United States Patent [19]

Cox et al.

[11] **3,908,321**

[45] **Sept. 30, 1975**

[54] **INSTALLATION OF CONDUITS IN PRECAST CONCRETE HOUSING**

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[73] Assignee: **H. B. Zachry Co.,** San Antonio, Tex.

[22] Filed: **July 2, 1973**

[21] Appl. No.: **375,842**

Related U.S. Application Data

[62] Division of Ser. No. 191,505, Oct. 21, 1971, Pat. No. 3,772,835.

[52] **U.S. Cl.** **52/79;** 52/221

[51] **Int. Cl.** **E04b 5/48**

[58] **Field of Search** 52/79, 220, 221, 242

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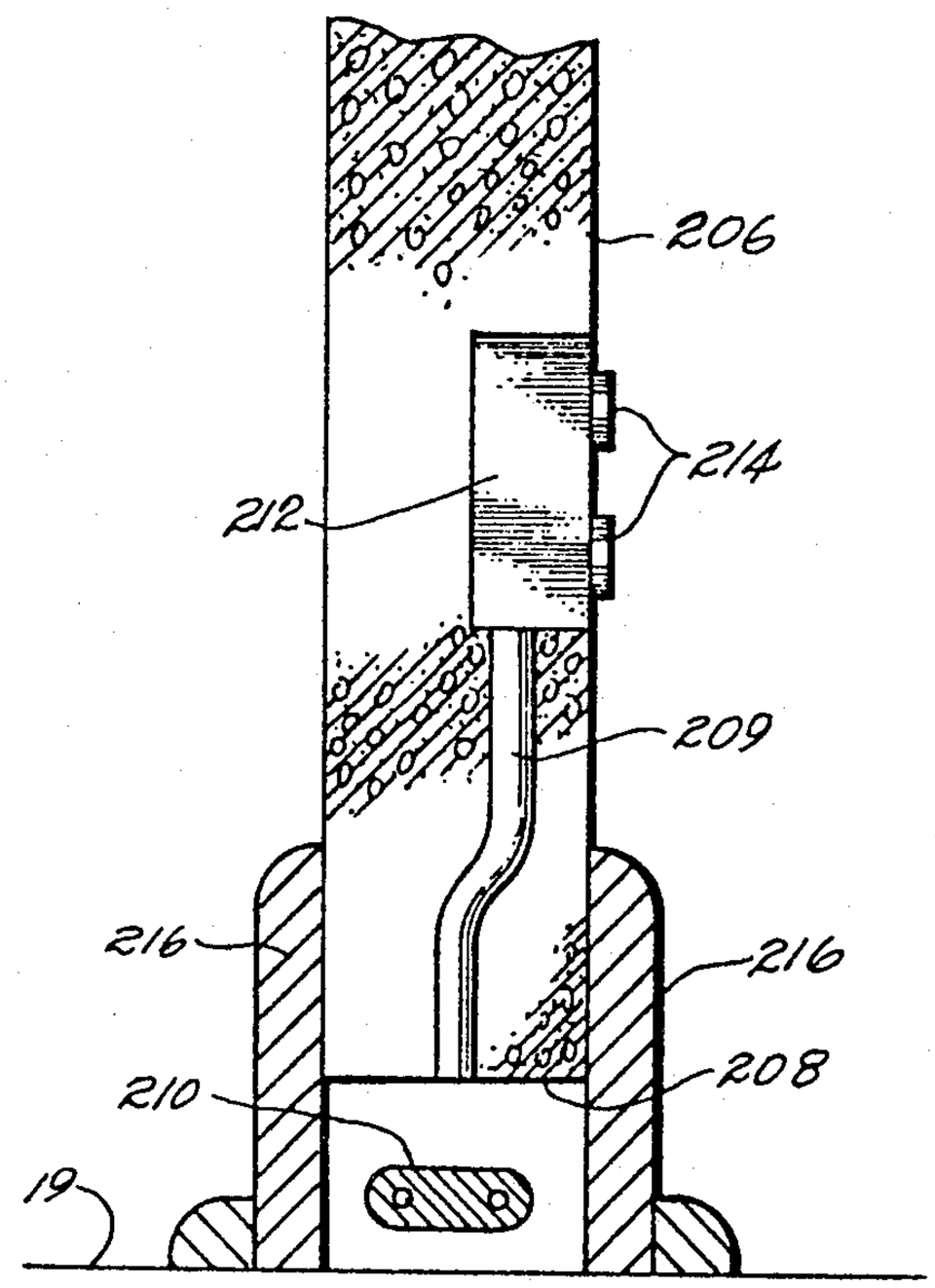
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Primary Examiner—Alfred C. Perham
Attorney, Agent, or Firm—Christie, Parker & Hale

[57] **ABSTRACT**

A pair of precast concrete building units are joined together to form a modular concrete house. Each concrete building unit includes a floor slab, upright load-bearing exterior walls joined with the perimeter of the floor slab, and a sloping roof cast integrally with the tops of the exterior walls. The building units are arranged so that the roof of each unit slopes upwardly toward the other unit, with the elevated ends of the roofs meeting to form an inverted V-shaped pitch roof. Interior walls are cast integrally with the exterior walls and the roof to divide the building units into separate rooms. The bottoms of the interior walls are spaced above the floor slab so that no loads are transmitted to the floor slab by the walls, and plumbing and wiring are run through the space between the bottom of the interior walls and the floor slab. A reinforcing cage formed from welded wire mesh is embedded in each exterior wall.

8 Claims, 22 Drawing Figures



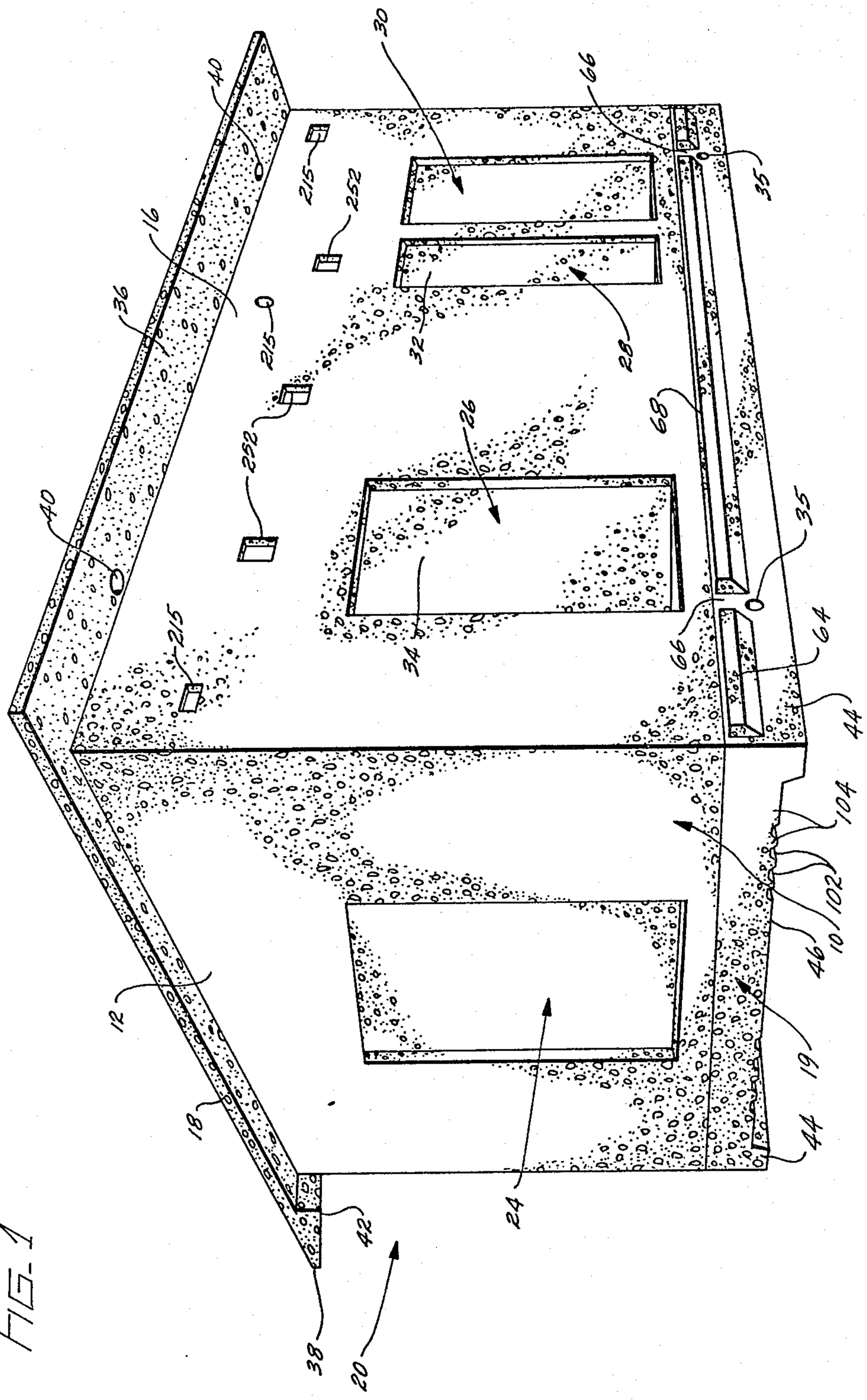

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FIG. 1

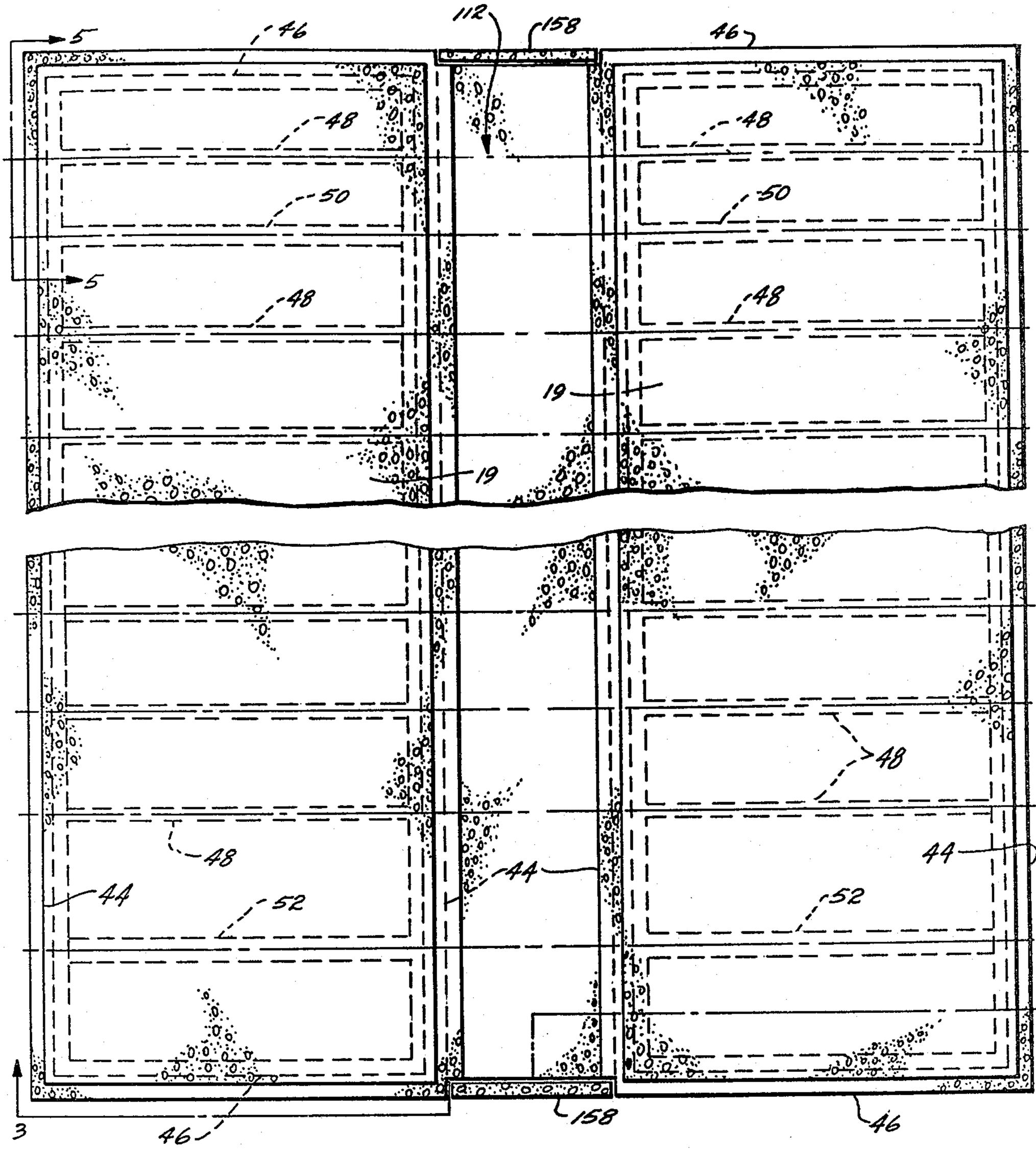


FIG. 2

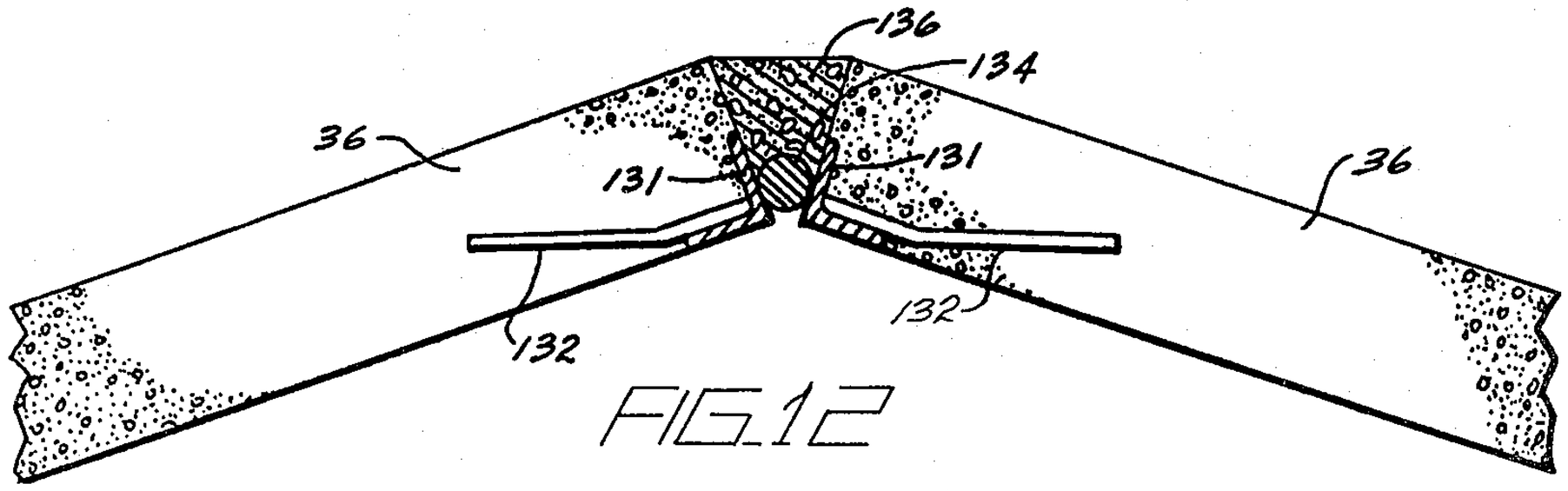


FIG. 12

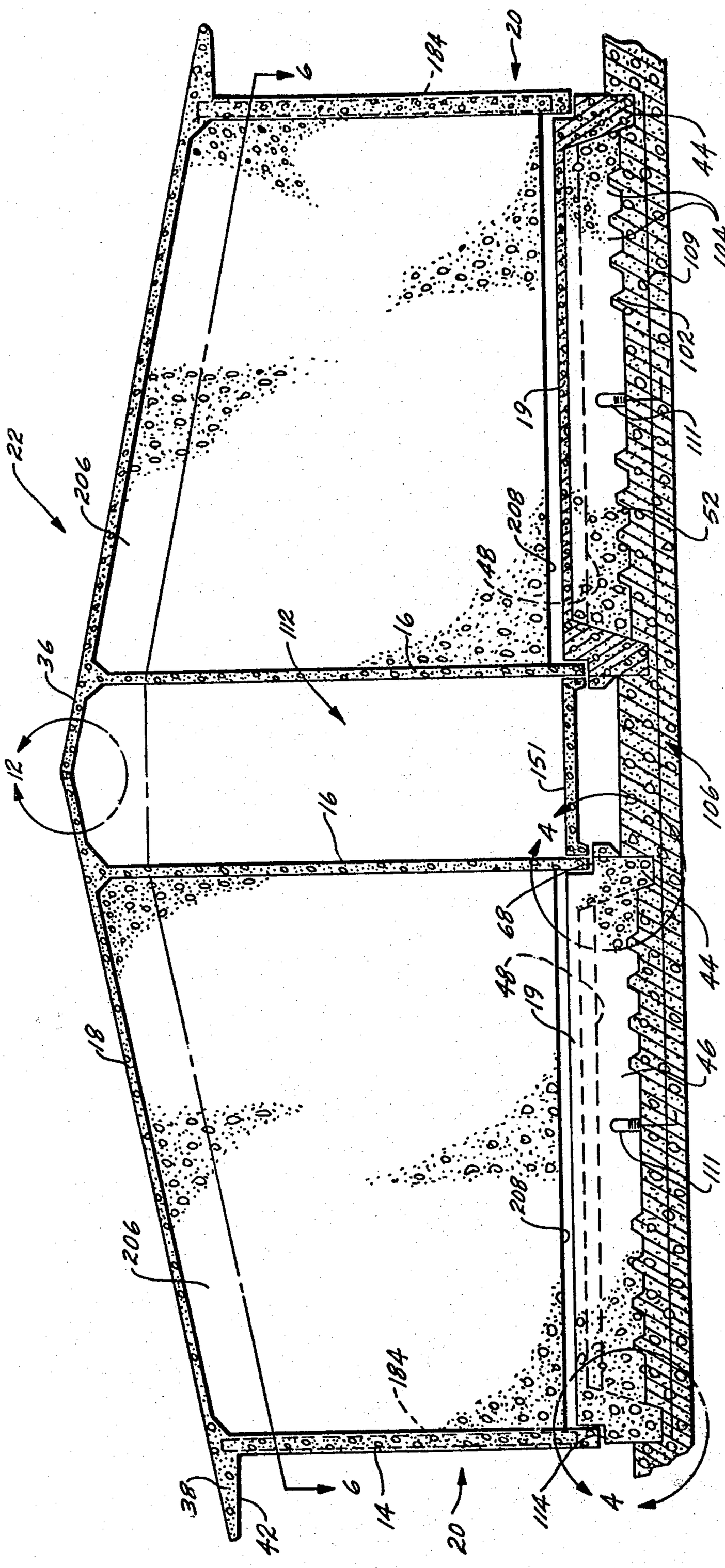

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94
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114
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FIG. 5

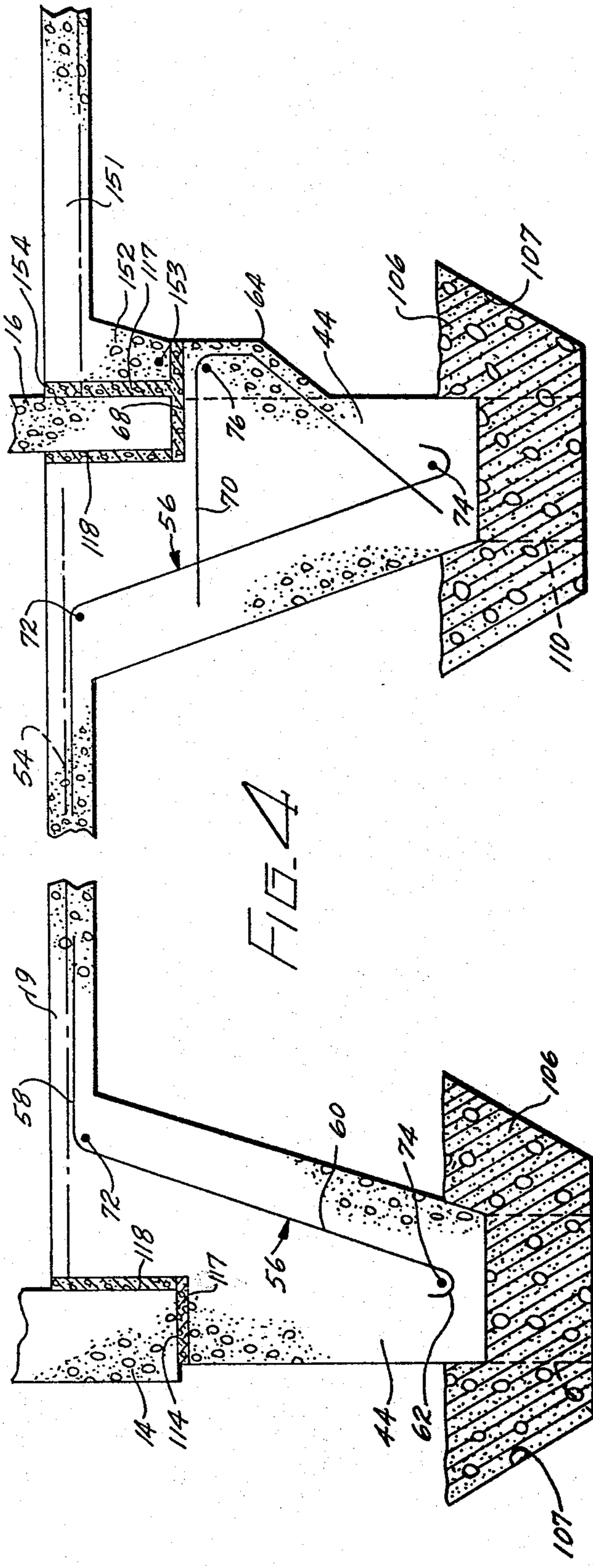

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117
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FIG. 4

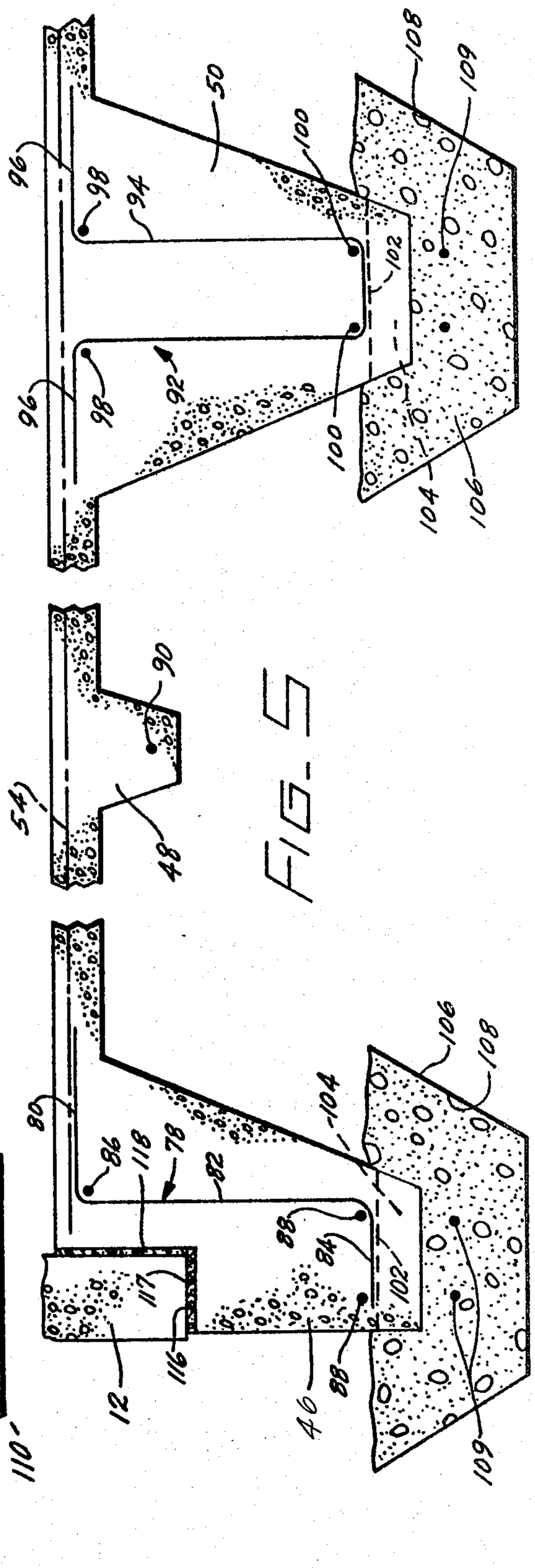

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FIG. 5

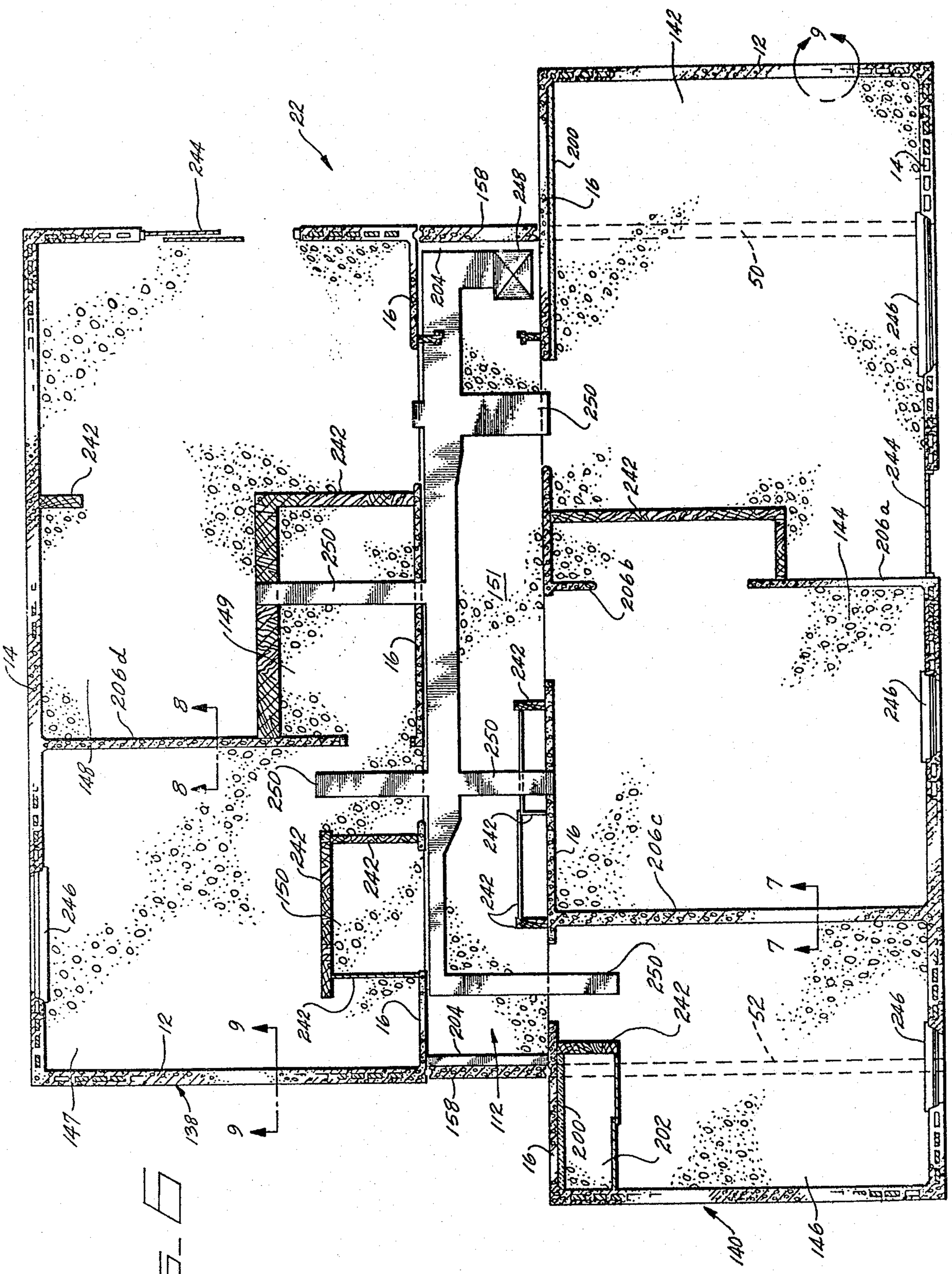

142
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206a
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206b
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206c
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FIG 6

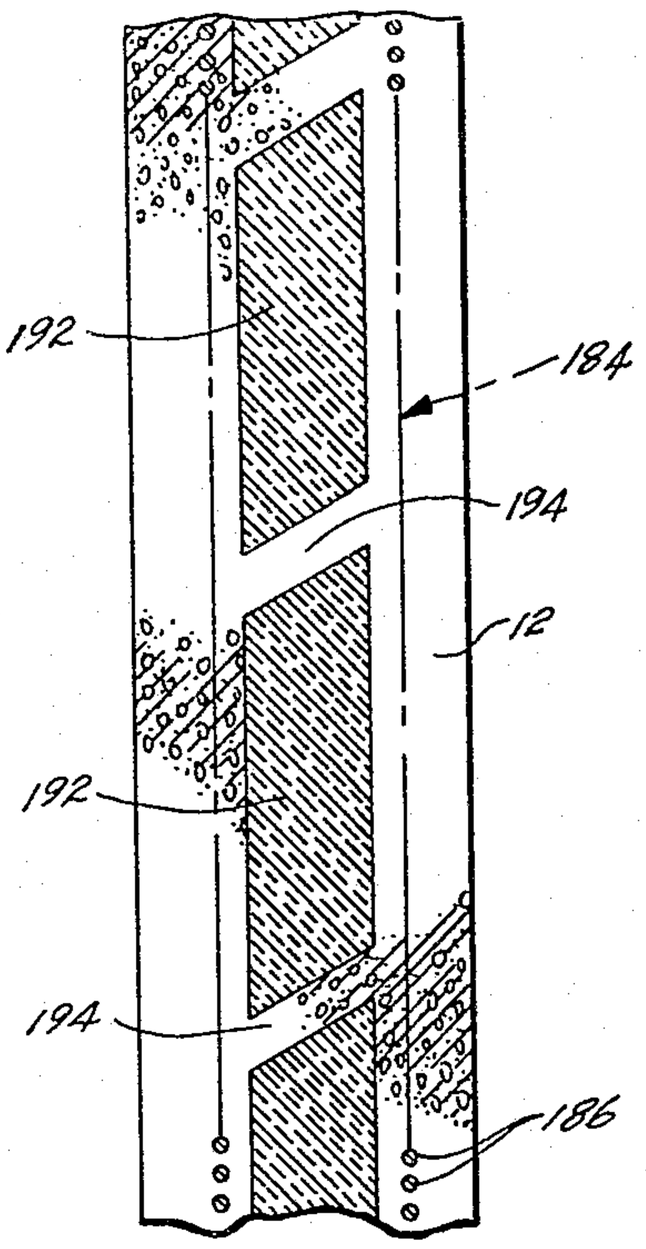


FIG 10

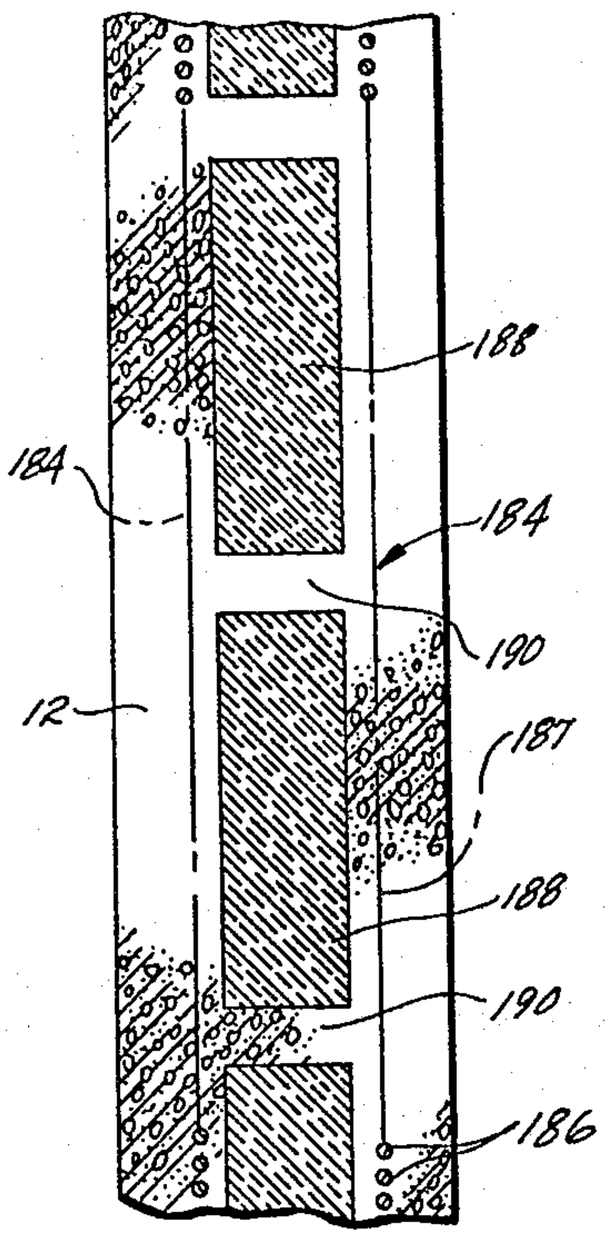


FIG 9

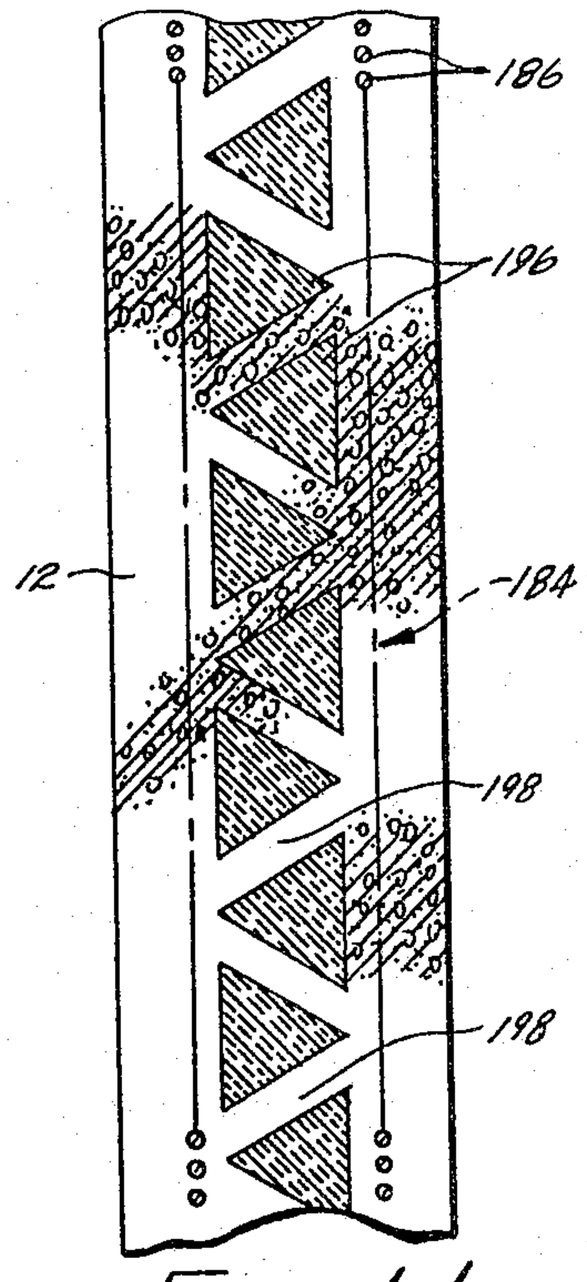


FIG 11

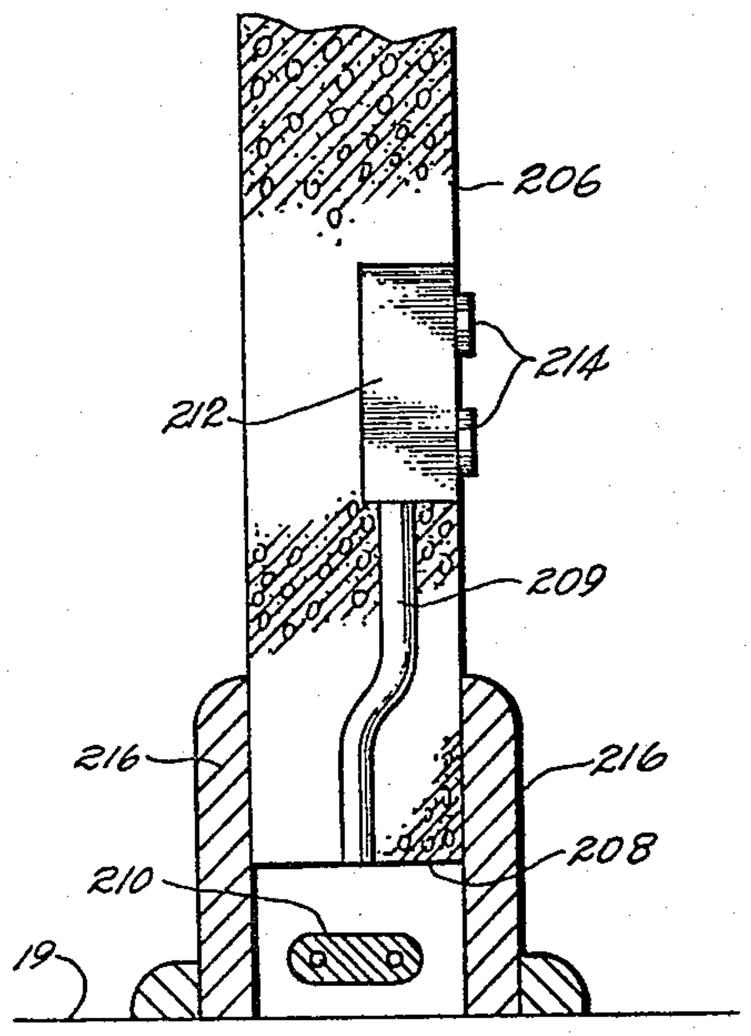


FIG 7

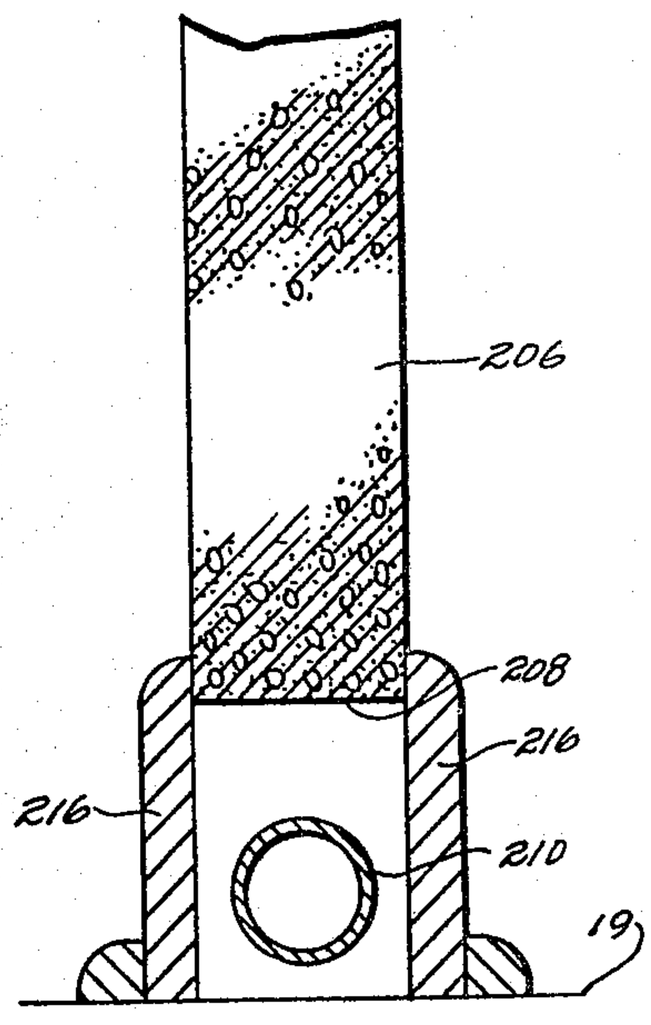


FIG 8

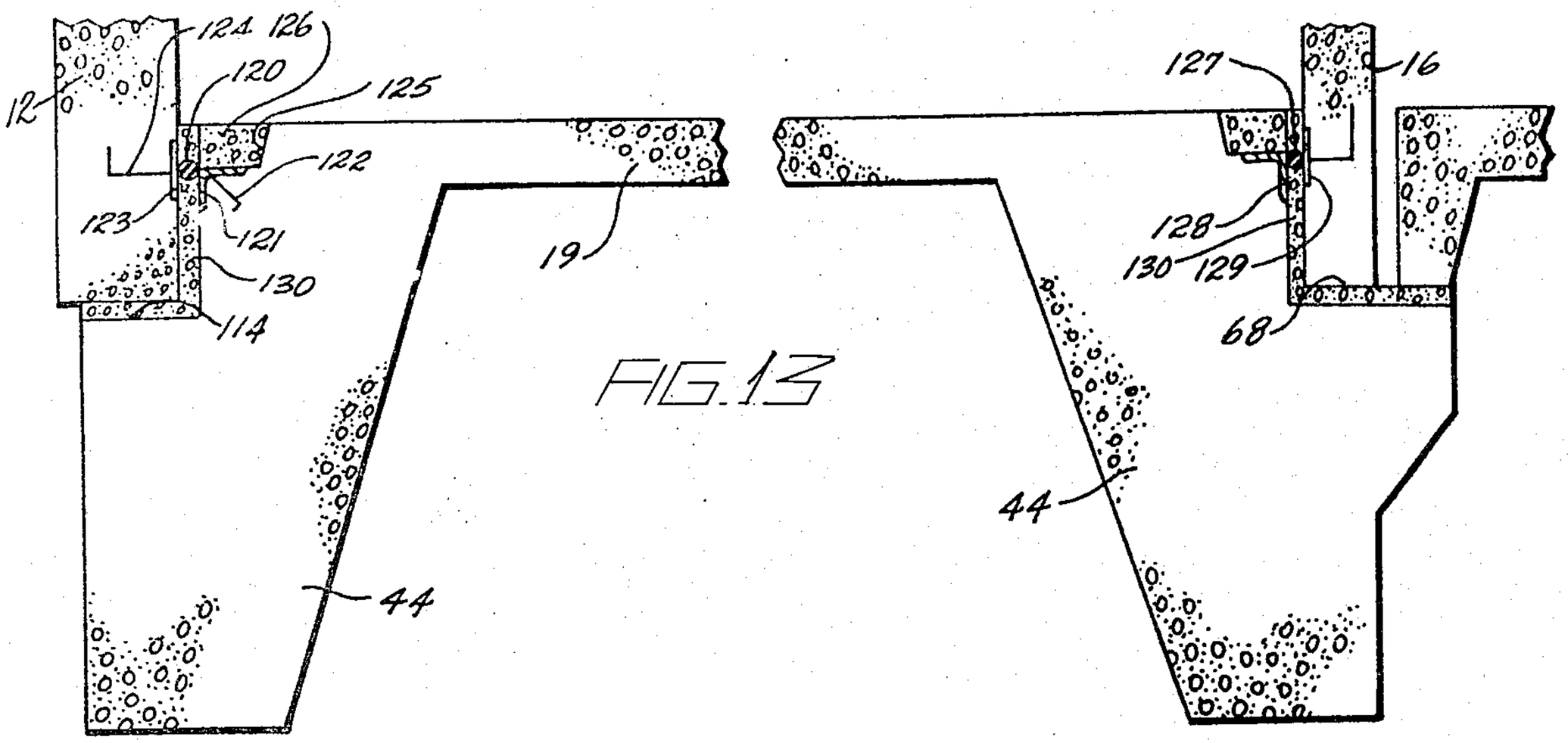


FIG. 13

FIG. 14

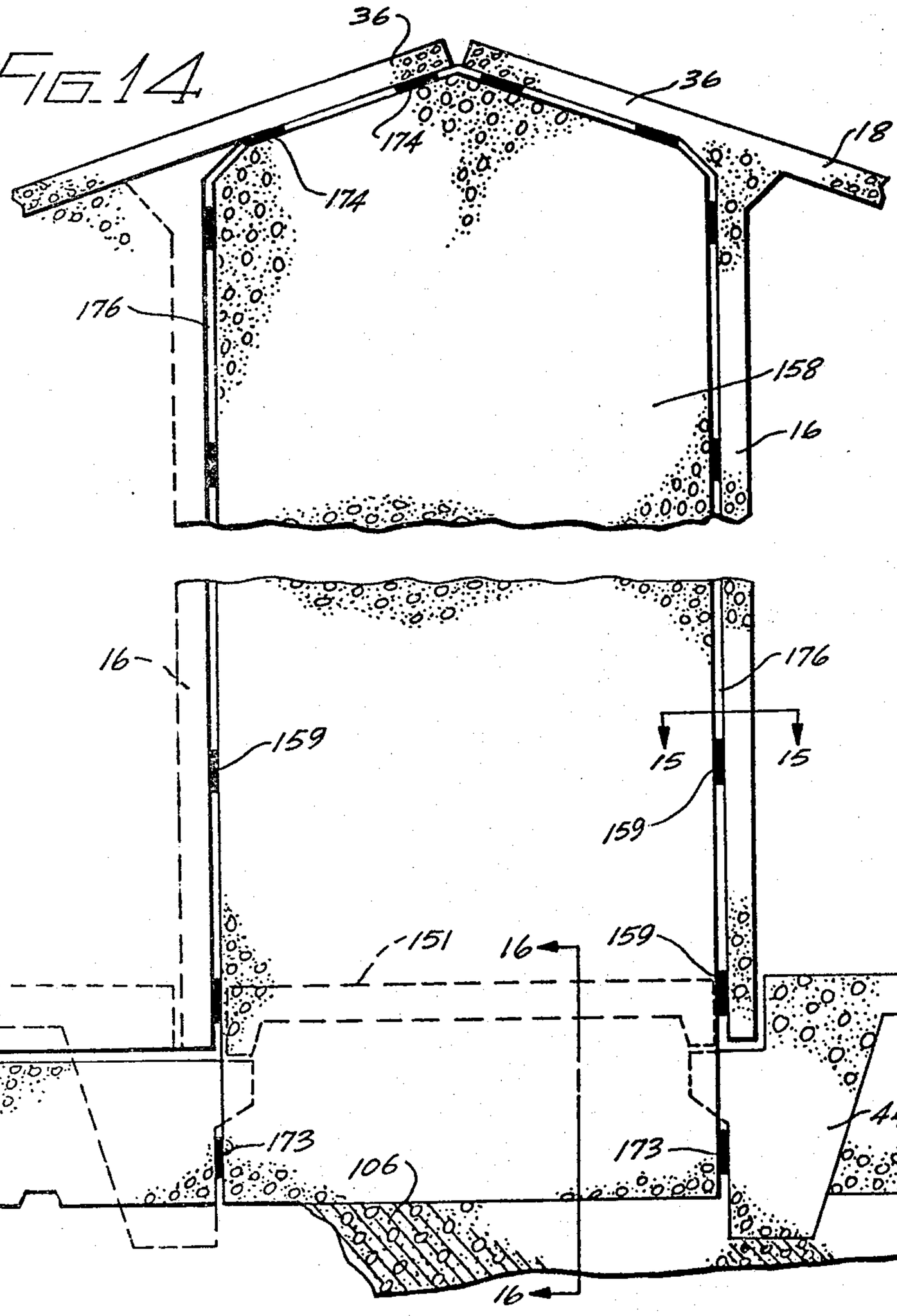


FIG. 16

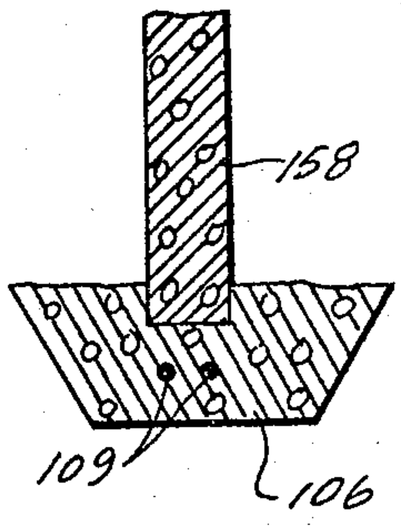


FIG. 15

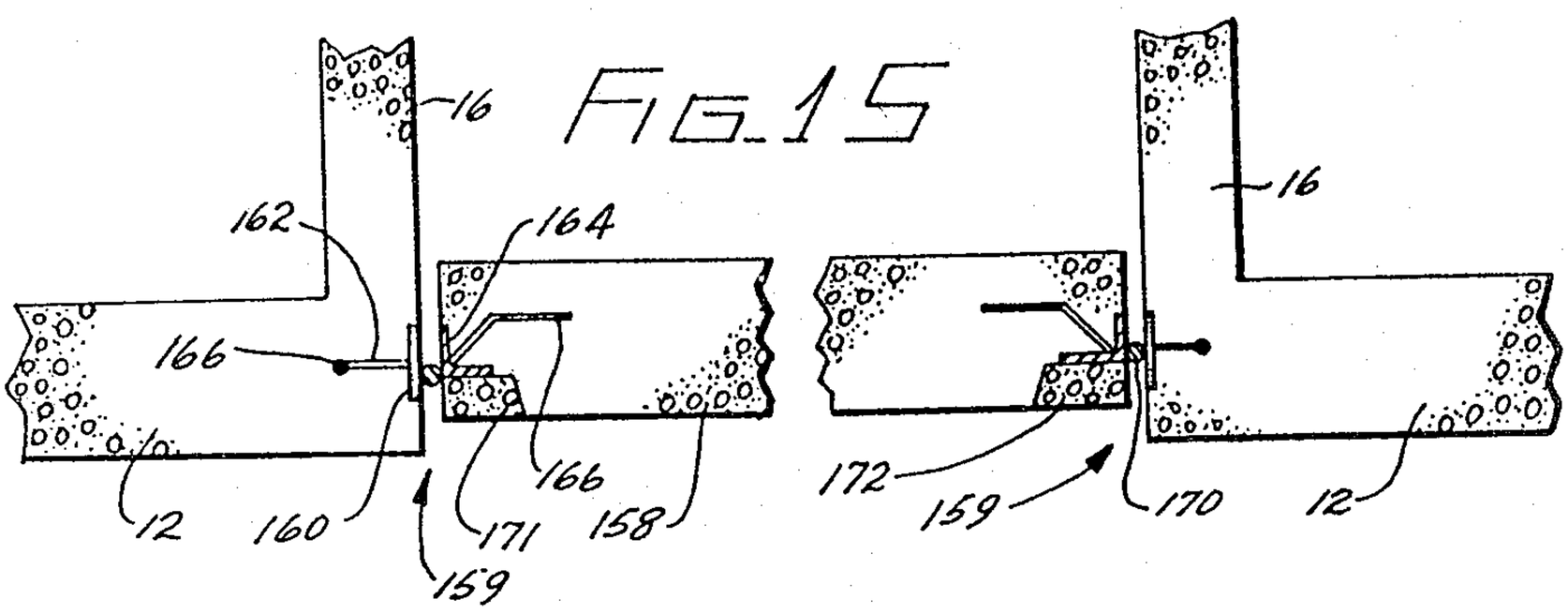


FIG. 17

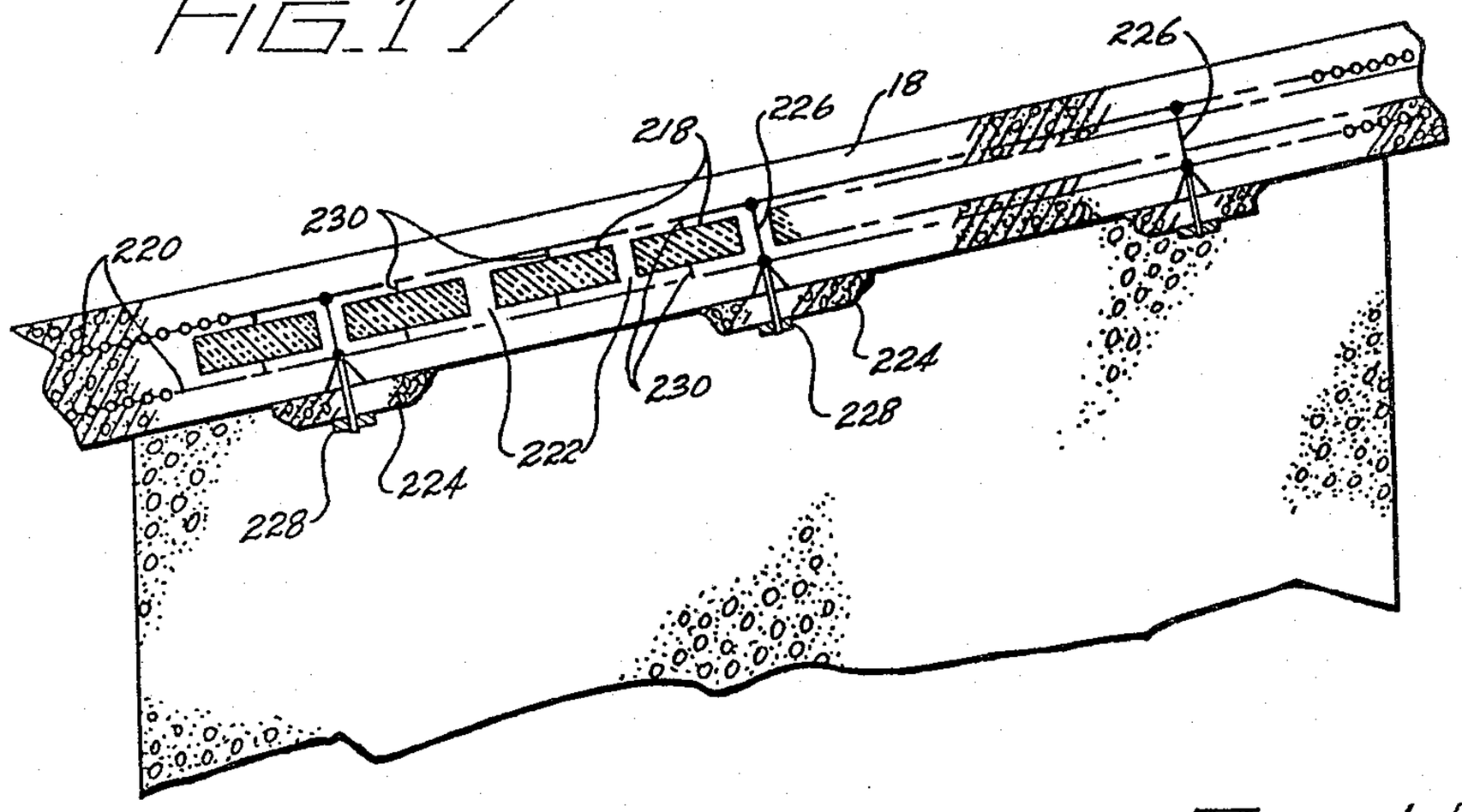


FIG. 19

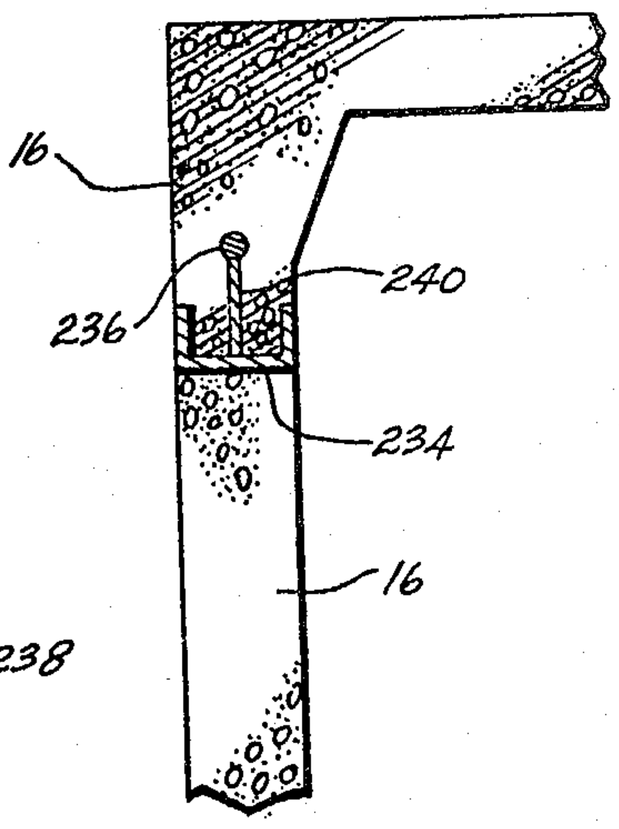


FIG. 18

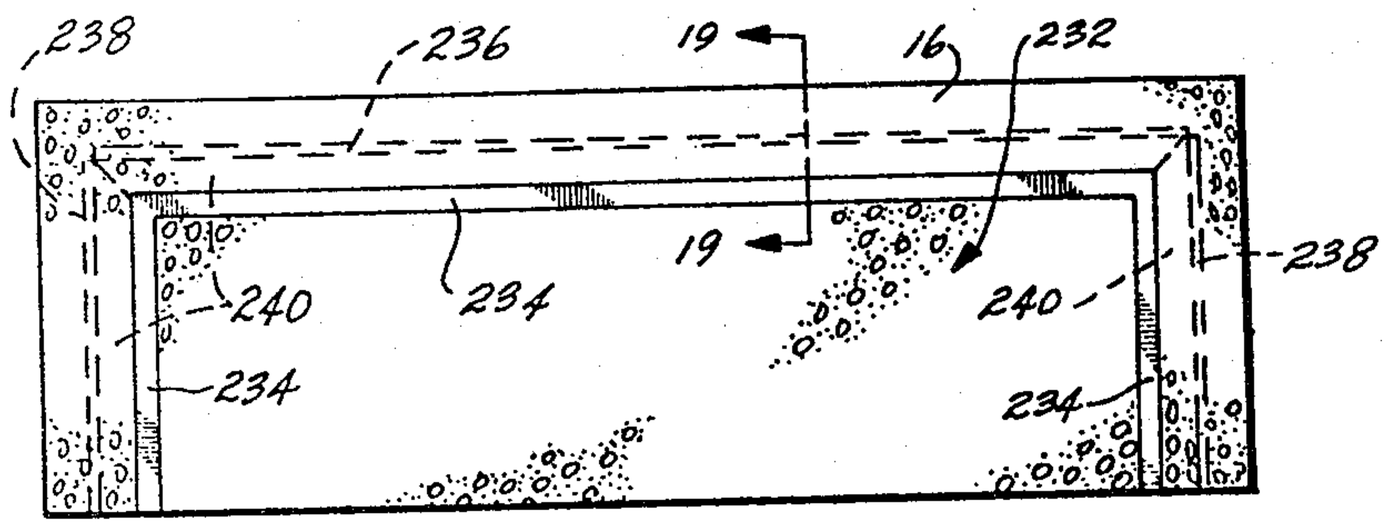


FIG. 21

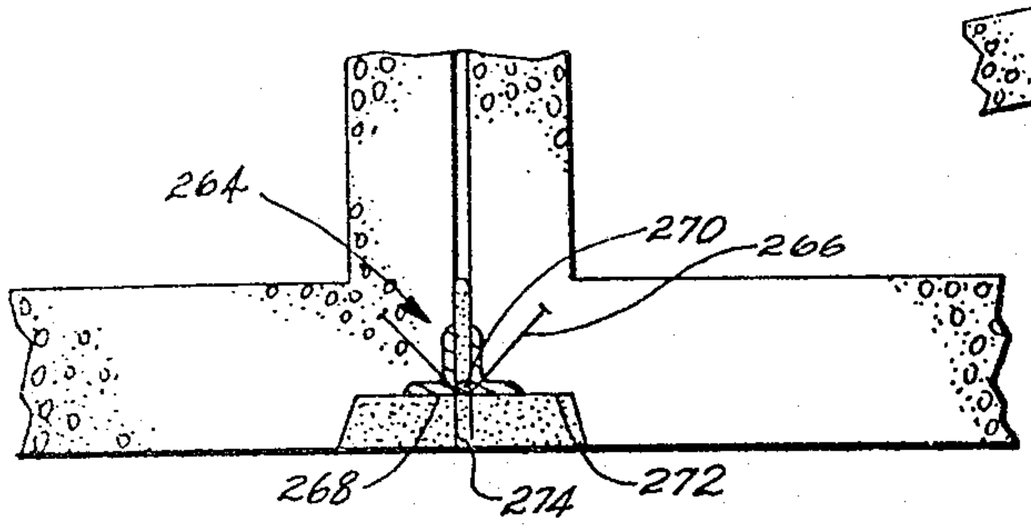


FIG. 22

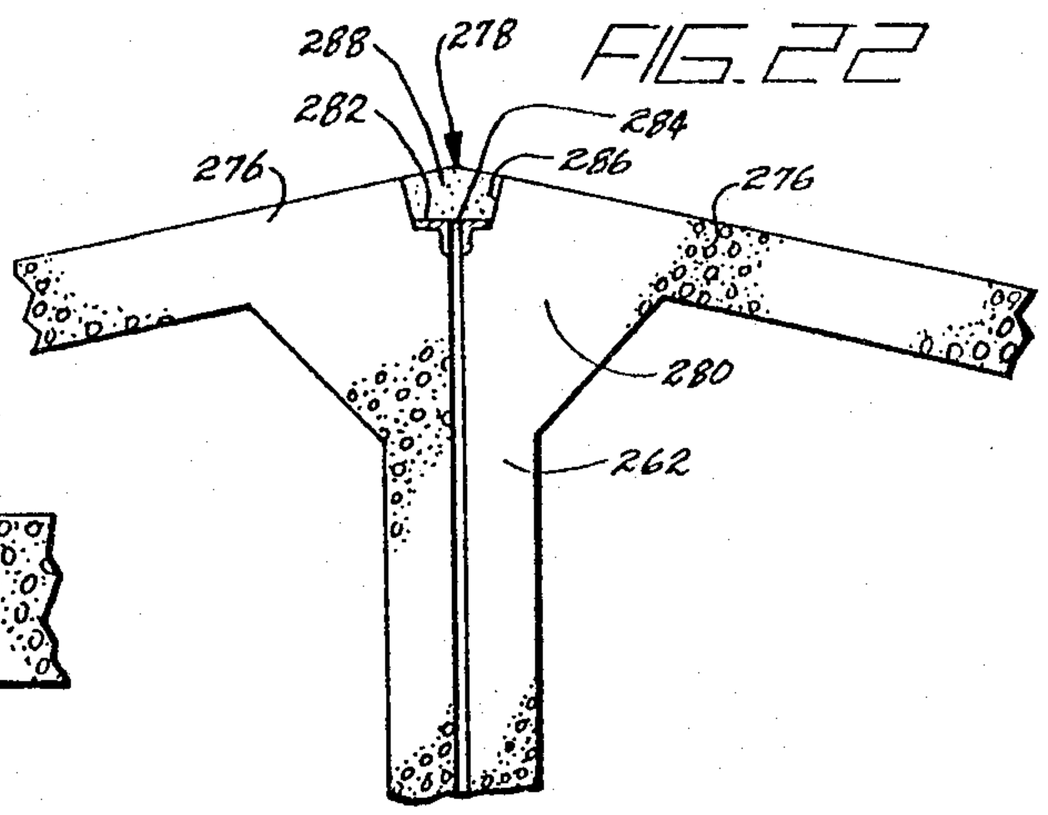
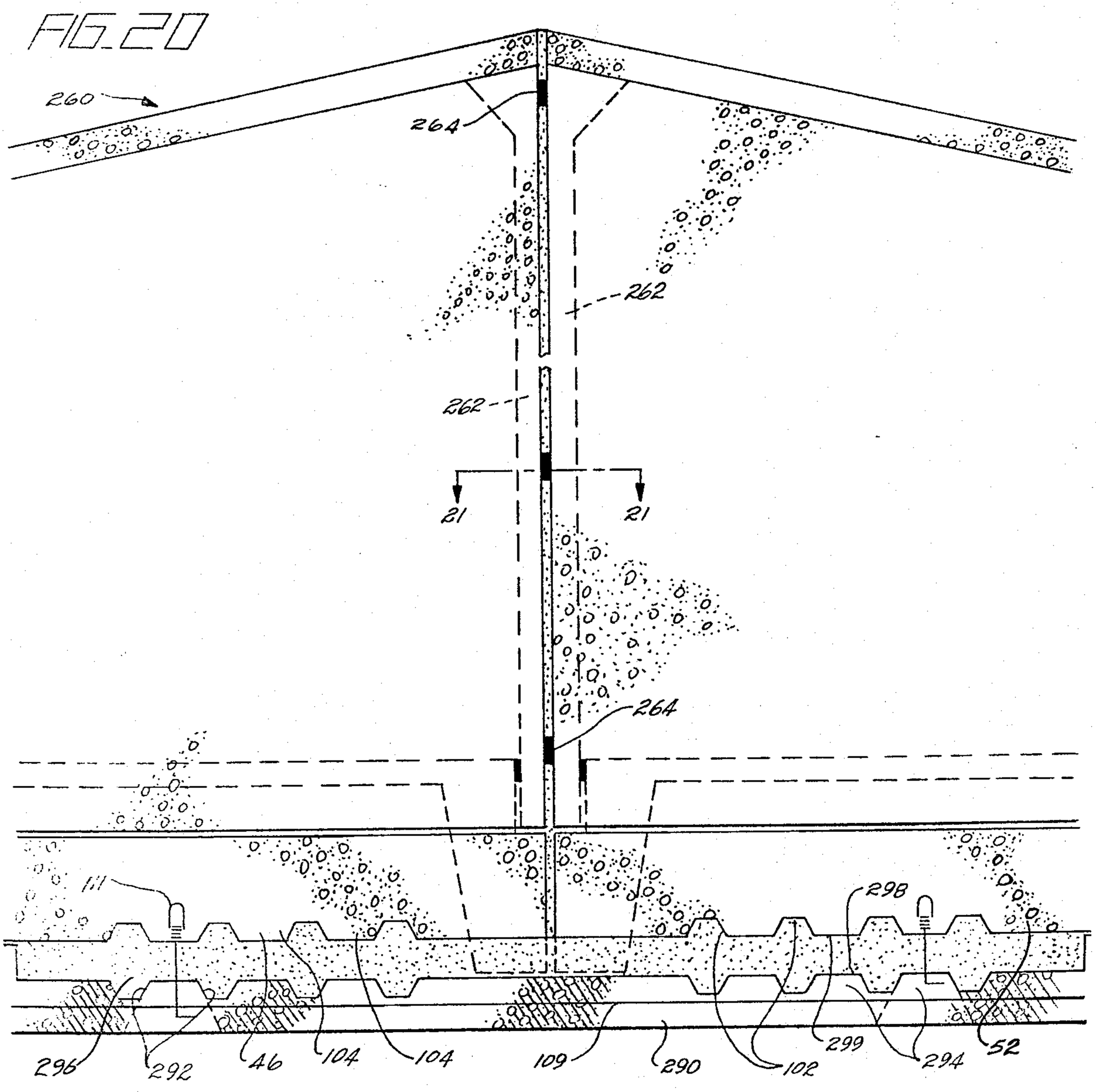


FIG. 20



INSTALLATION OF CONDUITS IN PRECAST CONCRETE HOUSING

This is a division of application Ser. No. **191,505,** filed Oct. **21, 1971** now U.S. Pat. No. **3,772,835.**

BACKGROUND OF THE INVENTION

This invention relates to housing, and more particularly to precast concrete modular dwelling units.

The recent housing shortage and increase in construction costs has stimulated the development of prefabricated modular housing. There is a need especially among low-income families for a durable high quality house that can be mass produced at a lower cost than conventionally built houses.

Most modular housing is in the form of wood frame houses made from prefabricated building wall panels, frames, and trusses. A majoı disadvantage of this type of housing is that the wall panels, frames, and trusses must be constructed with extreme precision on relatively expensive framing machines. The prefabricated wall panels, frames, and trusses then are transported to the building site where substantial additional costs are incurred in erecting them into houses.

Concrete modular houses also have been produced to satisfy the need for prefabricated housing. Generally, modular concrete houses are assembled from concrete modular units, or segments, and separate interior and exterior wall panels. The modular units and wall panels are transported to the building site where a substantial amount of construction must be done to erect them into a completed house.

SUMMARY OF THE INVENTION

This invention provides a precast concrete building unit which may be joined with one or more similar precast concrete building units to form a concrete modular house. The building units may be precast in a casting yard and transported to the construction site where they are placed on a foundation and connected together to form a completed concrete dwelling house.

In its preferred form, each building unit includes a floor slab, exterior walls joined with the floor slab, a roof cast with the exterior walls, and interior walls cast with the roof and the insides of the exterior walls. Finishing procedures such as installation of doors, windows, electrical lines, plumbing, and painting are performed at the casting site. Thus, a minimum amount of construction at the building site is required to connect the buildings together. This work consists primarily of setting the modules on the foundation, connecting them together, and making the necessary utility connections.

In a preferred form of the modular building unit, the roof, the exterior walls, and the interior walls are cast integrally with an appropriate pitch on the roof so that when two of the modular units are joined together, the completed house has a pitch roof. The interior walls preferably are cast to be spaced above the upper surface of the floor slab when the exterior walls are joined with the floor slab. Thus, no load is transmitted to the floor slab by the interior walls. An elongated strip of molding on each side of each interior wall covers the space between the floor slab and the bottom of the interior wall to form an enclosed area for electrical cables, plumbing lines, and the like.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a perspective view showing a precast concrete modular building unit;

FIG. **2** is a fragmentary plan elevation view showing the floor slabs of a pair of side-by-side modular building units which are connected together to form a house;

FIG. **3** is an elevation view showing the end of a pair of modular building units connected together to form a house, and an elevation view of the floor slabs of the building units taken on line **3—3** of FIG. **2**;

FIG. **4** is an enlarged fragmentary elevation view of the reinforcing means shown within the circle **4** of FIG. **3**;

FIG. **5** is a fragmentary elevation view taken on line **5—5** of FIG. **2** showing the reinforcing means for the transverse beams of the floor slab;

FIG. **6** is a plan elevation view showing the floor plan of a completed house;

FIG. **7** is a sectional elevation view taken on line **7—7** of FIG. **6** showing an interior wall of the modular building unit with an electrical outlet and an electrical conduit cast in place in the wall;

FIG. **8** is a sectional elevation view taken on line **8—8** of FIG. **6** showing an interior wall of the modular building unit with a gas line between the bottom of the wall and the floor slab;

FIG. **9** is a sectional elevation view taken on line **9—9** of FIG. **6** showing the means for reinforcing an exterior wall of the modular building unit;

FIG. **10** is a sectional elevation view showing an alternate form of the reinforcing means shown in FIG. **9**;

FIG. **11** is a sectional elevation view showing a further alternate form of the reinforcing means shown in FIG. **9**;

FIG. **12** is an enlarged elevation view of the means for connecting the roofs shown within the circle **12** of FIG. **3**;

FIG. **13** is a fragmentary schematic elevation view showing means for securing an exterior wall to the floor slab;

FIG. **14** is a fragmentary schematic elevation view showing means for securing a shear panel between two modular building units;

FIG. **15** is an enlarged fragmentary elevation view taken on line **15—15** of FIG. **14**;

FIG. **16** is an elevation view taken on line **16—16** of FIG. **14**;

FIG. **17** is a sectional elevation view showing means for casting the insulation in the roof of the modular unit;

FIG. **18** is an elevation view showing a reinforcing arch cast in the concrete surrounding an opening in an exterior wall of the modular unit;

FIG. **19** is a sectional elevation view taken on line **19—19** of FIG. **18**;

FIG. **20** is a fragmentary elevation view showing two alternate modular building units secured together without a shear panel;

FIG. **21** is a plan elevation view taken on line **21—21** of FIG. **20**; and

FIG. **22** is an enlarged elevation view of the means for connecting the roofs shown within the circle **22** of FIG. **20.**

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to FIG. **1**, a precast concrete building unit **10** includes a pair of parallel upright exterior side walls **12**, a long exterior end wall **14** (shown in FIG. **3**) cast integrally at its ends with a respective end of each side wall, a long exterior center wall **16** cast integrally at its ends with the other ends of exterior side walls **12**, and a roof **18** which is cast integrally with the tops of exterior walls, **12, 14**, and **16**. The roof slopes upwardly toward center wall **16**, thereby making the height of center wall **16** greater than that of end wall **14**.

The exterior walls of building unit **10** are joined with the perimeter of a rectangular precast concrete floor slab **19** to form a modular concrete half-dwelling unit **20** which forms half of a completed house **22** shown best in plan view in FIGS. **2** and **6**, and in end view in FIG. **3**. The means for joining building unit **10** with floor slab **19** will be described in detail below.

Window openings, such as an opening **24** in side wall **12**, may be cast in either of side walls **16** or in end wall **14**. One or more doorway openings, such as openings **26, 28**, and **30** which are cast in center wall **16**, may be cast in end wall **14** and either of the side walls, as well as the center wall. Openings **28** and **30**, which are spaced relatively close to each other, are separated by an interior wall **32** which divides modular unit **20** into separate rooms. A second interior wall **34** adjacent door opening **26** also divides the unit into separate rooms. Thus, each room in dwelling unit **20** has direct access to the mating other half of house **22** either through door openings **26, 28**, or **30**.

Building unit **10** and floor slab **19** are cast separately in a casting yard. Horizontal lifting holes **35** are cast in the long sides of floor slab **19** to receive lifting pins (not shown). A spreader bar (not shown) strapped to the lifting pins hoists the floor slab.

The elevated end portion of roof **18** above center wall **16** is cast in an outwardly and upwardly projecting overhang **36**. A downwardly and outwardly projecting overhang **38** is cast with the lower edge of roof **18** above end wall **14**. Longitudinally spaced apart vertical lifting holes **40** are cast in each overhang **36** and **38** to permit the passage of lifting devices, such as cables (not shown), from a gantry crane (not shown) positioned over building unit **10**. A lifting arm (not shown) secured to the end of each cable bears against the undersurface of each overhang portion of the roof to permit the building unit **10** to be lifted when the cables are drawn upwardly by the gantry crane.

Overhang **38** has a flat, horizontal undersurface **42** to permit the wall of the casting form (not shown) to be moved horizontally outwardly from end wall **14** without having its movement interrupted by the overhang portion of the roof.

Floor slab **19** is cast as a unit by constructing a rigid reinforcing steel cage in a mold (not shown) and pouring concrete into the mold to form the floor slab and the beams which project downwardly from the undersurface of the floor slab. The configuration of the preferred reinforcing steel cage is shown best in FIGS. **4** and **5**. The horizontal portion of floor slab **19** is reinforced by a horizontal wire mesh panel **54** (shown schematically in FIGS. **4** and **5**) made of pieces of six-gauge wire which are welded together to form a reinforcing grid. The wire mesh panel covers substantially the entire horizontal area of the floor slab.

Spaced apart downwardly opening notches **102** are cast in the bottom surfaces of the outer transverse beams **46** and large transverse beams **50** and **52**, thereby forming spaced apart downwardly projecting teeth or shear keys **104** in each beam. When floor slab **19** is placed on a foundation **106** (shown best in FIG. **5**), the shear keys are embedded in the foundation grout to form an undulating interface between the floor slab beams and the foundation, which aids in preventing movement of the housing floor slab **19** relative to the foundation. The shear keys also prevent movement of the floor slab relative to a floor slab of an adjacent modular half-dwelling unit **20** which makes up the other half of the completed house **22**. Foundation **106** preferably comprises a separate elongated trench **107** (see FIG. **4**) of pumped-in grout which forms a concrete pad below each longitudinal beam **44**, and separate transverse trenches **108** of pumped-in grout forming concrete foundation pads below each outer transverse beam **46** and below each of the large transverse beams **50** and **52**. Before the floor slab is placed on the foundation, levelling pads **110** (shown in dotted lines in FIG. **4**) are placed at spaced apart locations in trenches **107**. Longitudinal beams **44** rest on the pads when the floor slab is placed on the foundation, with a sufficient number of the pads being used at each location to level the floor slab.

As shown best in FIG. **5**, a separate pair of parallel elongated reinforcing bars **109**, which extend the width of the floor slab, are embedded in foundation grout **106** below each outer transverse beam **46** and below each of the large transverse beams **50** and **52**. Reinforcing bars **109** preferably are number six steel rods. A separate vertically extending anchor **111** (shown in FIG. **3**) embedded in each outer transverse beam **46** extends into the foundation grout between the respective pair of reinforcing bars **109** below it. Each anchor **111** is rigidly secured, such as by tying or welding, to each of the reinforcing bars **109** to provide additional resistance to the floor slab **19** and foundation **106** from being pulled apart. A separate identical anchor **111** embedded in each of the large transverse beams **50** and **52** extends into the foundation grout between the pair of reinforcing bars **109** below it. Each of these anchors is rigidly secured by suitable means to a corresponding one of the reinforcing bars **50,52**.

As shown best in FIG. **3**, the completed modular house **22** is formed by placing two modular half-dwelling units **20** parallel to each other on foundation **106**, with the cantilevered overhang **36** of one half closely spaced from that of the other half so the two roofs **18** cooperate to form a conventional pitch roof. When house **22** is in its assembled form, an elongated open-ended corridor **112** is formed between the parallel center walls **16**. Each half-dwelling unit **20** is placed on its respective floor slab so that the bottom of center wall **16** rests on the horizontal ridge **68** of the floor slab. The bottom of each end wall **14** rests on an elongated outwardly projecting horizontal outer ridge **114** cast integrally with the edge on the long side of the floor slab **19** opposite ridge **68**. The bottom of each side wall **12** rests on an elongated outwardly projecting horizontal ridge **116** (see FIG. **5**) cast integrally with the edge on each short side of the floor slab.

FIG. 4 shows an example of one means for securing the bottom portions of exterior walls **14** and **16** to the floor slab. The bottom portion of end wall **14** is set in a layer of bonding material **117,** such as grout, on outer ridge **114** of the floor slab. The bottom of center wall **116** is set in an identical layer of bonding material **117** on bearing surface **68** of ridge **64.** The space between the inner edge of each wall and the floor slab is filled with a layer of epoxy grout **118** to complete bonding of the walls to the floor slab. FIG. **5** shows an identical means for securing the bottom portion of each side wall **12** to the floor slab.

FIG. **13** shows means which are presently preferred for securing the bottom portions of the exterior walls of the floor slab. In the example shown in FIG. **13,** elongated, spaced apart, horizontal anchor bars **120,** preferably number six steel rods, are placed between the inside of exterior side wall **12** and the vertical outer edge of floor slab **19.** The anchor bars preferably are spaced **32** inches apart along the floor slab. An angular L-shaped weld plate **122,** which runs the length of the floor slab, is exposed at the vertical edge of the floor slab adjacent to anchor bars **120.** The angular weld plate **121** is held in place by spaced apart anchor rods **122** which are embedded in the floor slab. Spaced apart flat weld plates **123** are exposed along the inside of exterior side wall **12** adjacent to each anchor bar **120.** Weld plates **123** are held in place by respective inwardly extending anchor rods **124** which are embedded in exterior side wall **12.** It is preferred to place an anchor bar **120** and a cooperating weld plate **123** at least **8** inches from the corners of the floor slab and the corners of any interior walls. One side of each anchor bar **120** is welded to weld plate **121,** and the other side of each anchor bar is welded to a respective weld plate **123** to rigidly fasten exterior end wall **12** to the floor slab. Access for welding is obtained by blocking out spaced part notches **125** in the edge of the floor slab adjacent to each anchor bar **120.** After welding is completed the blocked out notches are filled with grout **126.**

On the other side of the floor slab identical means are used to secure center wall **16** to the floor slab. Spaced apart anchor bars **127** are placed between the inside of center wall **16** and the floor slab, with a continuous angled weld plate **128** embedded in the floor slab on one side of the anchor bars, and respective spaced apart flat weld plates **129** embedded in center wall **16** on the other side of each anchor bar.

Grout **130** is poured in the respective spaces between exterior walls **12** and **16** and the floor slab after welding is finished to complete the bonding of the walls to the floor slab.

Means similar to that shown in FIG. **13** preferably are used to secure exterior side walls **14** to the floor slab.

FIG. **12** shows the preferred means for securing together the adjacent ends of overhang portions **36** of roofs **18.** A separate elongated right-angle weld plate **131** is exposed at the lower corner of each overhang **36,** so the two weld plates face each other. Each weld plate **131** extends the length of the roof and is held in place by spaced apart elongated anchor rods **132** which are rigidly secured to the inside of their respective weld plates and embedded in concrete overhang **36.** Anchor rods **132** preferably are spaced **18** inches apart along the length of the roof.

An elongated anchor bar **134,** which runs the length of the roof, rests between weld plates **131.** Each weld plate **131** is welded to a respective side of anchor bar **134** to rigidly secure the overhang portions of the roofs together. Grout **136** is poured in the space between the ends of overhang portions **36** above anchor bar **134** to complete bonding of the roofs.

Referring to FIG. **4,** an elongated concrete corridor floor slab **151** extends substantially the entire length of the house to provide the floor for the corridor or hallway **112** between the two half-dwelling units. The horizontal upper surface of corridor floor slab **151** is in the same plane as the upper surface of each floor slab **19.** A pair of parallel, laterally spaced apart, elongated marginal ridges **152** project downwardly from the underside of the corridor floor slab along the outer edges of the slab. Each marginal ridge runs the length of the corridor floor slab, with a separate elongated reinforcing bar **153** being embedded substantially in the center of each ridge. Each reinforcing bar **153** runs the length of the corridor floor slab and preferably is a number four steel rod. The corridor floor slab is mounted between the modular half-dwelling units so each marginal ridge **152** rests on the outwardly projecting horizontal upper surface **68** of a respective one of the ridges **64** which extend the length of the corridor.

Preferably, each marginal ridge **152** is set in grout bed **117** which also secures center wall **16** to the floor slab. Spaced apart leveling pads (not shown) may be set below marginal ridges **152** to shim the corridor floor slab. Grout **117** also fills a portion of the space between the outer edge of the corridor floor slab and the adjacent outer edge of the center wall **16.** A portion of the space above grout **117** is filled with an epoxy grout **154** to complete bonding of the corridor floor slab to the center wall. Alternatively the corridor floor slab may be welded to each center wall in a manner akin to that shown for the exterior walls in FIG. **13.**

As shown best in FIGS. **14** through **16** the half-dwelling units are rigidly interconnected by a separate upright shear panel **158** at each end of corridor **112.** Each shear panel **158** preferably is a precast concrete slab which is shaped to fit into the opening at each end of the corridor in front of corridor floor slab **151.** Each edge of the shear panel is joined with the edge of an adjacent center wall **16** by welding it at a plurality of vertically spaced apart points shown schematically at **159** in FIG. **14.**

The preferred means for joining the shear panel to the center wall is shown in FIG. **15** in which vertically spaced apart flat weld plates **160** are mounted at the edge of each exterior center wall **16.** Each weld plate **160** preferably is held in place by a pair of vertically spaced apart anchor rods **162** embedded in center wall **16.** The vertical spacing between adjacent weld plates **160** preferably is **32** inches. A separate continuous vertical weld plate **164** is mounted at each vertical edge of shear panel **158.** Each angular weld plate is held in place by spaced apart anchor rods **166** embedded in the shear panel. Spaced apart, vertical elongated anchor bars **170** are placed between each weld plate **160** and angular weld plate **162.** The weld plates are welded to opposite sides of anchor bars **170** to rigidly secure each edge of shear panel **158** to a respective center wall **16.** Access for welding is obtained by blocked out notches **171** formed in each edge of the shear panel ad-

jacent to anchor bars **170.** After welding is completed the notches are filled with grout **172.**

The lower edges of each shear panel **158** are secured to the outer edges of beams **44** of the floor slab at points shown schematically at **173** in FIG. **14.** Connecting means identical to that shown at **159** in FIG. **15** preferably are used to connect the lower portions of the shear panels to the floor slab beams. The lower edge of each shear panel **158** is embedded in foundation grout **106** as shown best in FIG. **16.** Connecting means identical to that shown in FIG. **15** also are preferably used to secure the upper edge of each shear panel to overhang portions **36** of roofs **18.** (These connecting means are shown schematically at **174** in FIG. **14**). Thus, each shear panel is rigidly secured around its perimeter to center walls **16,** the longitudinal beams **44** of the floor slab, the foundation **106,** and the roof overhang **36** to provide the equivalent of at least an **8** foot beam which provides substantial rigidity and strength for each end of the completed house. After the shear panels are mounted in place, the space **176** between the edge of each shear panel and the adjacent center walls **16** and roof overhang **36** is filled with grout to complete the bonding of the shear panel to the modular half-dwelling units.

As shown best in FIG. **6,** when a short modular half-dwelling unit is interconnected with a long modular half-dwelling unit, the edge of one shear panel **158** is secured to the floor slab of the long modular unit in the same plane as large transverse beam **50** of floor slab **19,** and the edge of the other shear panel is secured to the floor slab in the same plane as large transverse beam **52.** This arrangement provides the equivalent of a continuous reinforcing beam running the entire width of the completed house at each end of the house.

As shown best in FIG. **6,** the exterior side walls **12** and exterior end walls **14** of each half-dwelling unit have a central core of insulation which makes these walls thicker than exterior center walls **16.** Preferably, insulated side walls **12** and end walls **14** are about **5** inches thick, and the center walls are about **3** inches thick. Center walls **16** are reinforced by a vertically disposed welded wire mesh panel (not shown) similar to that used to reinforce floor slab **19.** FIG. **9** shows a detailed view of the insulation and reinforcing for side wall **12,** which includes a reinforcing cage formed from laterally spaced apart welded wire mesh panels **184** which are inserted in the form (not shown) used to cast the side wall. Each welded wire mesh panel **184** is formed from longitudinally spaced apart vertically extending wire reinforcing rods **186** welded to intersecting vertically spaced apart horizontal wire reinforcing rods **187** (shown schematically in FIG. **9**) to form a reinforcing grid.

Several concrete interior walls **206** are cast integrally with the interior of each modular half-dwelling unit. Preferably, the top of each interior wall is cast integrally with the underside of roof **18,** with at least one side of the interior wall being cast integrally with the inside of one of the exterior walls. For example, in long modular half-dwelling unit **140** shown in FIG. **6,** an interior wall **206***a* extends approximately half the width of the modular unit. The end of wall **206***a* is cast integrally with end wall **14** and at its top is cast integrally with roof **18.** A short interior wall **206***b* in the same plane as interior wall **206***a* is integral with center wall **16** at its end and with roof **18** at its top. A third interior wall **206***c* extends the entire width of the modular unit. The ends of wall **206***c* are cast integrally with end wall **14** and center wall **16,** and the top of wall **206***c* is cast integrally with roof **18.** In short modular half-dwelling unit **138,** an interior wall **206***d* extends about three-fourths of the width of the unit. One end of wall **206***d* is integral with end wall **14,** and the top of wall **206***d* is integral with roof **18.**

As shown best in FIG. **3,** each interior wall **206** is cast so each wall has a lower surface **208** which is spaced a short distance above the upper surface of floor slab **19** when the modular half-dwelling units are joined with the floor slab. Thus, the interior walls and roof transmit no load to the thin portion of the floor slab under the interior walls. Instead, the interior walls are held in tension by the roof and at least one exterior wall, with all the load of the roof and the interior walls being transmitted down through the exterior walls and shear panels.

Preferably, the interior walls **206** are cast so that their bottom edges **208** are at least one inch above the upper surface of floor slab **19.** As shown best in FIG. **7,** this spacing permits electrical wiring such as a conventional Romex electrical cable **210** to be run under interior wall **206** and connected with a conduit **211** from a conduit box **212** providing electrical outlets **214.** Electrical conduits and conduit boxes are cast in place in the interior walls and extension walls. The conduits are pre-wired prior to casting to facilitate installation of the electrical wiring. Electrical cables (not shown) strung from a main power source (not shown) are connected to the pre-wired conduits through openings **215** (see FIG. **1**) which are cast in center wall **16.** Preferably, a spacing of **1** inch is provided between the bottom **208** of interior wall **206** and floor slab **19** in the arrangement shown in FIG. **7.**

FIG. **8** shows another use for the spacing between the bottom of an interior wall and the floor slab. A larger spacing, preferably **2** or **3** inches, is provided for plumbing, such as a water line or gas line **210** to be run under the interior wall.

The space below each interior wall is enclosed by a separate elongated strip or molding **216** extending vertically from each side of the interior wall to the floor slab. The molding is releasably secured to the wall and floor slab to permit access to the electrical lines or plumbing.

The plumbing and wiring are run to the exterior of the house through openings (not shown) formed in either the floors or walls by blocks (not shown) when the modular dwelling units are cast. The blocks are removable from the modular units and the openings are covered by suitable means after the plumbing or wiring are run through them.

The modular half-dwelling units **20** are particularly suitable for being produced and outfitted in completed form in an assembly-line fashion in a casting yard. Floor slab **19** and the walls of building unit **10** are cast separately, with building unit **10** being lifted onto the floor slab at the casting yard after the concrete has set and the mold forms are removed. The exterior walls of the building unit are joined with the perimeter of the floor slab to form the outer shell of the modular half-dwelling unit **20.** Shear panels **58** and corridor floor slab **51** are cast as separate units in the casting yard.

The interior of the modular half-dwelling unit also is finished at the casting site. Plumbing and electrical wir-

ing is run under interior walls **206** of each modular unit, and molding strips **216** are fastened to the bottom of each interior wall to finish the interior walls. Insulation panels **200** are mounted against center walls **16** if the completed house is to include a long unit and short unit. A ceiling (not shown) made of nonload-bearing wallboards such as gypsum wallboard is placed on mounting tracks (not shown) in the upper portion of each modular half-dwelling unit. A similar ceiling is mounted in the upper portion of corridor **112** to form an attic space. Several removable nonload-bearing vertical wall panels **242** (see FIG. **6**) are placed on mounting tracks (not shown) on the floor slab and ceiling to separate the interior of the modular unit into rooms and to provide partitioning for closets and the like. Door jambs (not shown) are constructed, exterior doors **244** and interior doors (not shown) are mounted, windows **246** are installed, and the exterior and interior of the modular unit are painted. Interior fixtures such as a bathtub and kitchen facilities also are preferably added at the casting site.

The completed modular half-dwelling units are then transported to the building site where they are assembled to form a completed house. Two units are set side-by-side on foundation **106.** The overhang portions **36** of the roof **18** are connected together, and the corridor floor slab **151** is mounted between half-dwelling units. Shear panels **158** are then mounted at the ends of the house to connect the half-dwelling units together. An air conditioning and heating unit **248** (see FIG. **6**) is mounted in the upper portion of the corridor at one end of the house. Ducts **250** in the attic space above the ceiling in the corridor deliver air from the heating and air conditioning unit to each room in the house. The ducts open into each room through openings **252** (see FIG. **1**) which are cast in center walls **16.** Exterior trimming (not shown) is then added to the house and the house is in its completed form ready for use as a single family dwelling unit.

We claim:

1. A precast concrete building unit comprising the combination of a floor structure having a top surface; at least one upright cast concrete load-bearing exterior wall joined with the floor structure and extending above the top surface of the floor structure; a roof cast integrally with one or more of the exterior walls; an interior wall having an end which is cast integrally with at least one of the exterior walls and a top which is cast integrally with the roof, the interior wall having an undersurface spaced from the upper surface of the floor structure so that the interior wall does not transmit a load to the floor structure; an electrical outlet embedded in the interior wall; and an electrical conduit extending between the undersurface of the interior wall and the upper surface of the floor structure, the electrical conduit being connected to the embedded electrical outlet.

2. The combination according to claim **1** including a prewired electrical conduit connected to the embedded electrical outlet, and in which the electrical conduit which extends under the interior wall is an electrical cable connected to the prewired electrical conduit.

3. The combination according to claim **2** in which the prewired electrical conduit is embedded in the interior wall and extends to the space below the interior wall for connection to the electrical cable.

4. The combination according to claim **1** including an elongated strip of molding on each side of the interior wall for covering the space between the structure stucture and the undersurface of the interior wall to form an enclosed area for the electrical conduit.

5. A precast concrete building unit comprising the combination of a floor structure having an upper surface; at least one upright precast concrete load-bearing exterior wall joined with the floor structure and extending above the upper surface of the floor structure; an interior wall cast integrally with the exterior wall, the undersurface of the interior wall being spaced from the upper surface of the floor structure so that the interior wall does not transmit a load to the floor structure; an elongated strip of molding on each side of the interior wall for covering the space between the floor structure and the bottom of the interior wall to form an elongated enclosed area below the interior wall; an electrical outlet embedded in the precast interior wall; and an electrical conduit extending between the undersurface of the interior wall and the upper surface of the floor structure, the electrical conduit being connected to the embedded electrical outlet.

6. The combination according to claim **5** including a prewired electrical conduit connected to the embedded electrical outlet, and in which the electrical conduit which extends under the interior wall is an electrical cable connected to the prewired electrical conduit.

7. The combination according to claim **6** in which the prewired electrical conduit is embedded in the interior wall and extends to the space below the interior wall for connection to the electrical cable.

8. The combination according to claim **5** in which the molding strips are releasably mounted along the sides of the interior wall.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 3,908,321

DATED : September 30, 1975

INVENTOR(S) : Elmer A. Cox et al

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

[75] Inventors: "Adrian" should read -- Adrain --.

Col. 9, line 26, "roof" should read -- roofs --.

Col. 10, lines 18-19, "structure stucture" should read -- floor structure --.
(Claim 4)

Signed and Sealed this

twenty-fourth Day of *February 1976*

[SEAL]

Attest:

RUTH C. MASON
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents and Trademarks