary with panel material used.

[0048] As shown, spacer **34** has a rectangular lateral cross section (see e.g. **FIGS. 7 and 16**A). However, it could be rounded, for example by having a semi-circular or semi-oval cross section. It could also taper to its leading edge, as with a trapezoidal or triangular cross section. It could be stepped in cross section.

[0049] In an alternative embodiment of the invention (**FIG. 9**), wood based panel **40** has top surface **41** and bottom surface **42**. Additionally, panel **40** has tongue edge **44** and a groove edge **45**. Adjacent panels **40** are interconnected by tongue edge **44** being inserted into groove edge **45**. In contrast, panel end edge **46** is square or flush, and a relatively narrow, relatively thin spacer **34***a* projects from opposite end edge **47** (**FIGS. 9 and 11**).

[0050] A process of manufacture is depicted by referring to **FIGS. 12 and 13**. Wood based panel **30** is fed between two saw blades **50** at its edges **33**, thereby cutting panel **30** from both top and bottom surfaces **31** and **32**, to leave spacer **34** projecting from edge **33**, between saw blades **50**.

[0051] An alternate process of manufacture is depicted in **FIGS. 14 and 15**. Saw blade **51** is equipped with grooved teeth **52** having grooves or notches **53** therein, to allow single saw blade **51** to cut edges **33** to create spacer **34**. Blade **51** is oriented in the plane of panel **31**, rather than perpendicular thereto as is the case with blade **50**. Thus, edge **33** is cut back from its exposed face, leaving spacer **34** where the grooves in teeth **60**.

[0052] In use, panels **30** or **40** are placed in abutting relationship, with spacer **34** abutting the edge **37** or **39** (**FIGS. 16***a* and **17***a*), or spacer **34** abutting edge **46**. As panel **30** or **40** expands, spacer **34** or **34***a* is either crushed and collapsed (**FIGS. 16***b* and **16***c*), or is pushed into the wood of the adjacent panel **30** or **40**, respectively (**FIGS. 17***b* and **17***c*). As a result, panel buckling, deflection and flare-up are avoided, as are walls and ceilings being pushed out of plumb.

[0053] Panel **30** may be used in numerous situations, including but not limited to, use as indoor/outdoor floor covering, use as indoor/outdoor wall covering, or use as ceiling cover.

[0054] The above description is considered that of the preferred embodiment(s) only. Modifications of the invention will occur to those skilled in the art and to those who make or use the invention. Therefore, it is understood that the embodiment(s) shown in the drawings and described above are merely for illustrative purposes and not intended to limit the scope of the invention, which is defined by the followings as interpreted according to the principles of patent law, including the Doctrine of Equivalents.

The invention claimed is:

1- A wood based panel for use in building comprising; spaced top and bottom surfaces bounded by edges extending therebetween, the width of said edges defining the thickness of said panel; at least one of said edges including a spacer integral with and projecting from said edge, at least at

spaced intervals along said edge, said spacer projecting from said edge a distance equal to a predetermined desired spacing for said panels in order to avoid problems associated with improper spacing of said panel from adjacent panels, and said spacer having a thickness laterally of its direction of projection which is narrower than the width of said edge, said thickness being sufficient to give said spacer enough strength to resist damage during handling and installation of said panel, but leaving said spacer sufficiently weak or sharp that said spacer will collapse or be pushed into an adjacent panel under the pressure of linear expansion forces caused by expansion of the wood materials of which said panel is made.

2- The wood based panel of claim 1, wherein said spacer is continuous.

3- The wood based panel of claim 1, wherein said spacer is interrupted by gaps.

4- The wood based panel of claim 1, wherein said spacer projects from said edge a distance of from about 1/32 to about 1/4 inch.

5- The wood based panel of claim 4, wherein said spacer has a thickness of from about 2/3 of the panel thickness to about 0.1 inch.

6- The wood based panel of claim 4, wherein said spacer has a thickness of from about 2/3 of the panel thickness to about 0.1 inch.

7- The wood based panel of claim 1, wherein said spacer projects from said edge a distance of from about 1/16 to about 1/8 inch.

8- The wood based panel of claim 1 having a thickness of from about 1/4 to about 1 3/4 inch.

9- The wood based panel of claim 8, wherein said spacer projects from said edge a distance of from about 1/32 to about 1/4 inch.

10- The wood based panel of claim 9, wherein said spacer has a thickness of from about 2/3 of the panel thickness to about 0.1 inch.

11- The wood based panel of claim 9, wherein said spacer has a thickness of from about 2/3 of the panel thickness to about 0.1 inch.

12- The wood based panel of claim 8, wherein said spacer projects from said edge a distance of from about 1/16 to about 1/8 inch.

13- The wood based panel of claim 1 having a thickness of from about 7/16 to about 7/8 inch.

14- The wood based panel of claim 1, wherein the wood based panel has four edges with spacers on two adjacent edges.

15- The wood based panel of claim 1, wherein the panel has four edges, with a tongue and a groove on opposite edges, said spacer being on only one edge, extending between the tongue edge and groove edge.

16- A method of constructing a building comprising:

providing a support structure;

providing a plurality of wood based panels, each with spaced top and bottom surfaces, bounded by edges extending therebetween, the width of said edges defining the thickness of said panel;

at least one of said edges including a spacer integral with and projecting from said edge, at least at spaced intervals along said edge, said spacer projecting from said edge a distance equal to a predetermined desired spacing, and said spacer having a thickness laterally of its direction of projection which is narrower than the width of said edge, said thickness being sufficient to give said spacer enough strength to resist damage during handling and installation of said panel, but leaving said spacer sufficiently weak or sharp that said spacer will collapse or be pushed into an adjacent panel under the pressure of linear expansion forces caused by expansion of the wood material of which said panel is made; each of said panels including at least one edge which is free of such a spacer;

securing said wood based panels to said support structure with the spacer of one panel abutting a spacer free edge of an adjacent panel, to thereby properly space said panels from one another.

17- A method of manufacturing wood based panels having spaced top and bottom surfaces, bounded by edges extending therebetween, the width of said edges defining the thickness of said panel;

at least one of said edges including a spacer integral with and projecting from said edge, at least at spaced intervals along said edge, said spacer projecting from said edge at distance equal to a predetermined desired spacing for said panels, and said spacer having a thickness laterally of its direction of projection which is narrower than the width of said edge, said thickness being sufficient to give said spacer enough strength to resist damage during handling and installation of said panel, but leaving said spacer sufficiently weak or sharp that said spacer will collapse or be pushed into an adjacent panel under the pressure of linear expansion forces caused by expansion of the wood materials of which said panel is made;

said method comprising: passing a panel having top and bottom surfaces and a generally squared off edge between two spaced opposing cutting blades, one on either side of said panel adjacent said generally squared off edge, said cutting blade being positioned to cut away portions of said top and bottom surfaces of said panel adjacent to said squared off edge, but leaving said spacer between said cutting blades.

18- A method of manufacturing wood based panels having spaced top and bottom surfaces bounded by edges extending therebetween, the width of said edges defining the thickness of said panel;

at least one of said edges including a spacer integral with and projecting from said edge, at least at spaced intervals along said edge, said spacer projecting from said edge a distance equal to a predetermined desired spacing for said panels, and said spacer having a thickness laterally of its direction of projection which is narrower than the width of said edge, said thickness being sufficient to give said spacer enough strength to resist damage during handling and installation of said panel, but leaving said spacer sufficiently weak or sharp that said spacer will collapse or be pushed into an adjacent panel under the pressure of linear expansion forces caused by expansion of the wood material of which said panel is made;

said method comprising: passing a panel, having top and bottom surfaces and a generally squared off edge, through a cutting blade with grooved teeth, said cutting blade being positioned in the plane of said panel, so as to cut away the spaced top and bottom portions of the edge of said panel, but leave said spacer projecting from said edge.

* * * * *