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(54) **WALL LINER**

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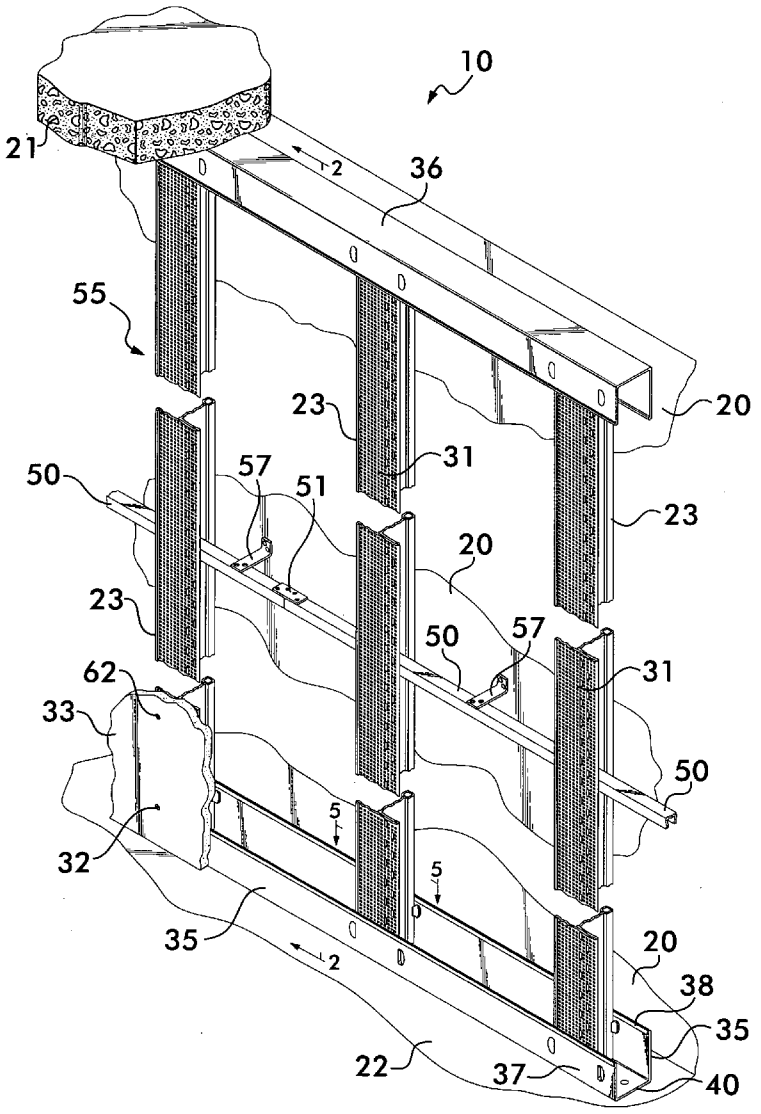
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(57) **ABSTRACT**

Rolled T-beams of the kind used in suspended ceilings, act as vertical stiffeners in a wall liner for a back wall. The vertical stiffeners, reinforced from the back wall, keep the sheets of wallboard that form the wall liner vertically aligned and together. The weight of the wallboard liner is borne directly by the floor under the liner, without support by columns or studs.



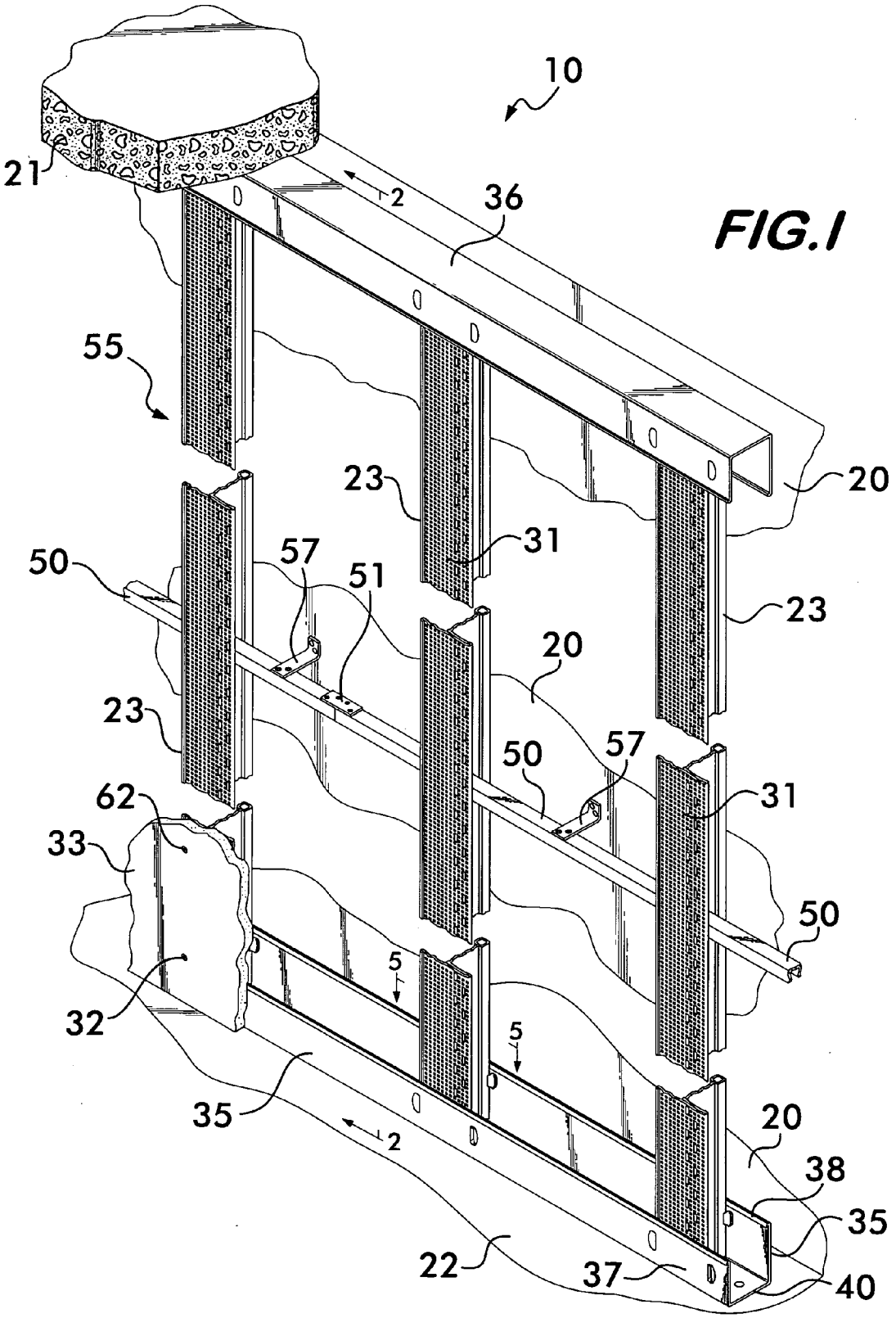

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FIG. 1

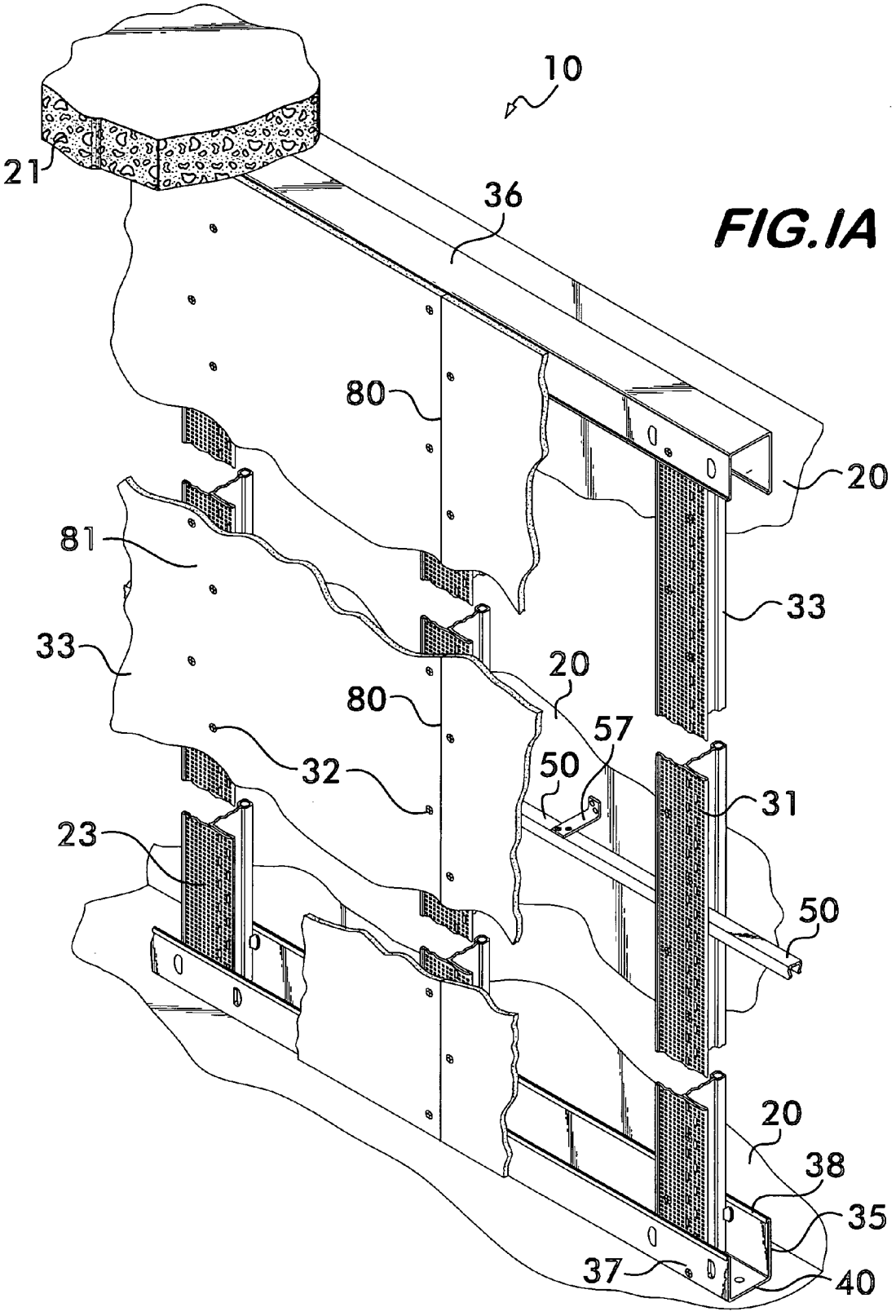


FIG. IA

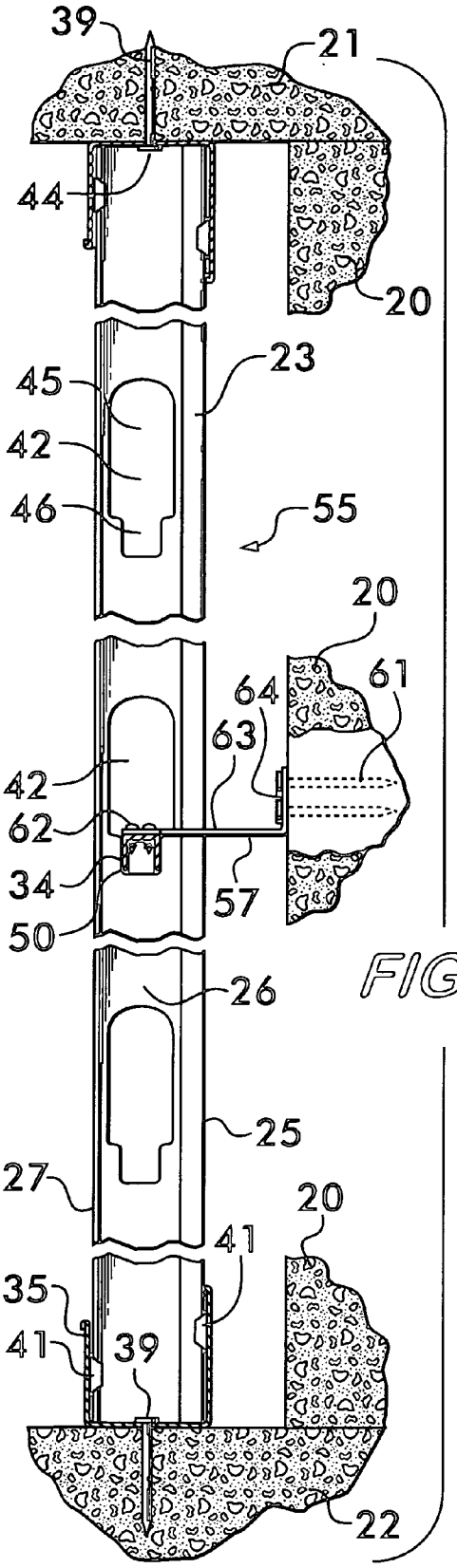
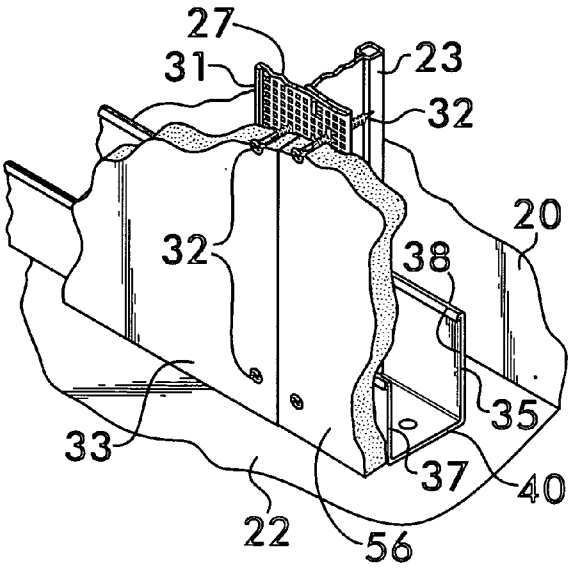


FIG.2

FIG.4



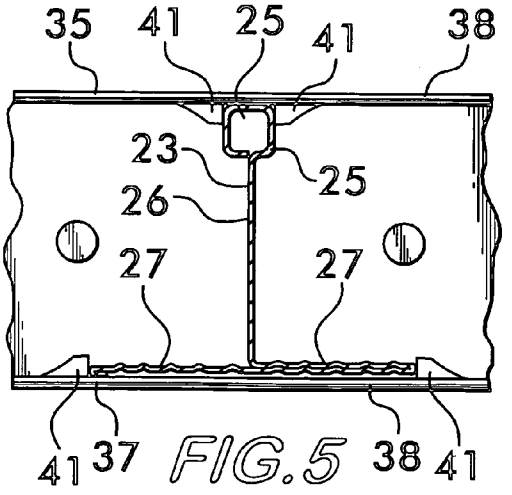


FIG.5

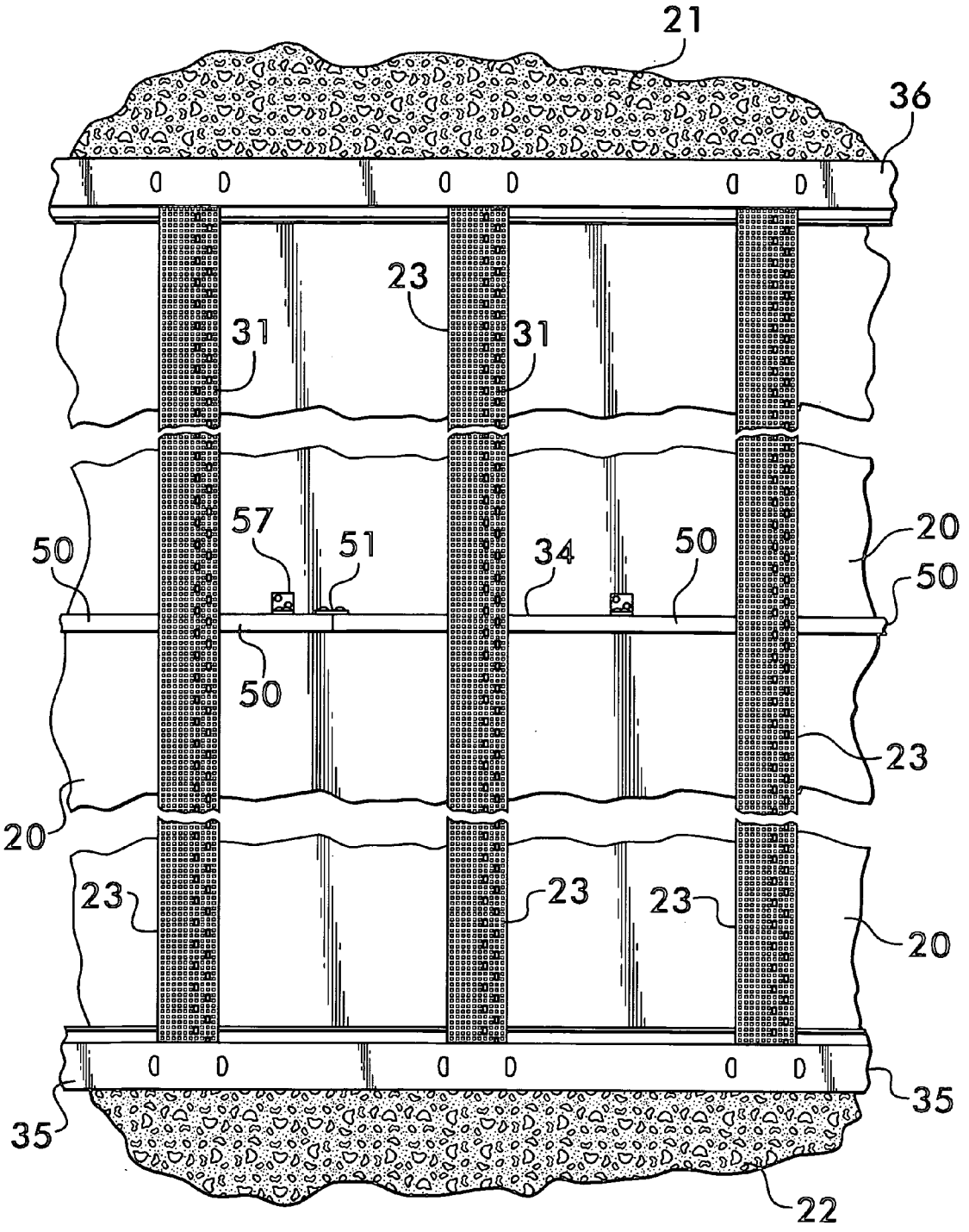


FIG.3

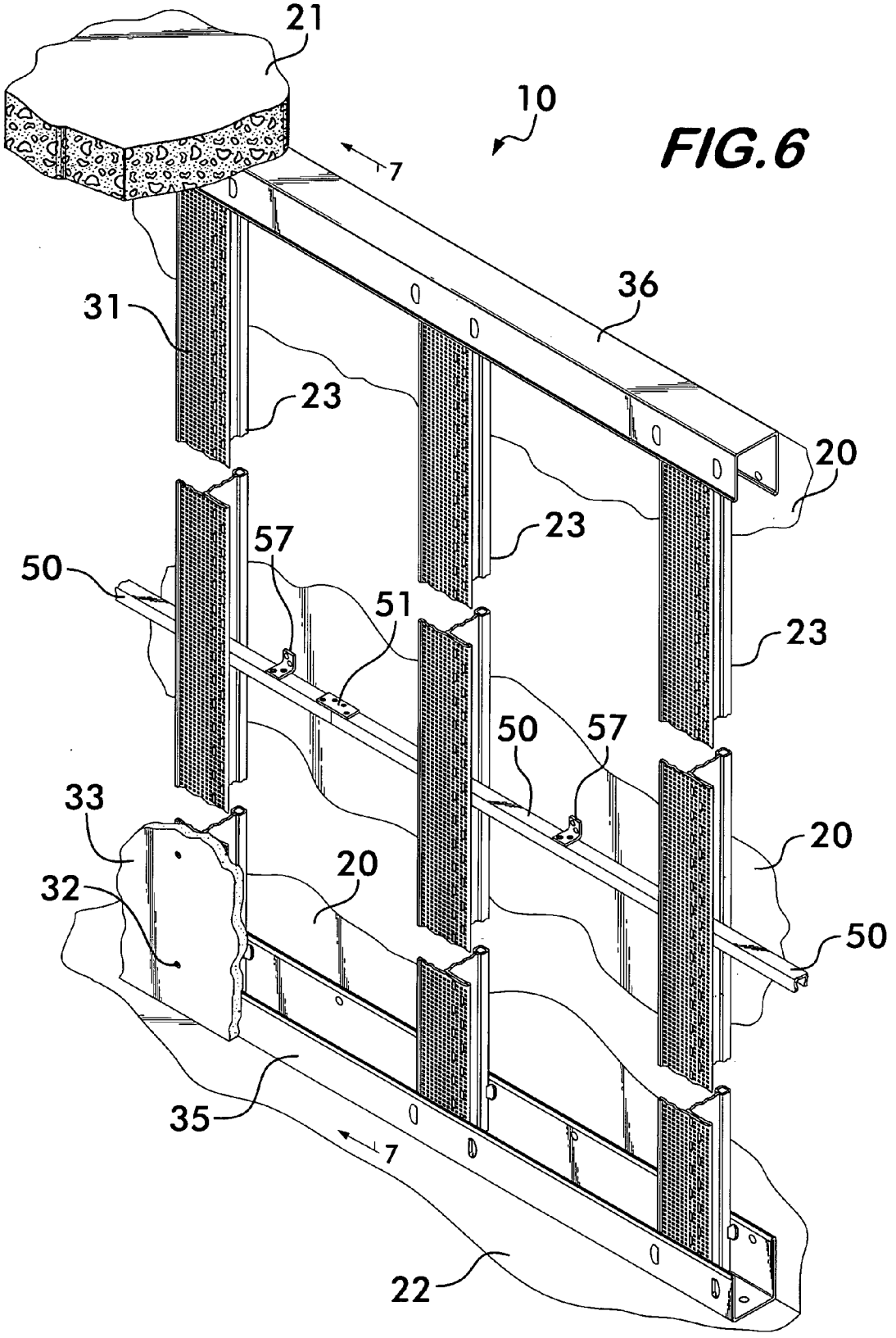


FIG.6

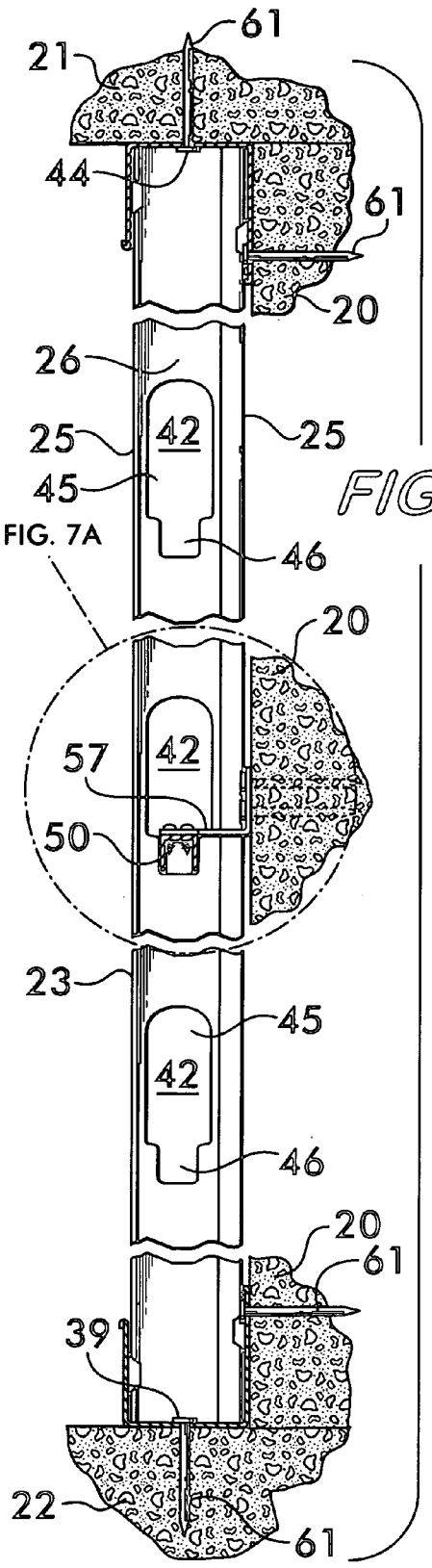


FIG. 7

FIG. 7A

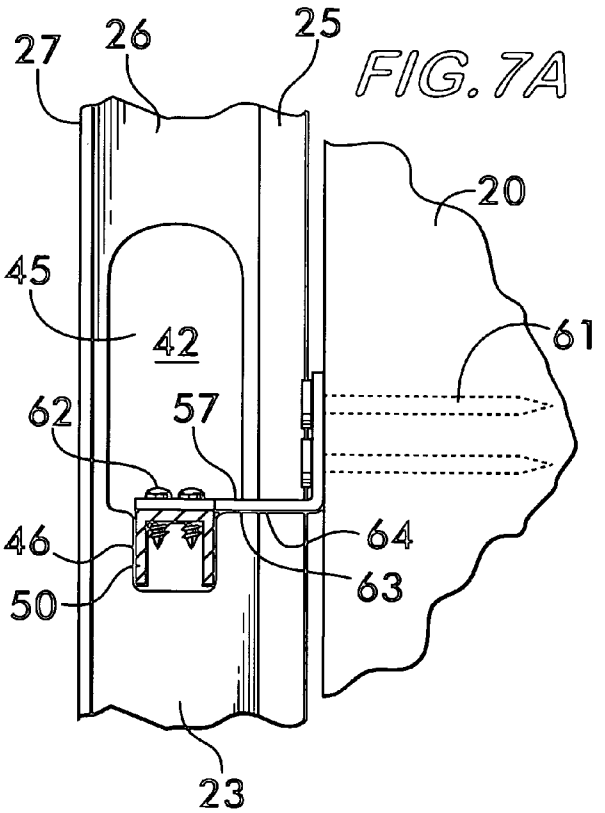


FIG. 7A

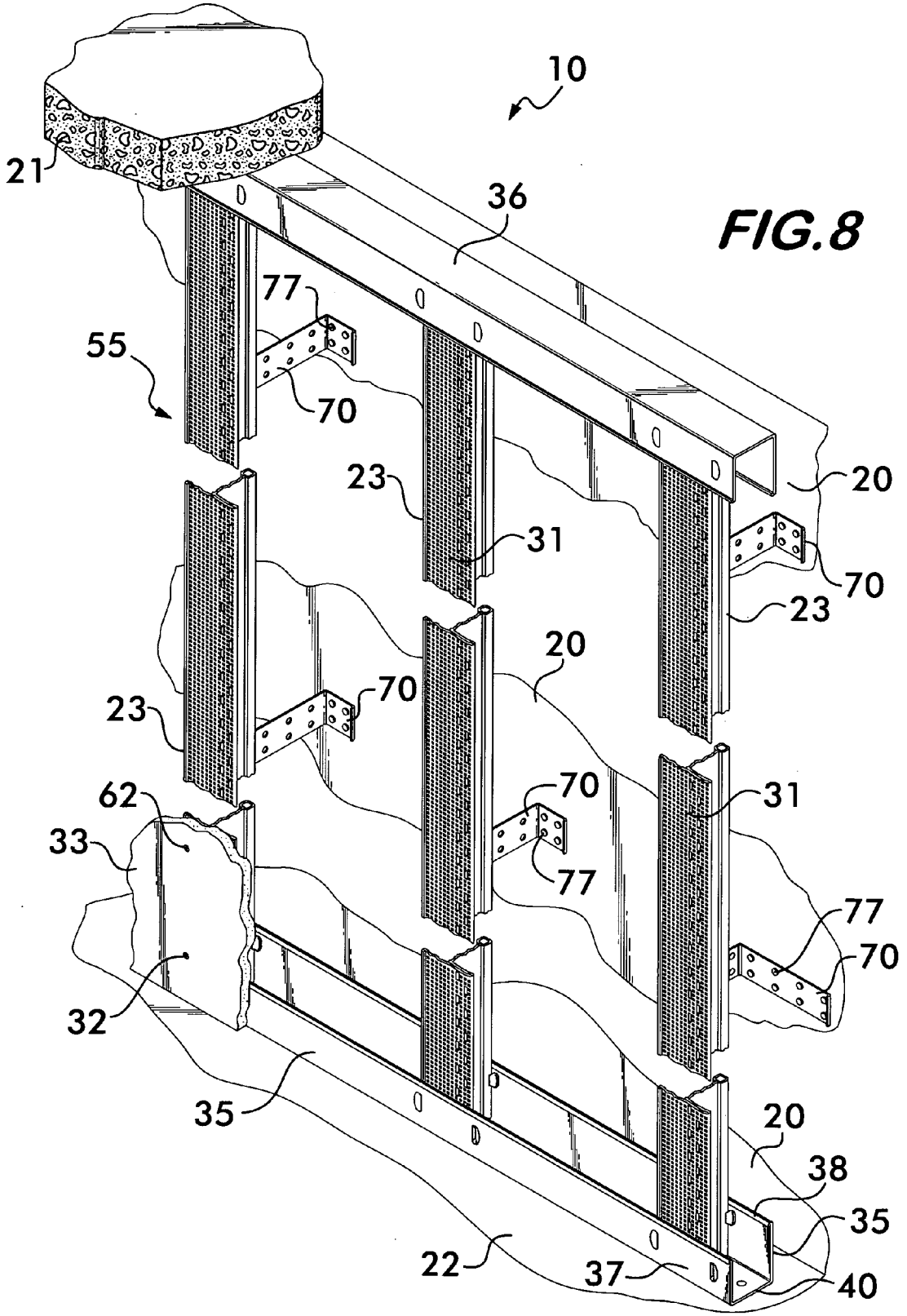

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FIG.8

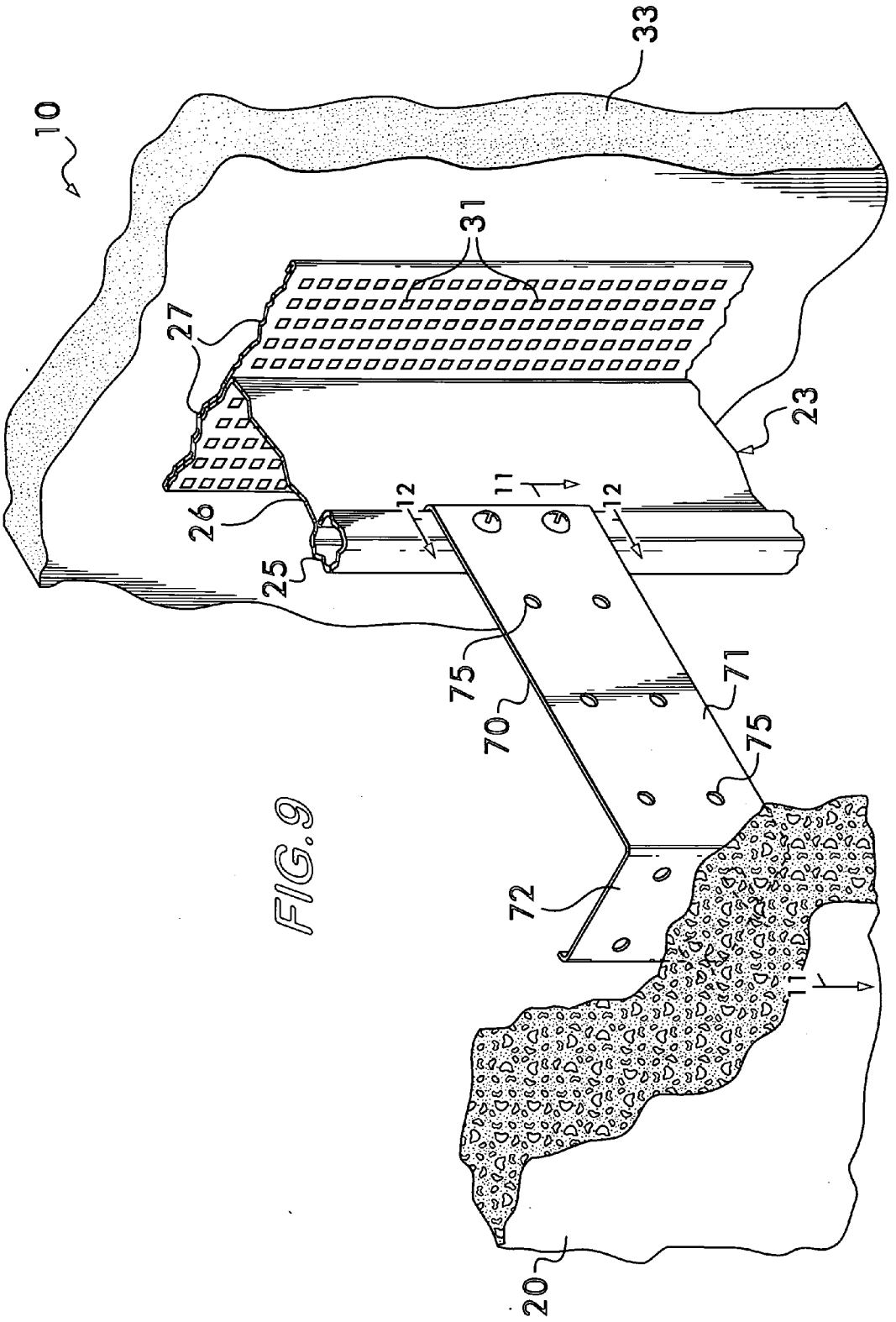


FIG. 9

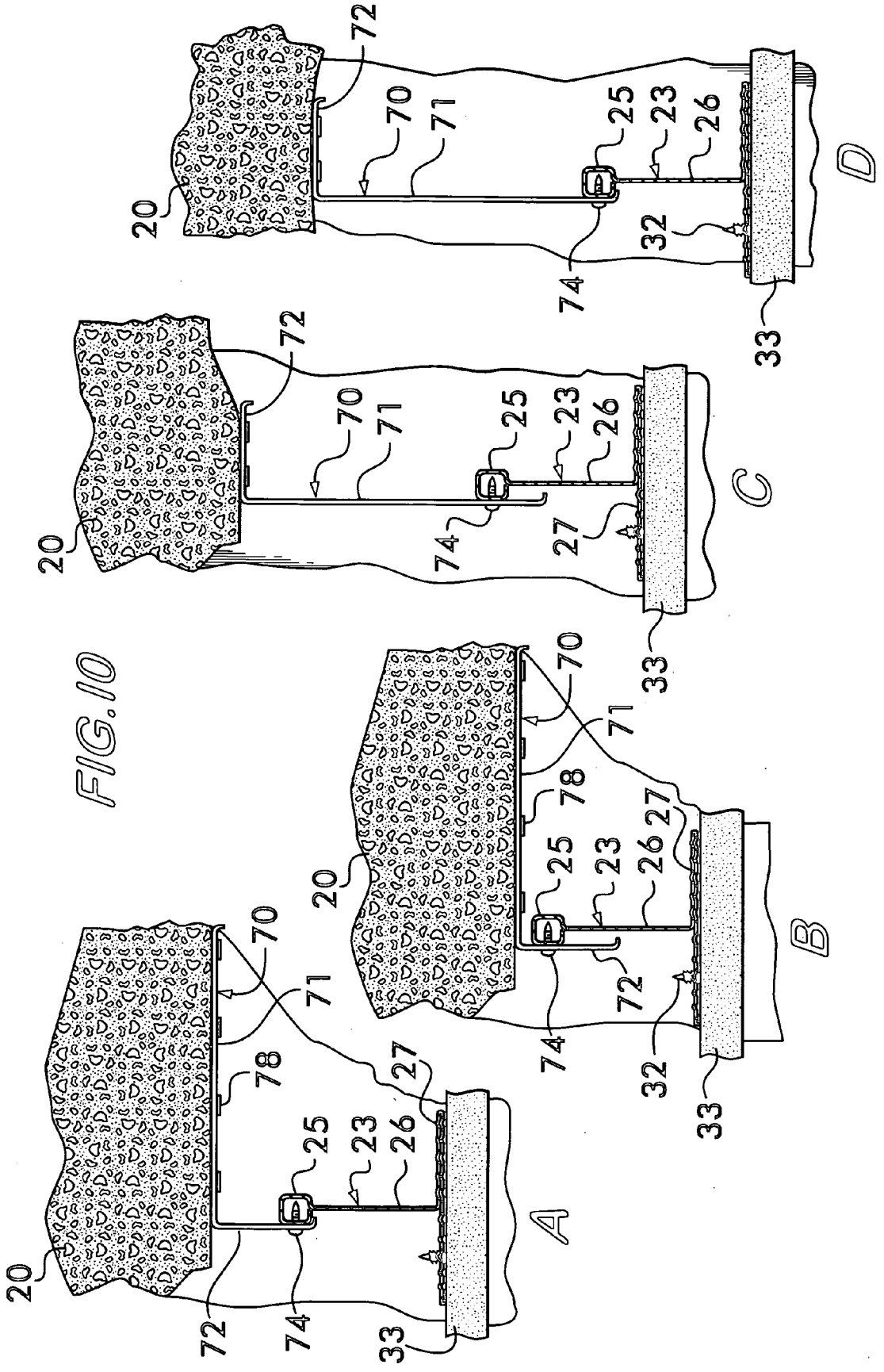


FIG. 10

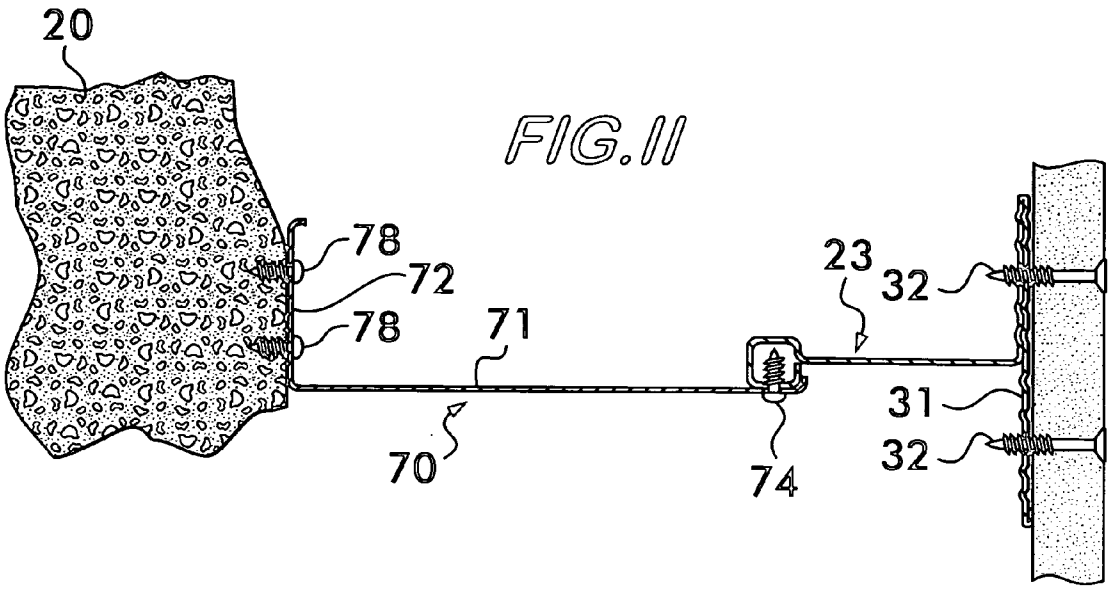


FIG. 11

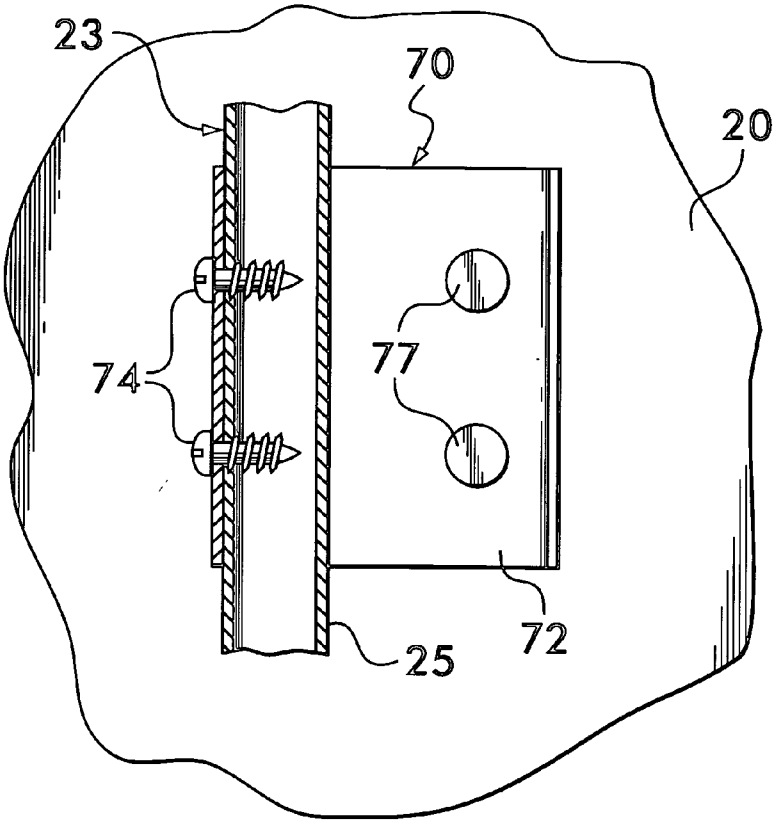


FIG. 12

WALL LINER

[0001] This application is a continuation-in-part of prior application Ser. No. 11/985,690, filed Nov. 15, 2007, for Wall Liner.

BACKGROUND OF THE INVENTION

[0002] 1. Field of the Invention

[0003] This invention is in the field of vertical liners for a back wall, such as a foundation wall. A liner is formed of adjacent sheets of wallboard extending in a vertical plane in front of a back wall. Such a liner presents a pleasing appearance to a viewer, and also serves to insulate a space against temperature extremes, noise, and humidity.

[0004] 2. Prior Art

[0005] a) Vertical Wall Liners

[0006] Prior art, vertical wall liners are formed by affixing sheets of wallboard to structural columns, or studs, of wood, or of metal having a U-shaped cross section with a leg of the U extending parallel to the plane of the wall. Nails, or screws, affix the sheets to the studs. Such studs, acting as columns, bear virtually all the weight of the wallboard, and are subject to twisting and buckling from such load, so that it is necessary that the columns have substantial resistance to the load imparted by the wallboard.

[0007] b) Suspended Horizontal Ceilings

[0008] A suspended, wallboard ceiling forms a horizontally extending liner for a structural ceiling. Such wallboard ceiling, also called a drywall ceiling, has sheets of wallboard attached by self-tapping screws to flanges of inverted rolled T-beams that are suspended from a structural ceiling by hang wires. The T-beams in a horizontal suspended drywall ceiling are united into a horizontal grid of main beams and cross beams, to provide stability to the beams, and to form a skeleton that totally supports the wallboard that is affixed to the grid by self-tapping screws inserted into the flanges of the T-beams. The entire weight of the wallboard is borne by the beams in the grid. Such prior art T-beams used in a horizontal suspended drywall ceiling grid are disclosed, for example, in U.S. Pat. No. 6,722,098 for Beam for Drywall Ceiling, incorporated herein by reference.

[0009] The prior art T-beams used in such drywall suspended ceilings are continuously formed by passing a web of sheet metal through a series of rollforming stations, as disclosed, for instance, in U.S. Pat. No. 5,979,055, for Process for Producing Rollformed Sections, incorporated herein as reference.

[0010] Such T-beams have a cross section of an inverted T shape, with a bulb at the top, a web depending downward from the bulb, and opposing flanges, extending horizontally from the web at the bottom thereof, as seen in the '098 patent. The beam design lends itself to ready insertion of the self-tapping screws into the flanges of the beams.

[0011] Such a T-beam used in a suspended ceiling is primarily subjected to a bending load downward from the weight of the wallboard, with virtually no compressive forces exerted longitudinally of the beam. Hence, the beam is so designed as to have virtually no resistance to act as a column, and readily buckles when subject to axial compression loads.

[0012] Although the entire weight of the wallboard is borne by such beams in the grid, the beams are required only to span the distance between the hang wire support wires, which generally are about two feet apart, so beams rolled of relatively light gauge metal, and of a height of less than b **1/3**;**4** inches, can be used.

BRIEF SUMMARY OF THE INVENTION

[0013] The invention uses the above-described T-beams of the prior art as vertical stiffeners for wallboard sheets that form a vertical wall liner, so that the wallboard can stand vertically alone. Even though such a T-beam has virtually no strength as a column, the invention enables such a beam to satisfactorily reinforce wallboard formed into a liner, so the wallboard can stand alone to form the wall. Wallboard sheets, generally formed of gypsum between outer paper layers, are relatively fragile, and fracture or buckle easily when subject to bending. In using a T-beam as a stiffener member affixed to the wallboard and attached to a back wall, the web of the beam is kept aligned by the bulb of the T-beam and the flanges, so that any bending forces impacted by or against the wallboard, are resisted by the web of the beam.

[0014] In one embodiment of the invention, the T-beams are joined by horizontal struts that extend through the T-beam vertical stiffeners, and are braced from the back wall, which can be a structural or partition wall. The flanges of the T-beam vertical stiffeners are secured to the wallboard sheets with self-tapping screws, as disclosed in the '098 patent.

[0015] In another embodiment of the invention, the horizontal struts are not used. The T-beam vertical stiffeners act individually on the wallboard to keep the wallboard vertically erect without buckling. The T-beam vertical stiffeners are not tied together by a strut, but rather, as vertical stiffeners, act individually to keep the wallboard sheets vertically aligned in the plane of the wall.

[0016] Individual T-beam vertical stiffeners are tied into the back wall with an L-shaped bracket adjustable to compensate for a back wall that may have a varying surface contour. These brackets primarily tie the wall liner horizontally to the back wall through the T-beam vertical stiffeners, without vertically supporting the wall, since the liner is primarily self-supporting vertically, provided the wall remains straight, and does not buckle. The brackets may be placed on the T-beam vertical stiffeners at varying vertical heights, and generally concentrated where best suited to tie the wall liner to the back wall.

[0017] In both embodiments of the invention, the wallboard itself, reinforced by the T-beams acting as vertical stiffeners, forms a self supporting wall.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING

[0018] FIGS. **1** through **7**A are directed to a first embodiment of the invention.

[0019] FIG. **1** is a perspective view of the first embodiment of the invention, with elements, including most of the wallboard, broken away.

[0020] FIG. **1**A is a perspective view, similar to FIG. **1**, with portions of sheets of wallboard in place.

[0021] FIG. **2** is a sectional view taken on the line **2**-**2** in FIG. **1**.

[0022] FIG. **3** is a front plan view of the embodiment of FIGS. **1** and **2** before the T-beams, acting as vertical stiffeners, are attached to the wallboard sheets.

[0023] FIG. **4** is a partial perspective view, with elements broken away, to show a rolled T-beam vertical stiffener attached to a wallboard sheet, and to a bottom track.

[0024] FIG. **5** is a sectional view taken on the line **5-5** of FIG. **1**, showing a T-beam vertical stiffener supported in a bottom track.

[0025] FIG. **6** is a perspective view similar to FIG. **1** showing the T-beam vertical stiffeners, positioned against a structural wall.

[0026] FIG. **7** is a view similar to FIG. **2**, taken on the line **7-7** in FIG. **6**, showing the T-beam vertical stiffeners, extending along the structural wall.

[0027] FIG. **7**A is an enlarged view of the circled area in FIG. **7**.

[0028] FIGS. **8** through **12** are directed to the second embodiment of the invention.

[0029] FIG. **8** is a perspective view, similar to FIG. **1**, showing the second embodiment of the invention.

[0030] FIG. **9** is a perspective view of a bracket of the invention secured to the back wall and to the bulb of a T-beam vertical stiffener.

[0031] FIG. **10** is a sectional view showing a bracket of the invention used to compensate for a varying contour in a back wall.

[0032] FIG. **11** is an enlarged sectional view of a bracket of the invention, similar to (d) in FIG. **10**, taken on the line **11-11** of FIG. **9**.

[0033] FIG. **12** is an enlarged sectional view taken on the line **12-12** of FIG. **9**.

DETAILED DESCRIPTION OF THE INVENTION

[0034] Wall liner **10** is intended to stand in front of a vertical back wall **20** between an upper ceiling **21** and a lower floor **22**, as seen in FIGS. **1**, **6**, and **8**.

[0035] The back wall **20** may be a structural wall, above or below ground level, of, for instance, poured concrete or concrete block, or back wall **20** may be any other form of wall, such as a partition wall.

[0036] Wall liner **10** has a front face of wallboard, also known as drywall sheets **33** that extend vertically from floor **22** to ceiling **21**.

[0037] Prior art wall liners are generally built with stand-alone wood, or U-shaped metal channels, that act as columns, or studs. With wood of rectangular cross section, the greater length of the section, and with channels, the base of the U, extends perpendicularly to the plane of the wall liner **10**. In the prior art, the sheets **33** of wallboard are attached to the columns, or studs, by nails or screws. The columns, or studs, stand vertically alone, unattached to the back wall. The columns, or studs, are stiff and rigid enough, by virtue of the thickness of the wood stud, or, of the U cross section of metal stud, which is formed of relatively thick metal, to withstand the vertical forces imparted to the studs by the weight of the wallboard sheets, as well as horizontal forces that impact against the liner. Such columns, or studs, can also withstand the forces exerted when the nails or screws holding the wallboard are being secured to the stud.

[0038] In effect, a prior art wall liner is a separate stand-alone wall built in front of a back wall, with wallboard sheets secured to vertically extending structural columns, or studs, that support the sheets.

[0039] In the present invention, prior art T-beams of the type disclosed in the '098 patent, for suspended ceilings, are used not as horizontal beams that carry the weight of the wallboard forming a horizontal suspended ceiling, but rather are used as vertical stiffeners attached to, and bracketed from, a back wall, in a vertical wall liner.

[0040] In a wall liner **10** using such T-beam vertical stiffeners **23**, the weight of the wall liner **10** rests primarily on the floor **22** under the wall. The function of the T-beam vertical stiffener **23** of the invention is to keep the sheets of wallboard **33** in the wall liner **10** vertically erect without buckling. The T-beam vertical stiffeners **23** also tie the sheets of vertically extending wallboard **33** together at their vertical edges, with self-tapping screws **32**, and reinforce the vertically extending wallboard sheets **33** against horizontal forces.

[0041] A T-beam vertical stiffener **23** is tied to the back wall **20** for horizontal support.

[0042] Although such a T-beam vertical stiffener **23** is much lighter per length than a comparable length of prior art stud, such as a U-channel section, and although much more subject to buckling than a stud when acting as a column, such a T-beam vertical stiffener **23**, when secured to the structural wall, is adequate to stiffen the wallboard to form a suitable wall liner **10**.

[0043] The present invention involves the new use of a prior art rolled T-beam, as a vertical stiffener **23** in a wall liner **10**.

[0044] The T-beam vertical stiffeners **23** are formed by passing an endless strip of sheet metal successively through rolling stations that fold the strip into a cross section having a bulb **25**, a web **26** depending from the bulb **25**, and a pair of flanges **27** extending oppositely from web **26**.

[0045] The flanges **27** generally have indentations **31** that capture a self-tapping screw **32** which passes through a wallboard sheet **33** to secure the wallboard sheet **33** to the flanges **27** of the T-beam. Such indentations are disclosed in the '098 patent, as used in horizontal suspended ceilings.

[0046] The T-beam vertical stiffeners **23** are positioned close to back wall **20** as seen in FIGS. **2** and **8**, or against the back wall **20**, as seen in FIG. **7**. The T-beam vertical stiffeners **23** are anchored at the bottom in floor track **35**, and the top in ceiling track **36**.

[0047] The tracks **35** and **36** are formed of a U-shaped channel of sheet metal having in cross section, a shorter arm **37** and a longer arm **38**, and a base **40**. The base **40** is secured at **39** to the floor **22** and at **44** to the ceiling **21** along the back wall **20**, and the T-beam vertical stiffeners **23** are locked into the tracks **35** and **36** by means of locking tabs **41** that are spaced, as seen particularly in FIG. **5**, to capture the bulb **25** of T-beam vertical stiffener **23** in arm **38**, and the flanges **27** in arm **37**. The tabs **41** are pierced from the arms **37** and **38**, and have sloping sides that permit the T-beam vertical stiffener **23** to be maneuvered and locked into place in the tracks **35** and **36**.

[0048] The tabs **41** are placed along the tracks **35** and **36** to provide suitable spacing, for instance, 16 inches between the T-beam vertical stiffener **23** centers. The tabs **41** on the top **36** and bottom **35** tracks are in vertical registry with each other.

[0049] The T-beam vertical stiffeners **23** during insertion into the tracks **35** and **36**, engage the sloping sides of the locking tabs **41** of the tracks **35** and **36** and flex the arms **37** and **38** of the tracks **35** and **36** outward to permit the T-beam vertical stiffeners **23** to be forced into place.

[0050] In the first embodiment of the invention disclosed herein, the T-beam vertical stiffeners **23** have openings **42** spaced vertically in the webs **26**. The openings **42** have a larger upper portion **45**, which is roughly rectangular, and a smaller bottom portion **46**, which is U-shaped.

[0051] A strut **50** having a U-shaped cross section corresponding to the shape of the lower portion **46** of opening **42**, that has been maneuvered through the larger opening **45**, engages the bottom portion **46** in a force fit, as shown particularly in FIGS. **2**, **7** and **7**A. The struts **50** may be spliced together longitudinally with a splice plate **51**, using pretapped holes in the strut **50** and plate **51**.

[0052] The strut **50**, which in the embodiment shown, has a cross section of an inverted U, reinforces each of the T-beam vertical stiffeners **23**, from back wall **20**.

[0053] Angle shaped brackets **57**, spaced along strut **50**, are anchored into back wall **20** with suitable fasteners, such as hardened nails **61**, and are secured to strut **50** by screws **62**. The brackets **57** may have a relatively long arm **63**, such as seen in FIG. **2**, where the wall liner **10** is set away from the back wall **20**, or may have a shortened arm **64**, as seen in FIG. **7** and **7**A, where the wall liner **10** is against the back wall **20**.

[0054] In the second embodiment of the invention disclosed herein, struts **50** are not used, so that the T-beam vertical stiffeners **23** are not tied together, except at the top track **36** and bottom track **35**, where they engage the tracks. Brackets **70** tie an individual T-beam vertical stiffener **23** to the structural wall **20** in back of the wall liner **10**, at any desired vertical location on the T-beam vertical stiffener **23**. The bracket **70** is L-shaped and has a first longer leg **71** and a second shorter leg **72**.

[0055] An example of leg length may be 4% inches for the longer leg **71**, and 1½ inches for the shorter leg **72**. The legs **71** and **72** have holes **75** spaced in the legs at desired locations which provide for adjustability of the bracket **70**. Where a structural back wall **20** varies in contour, a bracket **70** is adjusted to provide a solid connection between the structural back wall **20**, and the T-beam vertical stiffener **23**.

[0056] Examples of such adjustability are shown in FIG. **8**, where in views (a) and (b), the shorter leg **72** extends from the wall **20**, whereas in views (c) and (d), the longer leg **71** extends from the wall **20**.

[0057] As seen in FIGS. **8** through **12**, self-tapping screws **74** are used to attach the bracket **70** to the bulbs **25** of the T-beam vertical stiffener **23**, as shown. The bracket **70** is secured to the structural wall **20**, for instance, by hardened nails **77** driven into the wall **20**, or by self-tapping screws **78**.

[0058] The bracket **70** of the second embodiment of the disclosed invention provides numerous adjustments, as shown, to tie the individual T-beam vertical stiffeners **23** to the back wall **20**, while maintaining the flanges **27** of the T-beam vertical stiffener **23** in a flat vertical plane, so that the surface of the attached wallboard **33** also extends in a vertical plane.

[0059] The brackets **70** can be readily attached to the T-beam vertical stiffeners **23** and the structural wall **20** from in front of the T-beam vertical stiffeners **23**, before sheets of wallboard **33** are attached to the T-beam vertical stiffeners **23**.

[0060] The wall liner **10** is completed by securing the wallboard sheets **33** to the T-beam vertical stiffeners **23**. The wallboard sheets **33** register with the T-beams **23** at the vertical edges **80** of a sheet **33**, as shown in FIG. **1**A.

[0061] The sheets **33** are secured to the flanges **27** of the T-beam vertical stiffener **23**, at the edges **80** of sheet **33**, as well as optionally within the sheet **33** as at **81**, with self-tapping screws **32**, which enter indents **31**, where they pierce and are screwed into a flange **27** of T-beam vertical stiffener **23**, as seen in the '098 patent.

[0062] The T-beam vertical stiffeners **23**, anchored at the bottom and top in tracks **35**, **36**, and braced against wall **20** by brackets **57** as disclosed in the first embodiment, or by brackets **70**, as disclosed in the second embodiment of the invention, primarily keep the wallboard sheets **33** of the wall liner **10** vertically aligned, without buckling, with substantially all the weight of the wallboard **33** borne directly by the floor under the liner, rather than indirectly through studs, as in prior art liners.

[0063] Whereas the function of the prior art studs was to carry the weight of the wallboard sheets, in the present invention, the function of a T-beam **23** is to act as a vertical stiffener to keep the sheets **33** aligned and together. By tying T-beam vertical stiffeners to the back wall **20**, the T-beam stiffeners **23** also serve to resist horizontal forces exerted against the wall liner **10**, such as by bumps, or by matter resting against the wall.

1. In a method of constructing a vertical wall liner formed of sheets of wallboard (**33**), in front of a back wall (**20**),

the improvement comprising

using prior art rolled T-beams having a cross section with

a) a bulb (**25**),

b) a web (**26**) extending from the bulb, and

c) flanges (**27**) extending laterally from the bulb (**25**),

as vertical stiffeners on the wall liner (**10**) that

a) keep the wallboard (**33**) of the wall liner (**10**) vertically aligned, and

b) reinforce the wall liner (**10**) horizontally, to prevent buckling,

with the T-beam vertical stiffeners reinforced by brackets secured to the back wall.

2. The method of claim **1**, wherein the T-beam vertical stiffeners (**23**) are spaced and secured in an upper (**36**) and a lower (**35**) track, and the sheets of wallboard (**33**) are then attached to the flanges (**27**) of the T-beam vertical stiffeners (**23**) with self-tapping screws (**32**).

3. The method of claim **1** wherein the T-beam vertical stiffeners (**23**) are reinforced from the back wall (**20**) by struts (**50**) that extend through the T-beam vertical stiffeners (**23**), and are tied to the back wall (**20**).

4. The method of claim **1** wherein the T-beam vertical stiffeners (**23**) are reinforced from the back wall (**20**) by brackets (**57**,**70**).

5. The method of claim **4** wherein the brackets (**57**,**70**) are adjusted to compensate for variations in the contour of the back wall (**20**).

6. In a vertical wall liner formed of sheets of wallboard (**33**), extending in front of a back wall (**20**),

the improvement comprising

prior art rolled T-beams having a cross section with

a) a bulb (**25**),

b) a web (**26**) extending from the bulb, and

c) flanges (**27**) extending laterally from the bulb (**25**),

that form vertical stiffeners on the wall liner (**10**) that

a) keep the wallboard (**33**) of the wall liner (**10**) vertically aligned, and

b) reinforce the wall liner (**10**) horizontally, to prevent buckling,

with the T-beam vertical stiffeners reinforced by brackets secured to the back wall.

7. The wall liner of claim **6**, wherein the T-beam vertical stiffeners (**23**) are spaced and secured in an upper (**36**) and a

lower (**35**) track, and the sheets of wallboard (**33**) are attached to the flanges (**27**) of the T-beam vertical stiffeners (**23**) with self-tapping screws (**32**).

8. The wall liner of claim **6** wherein the T-beam vertical stiffeners (**23**) are reinforced from the back wall (**20**) by struts (**50**) that extend through the T-beam vertical stiffeners (**23**), and are tied to the back wall (**20**).

9. The wall liner of claim **6** wherein the T-beam vertical stiffeners (**23**) are reinforced from the back wall (**20**) by brackets (**57**,**70**).

10. The wall liner of claim **9** wherein the brackets (**57**,**70**) are adjustable to compensate for variations in the contour of the back wall (**20**).

* * * * *