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(54) STRUCTURAL WALL COMPONENT

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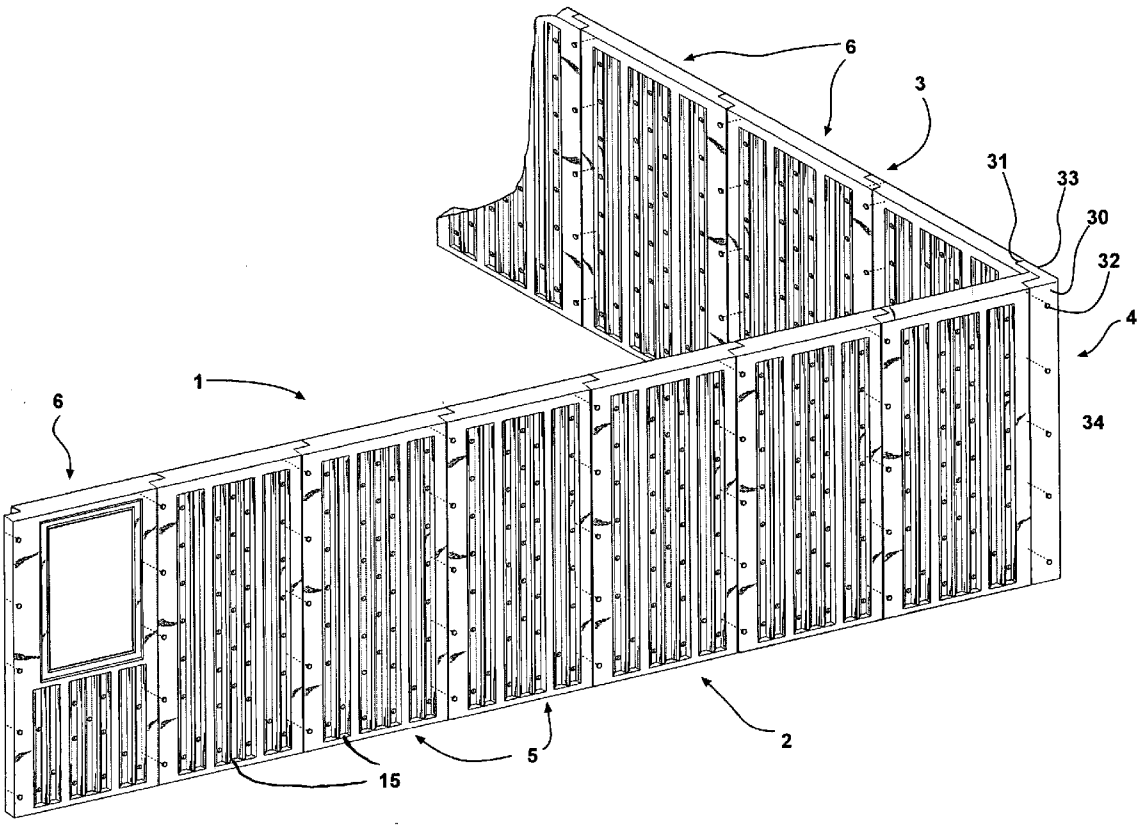
(57) **ABSTRACT**

A structural component for use in constructing a basement wall has two confronting panels of thermoplastic material joined together to form a closed chamber filled with a rigid structural foam. The width of the chamber is spanned by a plurality of indentations formed in the confronting panels and which are fused to one another to inhibit movement of the panels toward and away from one another. At the opposite sides of the component are joint-forming members which react with similar members of an adjacent component to secure the adjacent components to one another to form an upright wall section.



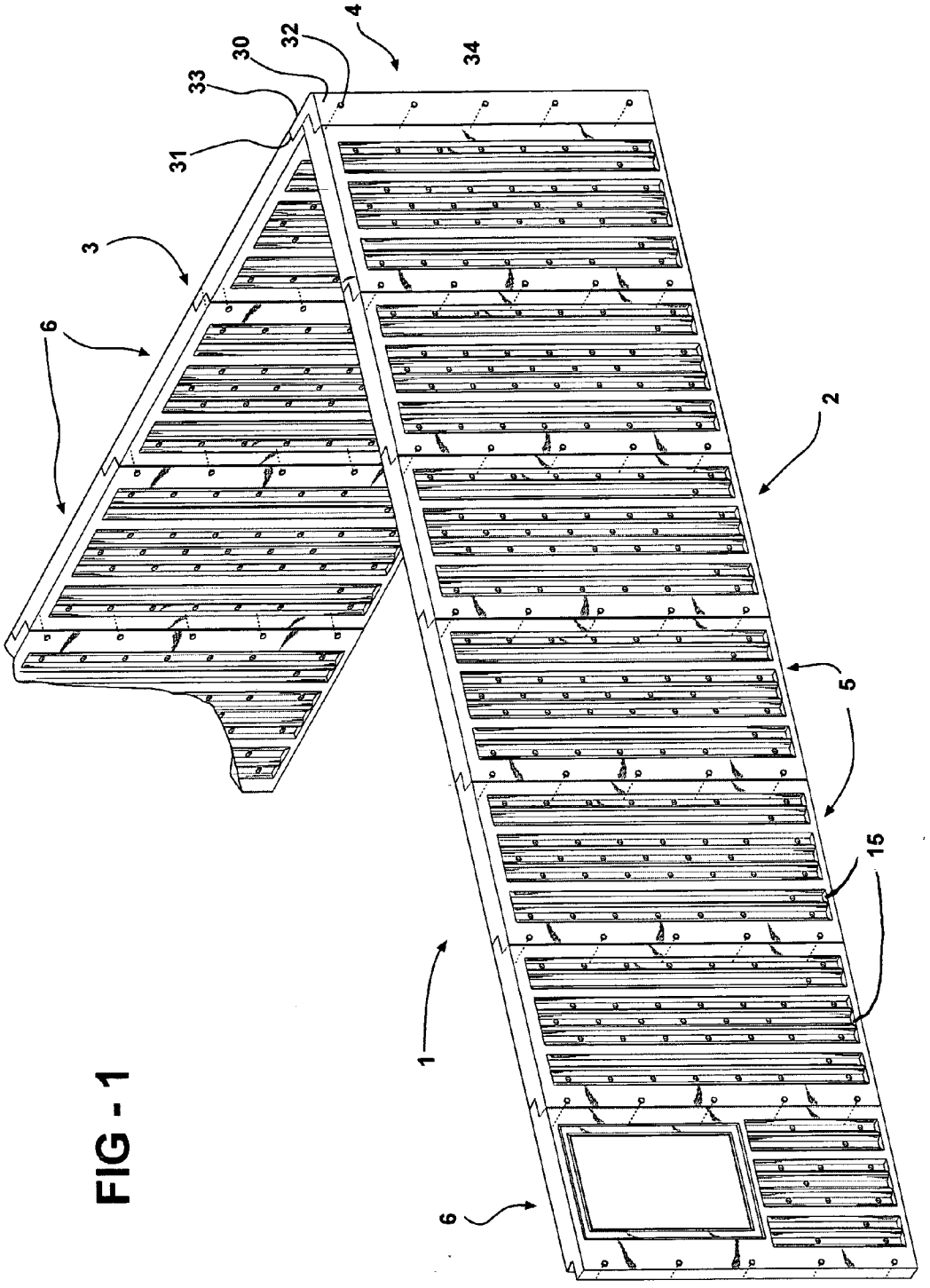


FIG - 1

FIG - 2

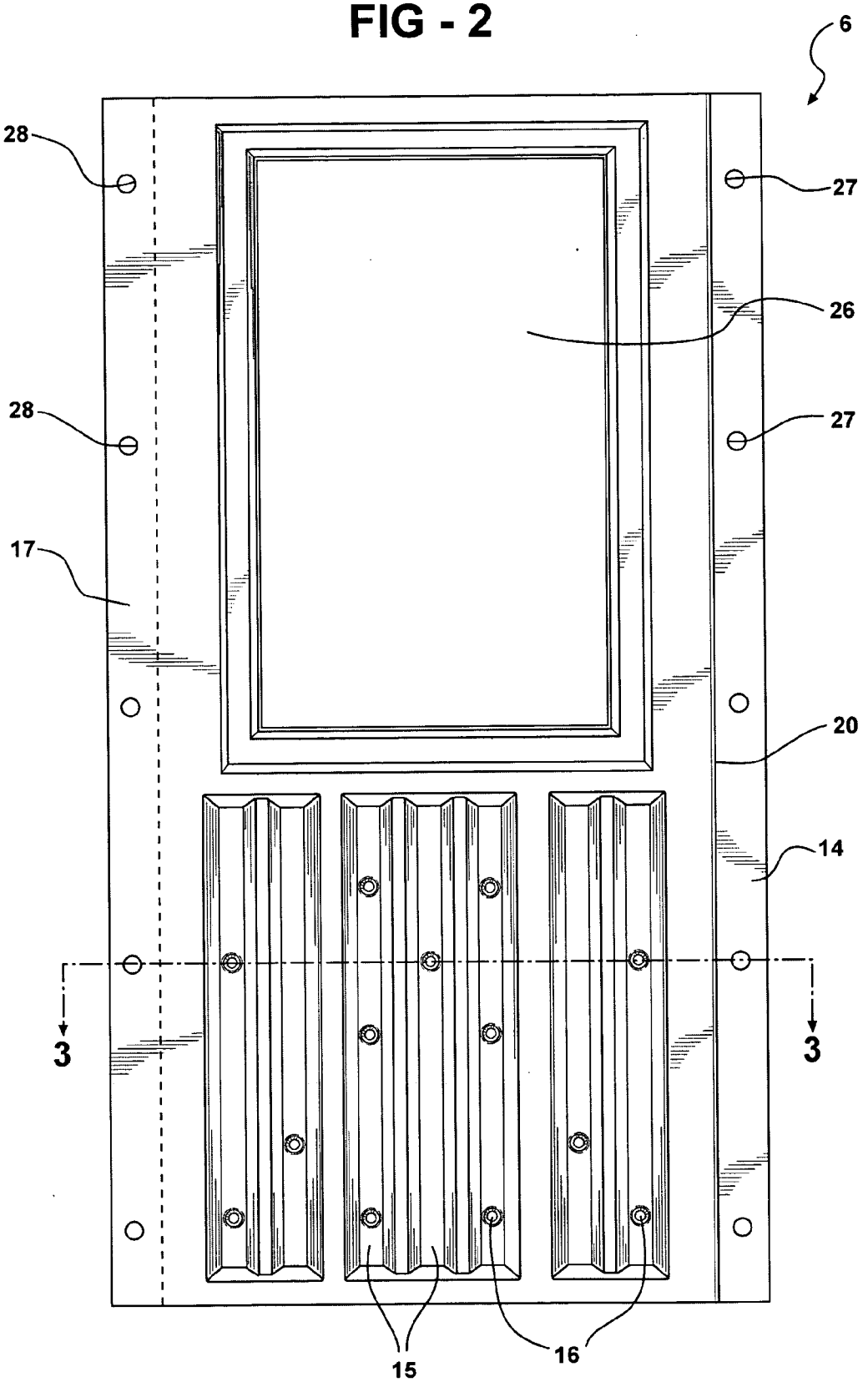


FIG - 3

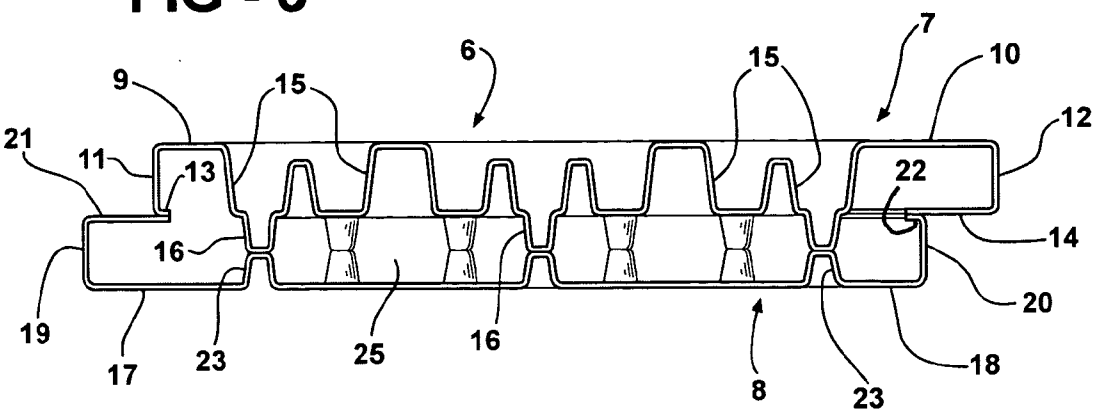

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FIG - 11

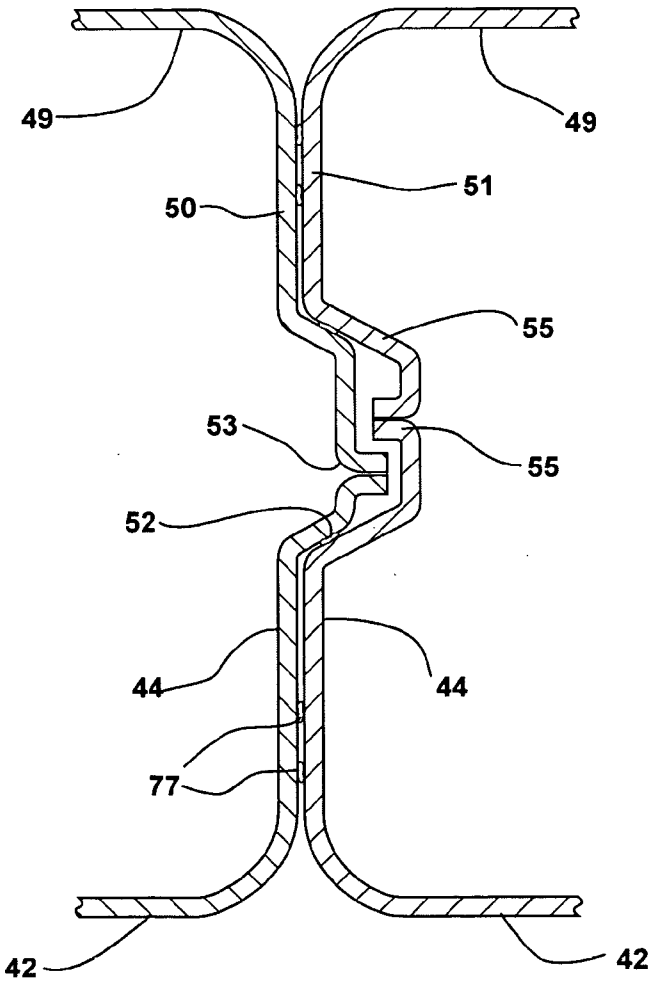
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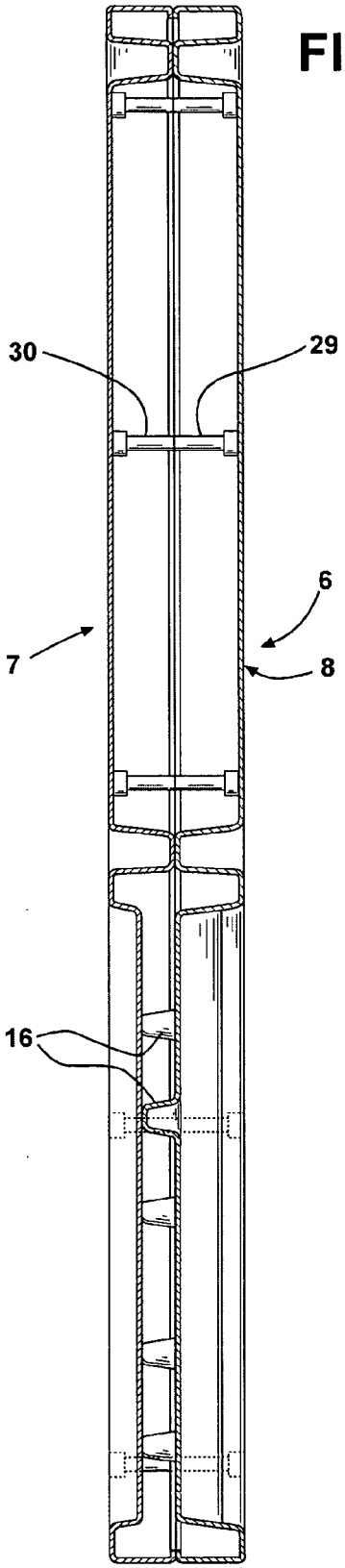
FIG - 4



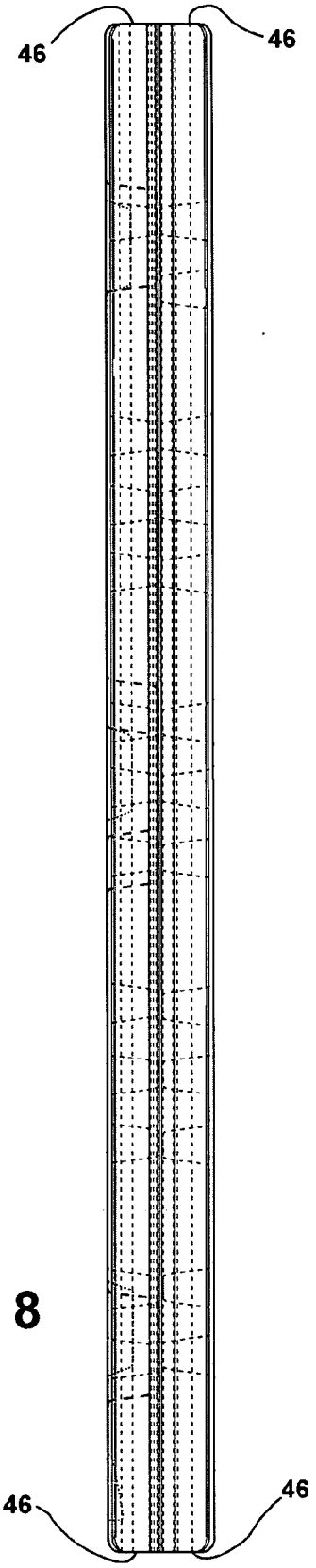


FIG - 8

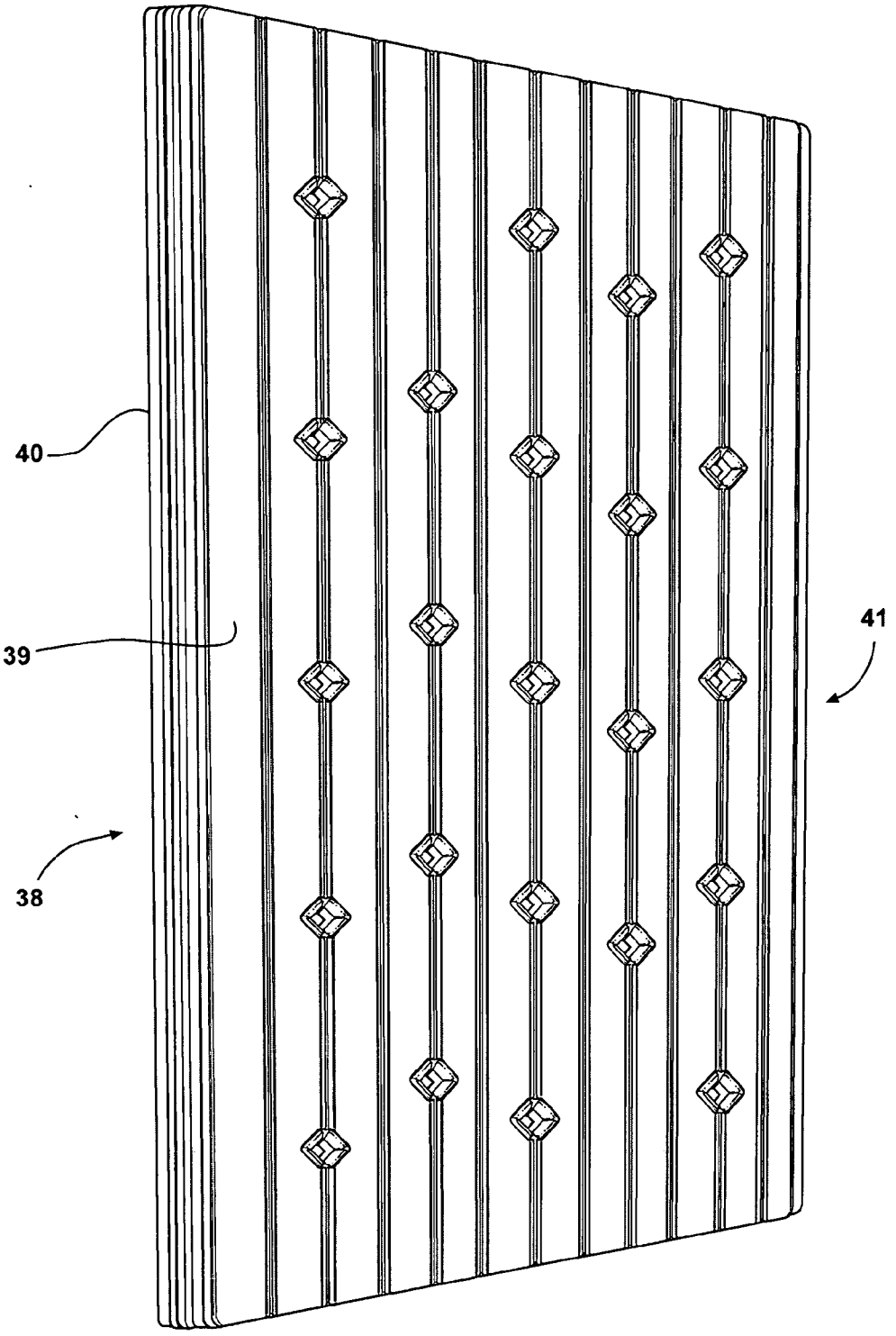


FIG - 5

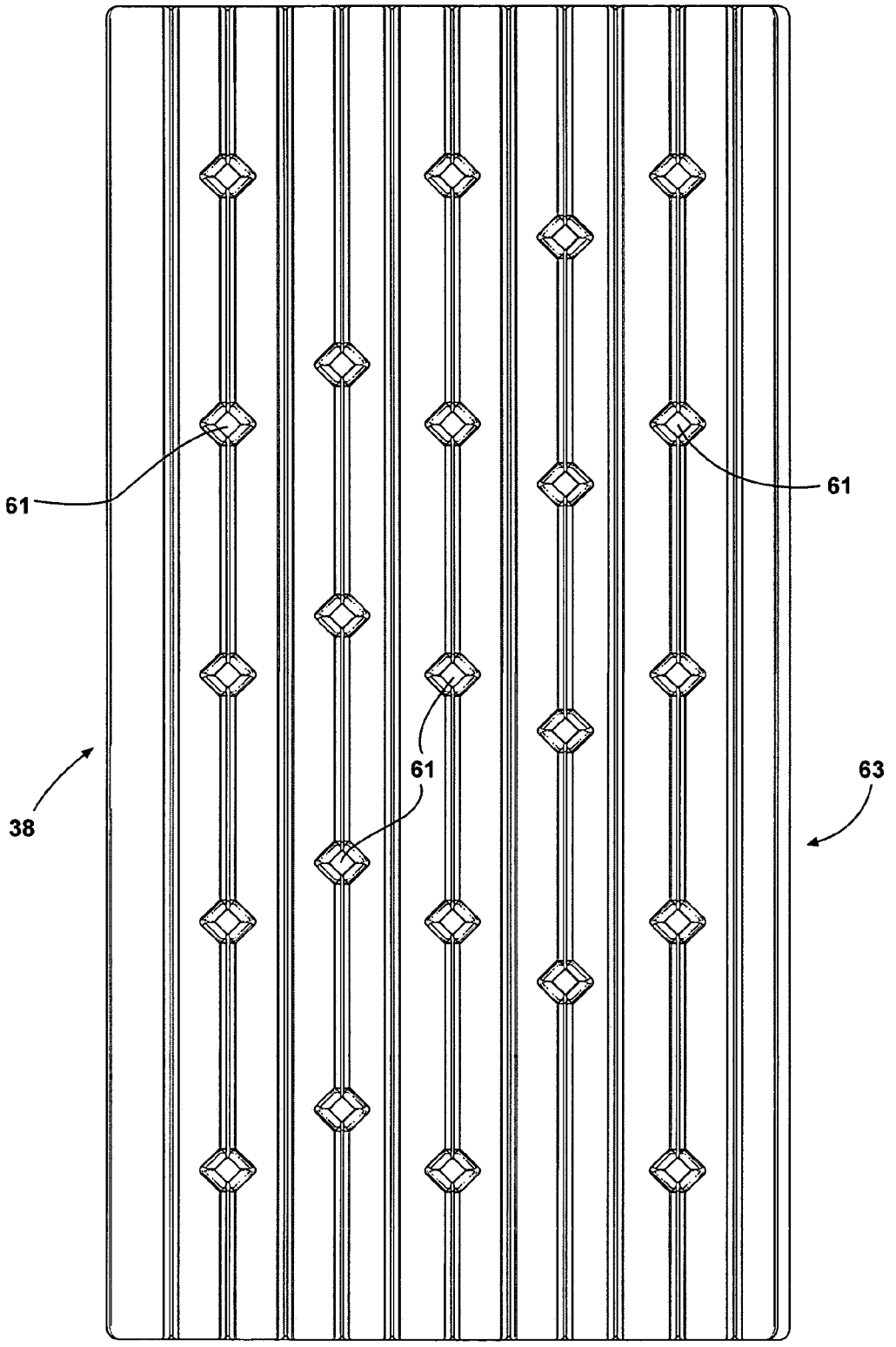
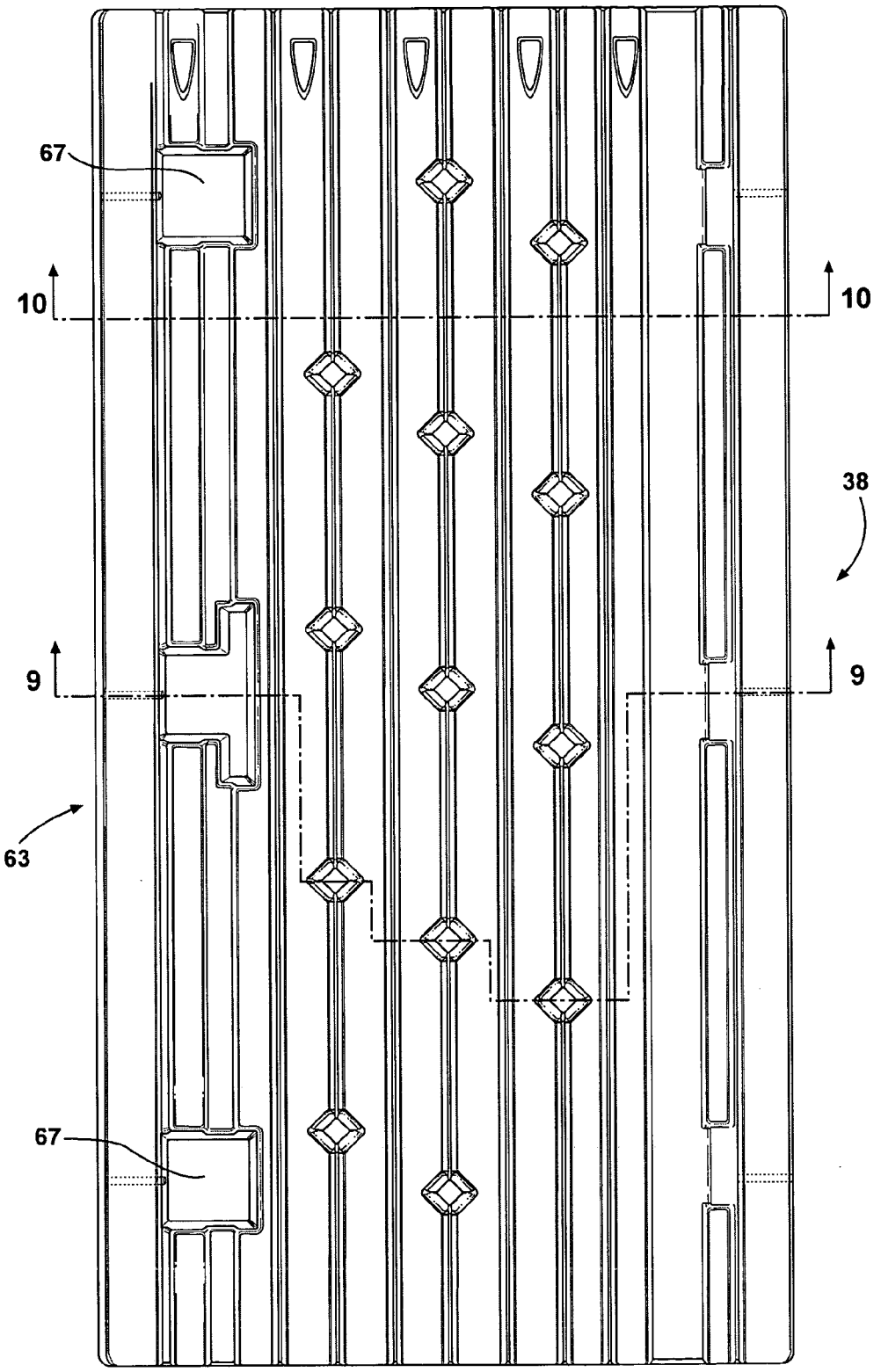


FIG - 6



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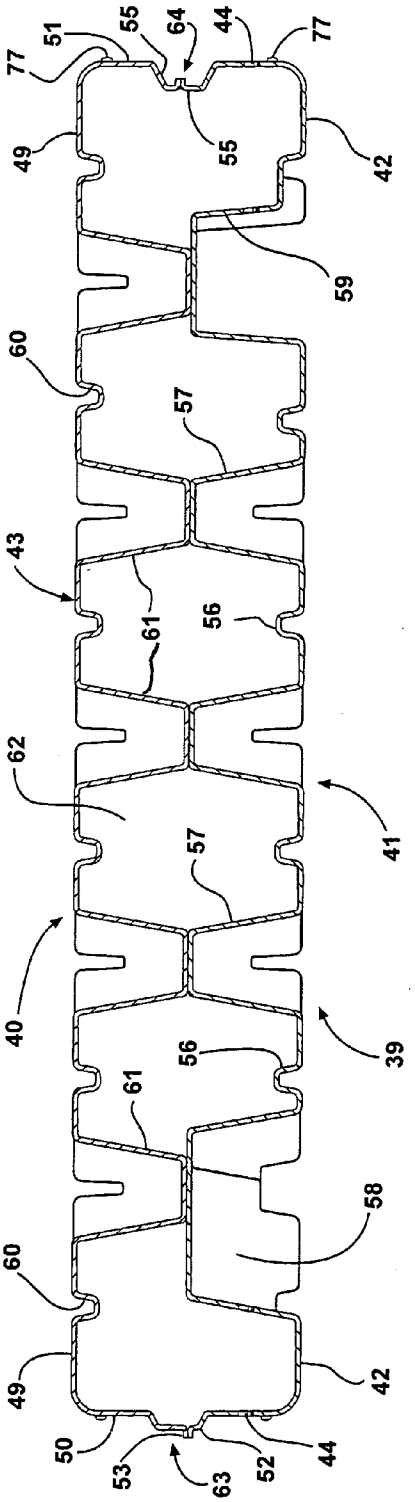
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FIG - 9

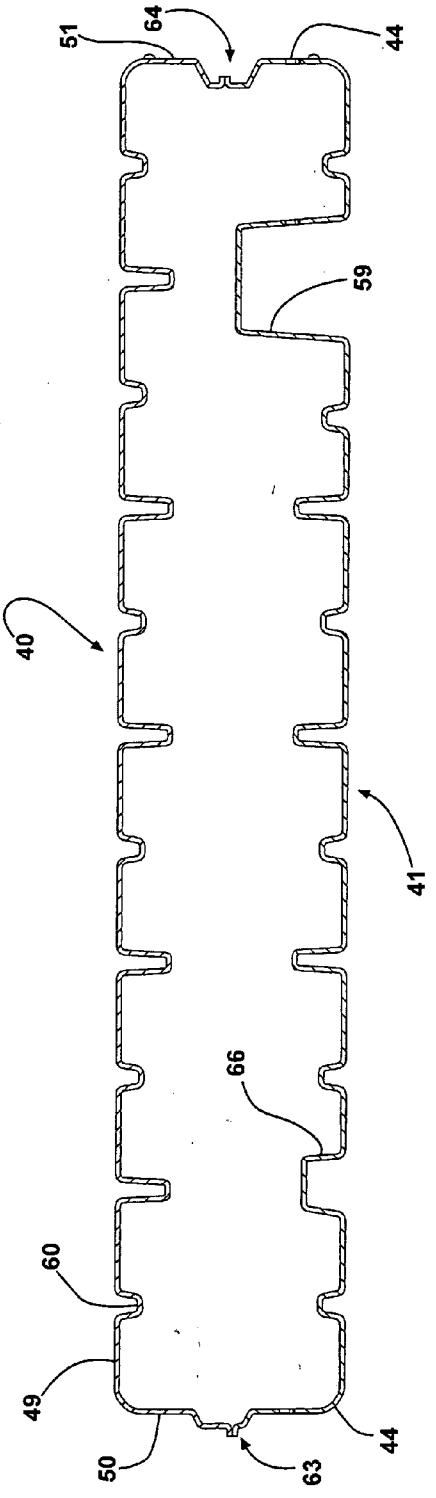
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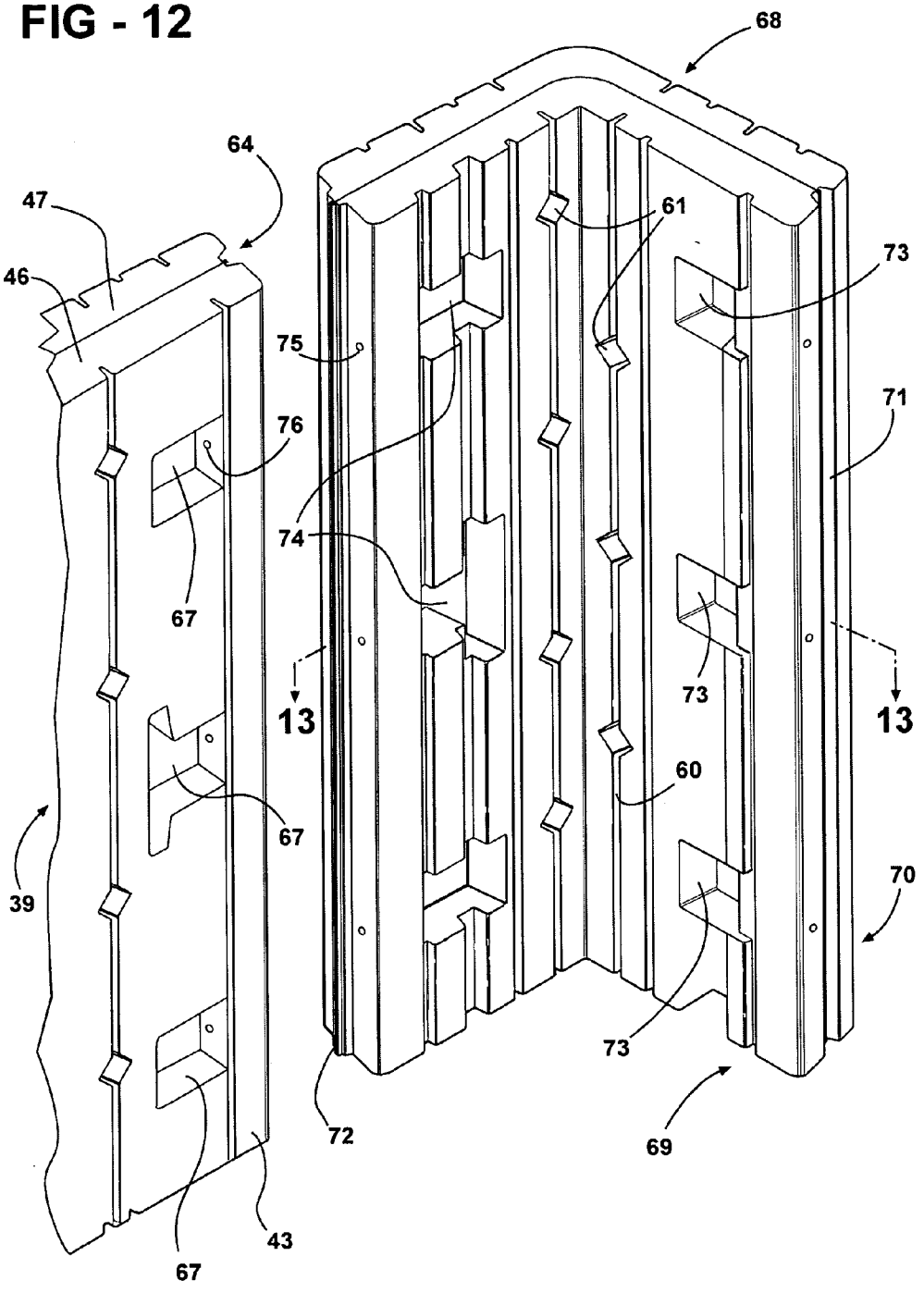
FIG - 10

FIG - 12



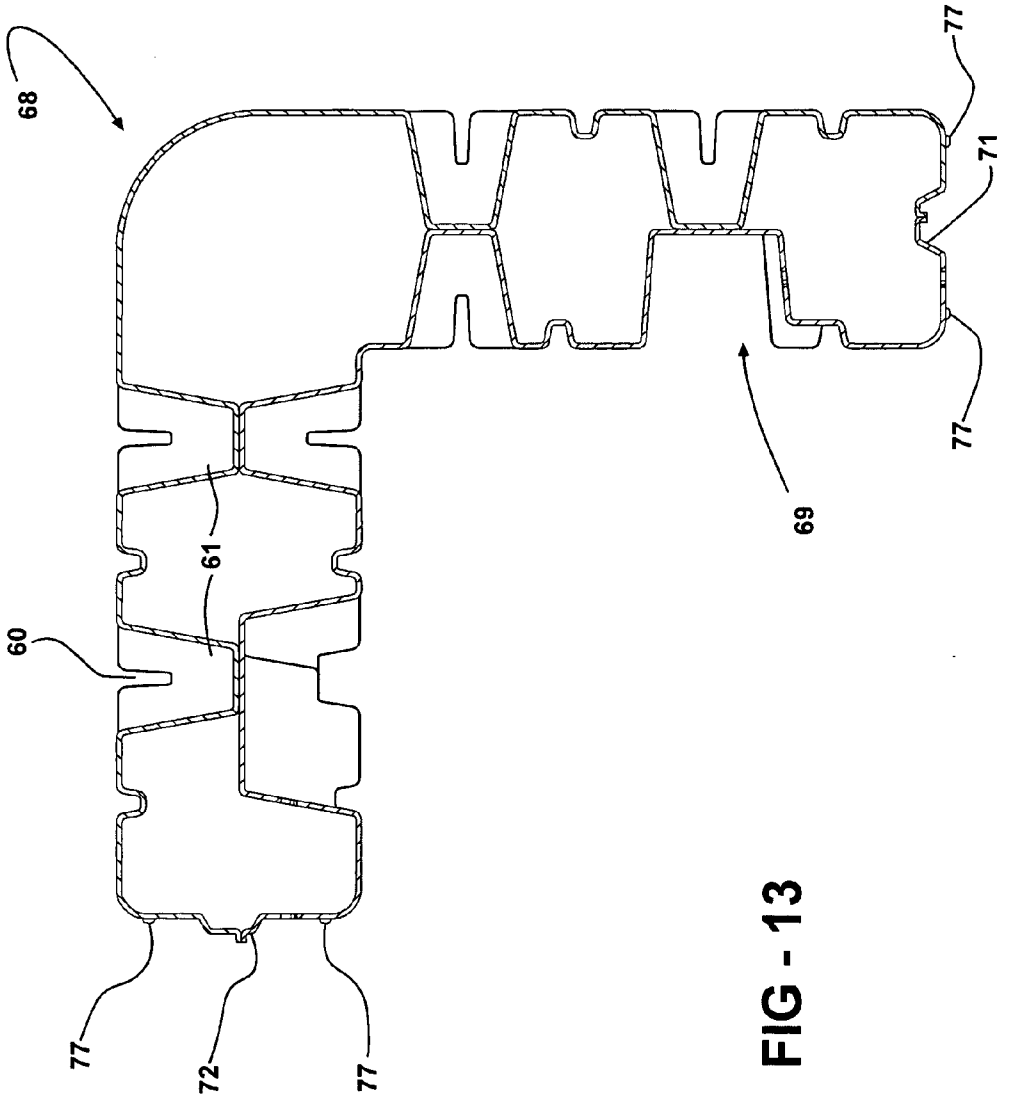


FIG - 13

STRUCTURAL WALL COMPONENT

[0001] This invention relates to a structural wall component of the kind which may be used in conjunction with similar components to erect a structural wall such as the wall of a basement.

BACKGROUND OF THE INVENTION

[0002] There are many kinds of structural components which may be used in the construction of a foundation or basement wall. Among these are poured concrete slab-like panels or entire walls, concrete blocks, bricks, and panels formed of combinations of materials designed to have thermal insulating properties and resistance to penetration by water. Not all of the structures heretofore formed of combinations of materials have been satisfactory, however, for a number of reasons. Among these are the difficulties in manufacture and installation, the lack of adequate strength to provide proper support for a super-structure, a lack of waterproofness, and excessive costs.

[0003] An objective of the invention is to provide a structural component which can be used in the construction of a foundation or basement wall and which overcomes or greatly minimizes the problems referred to above.

SUMMARY OF THE INVENTION

[0004] A structural component especially adapted for use in the construction of a foundation or basement wall comprises a pair of confronting body members or sheets joined to one another in such manner as to form a chamber filled with a rigid foam. Each of the confronting body members has its marginal edges configured to be joined to the marginal edges of the companion body member and thereby together form the chamber. The material from which the body members is formed is a thermoplastic capable of being vacuum formed by conventional vacuum forming machinery, the two body members being fused to one another so as to form a sealed juncture therebetween. At spaced intervals each of the body members has indentations formed therein which extend toward and engage and are fused with similar indentations in the companion panel so as to prevent movement of the confronting panels either toward or away from one another. The chamber formed by the two confronting panels of each component is filled with a rigid foam which provides structural strength and thermal insulation.

[0005] The component formed by the body members and foam is installed in an upright position with its lower edges atop a base and its side edges adjoining and secured to the side edges of adjacent components. The joint between adjacent components is such as to provide structural rigidity and a moisture barrier between adjacent body members.

[0006] Structural components formed in accordance with the invention may be molded in such manner as to accommodate openings for doors, windows, and ducts of various kinds if desired.

[0007] In the construction of a wall composed of a plurality of the individual components, such components are placed side by side to form a wall section of desired length. At the end of the wall section a corner member or component is placed adjacent the endmost wall component so as to enable another wall section extending in a different direction to be connected to the endmost component of the first wall section. The corner members embody the same principles as the components referred to earlier, but are smaller in width and are used for the purpose of joining together two wall sections extending in different directions from the corner member.

THE DRAWINGS

[0008] Apparatus constructed in accordance with preferred embodiments of the invention are illustrated in the accompanying drawings wherein:

[0009] **FIG. 1** is a fragmentary, isometric view of a wall formed from a plurality of components constructed in accordance with one embodiment of the invention;

[0010] **FIG. 2** is an enlarged, elevational view of one of the components shown in **FIG. 1**;

[0011] **FIG. 3** is a horizontal sectional view taken on the line **3-3** of **FIG. 2**;

[0012] **FIG. 4** is a vertical sectional view of the component shown in **FIG. 2**;

[0013] **FIG. 5** is an isometric view of another embodiment of a component;

[0014] **FIG. 6** is a front elevational view of the component shown in **FIG. 5**;

[0015] **FIG. 7** is a rear elevational view of the component shown in **FIG. 6**;

[0016] **FIG. 8'** is a side elevational view of the component shown in **FIG. 7**;

[0017] **FIG. 9** is a sectional view taken on the line **9-9** of **FIG. 7**;

[0018] **FIG. 10** is a sectional view taken on the line **10-10** of **FIG. 7**;

[0019] **FIG. 11** is a fragmentary, greatly enlarged view of a joint between two adjacent components;

[0020] **FIG. 12** is a isometric view of a corner member of the kind adapted for use in conjunction with components of the kind shown in **FIG. 5**; and

[0021] **FIG. 13** is a transverse sectional view taken on the line **13-13** of **FIG. 12**.

THE PREFERRED EMBODIMENTS

[0022] **FIG. 1** illustrates a wall **1** having two lineal sections **2** and **3** extending at a right angle to one another and joined at their confronting ends by a corner component **4**. The wall sections **2** and **3** are formed from one or more window-forming components **5** and a plurality of identical components **6** which differ from the components **5** in a manner which will be explained hereinafter.

[0023] The lower half of the components **5** and each of the components **6** is the same and, as is best shown in **FIG. 3**, comprises first and second body members or panels **7** and **8** which initially are in the form of planar sheets of a suitable thermoplastic material capable of being vacuum molded to the desired configuration such as is shown in **FIG. 3**. The panel **7**, for example, has marginal, coplanar, flat surfaces **9** and **10**, respectively, provided with right angular walls **11** and **12** and reversely turned flanges **13** and **14**. Between the

surfaces **9** and **10** are formed a plurality of rigidifying grooves **15**, as shown in **FIG. 1**, selected ones of which have indentations **16** which project beyond the bottoms of the grooves **15**. The panel **8** has planar marginal surfaces **17** and **18** provided with side edges **19** and **20**, respectively, which terminate in flanges **21** and **22**. The panel **8** also has rigidifying, indented grooves **23** provided which are of uniform depth and are spaced according to the spacing of the indentations **16**. The bases of the indentations **23** confront and bear against the bases of the indentations **15** and are adhered or bonded thereto. Further, the flange **13** overlies and is adhered to the flange **21** and the flange **14** overlies and is adhered to the flange **22**.

[**0024**] As is apparent from **FIG. 3** the configurations of the panels **7** and **8** are somewhat different, but they may be placed in confronting engagement so that, when secured to one another, the flanges **14** and **21** are at opposite sides of each component and form lateral projections which form a shiplap joint when one component **5** is placed alongside and adjacent to a corresponding component as is shown in **FIG. 1**.

[**0025**] In a typical vacuum forming process a planar sheet having a thickness of 0.125-0.250 inch is placed in a mold having a form corresponding to that which the panel **7** or **8** ultimately is to assume. The sheet is heated so as to become pliable and tacky and then subjected to a vacuum by means of which the various recesses, grooves, indentations, and the like may be formed in the heated sheet so as to form either the panel **7** or the panel **8**. Following the heating and formation of the two panels they are placed in overlying, confronting relation and moved into engagement with one another while tacky and then allowed to cool. The engaged surfaces of the two panels thus will fuse and bond to one another, thereby forming a shell having an interior chamber **25**. The joined panels **7** and **8** then may be removed from the mold and subjected to a known, conventional process in which the chamber **25** is filled with a rigid, structural foam having closed cells.

[**0026**] The material from which the panels **7** and **8** are formed may be any one of a number of suitable formable, waterproof, rigid plastics, such as ABS (acrylonitrile-butadiene-styrene), PVC (polyvinyl-chloride), or any other suitable, readily available thermoplastic material having the desired characteristics of structural strength, resistance to chemicals and corrosion, water resistance, and fire resistance. The material forming the foam also may be any one of a number of a rigid, foam materials such as urethane, polyethelene, or polystyrene which may be foamed in place within the chamber **25** by conventional foaming procedures.

[**0027**] As is apparent from **FIGS. 1 and 3** the forming of the grooves **15** and **16** provides longitudinally extending ribs which rigidify the component **5** and provide reinforcement against buckling and bending.

[**0028**] The component **6** is configured similarly to the component **5** with the exception that the component **6** has on open area **26** for the accommodation of a window and window frame (not shown).

[**0029**] The shiplap-forming parts **14** and **18** at one side of each component **5** and **6** are provided with a plurality of vertically spaced openings **27**. The shiplap-forming parts at the opposite side of each component **5** and **6** are provided with a plurality of correspondingly spaced openings **28**. The openings **27** and **28** are so arranged that, when two adjacent components are placed side by side the openings **27** and **28** will register with one another. The openings **27** and **28** are formed during the vacuum forming of the individual members **7** and **8** and include confronting sleeves **29** and **30** which accommodate the shanks of bolts (not shown) provided with suitable washers and nuts (not shown) for the purpose of securing adjacent components **5** or **6** to one another and without having to bore through the foam which completely fills the chamber **25**.

[**0030**] To construct a wall from the components **5** and **6** a basement is excavated and a peripheral trench dug for the accommodation of a base of pea gravel, for example. Individual components then have their bottoms supported on the gravel and their confronting shiplap joints secured to one another by bolts which extend through the openings **27** and **28**. Prior to securing adjacent components to one another, beads of a preferably elastomeric caulking may be adhered to the surfaces **11**, **12**, **19**, and **20**, as well as to the surfaces **14** and **21** so as to provide a moisture-tight seal at the confronting sides of the components. The caulking material may be any suitable kind which is waterproof and will adhere to the material from which the components are formed.

[**0031**] The height of the components **5** and **6** may vary according to the height above the basement floor the components should extend. Heights of 8-10 feet normally are satisfactory. The width of each component may vary, but a width of 4 feet is satisfactory.

[**0032**] Components **5** and **6** can be installed in the manner indicated and adjacent one another until such time as the length of the wall formed thereby is satisfactory. To extend the wall in another direction, a corner component **4** is provided to join the adjacent ends of the two wall sections. The component **4** has confronting sheet members **30** and **31** formed of thermoplastic material like that referred to earlier and are formed in a manner similar to that in which the components **5** and **6** are formed so as to provide an interior chamber similar to the chamber **25** and which is filled with the same kind of rigid foam material. The corner components have flanges **32** and **33** which conform to the shiplap construction referred to earlier and which have openings **34** corresponding to the openings **27** and **28** for the accommodation of anchoring bolts (not shown). The flanges **31** and **32** preferably also are provided with beads of caulking material to provide a moisture proof seal between the corner components and the adjacent wall-forming components.

[**0033**] When the basement wall is completed there will be a space between the exterior of the wall and the excavation which was provided in the formation of the basement. This space may be occupied by backfill, i.e., earth which was removed during the excavation of the basement. A concrete or other floor then may be poured to form a basement floor, as is customary. The basement floor and the backfill will provide lateral stability for lower ends of the basement wall.

[**0034**] The embodiment disclosed in **FIGS. 5-11** is similar in most respects to the first-described embodiment, but has certain differences which will be described.

[**0035**] A wall-forming component **38** comprises two thermoplastic sheets **39** and **40** of the kind previously described

and having been formed by conventional thermoforming techniques. As is best shown in **FIGS. 9-11** the sheet **39** forms a first panel **41** terminating at its opposite sides in flanges **42** which are turned to form marginal flanges. The sheet **40** forms a panel **43** having similar marginal flanges **48**. The upper and lower edges of the panels **40** and **41** have flanges **46** (**FIG. 8**) having terminal edges like the flanges **13** and **22** (described earlier). The panel **40** has side edges **49** which are turned to form flanges **50** and **51**. The flanges **44** and **50** have terminal ends **52** and **53**, respectively, which form convex projections which, together form a tongue **63**. The flanges **44** and **51** have concave indentations **54** and **55**, respectively, which, together, form a groove **64**.

[**0036**] The panel **41** has recessed grooves **56** and indentations **57**. The panel **41** is formed with recesses **58** and **59**. The panel **40** has similar recesses **60** and indentations **61** which are in register with the indentations **57** and engage the latter. The indentations **61** adjacent the side edges of the panel **40** engage the bases of the recesses **58** and **59**.

[**0037**] The construction of the sheets **39** and **40** is such that they confront one another and are adhered together in the same manner described earlier, thereby forming a unitary construction which defines a chamber **62** between the sheets or panels **39** and **40**. The chamber is wholly occupied by a rigid foam of the kind described earlier.

[**0038**] As has been indicated the convex projections at one side of the component **39** form a projecting tongue **63** and the concave indentations at the opposite side form a groove **64** of such size as to accommodate the tongue **63** of an adjacent component **39**.

[**0039**] The panels **40** and **41** also have inwardly extending projections **65** and **66**, respectively which form rigidifying ribs.

[**0040**] As is best shown in **FIG. 12** at one side of each component **39** is a plurality of vertically spaced recesses **67** the purpose of which will be explained.

[**0041**] As is best shown in **FIGS. 12 and 13**, the second embodiment of the invention includes a corner component **68** having two thermoplastic panels **69** and **70** confronting one another and, together, forming two sections extending from a center at a right angle. The panel **69** is adhered to the panel **70** in the manner previously explained and has at one side thereof a groove **71** and at the other a projecting tongue **72**. The groove **71** is adapted to accommodate the tongue **63** of an adjacent component **39**, whereas the tongue **72** is adapted to be accommodated in the groove **64** of another adjacent component **39**.

[**0042**] That surface of the corner member **68** which will be at the inside of the basement wall has vertically spaced recesses **73** and **74** which are at the same level as the recesses **67** formed in the adjacent component and in communication with each such recess is an opening **75** in register with an opening **76** for the accommodation of anchor bolts (not shown) of the kind referred to earlier.

[**0043**] To assemble a wall from the structural components shown in **FIGS. 5-13**, a plurality of components **39** are arranged side-by-side in the same manner described in connection with the first embodiment with the tongue **63** of each component accommodated in the groove **64** of the adjacent component. Prior to placing the components in wall-forming positions, beads **77** of caulking material are laid upon the sides of the component to form a moisture proof seal. Preferably, the caulking beads **77** straddle the openings in which the securing bolts are accommodated, thereby avoiding the introduction of moisture to the interior of the components through the bolt openings.

[**0044**] When enough of the components **39** have been assembled to form a wall of the desired length, a corner component **68** may be fitted to the endmost component **39** and secured thereto by anchor bolts which extend through the openings **75**. Again, caulking beads **77** may be applied to the side faces of the corner component so as to form a seal between such corner components and the planar components to which they are joined.

[**0045**] Although the corner components shown in the drawings are right angular, it will be understood that they may have any angular configuration desired.

[**0046**] A wall constructed in accordance with either embodiment of the invention is waterproof, impervious to rot and mold, and has both thermal and acoustical insulating characteristics.

[**0047**] The disclosed embodiments are representative forms of presently preferred forms of the invention, but are intended to be illustrative rather than definitive thereof. The invention is defined in the claims.

I claim:

1. A structural component adapted for use in constructing an upright wall, said component comprising a pair of thermoplastic sheets joined to one another and forming a closed chamber defined in part by spaced apart front and rear panels substantially parallel to each other, each of said panels having therein indentations extending inwardly of said chamber so that at least some of the indentations of one of said panels engage at least some of the indentations of the other of said panels and inhibit relative movement of said panels toward one another; and a rigid foam accommodated in and filling said chamber.

2. The component according to claim 1 wherein each of said components has securing means for securing such component to an adjacent component.

3. The component according to claim 2 wherein said securing means comprises a shiplap joint between adjacent components.

4. The component according to claim 2 wherein said securing means comprises a tongue and groove connection between adjacent components.

5. The component according to claim 1 wherein said some of the indentations of one of said panels are joined to the indentations of the other of said panels thereby inhibiting movement of said panels away from one another.

6. The component according to claim 1 wherein each of said panels is ribbed for rigidification.

7. The component according to claim 1 wherein each of said panels has recesses therein adjacent the sides thereof and openings extending through said recesses for the accommodation of fastening means adapted to fasten one of said components to an adjacent component.

8. The component according to claim 1 wherein each of said panels has side edges which confront and engage corresponding side edges of the other of said panels, said confronting side edges being adhered to each other.

9. The component according to claim 1 wherein each of said some of said indentations of one of said panels is fused to a corresponding indentation of the other of said panels, thereby inhibiting relative movement of said panels away from one another.

10. A structural component adapted for use in constructing an upright wall, said component comprising a pair of thermoplastic sheets confronting one another and terminating at corresponding edges in flanges which extend toward and are joined together thereby forming a hollow chamber of selected width, each of said sheets having a plurality of indentations which are correspondingly located so that the indentations of one of said sheets engage the indentations of the other of said sheets, such engaged indentations having a combined length corresponding to the width of said chamber; and a rigid structural foam filling and occupying said chamber.

11. The component according to claim 10 wherein said component has two sections extending from a center in two different directions.

12. The component according to claim 10 wherein the engaged indentations are secured to one another so as to inhibit movements of said sheets toward and away from one another.

13. The component according to claim 12 wherein said engaged components are fused to one another.

14. The component according to claim 10 wherein said flanges are fused to one another.

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