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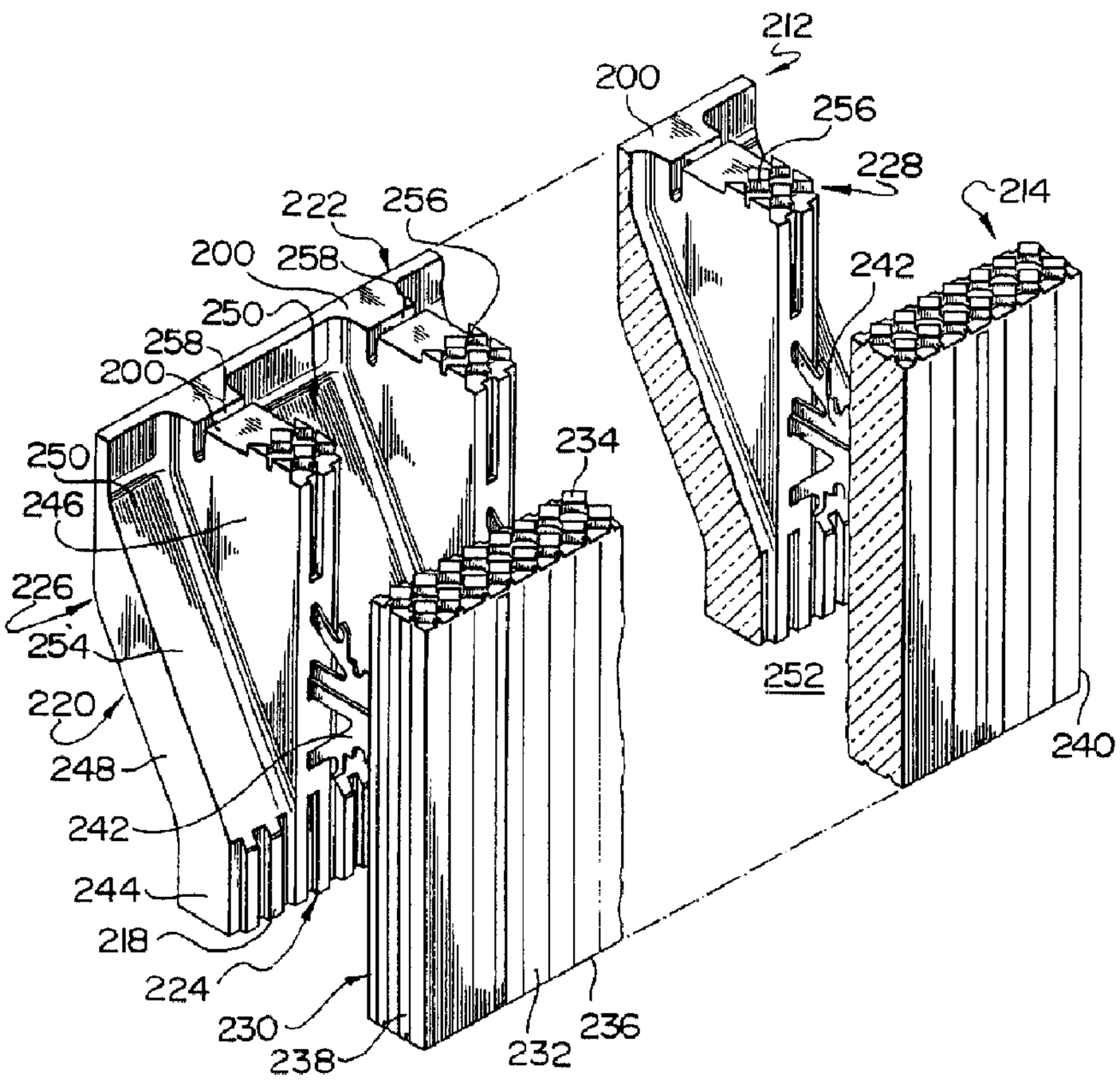
(54) Titre : ELEMENT DE CONSTRUCTION POUR PAROIS DE COFFRE EN BETON INCORPORANT UN SUPPORT DE TABLETTE

(54) Title: BUILDING COMPONENT FOR CONCRETE FORM WALLS INCORPORATING A SUPPORTING SHELF



(57) Abrégé/Abstract:
The invention provides a building component comprising first and second insulating foam panels each having inner and outer surfaces, a top and bottom. The panels are arranged to define a space between them for receiving pourable building material. At least two bridging members extend between and connect the panes. The first panel extends outwardly and upwardly from its bottom to define a supporting shelf or brick ledge.

ABSTRACT

The invention provides a building component comprising first and second insulating foam panels each having inner and outer surfaces, a top and bottom. The panels are arranged to define a space between them for receiving pourable building material. At least two bridging members extend between and connect the panels. The first panel extends outwardly and upwardly from its bottom to define a supporting shelf or brick ledge.

BUILDING COMPONENT FOR CONCRETE FORM WALLS INCORPORATING A SUPPORTING SHELF

This application is a division of Canadian application number 2,193,630 filed June 20, 1995.

FIELD OF THE INVENTION

This application relates to a building component of the type which is used to build up permanent concrete form walls in building construction.

BACKGROUND OF THE INVENTION

In conventional construction in North America concrete walls are normally produced by constructing form walls, pouring concrete into the space between the form walls and, upon the setting of the concrete, removing the form walls. Finishing materials are then added to the concrete walls as required.

Typically in residential construction, concrete basement and other concrete walls will be constructed in the manner discussed above and wood framing will be constructed as required on top of or beside the walls. Insulation will be inserted between the framing members and the wall finished inside and out as desired.

Clearly both parts of this construction are inefficient. It is time-consuming and wasteful of materials to have to remove the form walls after the concrete walls are poured. Furthermore, it is now common to insulate all walls, including basement walls, particularly in colder climates, and framing and insulation must be installed separately inside the walls.

The piecemeal construction which is inherent in the wood frame part of the structure is labour-intensive and expensive.

As a result, there have been ongoing efforts for many, many years to provide more modular types of wall construction from which efficiencies can be gained.

One such construction type is that with which the current invention is concerned.

For some 15 years a system has been in use particularly in Europe which combines a number of the operations normally associated with residential and other building construction to provide savings in materials, energy, etc. The system basically comprises the use of a foam insulating material to construct permanent form walls. The form walls are constructed and the concrete poured and the form walls then left in place. The concrete walls so formed need not be confined to basement walls but may comprise all of a building's walls. No further insulation is necessary, and finishing materials may be applied to the interior and exterior of the wall as required.

Variations on this system have been proposed to achieve various improvements. All of the systems thus far proposed, while in many cases very useful, suffer from some or other disadvantages.

Against this background the present invention provides a form wall with an integral brick shelf. This saves considerable cost on labour and the provision of footings for brick cladding where a brick structure is to be constructed.

PRIOR ART

Applicant is aware of Canadian Patent No. 1,209,364, issued in 1986 to Aregger AG Bauunternehmung. The components described in that patent include cross members, the ends of which are disadvantageously completely embedded in the foam blocks.

United States patents of some interest include U.S. Patent No. 4,698,947, issued October 1987 to McKay and pertaining to a block in which the cross members are again imbedded in the foam blocks but in slots provided for the purpose.

U.S. Patent No. 4,730,422, issued March 1988 to Young, comprises form walls which again utilize bridging members the ends of which are located in slots imbedded within foam blocks.

U.S. Patent No. 4,879,855, issued November 1989 to Berrenberg, illustrates a form wall in which the bridging members are constructed from expanded webbed steel having galvanized steel strips at the ends thereof.

U.S. Patent No. 4,884,382, issued December 1989 to Horobin, again discloses bridging members which fit within preformed slots in foamed block members.

Applicant's own earlier U.S. Patent No. 5,390,459 issued February 1995 discloses an improved system utilizing plastic bridging members in a form wall.

European application EP-A-0405040 discloses blocks having overlapping end parts which can be oriented with mating blocks to form an angle in a wall.

PCT application WO-A-9404768 discloses a rather complicated system for constructing beams and pilasters for building walls. A substantial variety of components require to be fitted together to construct the forms.

BRIEF SUMMARY OF THE INVENTION

It has now been discovered that substantial advantages can be obtained where the building component used to build up a concrete form wall comprises bridging members which are engineered to combine an enhanced strengthening and reinforcing grid with a substantial reduction in material. The grid achieves enhanced strength not only from the arrangement of bracing members but also from enlarged openings in the grid allowing improved flow of foam and, subsequently, of concrete. In certain embodiments, the building component advantageously can be configured to include a supporting shelf.

Accordingly, in a broad aspect of present invention there is provided a building component comprising first and second insulating foam panels each having inner and outer surfaces, a top and a bottom, the panels being arranged to define a space therebetween for receiving pourable building material. At least two bridging members extend between and

connect the panels. The first panel extends outwardly and upwardly from the bottom thereof to define a supporting shelf, for example, a shelf for supporting bricks.

The foregoing and other features and advantages of the invention will now be described with reference to the drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a perspective view of a building component which embodies some aspects of the present invention.

Figure 2 is a top plan view of a building component which embodies some aspects of the present invention.

Figure 3 is a top plan view of another building component which embodies some aspects of the present invention.

Figure 4 is a perspective view of one of the bridging members used in the building component shown in Figure 1.

Figure 5 is a side view of the bridging member of Figure 4.

Figure 6 is an end view of the bridging member of Figure 4.

Figure 7 is an end view of a building component which embodies some aspects of the present invention, and which incorporates the bridging member of Figure 4.

Figure 8 is a perspective view of a building component according to the present invention.

Figure 9 is an end view of the embodiment of Figure 8.

Figure 10 is a top plan view of the embodiment of Figure 8.

Figure 11 is an exploded perspective view of a further building component which embodies some aspects of the present invention.

Figure 12 is a top plan view of a component for use in the building component shown in Figure 11.

Figure 13 is a side elevation of a component for use in the building component shown in Figure 11.

Figures 14 to 16 are top plan views of variations of the building component shown in Figure 11.

Figure 17 is a perspective view of a wall section constructed according to the present invention.

Figure 18 is a perspective view of a series of protrusions and interconnecting walls for use on the top of a building component according to the invention.

Figure 19 illustrates a series of protrusions and depressions for use on the bottom of a building component according to the invention.

Figure 20 is a perspective view illustrating the use of a rebar in combination with a bracing member.

DETAILED DESCRIPTION

The description which follows and the related drawings include not only a description and illustration of a building component in accordance with the present invention (viz. a component which includes a supporting shelf), but also building components that while not specifically being described or shown as including a supporting shelf nevertheless embody aspects of the present invention. Such aspects will contribute to a better overall appreciation of the present invention and its use. A preferred embodiment of the present invention is particularly described and shown with reference to Figures 8 to 10 and 17.

Referring now to Figure 1, a building component 10 comprises first and second foam panels 12 and 14 secured together by at least two bridging members 42.

Panel 12 comprises inner and outer surfaces 18 and 20 respectively, top and bottom 22 and 24 respectively, and first and second ends 26 and 28. Panel 14 comprises inner and outer surfaces 30 and 32, top and bottom 34 and 36, and first and second ends 38 and 40.

The panels 12 and 14 are preferably fire retardant expanded polystyrene, polyethylene or polypropylene. Subject to indentations and protrusions of minor height to be discussed below, the panels are of uniform rectangular cross-section. In a typical case each panel may be 48 inches long, 16 3/4 inches high and 2 5/8 inches thick.

Bridging members 42 comprise a pair of elongated end plates 44 and 46 joined by narrow strip member 48.

As illustrated, for example, in Figure 1, the end plates 44 and 46 have their outer surfaces 50 and 52 respectively substantially flush with the outer surfaces 20 and 32 of panels 12 and 14 respectively. End plates 44 and 46 are oriented vertically relative to panels 12 and 14. Throughout this specification references to vertical and horizontal are intended to indicate the orientation of component 10 in position of use in a vertical wall.

In the preferred configuration of bridging members 42, as illustrated in Figures 4 to 6, the narrow strip member 48 has a stepped configuration such that a first part 54 is horizontally offset at 56 from a second part 58.

Narrow bracing members 60, 62, 64 and 66 extend between a mid-area 68 of narrow strip member 48 and positions 70, 72, 74 and 76 close to but spaced from the extremities 78, 80, 82 and 84 of end plates 44 and 46. Preferably, end plates 44 and 46 include on the inner surfaces 86 and 88 thereof elongated reinforcing ribs 90 and 92 which are integral with the respective ends of bracing members 60, 62, 64 and 66.

Bridging member 42 includes second bracing members 94, 96, 98 and 100 between narrow strip member 48 and first bracing members 60, 62, 64 and 66 respectively. In the preferred configuration second bracing members 94, 96, 98 and 100 are substantially vertically oriented and have their inner edges 102, 104, 106 and 108 respectively substantially flush with inner surfaces 18 and 30 respectively of panels 12 and 14.

The first bracing members 60, 62, 64 and 66 form in their preferred configuration an X-shape joining the positions 70, 72, 74 and 76 near the ends of end plates 44 and 46 through the mid-area 68. This configuration provides a substantial increase in strength in the bridging member over known such members.

In the preferred configuration transverse stiffening members 110, 112, 114 and 116 are provided between narrow strip member 48 and second bracing members 94, 96, 98 and 100 respectively. In configuration each of these members includes a first part 118 which in

use is substantially flush with the inner surfaces 18 and 30 of panels 12 and 14; and a second section 120 which extends into said panels.

There is also preferably provided a transverse stiffening member 121 across both surfaces of mid-area 68.

Mid-area 68 is preferably enlarged and profiled to provide a series of seats for rebar positioning. Thus, utilizing the seats. 122 provides an open pattern of rebar. Use of seats 124 provides a more closed pattern. Seats 126 provide one or two centered rebar rods.

In order to position and stabilize vertical rebar in constructing the wall, horizontal rebar may be placed in alternate seats, as selected, with the vertical rebar then placed between horizontal rebar. For example, horizontal rebar may be placed in seats 124 with vertical rebar in the space between.

Clearly a preferred pattern of rebar installation may be selected to meet job requirements.

In the preferred configuration each of the rebar seats is provided with a resilient hook member as at 128 to provide a snap fit to maintain the rebar in position. This will avoid the extra labour involved in tying in some or all of the rebar.

Each bridging member 42 comprises a single integral unit molded of plastic. The preferred plastic is high-density flame retardant polyethylene, although flame retardant polypropylene, polystyrene and other suitable polymers may be used.

The bridging members 42 are molded into the panels 12 and 14 in the course of producing the panels. As best seen in Figure 1, the end plates 44 and 46 are preferably of substantially equal height with the panels 12 and 14 and are substantially flush with the top and bottom of the panels, subject to the vertical joining means on the panels, to be discussed below.

As illustrated in Figure 17, a series of components 10, including a row of components 210 (Figures 8-10) are built up to form a wall 130. Initially a series of components 10 and 210 are stacked to form a hollow wall or concrete form after which concrete 132 is poured into the hollow part of wall 130 to complete the wall.

In order to facilitate the stacking of the components 10, the panels 12 and 14 are provided on the top thereof with a series of plugs 134 joined by low walls 136 (Figure 18) ; and on the bottom 24 and 36 thereof with a mating series of plugs 138 and walls 140 (Figure 19). The plugs 134 and 138 are offset relative to each other, such that when the bottom of one component 10 is placed on the top of a lower component 10, the plugs 134 and walls 136 of the upper component mate with the plugs 138 and walls 140 of the bottom component to form a tight seal to prevent leakage of concrete during wall formation and of energy through the completed wall.

As best illustrated in Figures 2 and 3, the inner surfaces 18 and 30 of panels 12 and 14 respectively are preferably provided with a series of indentations 142. Concrete being poured into the hollow wall will flow into indentations 142 and enhance the bond between panels 12 and 14 and concrete 132.

With reference to Figures 8 to 10, an embodiment of the invention is shown which provides for an integral brick shelf 200 (viz. a supporting shelf) to be formed at the appropriate level of the form wall. This will normally be at grade. In current construction considerable cost and labour is expended in providing footings for brick cladding where a brick structure is being constructed. The embodiment of Figures 8 to 10 permits an integral brick shelf to be constructed.

Thus, the building component 210 comprises first and second foam panels 212 and 214 secured together by at least two bridging members 242.

Panel 212 comprises inner and outer surfaces 218 and 220 respectively, top and bottom 222 and 224 respectively, and first and second ends 226 and 228. Panel 214 comprises inner and outer surfaces 230 and 232, top and bottom 234 and 236, and first and second ends 238 and 240.

As can be seen in Figures 8 to 10, the top 222 of panel 212 is substantially thicker than the bottom 224. The outer surface 220 of panel 212 is profiled to extend outwardly and upwardly from bottom 224 to the top 222. In the preferred configuration bottom part 244 of panel 212 is the same thickness as panel 214 and of other panels in a wall. At part 244 the

outer surface 220 is preferably vertical. A top part 246 of panel 212 is substantially thicker than bottom part 244. Outer surface 220 at part 246 is also preferably vertical. At an intermediate part 248 of panel 212 the outer surface 220 is profiled to join lower part 244 to thicker upper part 246.

As illustrated in Figures 8 and 9, parts of thicker upper part 246 of panel 212 are cut away (by means of mold cavities rather than by actual cutting) in areas which do not contain bridging members 242. The cut-away areas 250 are thus open to the space 252 between the panels.

The inner surface 218 of panel 212 in the area of cut-aways 250 is profiled as at 254 to follow the profile of outer surface 220, although not necessarily at uniform distance from that outer surface.

It will thus be seen that when a wall is constructed in the usual way which includes a course of modified components 210 (see Figure 17), and when concrete is poured to form the core of the wall, the concrete will fill the cut-aways or cavities 250 to form the brick shelf integral with the wall.

The solid foam partitions 256 between cut-aways 250 preferably include a slot 258 to support rebar or other reinforcing means for the shelf.

A further problem which arises in the construction of form walls concerns the difficulty in establishing correct angles where a directional change in a wall of less than 90^0 is required. If, for example, the angle in a foundation wall is incorrect by a small amount, the entire building above that part of the foundation is affected. Accordingly, the building component of Figures 11 to 16 has been devised to enable a range of directional changes or corners to be accurately constructed in a form wall, providing continuity in the form wall incorporating the building components of the invention.

Thus, the component 310 comprises panels 312 and 314 secured together by a series of bridging members 342. Panel 312 comprises inner and outer surfaces 318 and 320 respectively, and first and second ends 326 and 328. Panel 314 comprises inner and outer surfaces 330 and 332, top and bottom 334 and 336, and first and second ends 338 and 340.

At the end of component 310 integral end parts 344 and 346 are shown. These end parts are seen to be integral with panels 312 and 314 respectively. Each of end parts 344 and 346 is preferably semi-circular in configuration.

As illustrated in Figure 13, end part 344 extends from the upper half of ends 326 and 328 of panels 312 and 314; and end part 346 extends from the lower half of ends 328 and 340 of the panels. End part 344 preferably includes in a lower surface 348 thereof a central semi-circular groove 350.

The upper surface 352 of end part 346 includes a complementary central raised tongue 354 of semi-circular plan.

When a change of direction of, say, 30° is required in a wall, the component 310 can be bisected at an appropriate point and turned end to end to form part components 310a and 310b (Figure 11). The tongue 354 can then be mated with the groove 350 and the units rotated to the required angle. At that point a part of the end parts 344 and 346 will cross the space 356 between the panels. That part of the end parts 344 and 346 can then simply be cut out to allow the concrete core to be installed.

The ends 326 and 328 of panel 310, and 338 and 340 of panel 314 are angled as shown at 356, 358, 360 and 362 to accommodate the semi-circular end parts 344 and 346 over a range of rotation.

While a preferred configuration of this component has been described, a number of variations are possible. For example, rather than being of semi-circular configuration, the end parts may be stepped to accommodate specific predetermined angles as in a semi-hexagonal configuration.

As well, only one of end parts 344 and 346 may be present on a given component with a second complementary and mating end part on a second component. There are, however, advantages in including the two end parts on a single component. These include the very significant fact that only a single mold is required for that case. As well, where the double-ended panels are utilized, builders will always be sure of having available an equal number of half joints.

The highly preferred overlapping configuration of blocks in a wall can be achieved with the double-ended unit by bisecting succeeding double-ended blocks at different locations along their length into non-equal parts.

In the typical basic component discussed earlier for use in combination with the building component of the invention (e.g. Figure 1), of 48-inch width, the bridging members 42 will preferably be spaced on 8-inch centres with the two bridging members closest to the ends of the component located 4 inches from the ends. Thus, when the panels are overlapped to form the wall, the bridging members of the various courses can be aligned to form continuous strips of end plates 44 and 46 over the entire height of the wall. This is a very significant advantage of the present system, since interior or exterior wall cladding can be fixed to the exterior of the end plates 44 and 46, preferably using screws.

Drainage is provided and parging and damp-proofing of the exterior as is the case with a conventional concrete basement wall.

Using the typical dimensions noted above with a panel separation of 6 1/4 inches (6 1/4 inches of concrete) the insulating value of the wall is R26. This is a very high rating for wall construction and thus no additional insulation is required. In addition to the energy-saving value of the insulation, the walls have high resistance to sound transmission with a typical sound reduction of 53DBA.

The typical component noted above for use in combination with the building component of the invention will weigh only about 2.8 kgs. and so provides a substantial advantage to tradesmen building a wall.

While the invention has been described in conjunction with specific embodiments, it will be apparent to those skilled in the art that many alternatives, modifications and variations are possible. It is to be understood that it is not intended to limit the invention to the embodiments described. On the contrary, it is intended to cover all alternatives, modifications, variations and equivalents as fall within the spirit and scope of the invention as defined by the claims which follow.

THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. A building component comprising:

first and second insulating foam panels each having inner and outer surfaces, a top and a bottom, said panels being arranged to define a space therebetween for receiving pourable building material;

at least two bridging members extending between and connecting said panels; and,

wherein said first panel extends outwardly and upwardly from said bottom thereof to define a supporting shelf.

2. The building component of claim 1 wherein said outer surface of said first panel includes a lower vertical part, an upper vertical part, and an intermediate part connecting said lower and upper parts, said intermediate part being angled relative to said vertical parts.

3. The building component of claim 1 wherein said top of said first panel is substantially thicker than said bottom thereof, said outer surface of said first panel is profiled to extend outwardly and upwardly from said bottom thereof to said top thereof, and wherein said inner surface of said top is partially cut away in areas spaced from said bridging members of said first panel.

4. The building component of claim 3 wherein said cut away parts follow the profile of, but are spaced from, said outer surface of said first panel.

5. The building component of claim 1 wherein said first panel further includes at least two members extending inwardly from said first panel inner surface, each of said extending members having a top portion, a bottom portion and an intermediate portion extending therebetween, said top portion being substantially thicker than said bottom portion.

6. The building component of claim 5 wherein said extending members comprise partitions connected with said first panel.

7. The building component of claim 6 wherein said partitions are integrally formed from insulating foam material with said first panel.

8. The building component of claim 5 wherein each of said bridging members include a first end connected to one of said extending members and a second end connected to said second panel.

9. The building component of claim 5 wherein each of said bridging members include a pair of end plates, with a first one of said end plates being molded into one of said extending members and a second one of said end plates being molded into said second panel.

10. The building component of claim 9 wherein each of said end plates abuts the outer surface of one of said first and second panels.

11. The building component of claim 1 wherein said bridging members are molded into said first and second panels.

12. The building component of claim 1 wherein said bridging members include a pair of end plates, wherein each of said end plates abuts the outer surface of one of said first and second panels.

13. The building component of claim 1 wherein said bridging members are formed integrally from one piece of material.

14. The building component of claim 1 wherein said bridging members are disposed symmetrically about a vertical axis.

15. The building component of claim 5 wherein said top portions of said extending members define at least a portion of said supporting shelf.

16. The building component of claim 1 wherein said supporting shelf includes a top surface of building material received within said space.

17. The building component of claim 1 wherein the building material received within said space defines a vertical wall portion integral with said supporting shelf.

18. The building component as defined in any one of claims 1 to 17 wherein said first and second insulating foam panels are high density foam panels.

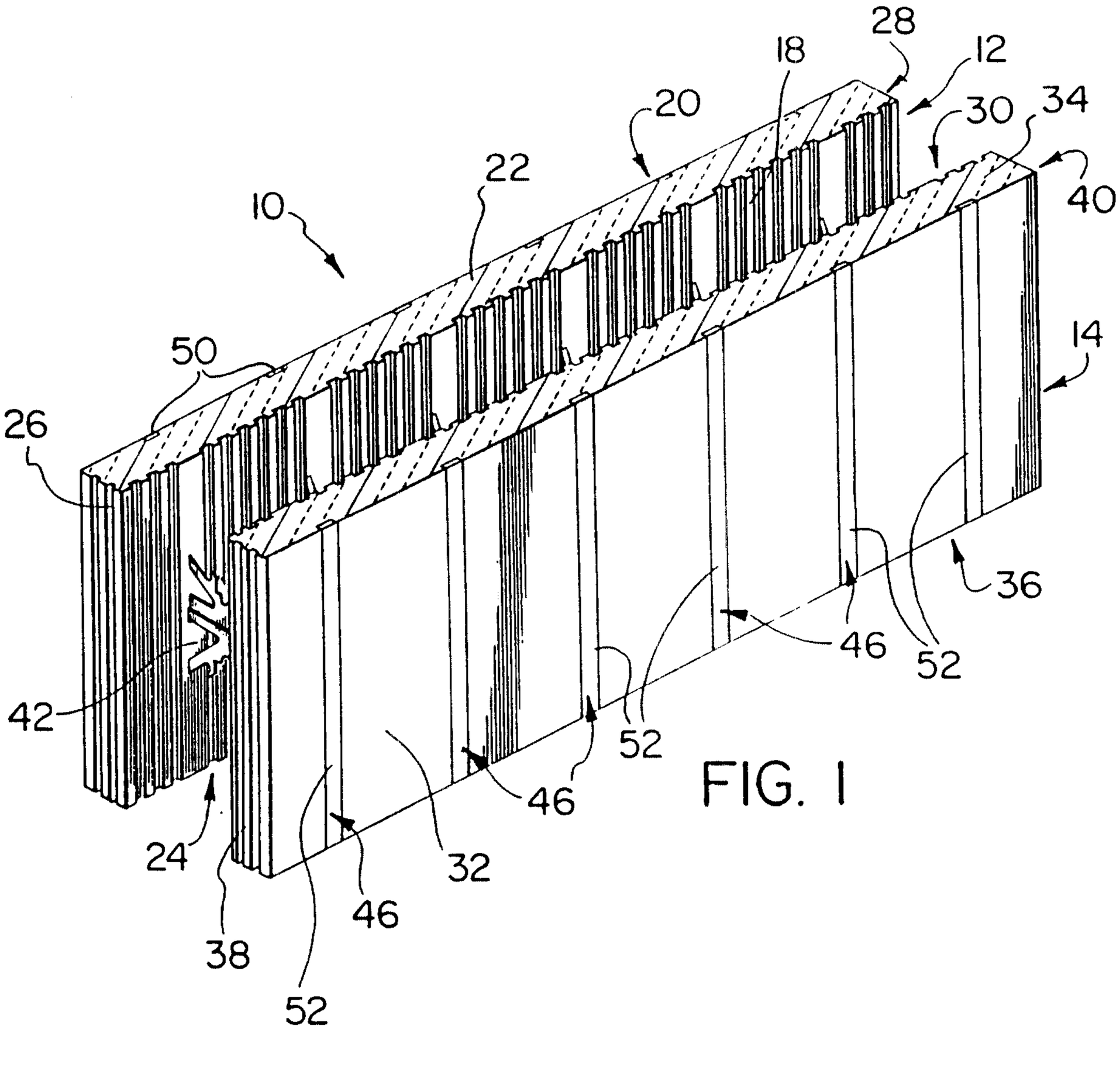


FIG. 1

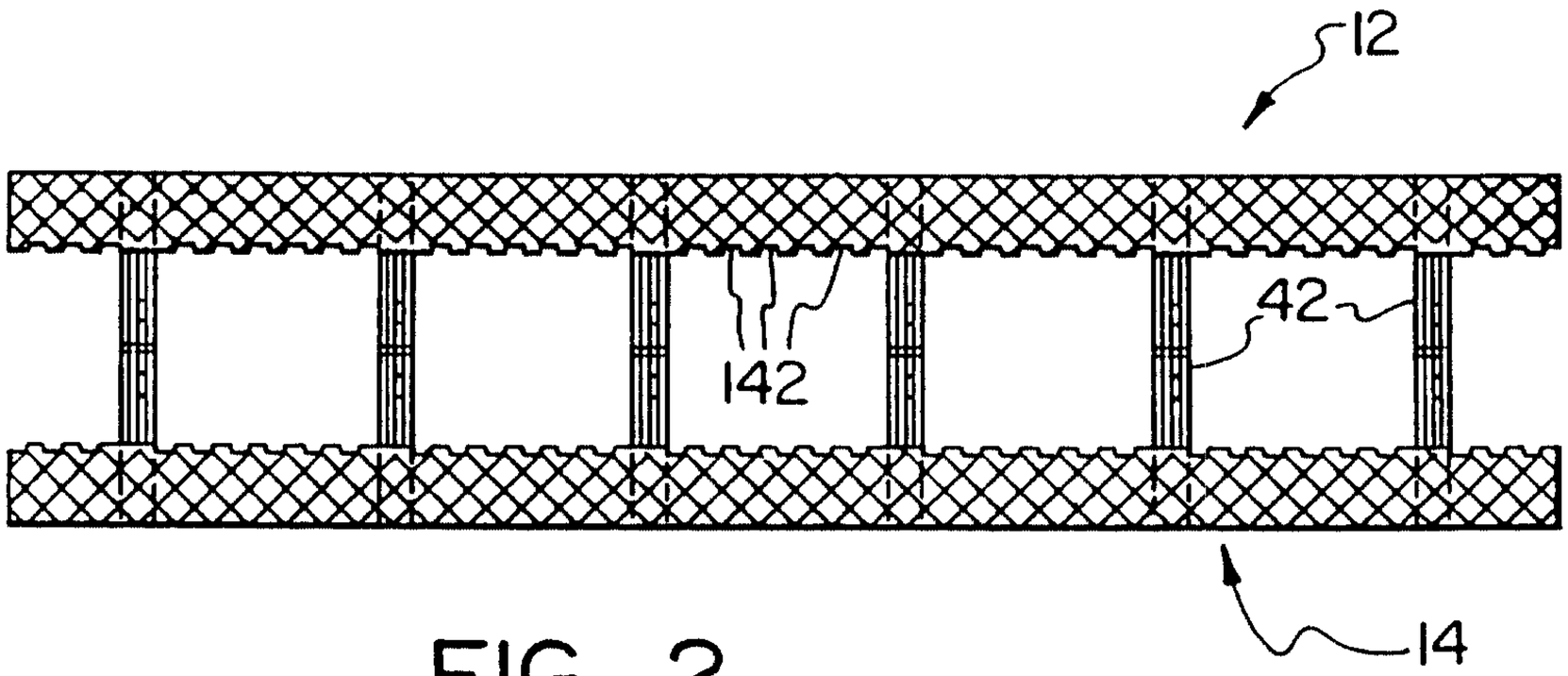


FIG. 2

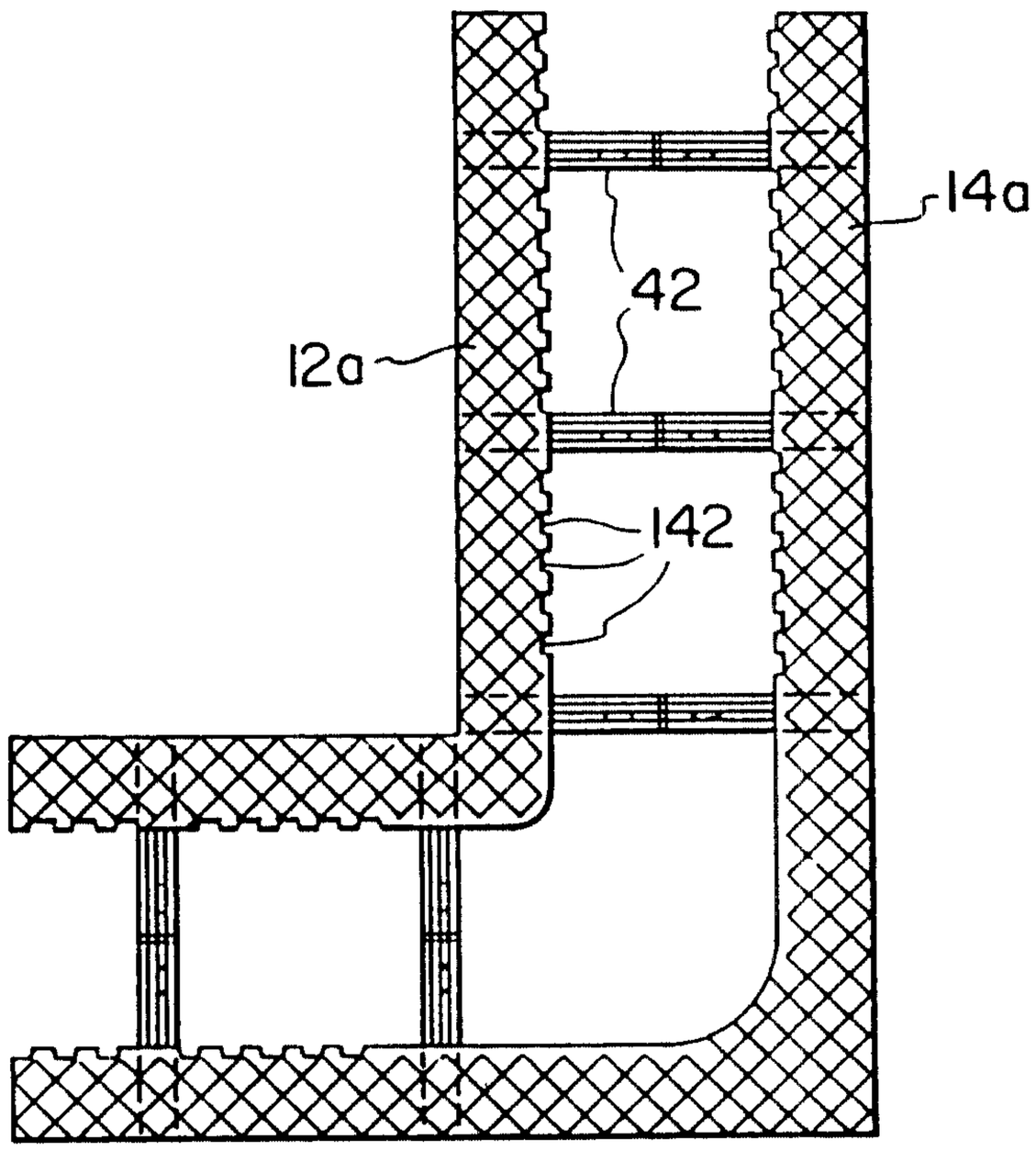


FIG. 3

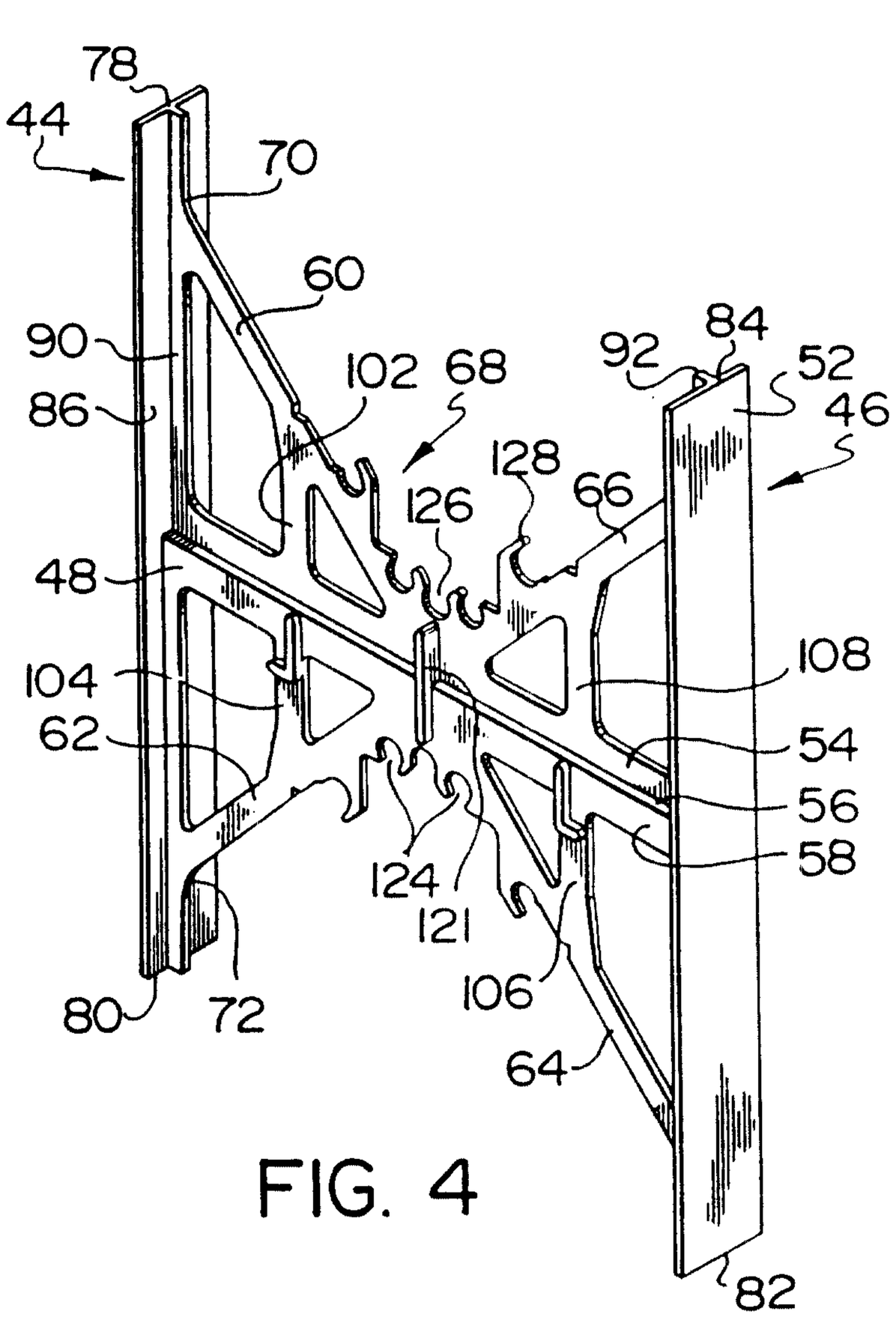

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FIG. 4

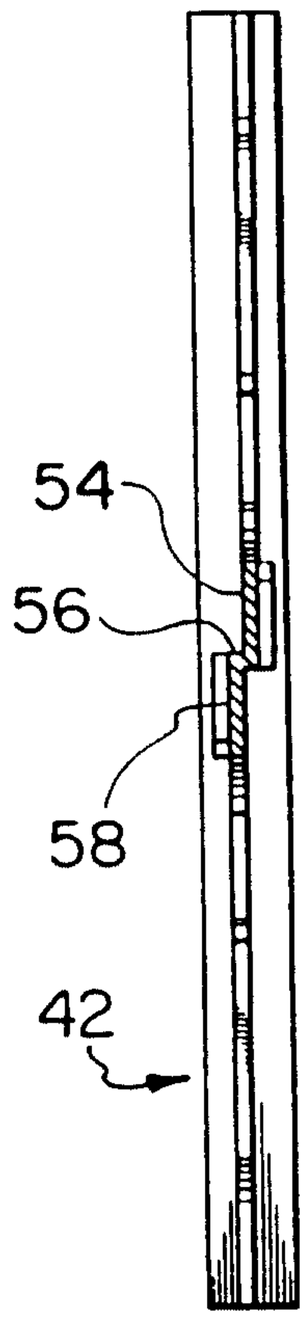
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FIG. 6

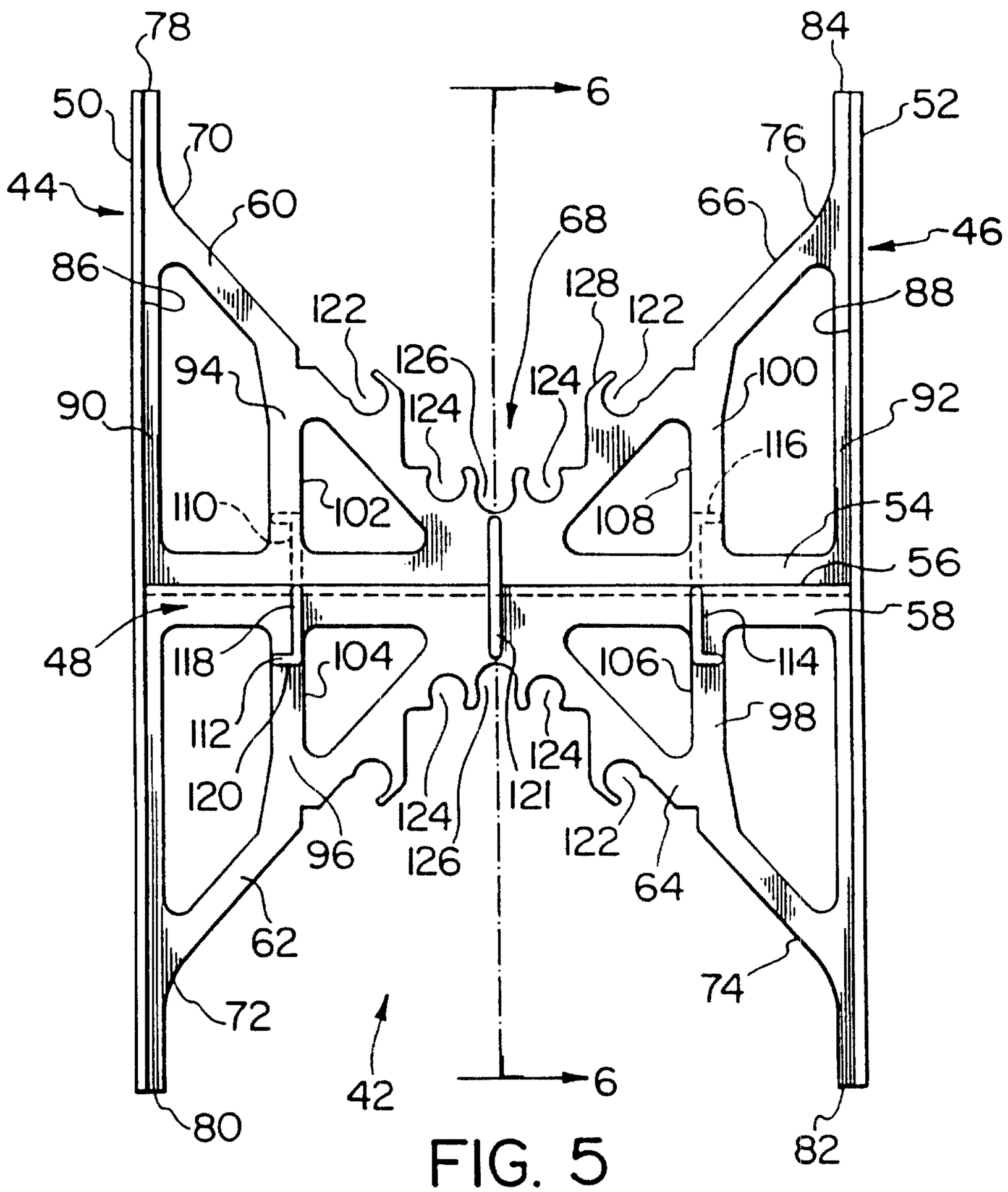
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FIG. 5

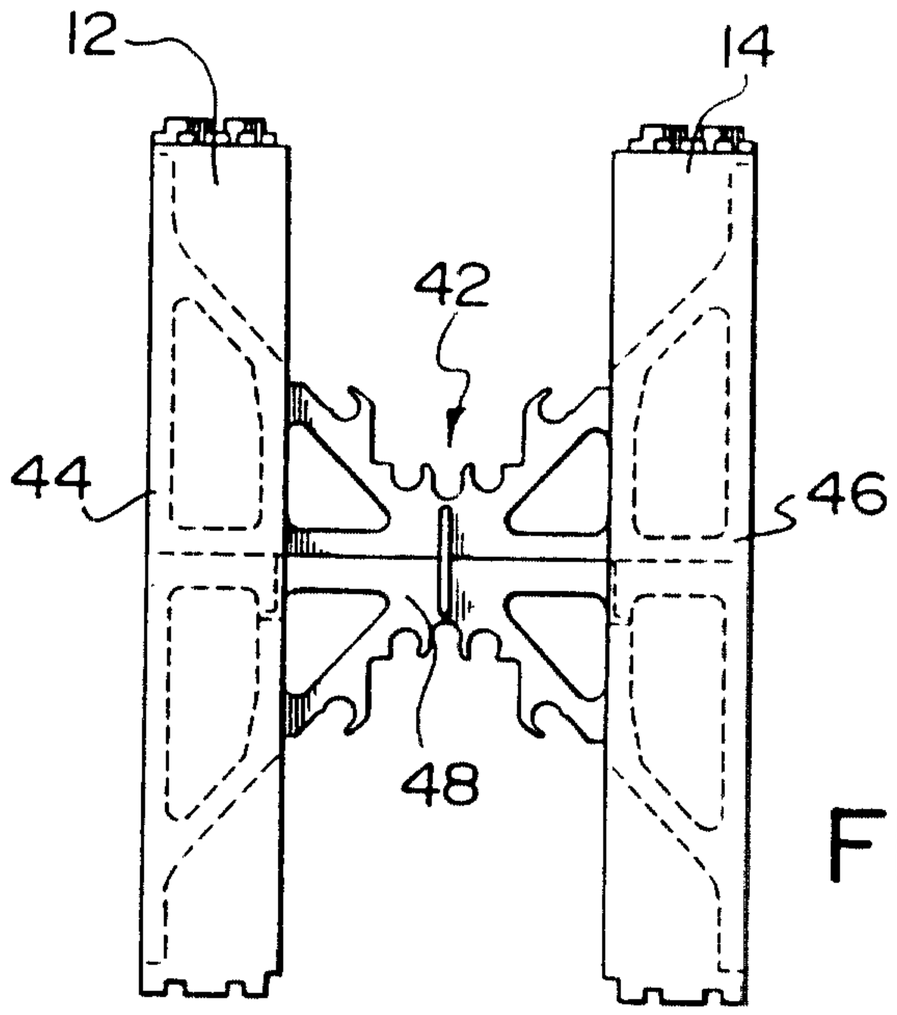
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FIG. 7

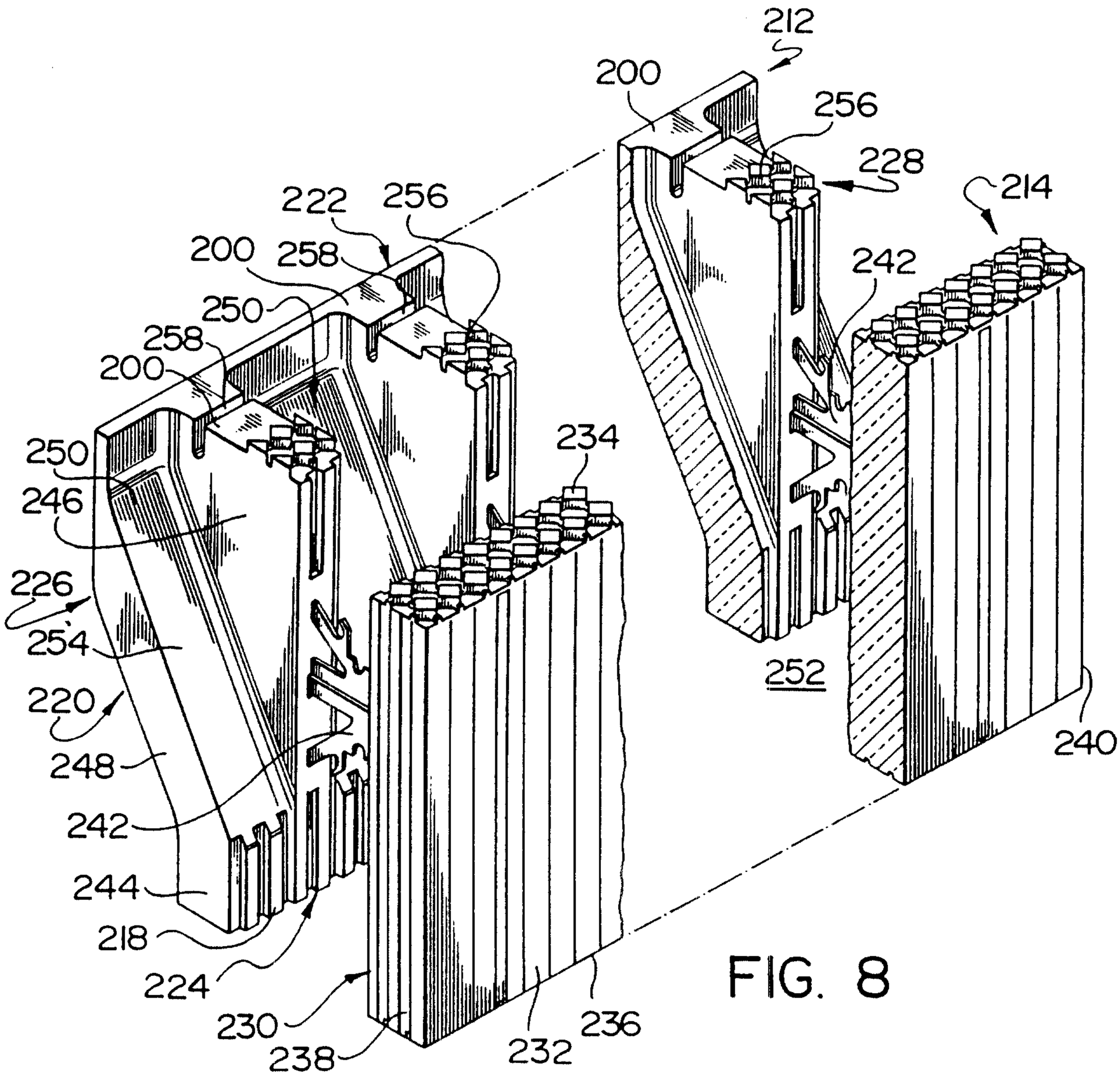
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FIG. 8

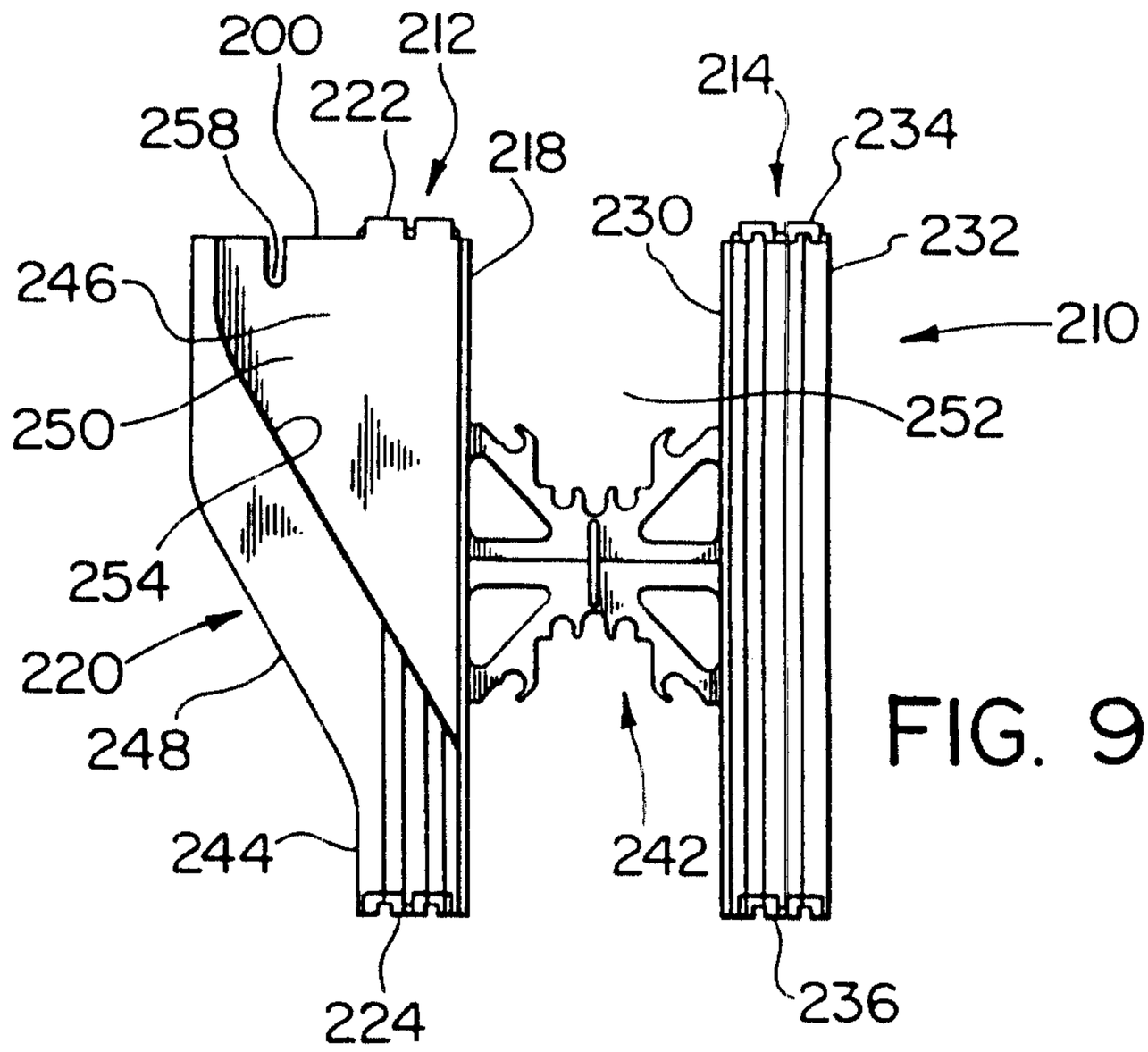
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FIG. 9

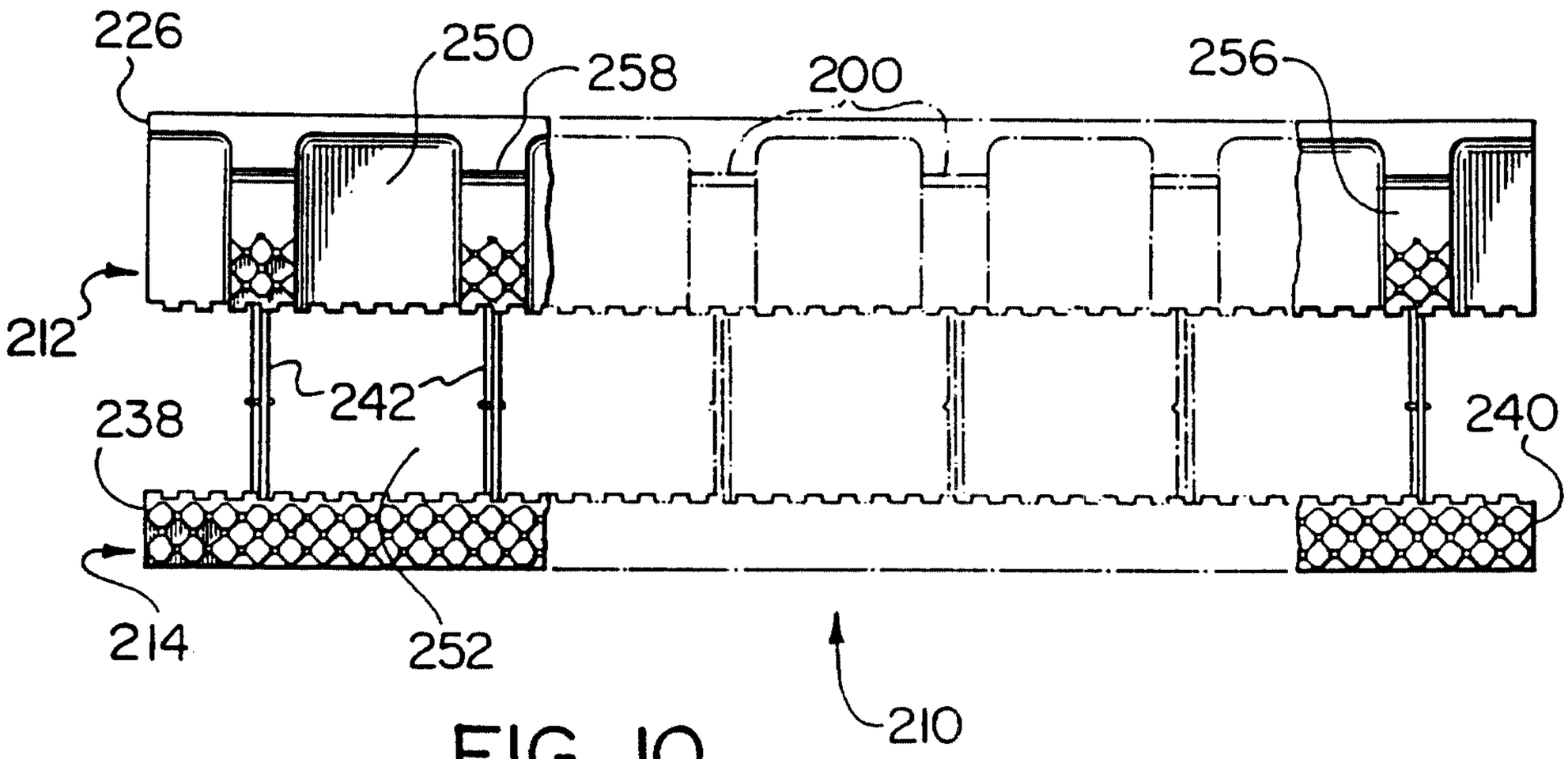
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FIG. 10

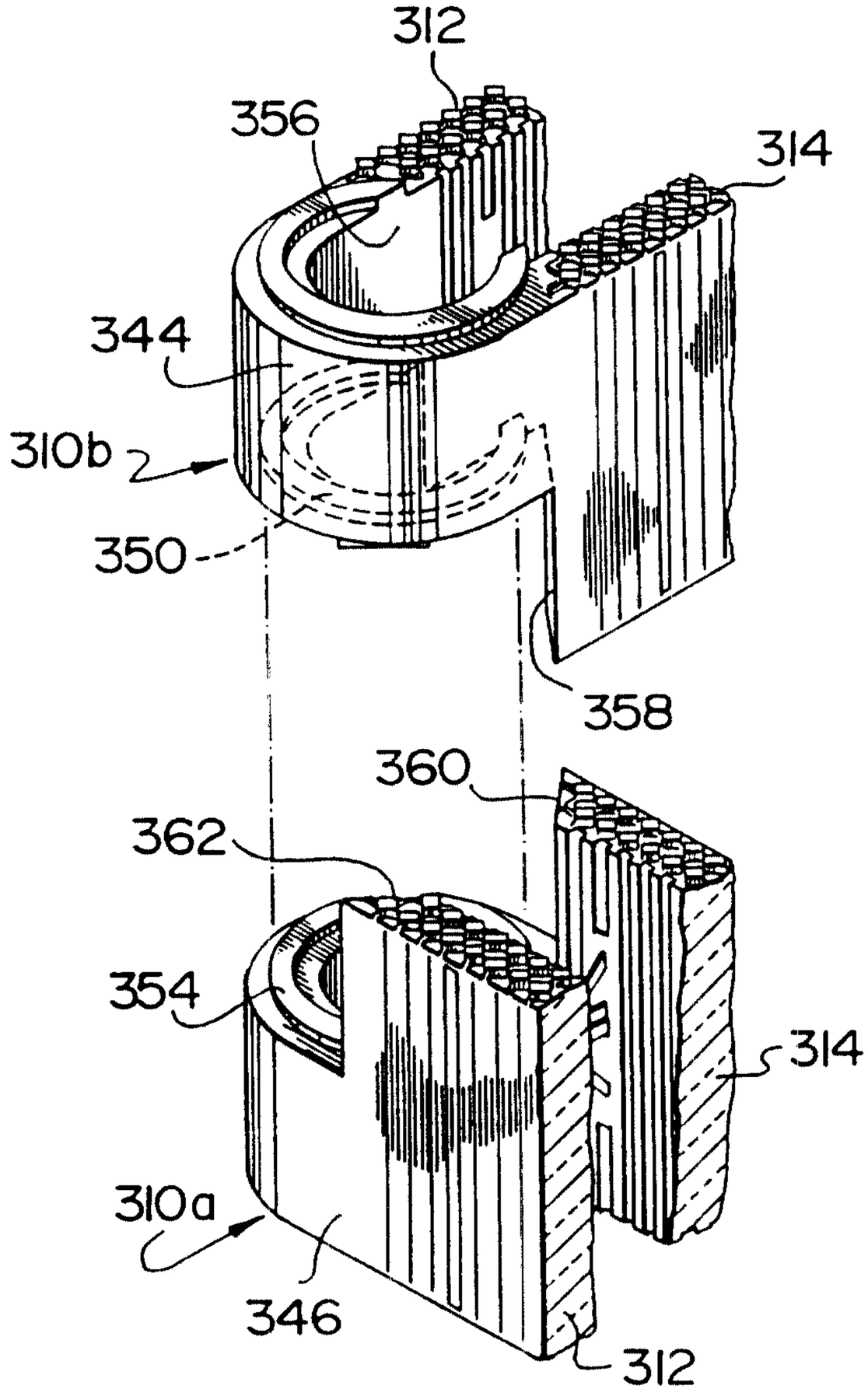


FIG. 11

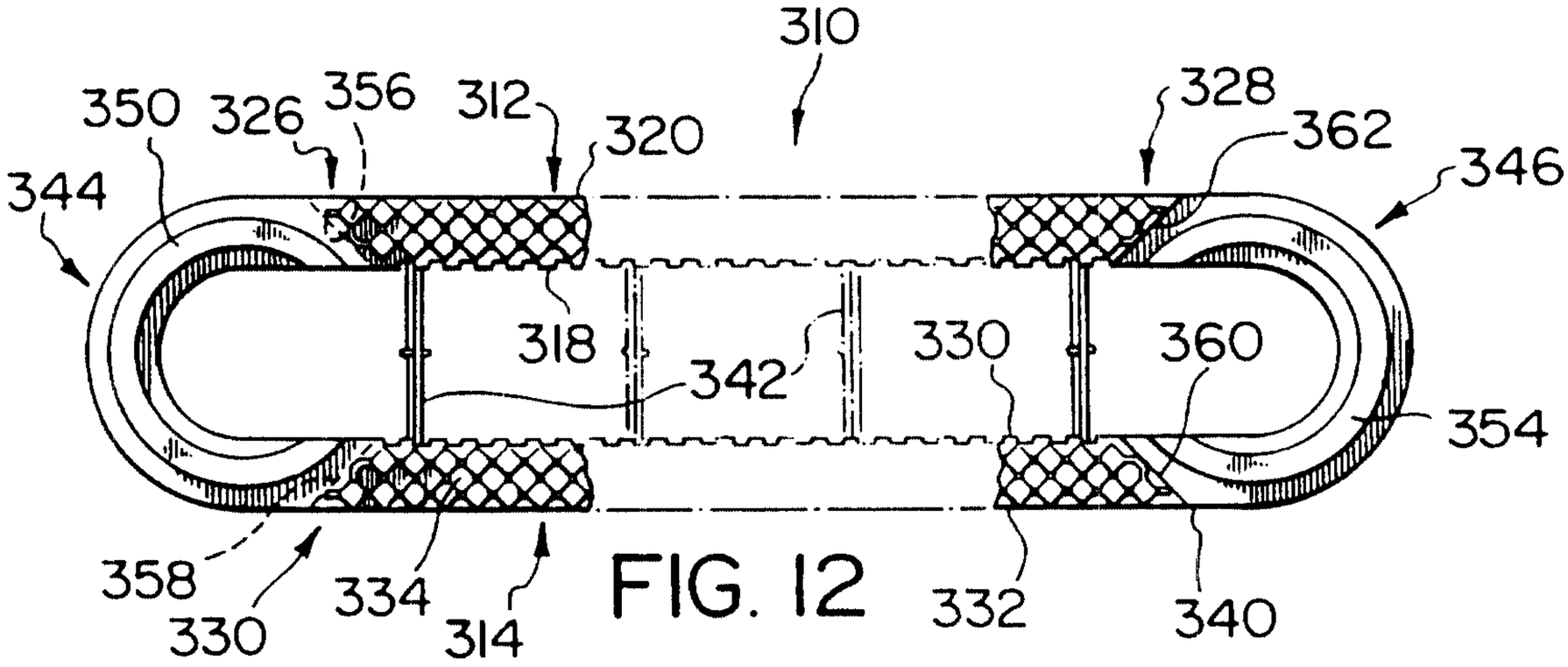


FIG. 12

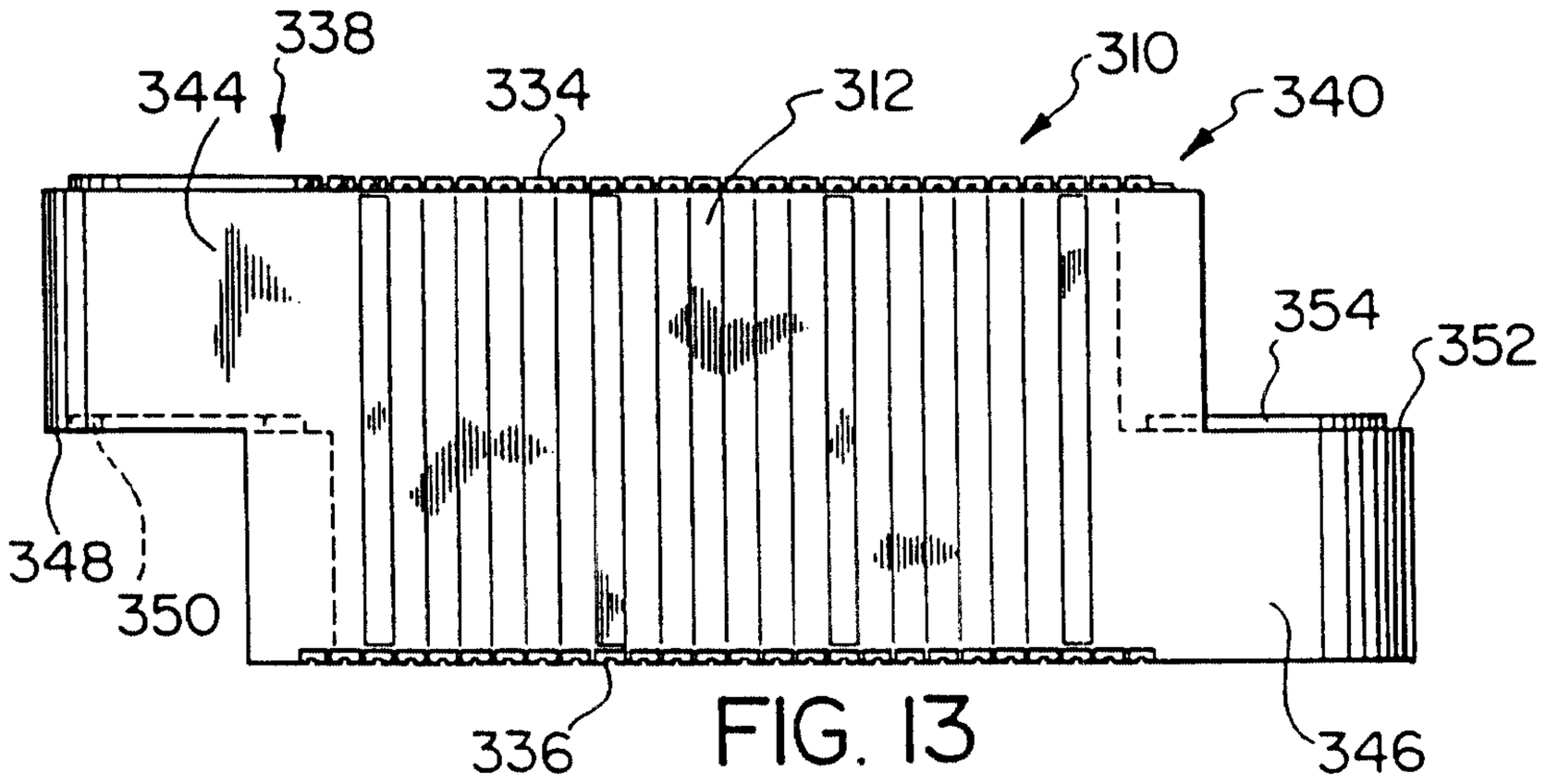


FIG. 13

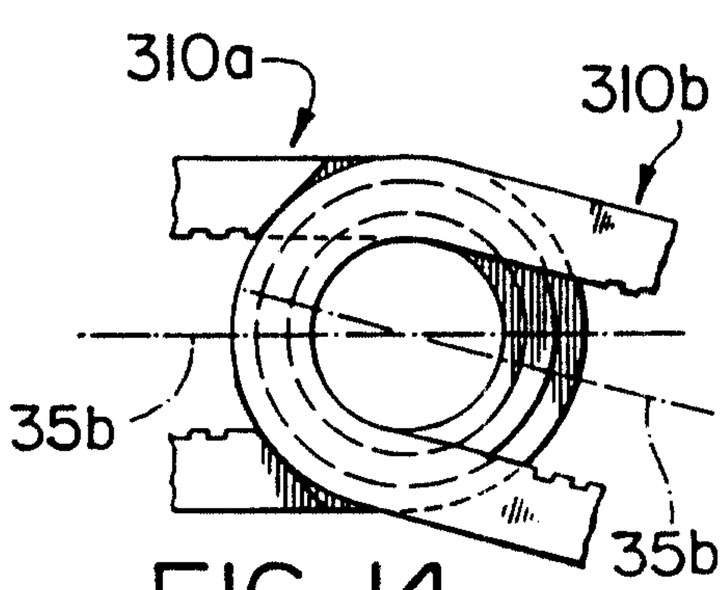


FIG. 14

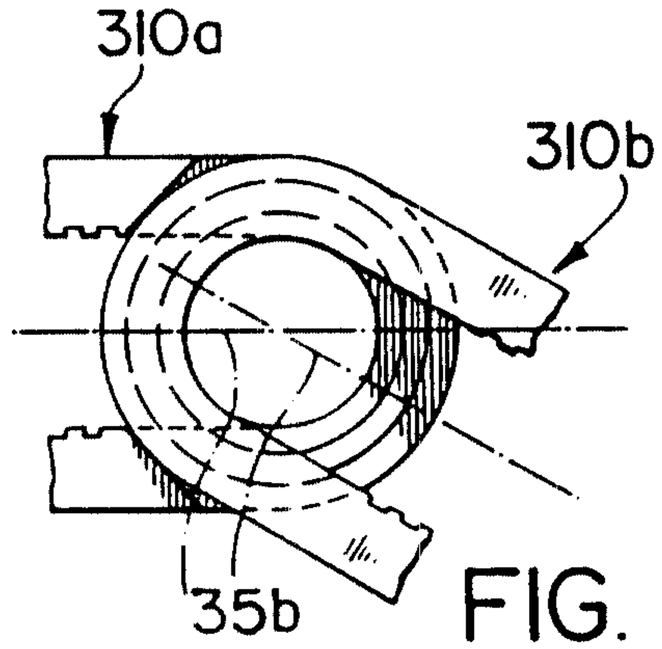


FIG. 15

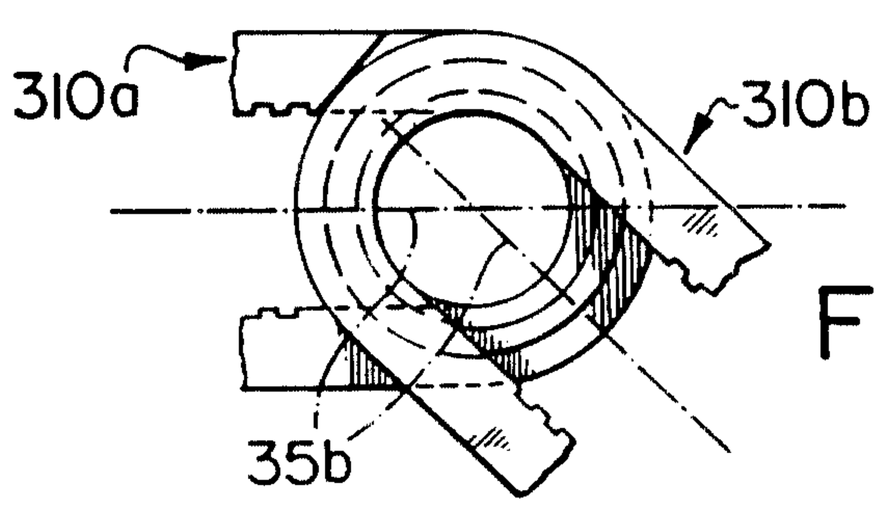


FIG. 16

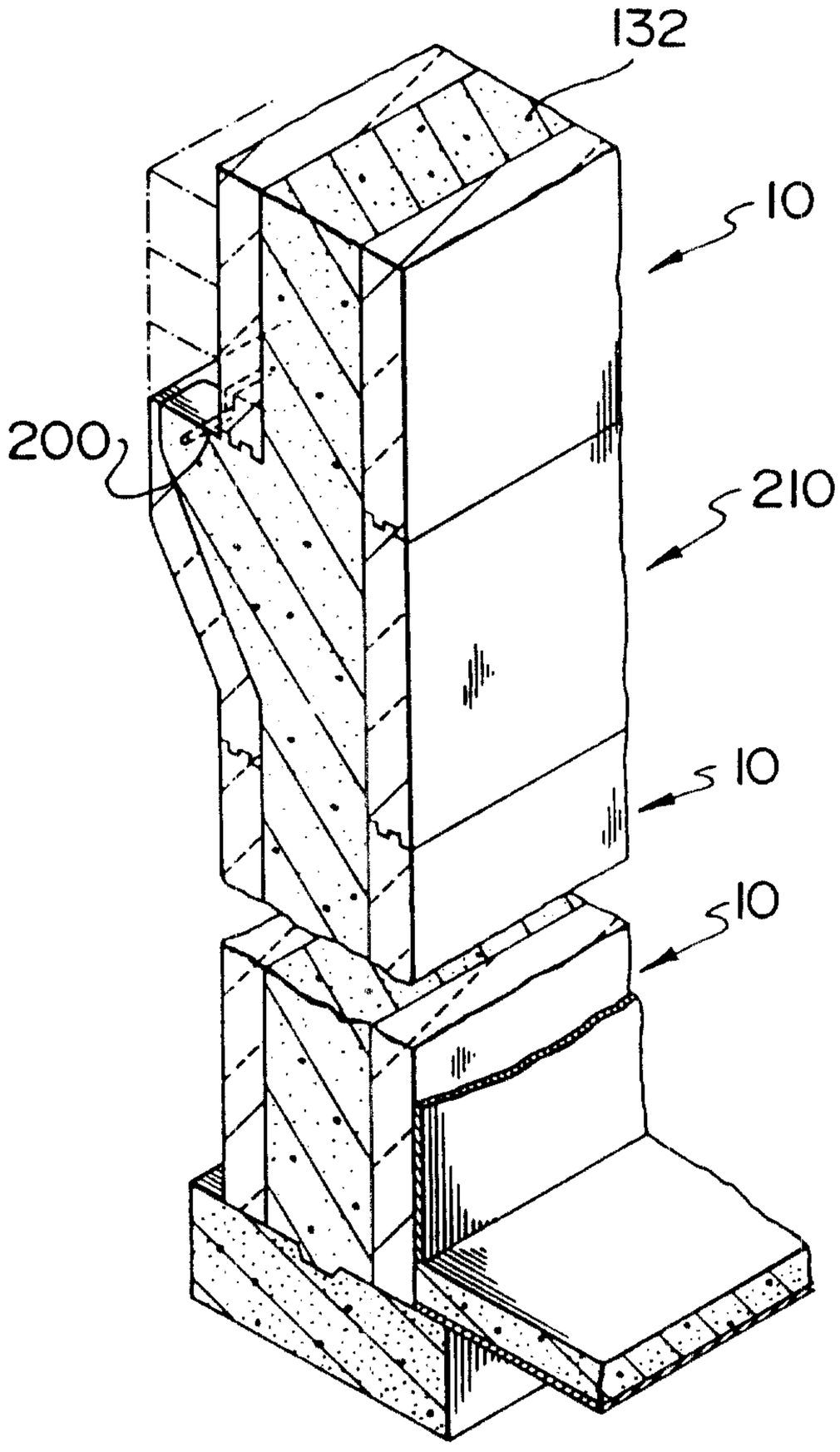


FIG. 17

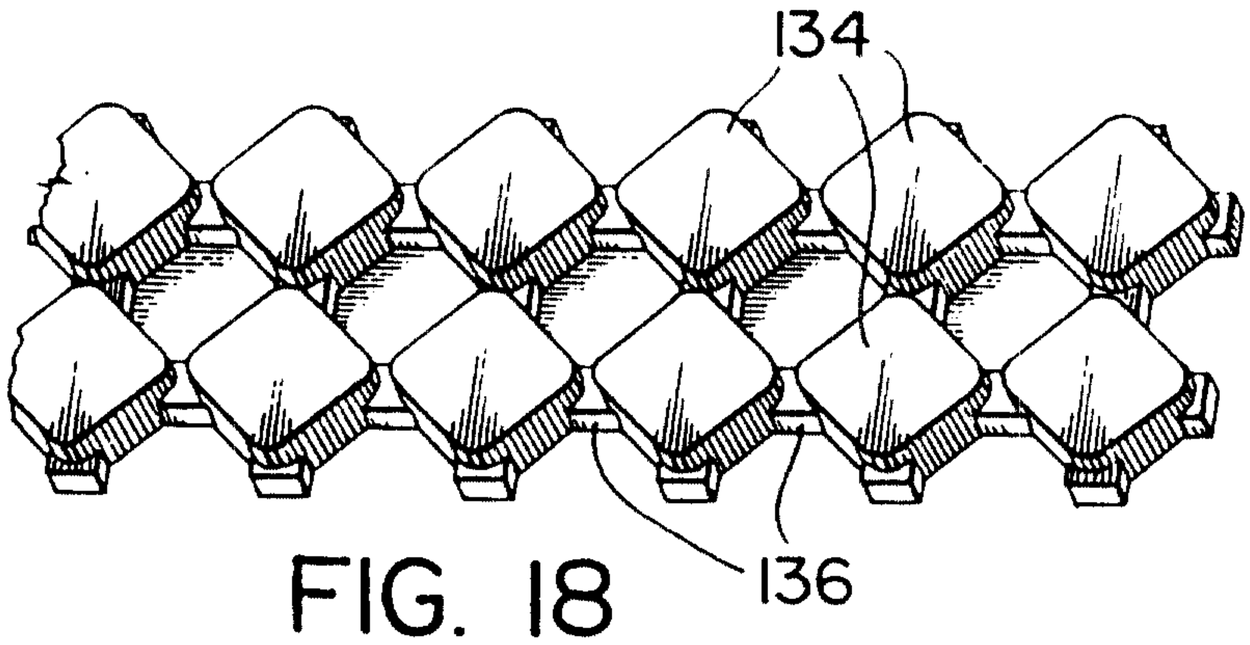


FIG. 18

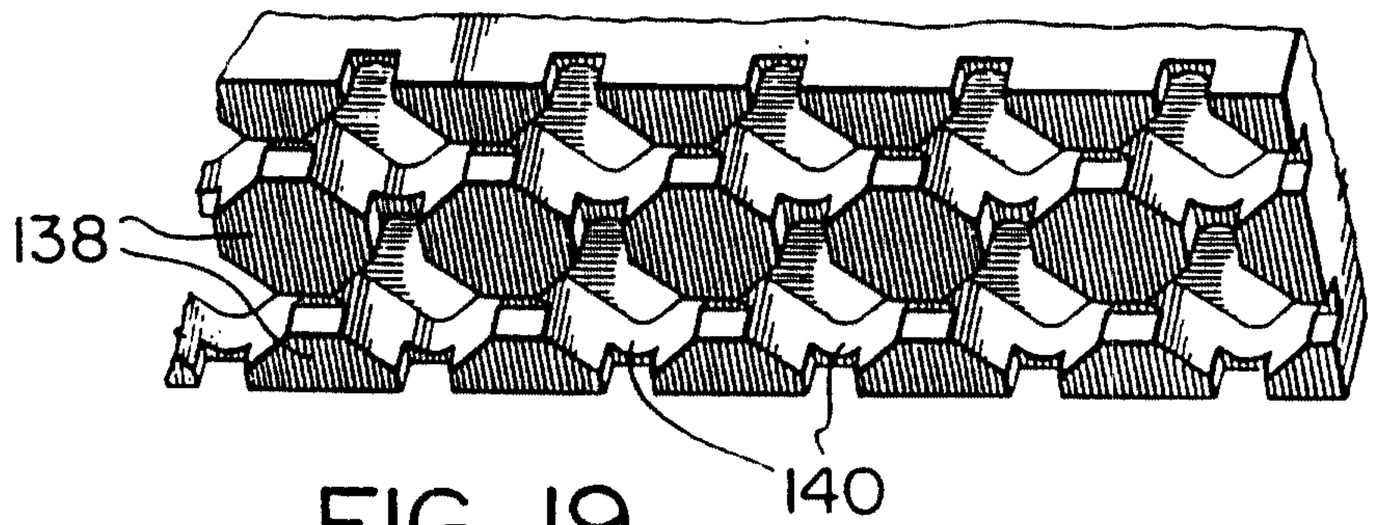


FIG. 19

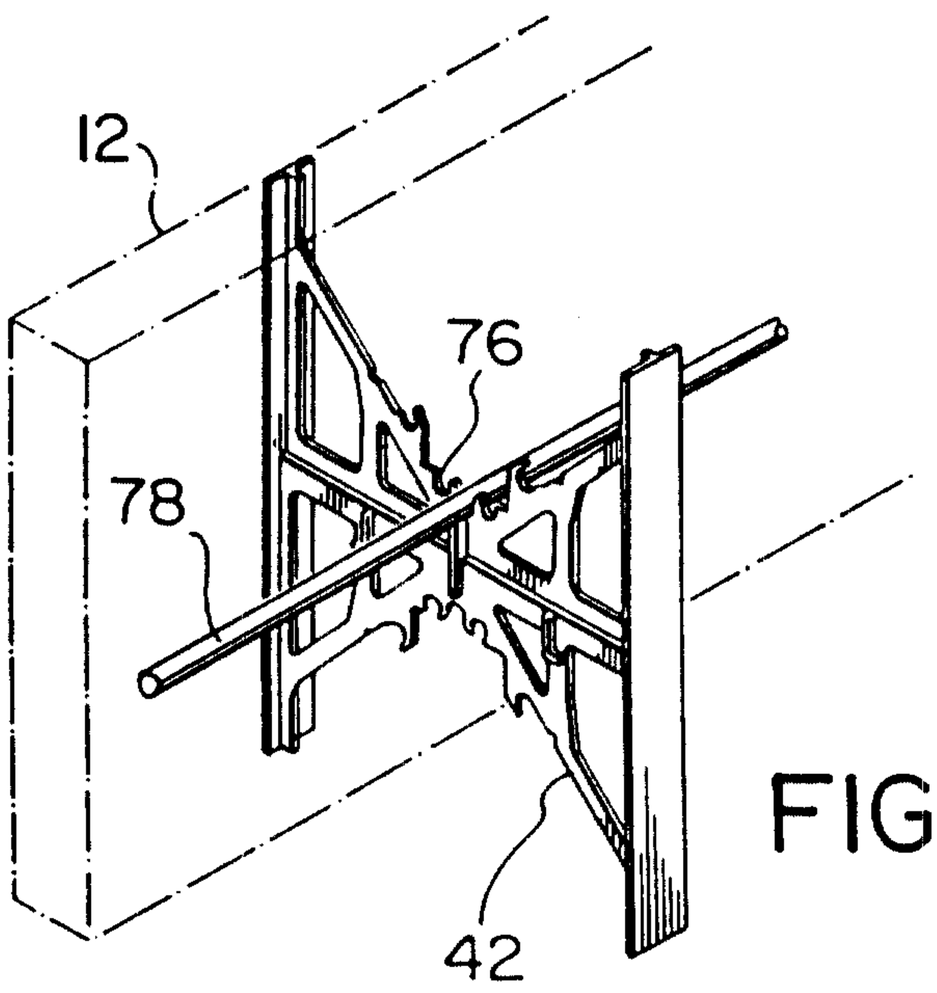
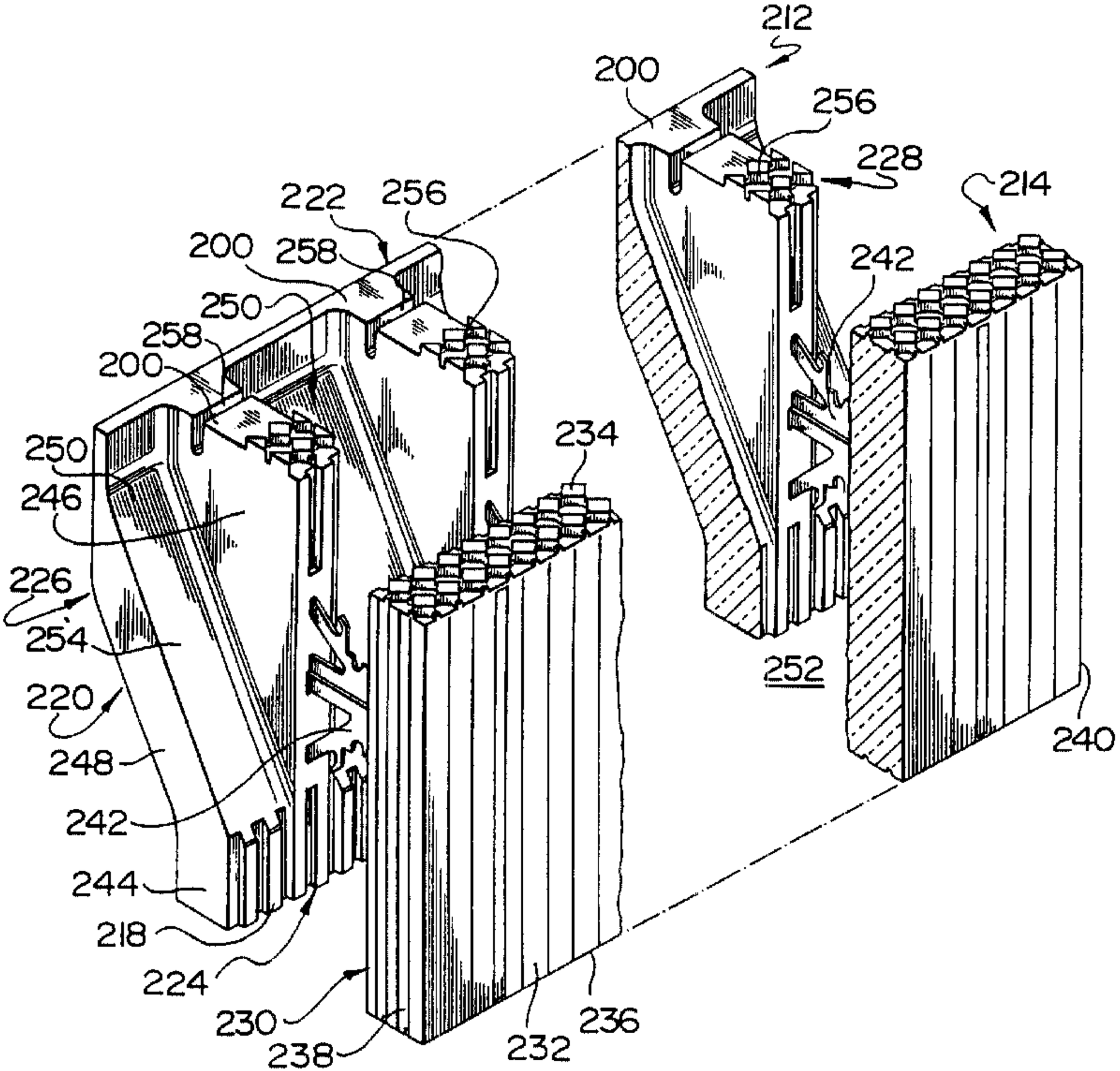


FIG. 20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