United States Patent

Jansen, Jr.

[15] **3,707,060**

[45] **Dec. 26, 1972**

[54] **BUILDING ASSEMBLY AND COMPONENTS**

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[22] Filed: **Aug. 19, 1970**

[21] Appl. No.: **65,067**

[52] **U.S. Cl.** **52/241**, 52/283, 52/393

[51] **Int. Cl.** **E04b 2/74**

[58] **Field of Search**.....52/238, 241, 393–402, 52/403, 239, 240, 242, 122; 49/475, 484, 489, 495

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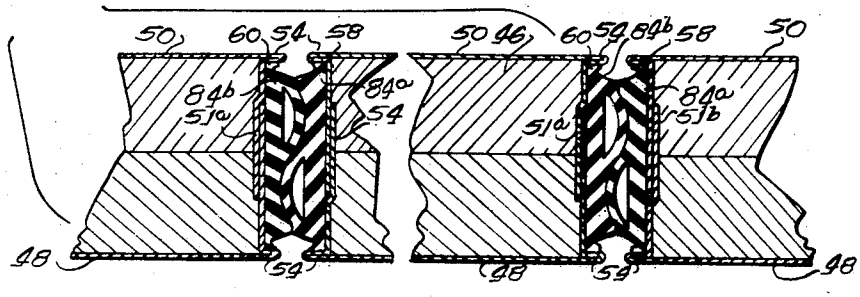
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[57] **ABSTRACT**

A plurality of erect panel units having complementary interfitting resilient gaskets along their vertical edges form a portable partition, a fixed retainer engages the upper ends of the panel units and permits movement of these upper ends transversely of the partition while permitting vertical movement of the individual panel units, and means on the lower ends of the panel units support these units on a carpeted floor surface and engage the carpeting to restrain the lower ends of the units against movement transversely of the partition. The interfitting resilient edge gaskets provide resistance to relative transverse movement between assembled panel units and permit relative vertical movement between adjacent panel units for disengaging any selected unit from the floor surface, while being sufficiently resilient to permit removal and replacement of an individual unit in an assembled partition without antecedent movement of the adjacent units.

18 Claims, 23 Drawing Figures



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SHEET 1 OF 5

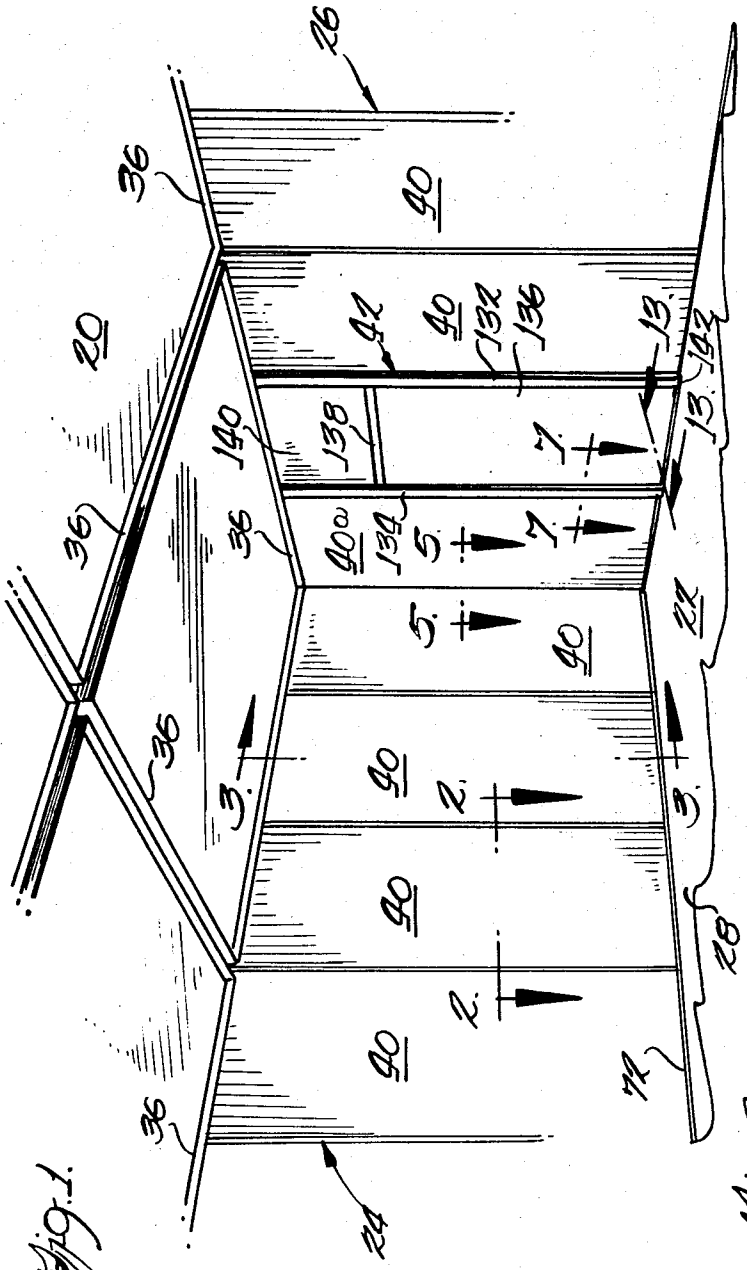


Fig. 1.

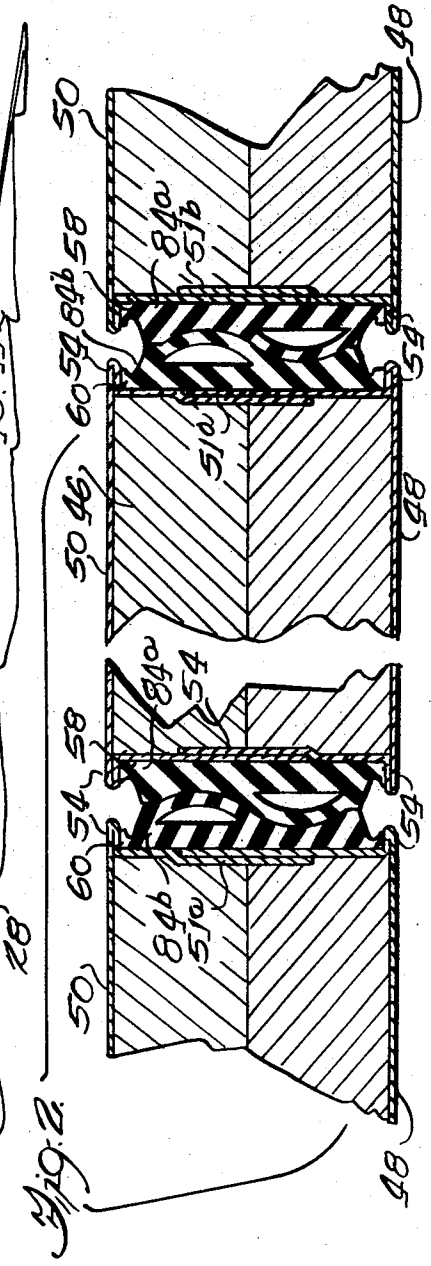


Fig. 2.

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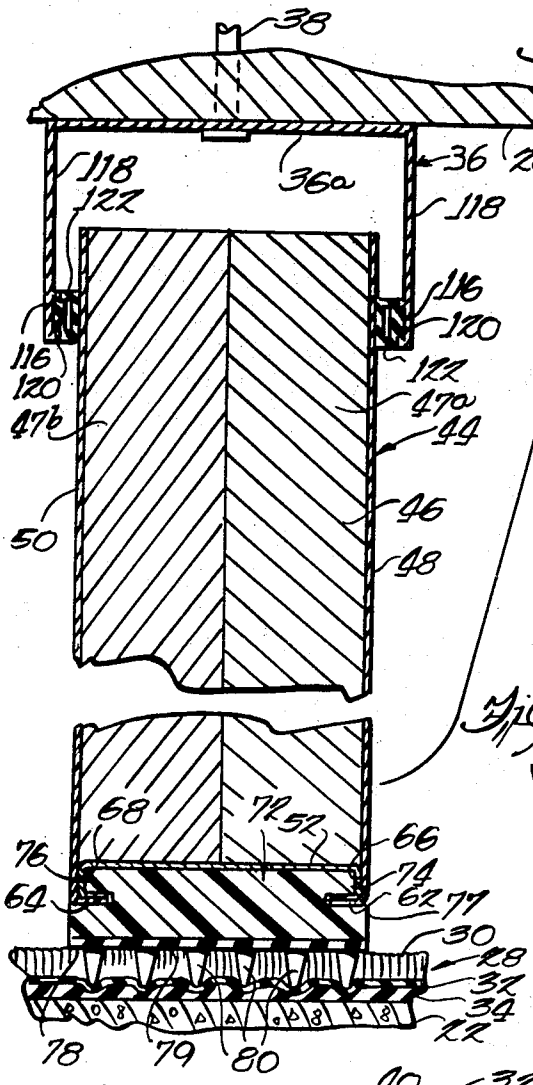


Fig. 3.

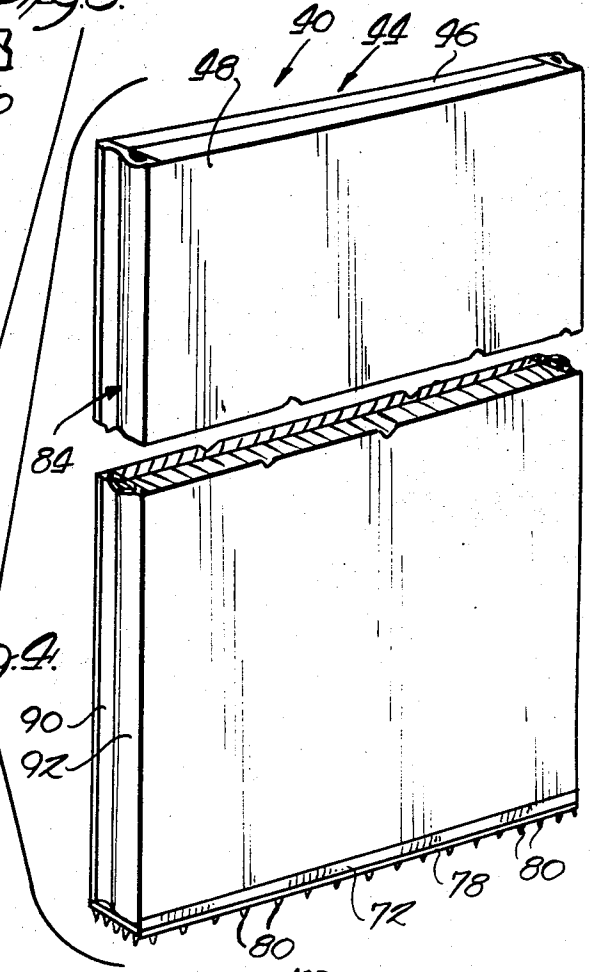


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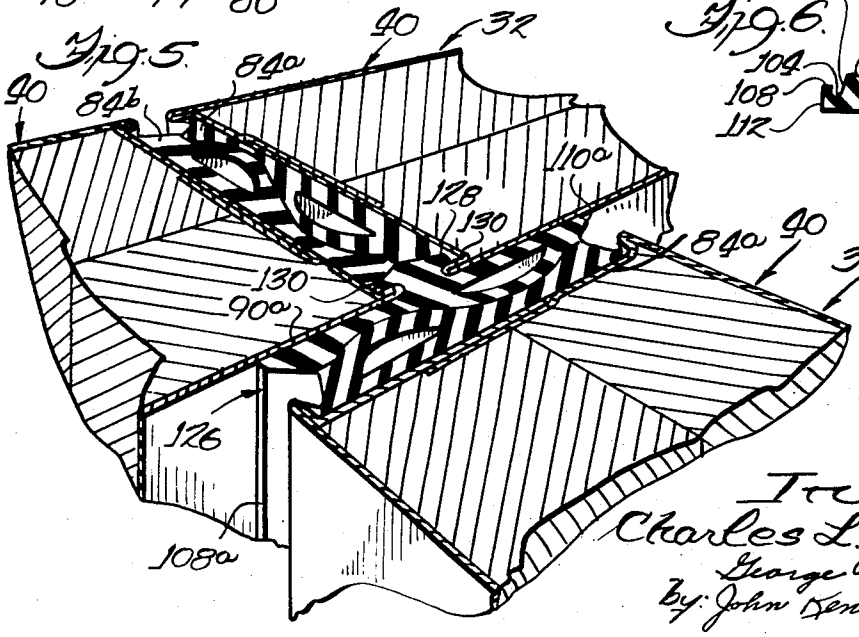


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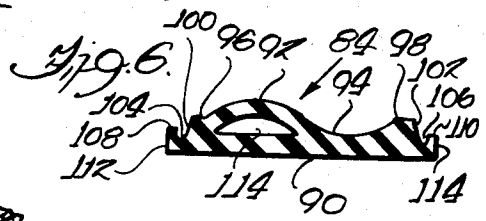


Fig. 6.

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Fig. 7.

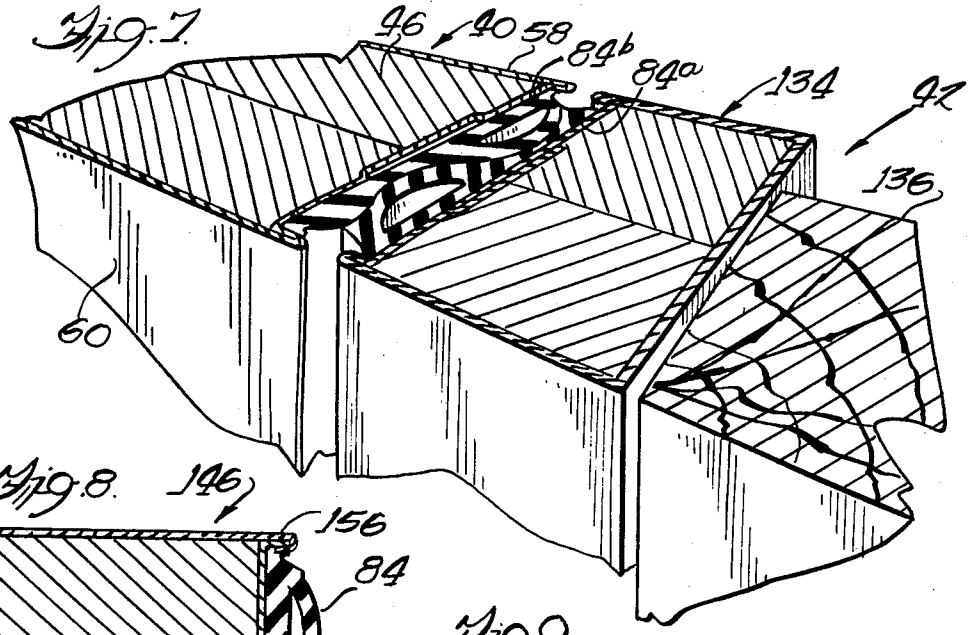


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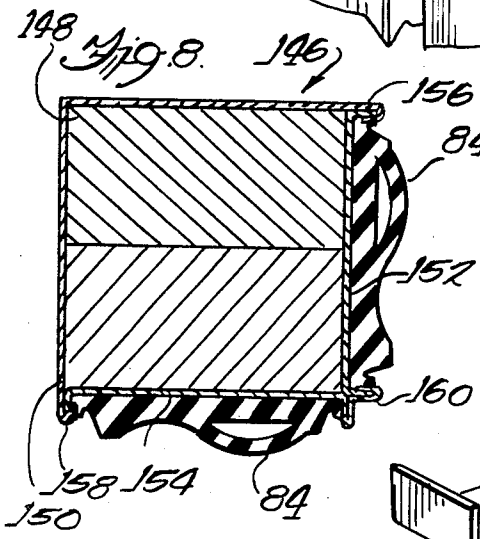


Fig. 9

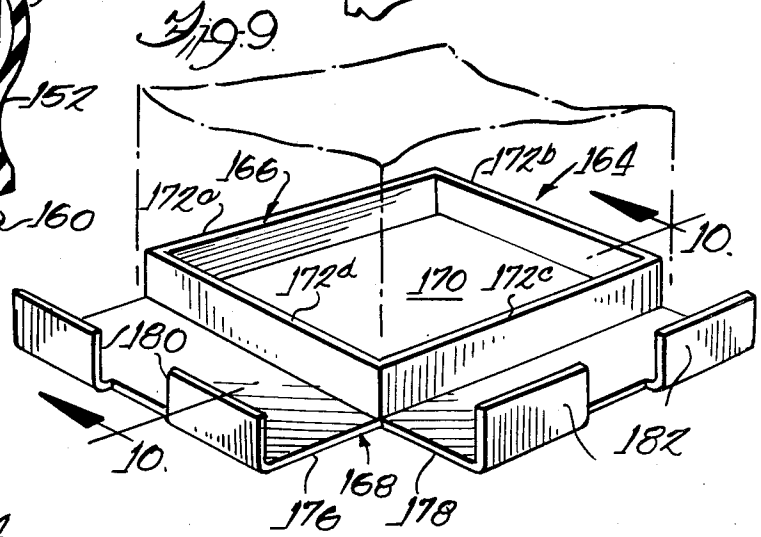


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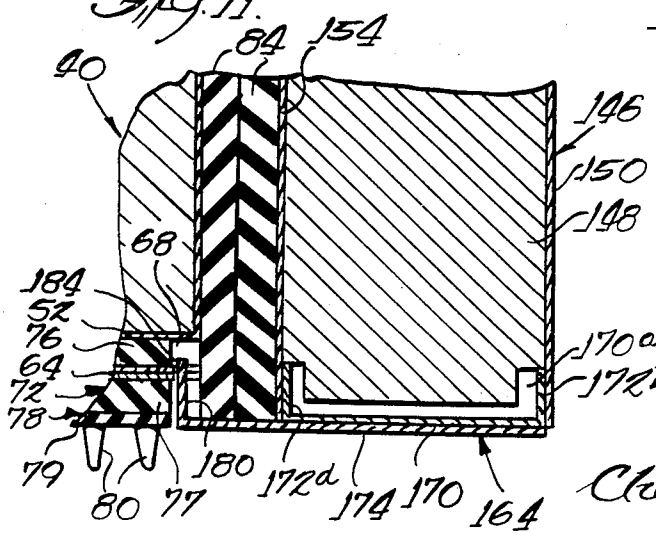
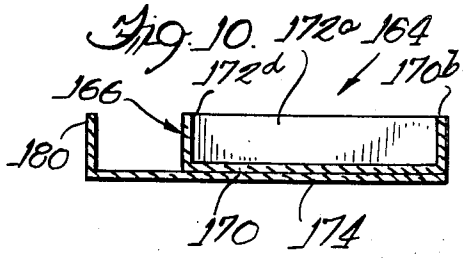


Fig. 10.



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Fig. 12.

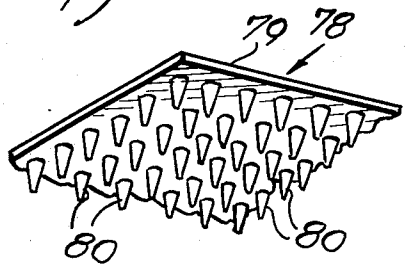


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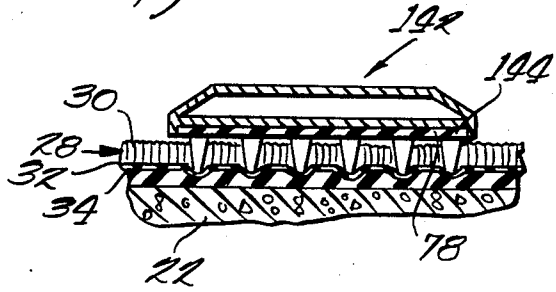


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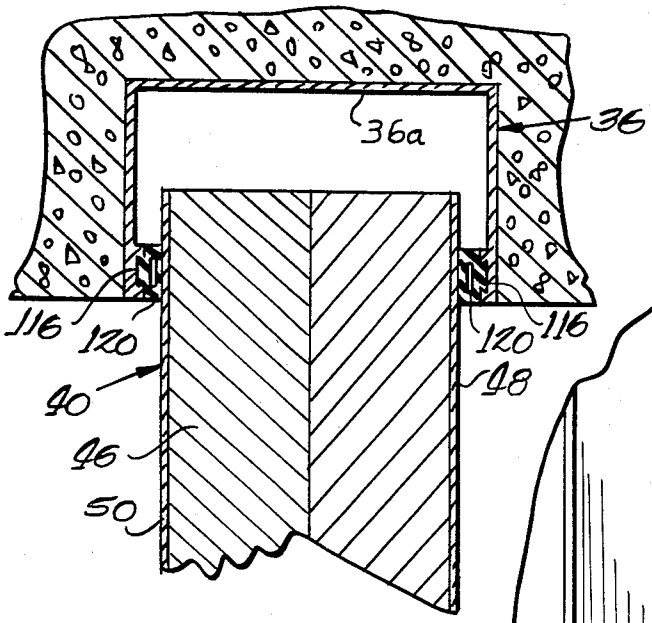
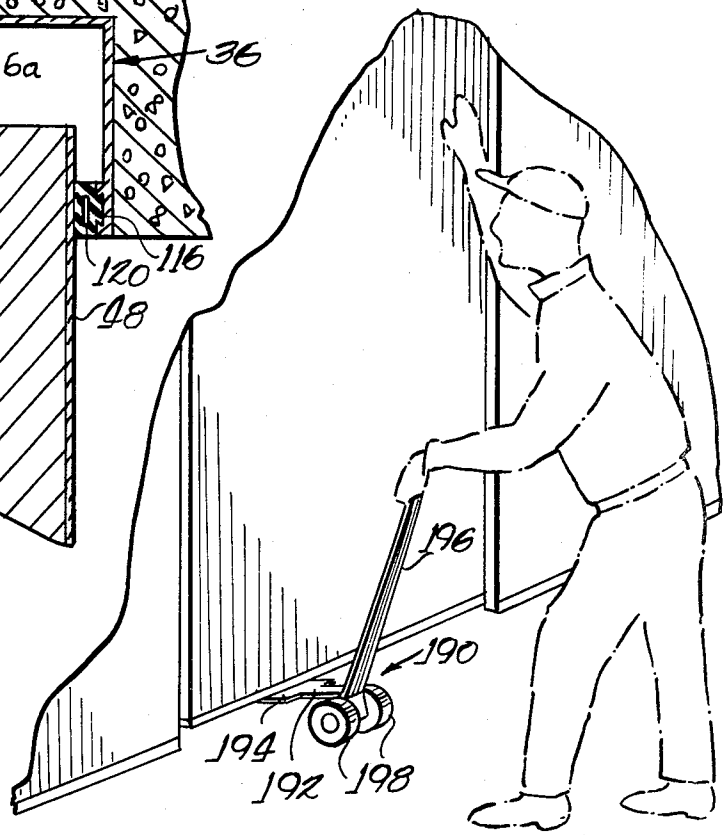


Fig. 15.



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Fig. 22.

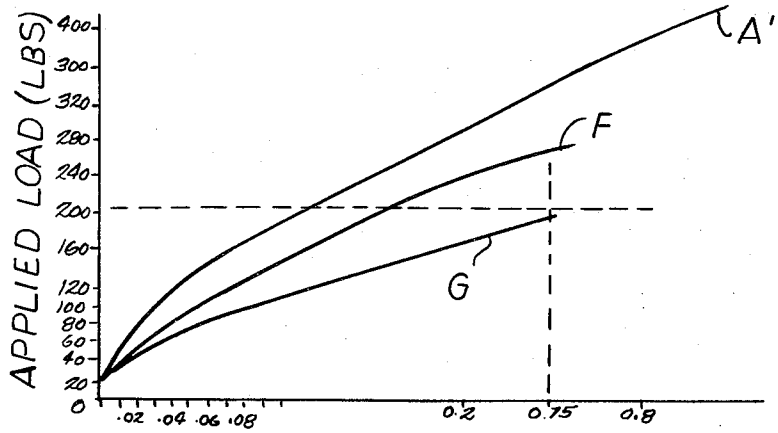


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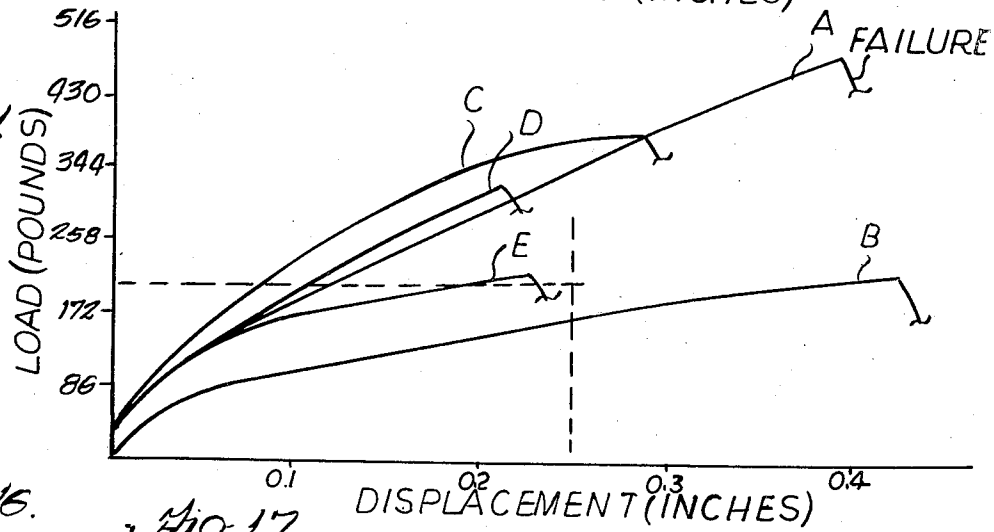


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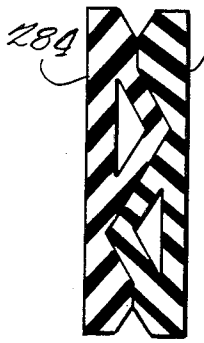


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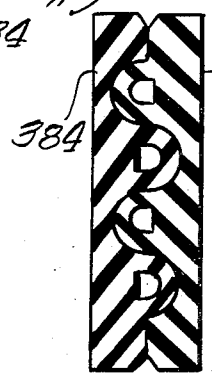


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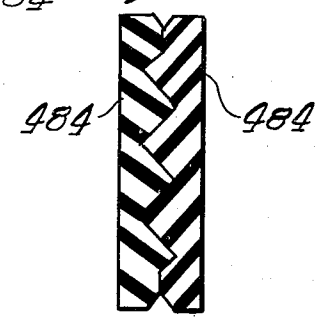


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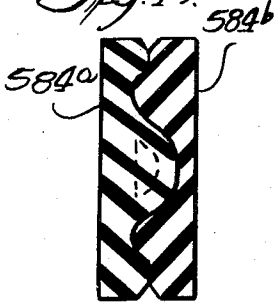


Fig. 20.



Fig. 23.



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BUILDING ASSEMBLY AND COMPONENTS

This invention relates to building assemblies and more particularly pertains to portable partitions and components therefor.

The desirability of providing a high degree of flexibility in the usage of floor space within buildings has led to a demand for readily movable or portable internal partitions. Examples of building uses in which such flexibility may be particularly desirable include schools, churches, hospitals, meeting and dining facilities in motels and hotels, and offices.

Various partition assemblies have been proposed toward meeting the above-indicated demand. These proposals include movable partitions having components which are fastened to one another by various means and which are attached to the permanent building structure, as at the floor and ceiling. Some of these units include the use of modular panels with interfitting tongues and grooves at the vertical joints between adjacent panels. Such constructions are dependent upon various trim items to support the partition in the desired position, and many have a high degree of permanence. Another approach to obtaining the desired flexibility has been to provide folding partitions, e.g., continuous accordion folded components or hinged panel units. These types of systems require ceiling and/or floor trolleys or guides, and may include edge gaskets actuated by a jamming action or mechanically actuated means for compressing a row of panels into a relatively solid partition assembly.

Other movable partitions comprise so-called portable partitions fabricated of individual panels, with the individual panels being held in position by independent securing arrangements. Such securing arrangements include mechanical or pneumatic means to wedge or jam the panels between the floor and the ceiling. The panels usually are joined to one another by a tongue and groove edge configuration which interlocks the panels into a relatively rigid partition, but which also requires a progressive sequence of erecting and removing or replacing the panels.

Several factors must be considered in arriving at a satisfactory portable partition assembly. Some of these factors include allowance for the variations in floor to ceiling dimensions normally encountered in building constructions, as well as the ability to accommodate vertical structural movements encountered due to deflection of the building components with changing temperature, humidity and load conditions. The partition must provide a satisfactory sound barrier between adjacent building spaces and have adequate fire ratings, and preferably should be of low cost, modular design.

The entire partition, including the individual panels, must be firmly supported when assembled to avoid inadvertent displacement. For instance, the installed partition system must withstand unintentional dislodgment by horizontal forces such as those that may be imposed by handcarts, people, movement of furniture and normal maintenance operations. At the same time the partition assembly should provide for easy and economical removal of the components from one location and reassembly in another location, e.g., be capable of rapid installation and relocation by building maintenance personnel, without a need for ladders or scaffolding.

Further, the partition assembly should provide for secure retention and subsequent removal without damaging the permanent structural components and without damaging or defacing floor surfacing materials or other adjacent finished or decorated surfaces.

Individual panel units of various functional characteristics should be readily interchangeable, as by way of inserting a doorway unit or a unit having a chalkboard or tack board surface component in place of another panel unit. The assembly preferably should include adaptability for the use of panels which are prefinished on both sides and avoid the use of battens or other covering devices at the joints between the individual panels.

It is an object of this invention to provide an improved portable partition system meeting the above-noted requirements.

It is an object of this invention to provide an improved portable partition panel system utilizing independently movable panel units which may be secured in place in a partition assembly without adding permanent fasteners or applying externally generated retaining forces, and wherein the individual panel units readily may be removed and replaced without antecedent movement of the adjacent panel units.

It is a further object of this invention to provide improved panel units adapted for assembling as portable partitions.

It is another object of this invention to provide an improved joint gasket component adapted for use in meeting the above-noted objects.

In one illustrative form of this invention in a building assembly including a generally planar base, a plurality of erect panel units are arranged in edge-to-edge relation to one another to form a partition, with means engaging the upper ends of the panel units to prevent movement of these ends transversely of the partition while permitting vertical movement of the individual units. Further means along the lower end of each panel unit engages the planar base for restraining the lower ends of the panel units against movement transversely of the partition. Resilient joint closure means provide sealed abutment joints between adjacent side edges of the panels. The joint closure means permit relative vertical movement between adjacent panel units and are yieldable to permit removal of a panel unit in a direction transversely of the partition assembly and replacement of such a panel unit in abutting joint closing relation with the two adjacent panel units without prior or concurrent movement of such adjacent units. Each of the panel units includes a panel with a gasket member secured to each vertical edge and one or more grippers secured to the lower edge of the panel for engaging a carpeted base, the edge gasket members being of complementary configuration for interfitting abutting engagement with one another and being sufficiently resilient to permit removal and replacement of individual panels as indicated above.

For a more complete understanding of this invention, reference now should be had to the embodiments illustrated in the drawings and described below by way of example of the invention. In the drawings:

FIG. 1 is a partial perspective view of a building assembly including partitions employing teachings of this invention;

FIG. 2 is an enlarged section taken along line 2—2 of FIG. 1 and looking in the direction of the arrows;

FIG. 3 is an enlarged section taken along line 3—3 of FIG. 1 and looking in the direction of the arrows;

FIG. 4 is a perspective view of a panel unit included in the assembly of FIG. 1;

FIG. 5 is an enlarged perspective view of a section taken along line 5—5 of FIG. 1 and looking in the direction of the arrows;

FIG. 6 is a cross section of an edge gasket used in the assembly of FIG. 1;

FIG. 7 is an enlarged perspective view of a section taken along line 7—7 of FIG. 1 and looking in the direction of the arrows;

FIG. 8 is a cross section of a corner post for use at a right angular corner between two partition assemblies similar to those illustrated in FIG. 1;

FIG. 9 is a perspective view of a clip adapted for securing the bottom of a corner post as in FIG. 8 to adjacent panel units;

FIG. 10 is a reduced section taken along line 10—10 of FIG. 9 and looking in the direction of the arrows;

FIG. 11 is a sectional view taken along a vertical plane through the lower portion of a post as in FIG. 8 and an adjacent portion of a panel unit, illustrating the use of the clip of FIG. 9;

FIG. 12 is a perspective view of a portion of a gripper component for use in an assembly as in FIG. 1;

FIG. 13 is an enlarged section taken along line 13—13 of FIG. 1 and looking in the direction of the arrows;

FIG. 14 is an enlarged section, similar to FIG. 3, illustrating another ceiling channel installation;

FIG. 15 is a sketch illustrating how an individual panel unit may be installed, removed and/or replaced in an assembly as in FIG. 1;

FIGS. 16, 17, 18, 19 and 20 illustrate cross sections of other edge gaskets;

FIGS. 21 and 22 are graphs illustrating the results of certain tests performed upon various panel units; and

FIG. 23 illustrates another gripper component.

Referring to FIGS. 1–5 of the drawings, the illustrated building assembly includes a ceiling 20, a floor 22, a first partition assembly 24 and a second partition assembly 26 extending at right angles to the assembly 24. The floor normally may be a part of the building support structure. The ceiling also may be a part of the support structure, or may be a ceiling assembly spaced from the superjacent permanent structural components. With particular reference to FIG. 3, it will be noted that the illustrated floor structure 22 is of masonry construction and is covered with wall-to-wall carpeting 28. The carpeting 28 includes looped pile 30 and a primary backing fabric 32 with a resilient backing 34 of high density foam rubber bonded to the pile and primary backing assembly.

Several channel members 36 are positioned in a grid pattern on the ceiling 20 at modular intervals and are permanently secured to the ceiling, as by fasteners 38 (FIG. 3). Partition assembly 24 includes a plurality of panel units 40 disposed in erect edge-to-edge engagement, with their upper ends extending into an aligned series of the channels 36 and their lower ends resting on the carpeting 28. The partition 26 includes a similarly assembled set of panel units 40 and 40*a*, together with a door panel unit 42 which will be described further below.

Referring particularly to FIGS. 2, 3 and 4, each panel unit 40 comprises a panel member 44 including a core 46, finish facings 48 and 50 on the opposite major surfaces of the core 46, and a bottom edge cover 52. The core 46 preferably is of a material selected to enhance the sound attenuation and fire resistant properties of the panel unit, as well as for its weight characteristics. In the illustrated embodiment the core 46 comprises a pair of laminated insulation boards 47*a* and 47*b* which may be water-felted mineral fiberboards.

The facing sheets 48 and 50 are of appropriate materials to provide planar finished outer or exterior surfaces, and may be prefinished steel sheets. The sheets 48 and 50 are formed with a reverse bend to provide a lip 54 along each vertical corner of the panel, with the lateral edge portions being limited in width by the sheets at the lips 54, the sheets extending in overlapping relation along the intervening vertical edges of the core 46 as seen at 51*a* and 51*b* in FIG. 2. The overlapping edge portions are secured to one another, as by spot-welding. The lips 54 and the intervening portions of the surface sheets 48 and 50 overlying the core edges define shallow channel-shaped recesses 58 and 60 along the opposite vertical edges of each panel 44.

Referring to FIG. 3, the bottom edges of the sheets 48 and 50 are bent inward to form flanges 62 and 64 which are secured to the opposite lateral edges of the C-shaped bottom cover 52, as by spot-welding. The cover 52 and the cooperating flanges 62 and 64 define a pair of opposed elongated recesses 66 and 68 each extending the width of the lower edge of the panel 44.

Each panel unit 40 includes a soft compressible strip 72 extending across and secured to the bottom edge of panel 44. The strip 72 is of a shallow H configuration in cross section, including ear portions 74 and 76 and a bottom pad portion 77. The ear portions slidingly engage in the recesses 66 and 68 to permit simple installation and replacement of the strip 72 and the attached grippers described below.

One or more relatively rigid gripper members 78 are secured to the lower surface of strip 72, as by being adhered thereto. As also seen in FIG. 12, a gripper 78 includes a base portion 79 and a plurality of downwardly extending truncated conical teeth 80. A single gripper strip 78 may be used, substantially coextensive with the lower surface of strip 72, or several short gripper sections 78 may be spaced from one another across the width of a panel unit 40.

By way of example the strip 72 may be a soft compressible vinyl material, whereas the gripper section 78 may be molded of a relatively rigid vinyl material. As another alternative, the strip 72 and member 78 may be a unitary component including a soft compressible upper portion and a relatively rigid lower section which includes the base 79 and the teeth 80 or similar gripper cleats. The compressibility of strip 72, and particularly of base section 77, assures conformance with the subjacent base surface across the width of the panel irrespective of floor surface and deflection variations thereacross and thus insures a good sound seal and engagement of all of the gripper sections on each panel unit with the base surface.

Referring particularly to FIG. 2, each panel unit 40 also includes a pair of resilient gasket strips 84*a* and 84*b* secured in the two vertical edge recesses 58 and 60, as by being adhered to the subjacent edge covering

portions of the face sheets **48** and **50**. The two strips **84***a* and **84***b* are of identical cross-sectional configuration, one being reversed with respect to the other at the time of installation.

As will be noted particularly with reference to FIG. **6**, each gasket **84** (**84***a* and **84***b*) is formed with a flat planar back surface and a corrugated front surface having a land **92** and a groove **94** of the same configuration, in opposite senses. Two shoulders **96** and **98**, at opposite edges of the corrugated surface, lie in a common plane which is the midplane of surfaces **92** and **94**, e.g., surfaces **92** and **94** define a sinusoidal curve in cross section with the plane of shoulders **96–98** as its zero axis. Thus the surfaces **92** and **96** on one side of the center line of the front surface of gasket **84** are complementary to the surfaces **94** and **98** on the opposite side of that center line. Accordingly, the surfaces **92**, **94**, **96** and **98** of a pair of reversed gasket elements **84***a* and **84***b* are complementary to one another, as seen in FIG. **2**.

With further reference to FIG. **6**, surfaces **100** and **102** taper outwardly and rearwardly from the shoulders **96** and **98**, and thence outwardly and toward the front of the gaskets to form shallow grooves **104** and **106**. Narrow shoulders **108** and **110** extend from these grooves to the respective side edges **112** and **114**, beneath the plane of shoulders **96** and **98**.

The effective thickness of each gasket, e.g., the dimension between the plane of surfaces **96–98** and the back surface **90**, is greater than the depth of the lips **54** and thus is greater than the depth of a recess **58** or **60**. Accordingly, a pair of reversed gasket elements **84***a* and **84***b* on opposed edges of adjacent panels may abut one another in compressive sealing engagement along their complementary front surfaces **92–98**, as in FIG. **2**, with lips **54** of adjacent panel units remaining spaced from one another, to assure a good sound and air transmission seal between contiguous panel units.

As seen in FIGS. **2**, and **5** through **8**, each gasket **84** is of a width corresponding to the width of the recesses **58** and **60**, and thus approximately the thickness of the panels whereby the lateral edges **112** and **114** engage the inner surfaces of the lips **54**, with the shoulders **106** and **108** being recessed or disposed beneath the distal edges of the lips **54**. This guards against easy access to the interface between each gasket and the respective panel in an assembled partition to discourage curious persons or vandals from seeking to separate the components at this interface. Also, the adjoining surfaces **100** and **102** of the abutting gaskets form a vertical groove accent line between such abutting panel units, without any edge portions of the gasket being readily accessible for gripping and pulling by such persons.

The gaskets **84** are formed of suitable flexible compressible resilient material, such as a soft neoprene having a durometer rating of about **43**. A longitudinally extending cavity **114** of D-shaped cross-sectional configuration may be provided beneath each land **92**, as illustrated, to enhance the flexibility deformability and the compressibility of the land portions for purposes to be noted below.

With the indicated arrangement of identical complementary gaskets, each panel unit is reversible in that it may be installed with either major surface exposed to either side of the partition as desired. It will also be appreciated that each panel unit, comprising a panel **44**, the attached edge gaskets **84**, the bottom strip **72**, and the grippers **78** comprises an integral unit for convenient handling, installation and removal of these units.

Referring to FIG. **3**, each channel runner **36** is provided with a keyway **116** along the inner surface of the distal end of each leg portion **118**. Resilient bearing strips **120** engage in the keyways **116** and include hollow D-shaped cushion portions **122**. Strips **120** provide snug bearing abutment with the surface sheets **48** and **50** of the panel units **40** to provide a sound seal and reduce panel vibration while avoiding marring of the finished surfaces of the panels during installation or removal of the panel units in a partition assembly. Resilience of the leg portions **118** may assist in insuring such snug engagement with the panel units. By way of example, channel **36** may be formed of extruded aluminum, and may be of other configurations in cross section. The bearing strips **120** may be of nylon. Dependent somewhat upon the materials utilized for the face sheets **48** and **50**, and the material and flexibility of the channel runners **36**, the bearing strips **120** may be eliminated in certain circumstances or may be a unitary part of the ceiling runners. In addition to their transverse retaining function, the channels **36** permit lateral adjustment of the individual panel units and serve as trim strips to conceal the top edges of these units.

FIG. **5** illustrates an arrangement for providing an abutment joint between the partition assembly **26** and the partition assembly **24**. A modified gasket strip **126** is used as a starter component. This gasket strip is basically similar to the above-described gasket strips **84** except for the modifications indicated herein. The gasket **126** is provided with a unitary rib **128** extending from the back surface **90***a* along the center line thereof. The rib is of arrowhead or T-shaped configuration, as illustrated, to engage in the V-shaped slot formed by the surfaces **100** and **102** of the abutting gaskets **84** at a vertical joint between adjacent panel units **40**. The rib **128** is provided with shoulder portions **130** which engage behind the respective lips **54** to retain the gasket strip **126** in position. Further, the shoulder sections **108** and **110** of the gasket **84** are omitted from the gasket **126**, thereby providing simple right-angular edges as at **108***a* and **110***a*.

The first adjacent panel unit **40***a* of the assembly **26** is positioned with one edge gasket **84** thereof in complementary abutting engagement with the gasket **126**, as illustrated. Panel unit **40***a* may be identical to panel units **40**, or may be of slightly less width (by an amount equal to half the thickness of a panel unit) to maintain the modular positions of the vertical joints in assembly **26**.

Where one end of a partition is to abut a structural wall or a partition of other construction, a gasket strip similar to a gasket **126** without the rib **128** may be suitably secured to such other wall or partition in the appropriate position to interfit with the adjacent edge gasket of the first panel unit **40**. Alternatively, the gasket strip **84** at the respective edge of the first panel unit **40** may be replaced with another gasket strip to provide an appropriate joint. For instance, a flat resilient strip or a gasket of a generally D-shaped cross-

sectional configuration may be placed in the panel edge recess and extend beyond lips **54** to about a substantially planar wall.

The door panel unit **42** included in the illustrated partition assembly **26** (FIGS. **1** & **7**) is of the same modular width as the panel units **40**. This panel unit includes opposite edge sections **132** and **134**, each including surface coverings, core material, edge configurations and edge gaskets **84** in the same general manner as the panel units **40**. The edge portions **132** and **134** comprise the vertical jambs at the opposite vertical edges of a door opening for receiving a door **136**. A header **138**, such as a metal channel member, extends between and is joined to the jamb sections **132** and **134** above the door opening. The remaining portion of the panel unit **140**, above the header **138**, may be a panel similar to the door panel **136**, or of the same construction as the body of panels **44**, or of other material, in accordance with the architectural and decorative accents desired. A threshold member **142** extends between and is joined at its opposite ends to the lower portions of the jamb sections **132** and **134**.

Referring particularly to FIG. **13**, the threshold member **142** may be formed of appropriate materials, such as extruded aluminum, and includes a bottom recess **144** which receives a gripper strip **78**. The strip **78** is suitably secured to the threshold **142**, as by being adhered to the inner surface of the recess **144**. Gripper sections may be adhered in similar recesses along the lower edges of jamb sections **132** and **134** or may be applied to these lower edges with a pad, as on panels **44**.

The door **136** may be of any desired construction, and appropriate hinge and latch means are provided for mounting and closing the door within the frame defined by the panel unit **42**.

FIG. **8** is a cross section of a corner post unit **146** for use where two partition assemblies in accordance with this invention meet at right angles to form a corner. The post **146** includes a core **148** corresponding to that described with respect to panels **44**, with a facing sheet **150** extending over the two surfaces which will be outwardly exposed at the indicated type of corner. A pair of shallow channel-shaped metal strips **152** and **154** cover the other two surfaces of the core **148**. The outer edges of the channels **152** and **154** are engaged by reverse bent lips of the sheet **150**, as indicated at **156** and **158**. The adjacent lips of the channel elements **152** and **154** are retained in position by a strip **160** of the facing material having its edges bent to engage the adjacent flanges of the channels **152** and **154** as also illustrated in FIG. **8**. Gaskets **84** are secured in the recesses defined by the strips **152** and **154**, in the same manner as described above with respect to the edges of the panels **44**.

The post **146** is of essentially square cross section, its lateral dimensions being the same as the thickness of a panel **44**. The upper end of a post **146** is inserted in the ceiling guide channels at an intersection of two channels which will receive the adjacent panel assemblies, and the lower end of the post rests upon the floor surface.

Due to the relatively small mass of a post **146**, as compared to a panel unit **40**, and the exposed position of the post at an external corner, a clip may be used at the lower end of the post to secure this end to the contiguous panel units. Such a clip is illustrated at **164** in FIGS. **9** and **10**, with the use of the clip being illustrated in FIG. **11**. The clip **164** may be formed of sheet metal components including a shallow box-like element **166** and a base section **168**. The element **166** includes a base portion **170** and four upstanding flanges or walls **172***a*, **172***b*, **172***c* and **172***d*. Element **166** is of a size conforming to the inside dimensions of the side walls **150**, **152** and **154** of the post **146**, for insertion in the bottom of the corner post with a snug fit, as illustrated in FIG. **11**. The base section **168** includes a planar bottom section **174** which underlies the bottom **170** of element **166**, with extensions **176** and **178** having upturned tabs **180** and **182**, respectively, at their distal ends. As will be seen in FIG. **11**, the tabs **180** and **182** are adapted to extend into slots **184** formed in the flanges **62** and **64** of an adjacent panel unit **40**. Thus, the clip **164** secures the base of a post unit **146** to the abutting panel units **40**.

FIG. **14** illustrates an alternative installation of a ceiling retainer channel **36**. In this arrangement the channel **36** is recessed in the ceiling, as by being prepositioned and cast therein in forming a poured concrete structure. The ceiling retainer also may be a part of the building support structure.

Each panel unit is of a length somewhat greater than the distance between the floor **22** and the lower edges of the superposed channels **36**, but less than the distance from the floor to the bases **36***a* of the channels. Adequate clearance is afforded in the channels **36** for the upper end of the panel units to be extended into the channels a sufficient distance to avoid engagement of the teeth **80** with the floor covering when the panels are vertical. The telescoping engagement of the panel units and the channels, and the aforementioned clearance, also accommodate variations normally encountered in the nominal floor-to-ceiling dimension as well as the variations in this dimension encountered under varying conditions of load, temperature, humidity, settling of a building and the like.

Each panel unit may be of appropriate effective width corresponding to desired modular dimensions for a building assembly. Alternatively, the units may be of various widths whereby appropriate combinations of the panel units will meet modular requirements, e.g., panel units of 40 inch width and 20 inch width to correlate with both 5 foot and 10 foot modules. Further, the overall effective width of each unit, with the gaskets relaxed, may be slightly greater than the nominal intended installed panel unit width in a partition assembly to insure sealing engagement between abutting gaskets **84**.

To assemble a partition, the installer selects the desired channel of a previously installed grid of the guide runners **36**, or installs a guide channel along the line where a partition is to be placed. The individual panel units are then installed by inserting the upper end of each panel unit into the selected channel, with the panel at a slight angle to the vertical, and sliding the panel unit upward in the ceiling channel so that the gripper units **78** will be clear of the floor surface as the panel unit is moved into its vertical or plumb position. The panel unit is adjusted laterally along channel **36**, as necessary, to insure proper modular spacing and com-

pressive abutting sealing engagement between the edge gaskets of adjacent units. The panel unit is then lowered so that the grippers **78** rest upon the carpeted base surface and bear the weight of the unit, with teeth **80** engaging the carpeting **28**. The teeth **80** penetrate the pile **30** and may press upon the backing **32** to form indentations therein due to the resilience of the backing materials **32** and **34** (see FIGS. **3** and **13**) and/or to penetrate the fabric **32**. Engagement of the teeth in the carpeting material restrains each panel against inadvertent movement along the line of the partition, as well as providing resistance to transverse movement of the panels as referred to further below. A sufficient number of additional panel units are similarly positioned to complete the desired partition, the particular panel units being selected in accordance with the facilities desired, e.g., a panel unit **42** being placed wherever a doorway is desired.

Due to the independent vertical positioning of each panel unit afforded by the described assembly, each panel unit is automatically positioned vertically in accordance with the level of the subjacent base. Variations of the base surface within the width of a panel unit are accommodated by the resilient pad **72**, as aforenoted.

Referring to FIG. **15**, the individual panel units conveniently may be installed and removed by the use of a simple lever type of tool as illustrated generally at **190**. Such a tool includes a short base arm **192** with a flat end portion **194** designed to be slid beneath a panel unit. Gripper teeth **80** may be omitted along the center portion of the lower edge of the panel units, to facilitate insertion of such a tool end **194**. An elongated operating lever **196** provides adequate mechanical advantage for the operator to raise the panel unit to maintain gripper **78** out of engagement with the floor covering. Rollers or wheels **198** facilitate the transverse movement of the bottom portion of the panel necessary for installing and removing the individual units.

Where a post unit **146** is to be used, the post, or at least the clip **166**, may be positioned prior to the installation of the adjacent panels. Thereby each adjacent panel may be engaged on the tabs **180–182** as that panel unit is lowered into its final aligned position. Alternatively, installed panel units may be raised for insertion of the clip.

With the panel units assembled as described and illustrated, it will be appreciated that the upper end of each panel unit is engaged in a channel **36** which prevents transverse movement of this upper portion. The lower end of each panel is restrained against transverse movement by the engagement of the grippers **78**, and particularly the teeth **80**, with the carpeting **28** under the force applied by the weight of the panel unit. Further, the complementary interfitting engagement between the gasket strips at each vertical joint and the frictional engagement between abutting gaskets provides for transfer of transverse forces between adjacent panels, whereby a part of a transverse load applied to one panel of a panel assembly will be transferred to the adjacent panels which thereby assist in resisting that load.

By way of one illustration of the shear resistance effect of mating gaskets **84**, a series of tests were conducted by quarter-point loading a single panel standing alone and similarly loading the middle panel of a three-panel assembly including mating neoprene gaskets at the vertical joints as described above. The panels were formed of laminated sheets of plywood, and were 10 feet high, 40 inches wide and about 2⅛ inches thick. The abutting gaskets of the three-panel assembly had a durometer test rating of **43** and were in light compressive contact with one another. The center deflection of the center panel of the three-panel assembly was 10 to 20 percent less than that of the single panel, with the greater reduction in deflection occurring under the greater loads.

While the mating gaskets **84** will sustain limited shear loads to transfer transverse forces between adjacent panels when in light compressive contact adequate to insure sealing engagement therebetween, the gaskets are sufficiently resilient that any individual panel unit may be removed from a partition of assembled panel units without spreading or otherwise adjusting the adjacent panel units and without damaging the gaskets. Such removal is accomplished by first raising the selected panel unit vertically, as by use of the implement **190**, to disengage the grippers **78** from the carpet. The gaskets **84** on each edge of the selected panel unit slide longitudinally along the respective abutting gaskets **84** of the adjacent units, and the channel **36** accommodates the upward movement of the upper end, to permit such lifting of the selected panel unit without moving the adjacent units. By applying a transverse force near the bottom of the panel, the shear resistance of the mating gaskets at each edge of the selected unit is then overcome and the panel is removed by movement of the bottom transversely of the partition until the upper end is disengaged from the guide channel **36**. The abutting gaskets, and particularly the overlapping protruding portions, flex and compress during such removal to permit disengagement of the interfitting gasket portions without damage to or permanent deformation of the gaskets.

Similarly, the removed panel unit, or another panel unit of the same lateral dimensions, may be installed in the vacated space and in the same sealed joint relation with the adjacent units, without moving those units, by the reverse of the indicated steps, i.e., by inserting the upper end of the unit in the guide **36** between the adjacent units, with the panel tilted slightly, raising the panel unit and pressing the lower portion into partition alignment position, and thereafter lowering the unit to engage the grippers in the carpet. The gaskets on each edge of the panel unit being installed and the adjacent gaskets of the adjacent units will flex and compress as noted above to accommodate insertion of such a panel unit. The resilience of the gaskets will insure their recovery to the desired joint sealing abutting engagement when the replacement unit is in its aligned position.

The panel units may be installed, removed and/or replaced in the indicated manner by an operator on either side of the partition and by movement of the panel units in either direction transverse to the partition.

It will be appreciated that edge gaskets of various cross-sectional configurations may be formed of appropriate materials to obtain the indicated bidirectional shear resistance while still providing suffi-

cient compressibility and resilience for installation and removal of individual panel units as described above. FIGS. **16, 17** and **18** are illustrative of abutting pairs of gaskets **284, 384** and **484**, respectively, which will provide such bidirectional shear resistance. Further, each gasket of each of these pairs is identical in cross section with the other gasket of the same pair and is also bilaterally complementary. Thus each of these gaskets is complementary to a reversed gasket of the same design for interfitting engagement therewith upon reversal of one of the gaskets as illustrated in FIGS. **16–18** and as outlined above the respect to gaskets **84**. This relationship permits use of gaskets of the same design on both vertical edges of the panels and affords reversal of any panel in a wall assembly, i.e., installation of a panel with either major panel surface exposed on a given side of the partition, without altering or adjusting the adjacent panels.

FIGS. **19** and **20** are two further examples of mating gaskets **584***a* and **584***b*, and **684***a* and **684***b*, respectively, which also can be utilized to obtain bidirectional shear resistance. However, the latter two designs do not provide the reverse symmetry of the aforedescribed gaskets, and thus would not permit reversal of an individual panel as with the previously noted designs.

In each of the illustrated gasket designs, the side surfaces of the interfitting land and groove portions are disposed at acute angles to the respective back section, i.e., at acute angles to a vertical plane normal to the panel on which the gaskets are installed. Thus the interfitting protruding portions of a pair of the gaskets will tend to override one another as the gaskets are moved in either direction generally parallel to the gasket face, to facilitate compressing the protrusions without damaging the gaskets during installation and removal of a panel unit between two installed units as described above. In the preferred embodiment of FIG. **6**, the maximum included angle between the face surface and the noted reference plane is about 45° and occurs at the line of inflection between land **92** and groove **94**.

One set of desirable performance specifications for partitions of the type discussed herein is for a single panel to withstand a transverse design load of 5 lbs./ft.^{2} without permanent displacement of the bottom edge upon removal of that load, and to withstand a transverse load of 12.5 lbs./ft.^{2} with bottom edge movement, under load, no greater than 0.25 inch. The described design loads on a panel 40 inch × 10 feet result in theoretical transverse loads to be resisted by the bottom gripper components of 83.2 lbs. and 208 lbs., respectively, i.e., one-half of the total transverse load on the panel. The higher of these design load requirements and the attendant displacement parameter are indicated on the graphs of FIGS. **21** and **22** by horizontal and vertical dashed lines, respectively.

FIGS. **21** and **22** indicate the transverse load resistances at the bottom ends of various panel units, as observed in tests on panels of various weights and with various base gripper arrangements. Each curve in these graphs illustrates the observed movement or displacement of the lower edge of a test panel unit as transverse loads were applied to the lower end portion of that unit. In each instance a single panel unit 40 inches wide was erected on a planar carpeted floor surface about 4 feet × 8 feet which was covered with a single piece of carpet **28** as described above, the carpeting being secured to the floor around the periphery of the test surface. The specific carpet used was a 100 percent wool pile carpet of Universal Carpets, Inc., Ellijay, Georgia, sold under the name "Star Trek." This carpet had looped pile of 30 oz. per sq. yd. and a pile depth of about 0.156 inch, with a primary backing fabric through which the loops were formed, and a high density foam rubber backing of 40 oz. per sq. yd. bonded to the underside of the pile and primary backing assembly. The upper end of each panel was restrained as by a channel **36**.

The curves of FIG. **21** illustrate the results of certain tests conducted on panels having a weight of 141.25 lbs., with various gripper arrangements. Curve A illustrates the displacement observed when using gripper elements made from commercially available furniture coasters of a semirigid molded plastic material. These grippers were of the general configuration illustrated for gripper strip **78**, and comprised Craftsman Carpet Guard caster cups, sold by Sears, Roebuck & Co., with the side walls of the cups being removed prior to installation on the panels. Each gripper was about 2⅛ inches long and 2⅛ inches wide and had seventy-nine truncated conical teeth **80** uniformly distributed on ¼ inch centers over the bottom surface, two teeth being removed to provide space for attachment screws. Each tooth was about ⅜ inch long, or slightly shorter, about 5/32 inch in diameter at its base and had a rounded outer end about 1/16 inch in diameter. Four such grippers were uniformly spaced along the bottom edge of the panel.

As illustrated in FIGS. **3** and **13**, the teeth of the aforedescribed grippers penetrated the full depth of the carpet pile **30**, and their points pressed on the primary fabric backing **32**. Observed measurements indicated that each tooth depressed the backing slightly, forming a shallow depression or dimple in the backing materials upon installation and proper seating. However, there also may have been some penetration of the backing.

The grippers of curve B were formed of a hard neoprene machine pad sold under the name "Fabcell." Two gripper strips of this material were used on the test panel unit, each strip being 2 inches wide and 15 inches long, with the strips spaced apart about 6 inches to accommodate a lifting tool **190**. The outer surfaces of these strips were covered with a tacky coating, and were ridged, in a waffle pattern, with the ridges being about ⅛ inch high and spaced about ½ inch on center lines, with the intervening depressions being about ¼ inch by about ¼ inch.

Curves C and D illustrate the displacement observed in two separate tests each conducted on a panel unit with four extruded aluminum gripper strips as illustrated at **286** in FIG. **23**. Each of these strips was 17 inches long and included a flat back section **288** which was 1⅛ inches wide and 0.053 inch thick, with three gripper ribs **290** spaced on about ⅜ inch centers. Each rib was coextensive with the strip in length and was about 0.053 inch wide and extended about ½ inch from the back section **288**. The four strips were secured to the bottom edge of the panel in parallel adjacent pairs, with adjacent ends of the pairs spaced about 6 inches to accommodate the tool **190** therebetween.

The gripper for the panel unit of curve E was a strip of hard molded epoxy resin 2 inches wide and 40 inches

long, with a reinforced base ⅛ inch thick and having ninety teeth. The teeth were arranged in transverse rows each centered on the center line of the base, with three teeth in alternate rows and two teeth in each of the remaining rows. The teeth were spaced about ⅞ inch on centers in each row, and the rows were spaced about ⅞ inch on centers, except for a gap of about 8 inches in the center of the strip with no teeth to accommodate tool **190**. Each tooth was about ¼ inch long and of truncated conical configuration, with a base about 3/16 inch in diameter and about 3/32 inch in diameter at its outer end.

The curves of FIG. **22** illustrate the results of certain tests on panels of various weights, each provided with four gripper elements as described above with respect to curve A of FIG. **21**. Curve A′ is the same as curve A, representing the test results with the 141.25 lb. panel. The panel of curve F weighed 101.25 lbs., and the panel of curve G weighed 74.25 **lbs**.

As will be observed, the panel units of curves A, A′, C, D, E and F met the higher load test requirements noted above. They also met the 5 lbs./ft.^{2} requirement. Referring particularly to FIG. **22**, it will also be seen that the 74.25 lbs. panel fell just below the desired test results, while the 101.25 lbs. and 141.25 lbs. panel exceeded the requirements. Thus, a 40 inches panel weighing about 80 lbs., as well as heavier panels, will satisfy the above-indicated performance specification in the described four gripper installation.

Of course, there are several factors in the gripping engagement and transverse force resistance determinations, e.g., the particular carpeting, the type of gripper, the effective weight of the panel unit, the seating of the grippers in the carpet, and the number of gripper teeth or ribs and their particular configuration. For instance, in some instances additional grippers will increase the transverse load resistance, and panels which are lighter in weight may be used with appropriate grippers properly seated.

Good seating of the grippers is an important element in obtaining optimum results in terms of withstanding transverse loads. An 80 lb. panel weight appears to meet this requirement for the aforenoted transverse loading parameters. In a test conducted with four grippers applied to a 40 inches wooden beam in the same manner as described for the panel unit of curve A, an 80 lb. test weight caused the prongs to penetrate about 0.19 inch into the aforedescribed carpet, indicating that the teeth depressed or penetrated the backing about 0.034 inch. Effective seating of the grippers may be insured, particularly with panels of lighter weights, by adding downward force to the panel, e.g., by dropping the panel abruptly during installation or by pressing downward on the panel. Penetration of the backing may be obtained with some grippers when engaging open weave primary backing materials, particularly after prolonged periods of settling or seating in an installation.

Panels fabricated of various materials will provide adequate performance characteristics, such as beam strength, airborne sound transmission resistance, fire resistance and resistance to marring or defacing, while providing adequate weight for effective gripping of a carpeted surface as described above. By way of example only, panels 10 feet high, 40 inches wide and 2 inches to 3 inches thick, with face sheets of 22 gauge steel or 26 gauge steel or glass fiber reinforced plastic sheets 80 mils thick, and with laminated cores of water-felted mineral fiber-boards (density of about 20 lbs./ft.^{3}) or of such fiberboards with gypsum boards, have proven satisfactory. Such panels weighed between about 118 lbs. and about 219 lbs., or between about 35.4 lbs. and about 65.7 lbs. per foot of width, which is adequate to obtain good bottom edge gripping as outlined above.

It will be obvious that certain other modifications of the specific embodiments shown may be made. For example, other specific gripper components may be utilized. As an alternative installation where the base or floor is not carpeted, a strip of carpeting of a width approximately equal to the thickness of the panel units may be adhered to the base surface for engagement by the gripper elements of the panel units. Also, appropriate panel units may be designed for various alternative uses such as service window or counter openings, and the panels may be provided with chalkboard, tack board, or other utilitarian surfaces.

It will thus be seen that a partition assembly and components therefor have been provided which meet the abovenoted objects of this invention.

While particular embodiments of this invention have been shown and described, it will be understood, of course, that the invention is not limited thereto since modifications may be made by those skilled in the art, particularly in light of the foregoing teachings. Therefore, it is contemplated by the appended claims to cover any such modifications as incorporate those features which may be said to constitute the essential features of these improvements, within the true spirit and scope of the invention.

What is claimed is:

1. In a building assembly including a base, a plurality of erect panels arranged in edge-to-edge relation to one another and supported on said base to form a partition, means for preventing movement of the upper ends of said panels transversely of said partition and permitting vertical movement of said panels, means along the lower end of each of said panels engaging said base for restraining said lower ends against movement transversely of said partition, and resilient joint closure means providing sealed abutment joints between adjacent edges of said panels, said joint closure means having outer surfaces of complementary land and groove configurations, said configuration at each adjacent edge being characterized by a resiliently deformable land, a shoulder, and a groove between said land and said shoulder, the land and shoulder projecting outwardly beyond the groove surface and being positioned within the exterior planar surfaces of said panels defining the lateral limits of said adjacent edges, said complementary configurations in their abutted relationship positioning said land of one closure means within said groove of the adjacent closure means, thus permitting relative vertical movement between adjacent panels for disengaging the lower end of one of said panels from said base, each said land being sufficiently deformable as to permit, by pressure delivered by said shoulder of the adjacent edge, removal of such panel transversely of said partition and replacement of such a panel in such sealed joint relation with the panels adjacent each edge

thereof without moving said adjacent panels, whereby said joint closure means have bidirectional shear resistance sufficient to resist relative transverse movement between adjacent panels, except deliberate movement caused by the removal of one of said adjacent panels.

2. In a building assembly as in claim 1, said joint closure means including a resilient element extending along and secured to each such edge of each of said panels, said resilient elements at each such joint abutting one another, with the land configuration of the element on one edge complementally and intimately abutting the groove configuration of the element on the adjacent edge.

3. In a building assembly as in claim 2, said resilient elements at each of said joints extending approximately the full thickness of the panel, thereby overlapping one another.

4. In a building assembly as in claim 2, said abutting resilient elements at each of said joints being of mating over-lapping cross-sectional profiles.

5. In a building assembly as in claim 2, each of said complementary surfaces including a portion of sinuous configuration in cross section.

6. In a building assembly as in claim 2, the portion of each of said outward surfaces abutting another of said resilient elements being of a configuration such that no portion thereof extends at more than a shallow angle to a vertical plane normal to the respective panel.

7. In a building assembly as in claim 2, the portion of each of said outward surfaces abutting another of said resilient elements being of a configuration such that no portion thereof extends at an angle greater than about 45° to a vertical plane normal to the respective panel.

8. In a building assembly as in claim 2, said resilient elements at each of said joints interfitting one another in complementary engagement to resist relative movement between such adjacent panels in either direction transversely of said partition.

9. In a building assembly as in claim 1, said means preventing movement of the upper ends of said panels comprising channel members receiving said upper ends therein.

10. In a building assembly as in claim 9 including a ceiling, said channel members being secured to said ceiling.

11. In a building assembly as in claim 9, resilient means secured along each inner side of said channel members for abutting said panels received therein.

12. In a building assembly as in claim 1, said base including a support floor and a fabric covering thereover, said engaging means including a plurality of downwardly extending projections engaging said covering.

13. In a building assembly as in claim 12, said fabric covering comprising carpeting, and said engaging means comprising gripper means secured to the lower ends of said panels and supporting said panels on said carpeting.

14. In a building assembly as in claim 12, said base including resilient pad means beneath said fabric covering.

15. In a building assembly as in claim 1, a corner post, a plurality of panels abutting said post, and clip means engaging the lower end of said post and the adjacent lower portions of said abutting panels.

16. In a building assembly including a floor with carpeting thereover and a ceiling, a plurality of erect panel units each resting on said carpeting and arranged in edge-to-edge abutting relation to one another to form a partition, means along said ceiling for engaging the upper ends of said panel units, said means preventing movement of said upper ends transversely of said partition and permitting vertical movement of said panel units, each of said panel units including projection means along its lower edge engaging said carpeting for restraining the lower ends of said units against movement transversely of said partition, and each of said panel units including abutting resilient joint closure means extending along each vertical edge thereof for providing sealed abutment joints between adjacent units, said joint closure means being characterized by a resiliently deformable land, a shoulder, and a groove between said land and said shoulder, the land and shoulder projecting outwardly beyond the groove surface and being positioned within the exterior planar surfaces of said panels defining the lateral limits of said adjacent edges, said closure means of adjacent edges being positioned, when assembled, with the land of one closure means within said groove of the adjacent closure means, permitting relative vertical movement between adjacent units, each said land being sufficiently deformable as to permit, by pressure delivered by said shoulder of the adjacent edge, removal of one of said panel units transversely of said partition and replacement of such a unit in such sealed joint relation with the panel units adjacent each edge of such removed unit, without moving said units, whereby said joint closure means have bidirectional shear resistance sufficient to resist relative transverse movement between adjacent panels, except deliberate movement caused by the removal of one of said adjacent panels.

17. In a building assembly as in claim 2, the groove configuration of said one edge element complementally and intimately abutting the land configuration of said adjacent edge element.

18. In a building assembly as in claim 4, said abutting resilient elements being reversed images of each other.

* * * * *

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,707,060 Dated December 26, 1972

Inventor(s) Charles L. Jansen, Jr.

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Line 4 of the Abstract should read -- upper ends of the panel units and prevents movement --.

Column 5, line 61, "flexibility deformability" should read -- flexibility, deformability --.

Column 7, line 2, "to about" should read -- to abut --.

Column 13, line 27, "a 40 inches panel" should read -- a 40 inch panel --.

Column 13, line 46, "a 40 inches wooden beam" should read -- a 40 inch wooden beam --.

Claim 4, column 15, the last line thereof should read -- overlapping cross-sectional profiles --.

Signed and sealed this 22nd day of May 1973.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents

FORM PO-1050 (10-69)

USCOMM-DC 60376-P69
* U.S. GOVERNMENT PRINTING OFFICE : 1969 O—366-334.