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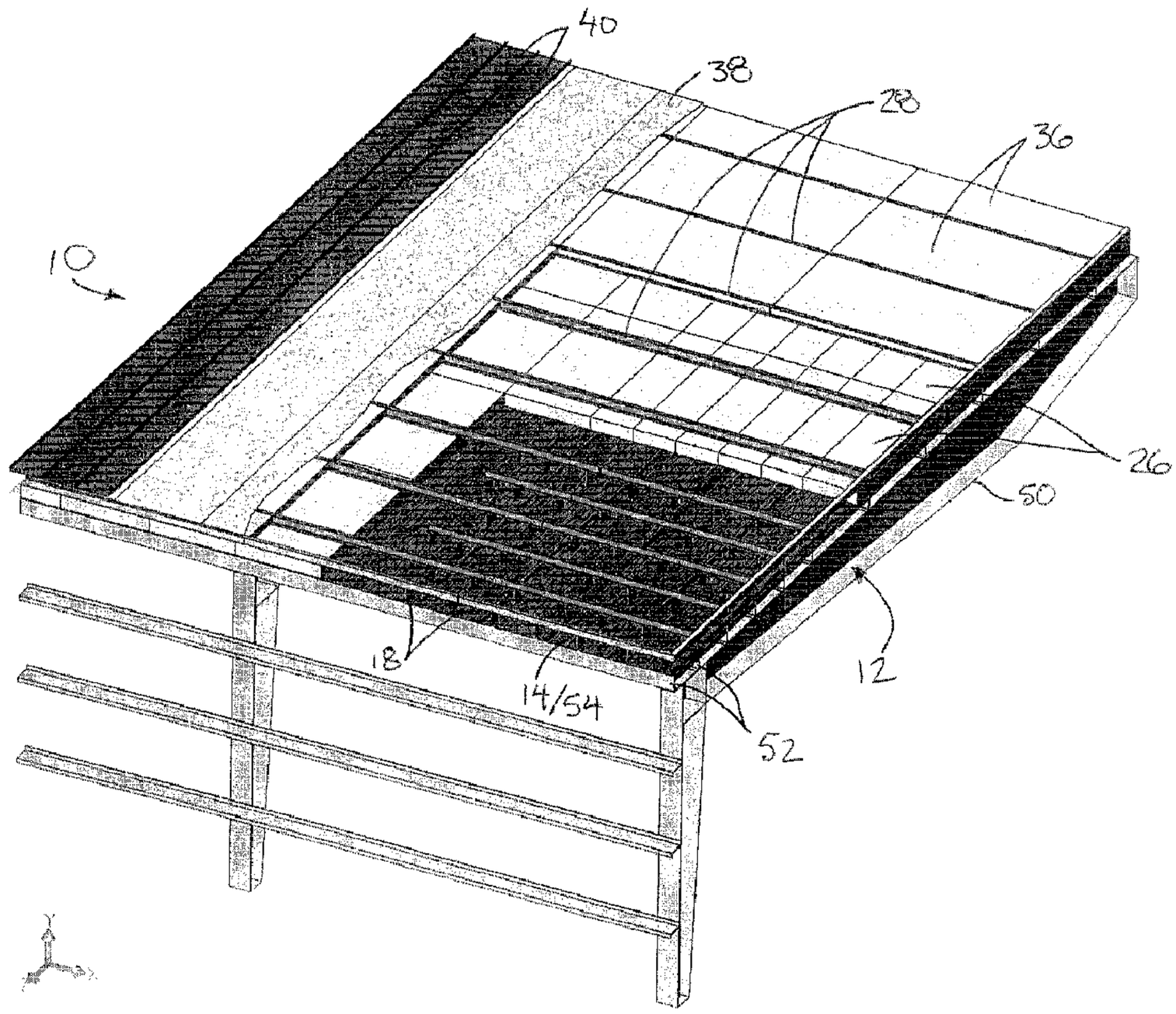
(71) Demandeur/Applicant:
MARSHALL, JOSEPH T., CA

(72) Inventeur/Inventor:
MARSHALL, JOSEPH T., CA...

(74) Agent: ADE & COMPANY INC.

(54) Titre : SYSTEME DE TOITURE ISOLEE RIGIDE
(54) Title: RIGID INSULATED ROOFING SYSTEM



(57) Abrégé/Abstract:
A roofing system for a building having an upper supporting surface over top of the interior of the building includes a plurality of mounting clips formed of sheet metal which protrude upwardly from the upper supporting surface to be received between rigid

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(57) Abrégé(suite)/Abstract(continued):
insulation panels of a first layer. A plurality of mounting channels extend over top of the first layer to protrude upwardly from the first layer to be received between rigid insulation panels of a second layer. Exterior sheets of finishing material span over the second layer. Adjacent panels of the first layer are separated only by the thickness of the sheet-metal forming the mounting clips, while adjacent panels of the second layer are separated only by the thickness of the sheet- metal forming the mounting channels.

ABSTRACT

A roofing system for a building having an upper supporting surface over top of the interior of the building includes a plurality of mounting clips formed of sheet metal which protrude upwardly from the upper supporting surface to be received between rigid insulation panels of a first layer. A plurality of mounting channels extend over top of the first layer to protrude upwardly from the first layer to be received between rigid insulation panels of a second layer. Exterior sheets of finishing material span over the second layer. Adjacent panels of the first layer are separated only by the thickness of the sheet-metal forming the mounting clips, while adjacent panels of the second layer are separated only by the thickness of the sheet-metal forming the mounting channels.

RIGID INSULATED ROOFING SYSTEM

FIELD OF THE INVENTION

The present invention relates to a roofing system for a building in which rows of first rigid insulation panels are supported between mounting clips in a first layer, and rows of second rigid insulation panels are supported between mounting channels to span transversely over top of the first rigid insulation panels, between an upper supporting surface of the building structure below and exterior sheets of exterior finishing material of the roof thereabove.

BACKGROUND

In order to construct buildings which are more energy efficient, it is known to be desirable to provide more layers of insulation in walls and roofs where possible. Simply increasing the thickness of the insulation layer in a typical roof structure however can be difficult as the roof may lose structural integrity when using conventional techniques of assembling a roof.

United States Patent No. 8,677,718 by Joseph T Marshall discloses a mounting clip for use in an exterior building surface in which dimensional lumber is supported by the mounting clips in transverse layers to permit flexible batts of insulation to be layered between the layers of dimensional lumber. The resulting structure of transverse layers of dimensional lumber are not well suited for use with rigid insulation which cannot conform about the shape of the dimensional lumber.

SUMMARY OF THE INVENTION

According to one aspect of the invention there is provided a rigid insulation roofing system for a building including a plurality of main structural members spanning over an interior of the building and an upper supporting surface spanning an outer side of the main structural members, the roofing system

comprising:

a plurality of mounting clips for being mounted on the upper supporting surface of the building in rows extending in a longitudinal direction of the building in which the rows are spaced apart from one another in a lateral direction of the building, each mounting clip including a bottom flange at a bottom end of the mounting clip for being secured to the upper supporting surface, an upstanding flange extending upwardly from the bottom flange, and a top flange at a top end of the mounting clip;

a plurality of first rigid insulation panels for being mounted in rows received between respective ones of the rows of mounting clips and having a thickness which spans a height of the upstanding flanges between the top and bottom flanges of the mounting clips;

a plurality of mounting channels for being mounted to extend in the lateral direction across a plurality of the rows of mounting clips overtop of the first rigid insulation panels, each mounting channel including a bottom flange at a bottom end of the mounting channel for being secured to the top flanges of respective ones of the mounting clips, an upstanding flange extending upwardly from the bottom flange, and a top flange at a top end of the mounting channel;

a plurality of second rigid insulation panels for being mounted in rows between respective ones of the mounting channels and having a thickness which spans a height of the upstanding flanges between the top and bottom flanges of the mounting channels;

a plurality of exterior sheets of exterior finishing material for being mounted to the top flanges of the mounting channels to span overtop of the second rigid insulation panels.

Use of mounting clips and mounting channels having upstanding flanges

connected between top and bottom mounting flanges provides a minimal thickness between adjacent rows of rigid insulation panels. The compressible nature of a typical installation panel formed of rigid, yet resilient foam material readily permits the thin sheet metal forming the upstanding flanges to be somewhat recessed into the edges of the rigid foam panels by lightly compressing the foam material against each upstanding flange. Accordingly, adjacent rows of the rigid insulation material within each row can be snuggly abutted with one another, so as to be separated only by the thickness of the upstanding flanges. Orienting the mounting channels to span transversely to the orientation of the upstanding flanges of the mounting clips also assists in orienting the seams between rows of first rigid insulation panels to be oriented transversely to the seams of the second rigid insulation panels to further minimize any areas in the roof through which heat can leak.

Preferably the rows of the first rigid insulation panels are separated only by a thickness of the upstanding flanges of the mounting clips, and the rows of second rigid insulation panels are separated only by a thickness of the upstanding flanges of the mounting channels. In this manner, cross bracing support is provided to the mounting clips primarily by the first rigid insulation panels and to the mounting channels primarily by the second rigid insulation panels.

Preferably the first rigid insulation panels are each elongate in the longitudinal direction of the building, and the second rigid insulation panels are each elongate in the lateral direction of the building.

Each mounting clip preferably has a generally Z shaped profile. Likewise, each mounting channel preferably also has a generally Z shaped profile.

Preferably the first rigid insulation panels and the mounting clips have a prescribed height which is greater than a prescribed height of the second rigid

insulation panels and the mounting channels.

In a preferred embodiment, the exterior sheets comprise standing seam roof panels.

Preferably the exterior sheets form a breathable layer such that moisture is arranged to be vented externally from the second rigid insulation panels through the exterior sheets.

The roofing system may further comprise one or more of the following features: (i) a barrier layer of heat radiant material spanning over top of the second rigid insulation panels, in which the exterior sheets are secured to the top flanges of the mounting channels through the barrier layer, (ii) a shielding layer of ice shielding material for spanning over the upper supporting surface of the building, in which the mounting clips are secured to the upper supporting surface of the building through the shielding layer, (iii) a layer of fire resistant material between the upper supporting surface of the building and the first rigid insulating panels, (iv) a thermal break formed of heat insulating material between the mounting clips and the upper supporting surface of the building, and/or (v) a thermal break formed of heat insulating material between the mounting clips and the mounting channel.

In one embodiment, the main structural members of the building comprise rafters extending in the longitudinal direction of the building, purlins extending across the rafters in the lateral direction of the building, and rigid sheeting extending over the purlins, in which the mounting clips are secured to the purlins through the rigid sheeting.

In another embodiment, the main structural members comprise roofing panels formed of concrete having a top side defining the upper supporting surface of the building, in which the mounting clips are secured into the concrete forming the

roofing panels.

BRIEF DESCRIPTION OF THE DRAWINGS

Various embodiments of the invention will now be described in conjunction with the accompanying drawings in which:

Figure 1 is a perspective view of a section of a first embodiment of a building upon which the roofing system is installed, in which portions of the rigid insulation panels, the radiant barrier, and the exterior sheets are shown removed for clarity;

Figures 2, 3 and 4 are additional perspective views of the section of the building according to Figure 1;

Figure 5 is a perspective view of a section of a second embodiment of a building upon which the roofing system is installed, in which portions of the rigid insulation panels are shown removed for clarity;

Figure 6 is a longitudinal end view of the roofing system according to Figure 5;

Figure 7 is an exploded lateral end view of the roofing system according to Figure 5;

Figure 8 is an exploded longitudinal and view of the roofing system according to Figure 5;

Figure 9 is a sectional elevational view of a further embodiment of the roofing system; and

Figure 10 is a sectional elevational view of another embodiment of the roofing system.

In the drawings like characters of reference indicate corresponding parts in the different figures.

DETAILED DESCRIPTION

Referring to the accompanying figures, there is illustrated a building roofing system generally indicated by reference numeral 10. The roofing system can be installed on a new building or retrofit over top of the roof of an existing building. In addition, the roofing system is applicable to various types of substructures according to the various embodiments described herein. The common features of the various embodiments will first be described.

Typically, the building includes a substructure including main structural members 12 spanning over an interior of the building between walls at opposing sides of the building, and an upper supporting surface 14 above the main structural members upon which roofing materials can be supported to form the exterior of the roofing structure.

The roofing system 10 according to the present invention is assembled in layers over top of the upper supporting surface of the building. Typically, an ice shielding layer 16 is initially installed directly over the upper supporting surface in the form of ice shielding material dispensed from rolls in adjacent rows with overlapping seams to form a uniform layer fully spanning over the upper supporting surface of the building. The material of the shielding layer 16 acts as a moisture barrier.

A plurality of mounting clips 18 are mounted onto the upper supporting surface of the building by fastening to the structure of the building therebelow through the material of the shielding layer 16. Each mounting clip includes a bottom flange 20 lying generally horizontally to define the bottom end of the mounting clip which receives fasteners therethrough for securing the mounting clip to the supporting structure of the building therebelow.

Each mounting clip further includes an upstanding flange 22

perpendicularly oriented relative to the bottom flange to extend generally vertically upward from one side edge of the bottom flange to define the overall height of the mounting clip between the top and bottom ends thereof. A top flange 24 extends horizontally outward from the top end of the upstanding flange 22 so as to be parallel and spaced apart from the bottom flange while extending laterally outward from the upstanding flange in an opposing direction relative to the bottom flange such that the overall shape of the mounting clip is generally Z shaped. The top flange thus defines the top end of the mounting clip to which subsequent components of the roofing system are secured as described in further detail below. Each mounting clip is formed of a single sheet of sheet metal which has been cut and folded into the desired shape.

The mounting clips 18 are mounted in rows extending across the roof in the longitudinal direction of the roof. Within each row, the mounting clips are longitudinally spaced apart from one another and oriented such that the upstanding flanges 22 of all the mounting clips within a common row lie within a generally common vertical plane oriented in the longitudinal direction. Adjacent rows are spaced apart from one another in the lateral direction of the building.

A first insulating layer formed of first rigid insulating panels 26 are mounted onto the top side of the shielding layer 16 to span the full height of the mounting clips such that the bottom flanges 20 lie flat against the bottom faces of the first rigid insulating panels 26 and the top flanges 24 lie flat against the top faces of the first rigid insulating panels 26. The first rigid insulating panels 26 are generally rectangular in shape so as to be elongate in the longitudinal direction of the building.

The panels 26 typically have a width in the lateral direction corresponding to the width between two adjacent rows of the mounting clips to fully span the width between the upstanding flanges 22 of the corresponding adjacent rows of the mounting clips.

Within each longitudinally extending row, a plurality of the panels 26 are abutted in series with one another to form a generally uniform layer. Adjacent rows of the panels 26 are similarly abutted so as to be separated only by the upstanding flanges of the mounting clips between adjacent rows. The rigid insulating panels comprise a rigid foam material commonly used for building insulation having a slight degree of resiliency when compressed by the thickness of the sheet-metal forming the mounting clips such that the panels 26 can be snuggly abutted to opposing sides of each upstanding flange with the flanges being slightly recessed into the resilient compressibility of the foam material so that adjacent rows of the foam material can also be substantially abutted with one another with minimal gaps therebetween.

The foam material forming the panels 26 has sufficient rigidity that the foam panels provide the primary cross bracing support between adjacent rows of the mounting clips when fully spanning the lateral width between mounting clips of adjacent rows.

When installing the panels 26, typically only a first row of mounting clips are mounted onto the upper supporting surface of the building structure followed by a corresponding first row of panels 26 abutted against the mounting clips. A subsequent row of mounting clips can then be snuggly mounted against the other side of the row of panels 26, followed by a subsequent row of panels 26. Installation proceeds laterally across the width of the building in a similar manner with each row of mounting clips being installed in abutment against a previously installed row of insulating panels.

The roofing system further includes a plurality of mounting channels 28 which are mounted to extend over top of the first rigid insulating panels 26 of the first insulating layer in a lateral direction of the building such that each mounting channel

extends perpendicularly across a plurality of rows of mounting clips. Each mounting channel is typically supported so as to extend across one mounting clip of each of the rows of mounting clips across which the mounting channel extends to permit fastening of the mounting channel to the top flange 24 of each mounting clip across which the mounting channel extends.

Each mounting channel 28 comprises a uniform Z shaped profile which is uniform along the full length of the mounting channel extending in the lateral direction across the roof. More particularly, each mounting channel includes a bottom flange 30 which is horizontally oriented to define the bottom end of the mounting channel for mounting flat against the top flanges of the corresponding ones of the mounting clips for fastening between the mounting channel and the mounting clips respectively.

Each mounting channel further includes an upstanding flange 32 extending upwardly from one side of the bottom flange in perpendicular relationship therewith to extend vertically upward and define the overall height of the mounting channel between top and bottom ends thereof. A top flange 34 which defines the top end of the mounting channel extends laterally outwardly from one side of the upstanding flange opposed from the bottom flange to form the Z shaped profile. The top flange is a horizontal flange oriented perpendicularly to the upstanding flange and parallel to the bottom flange therebelow. One or more mounting channels may be abutted in series across the lateral width of the building within each row of mounting channels.

A second insulating layer is formed by a plurality of second rigid insulating panels 36 formed of similar material to the first rigid insulating panels 26, but being reduced in height relative to the first insulating layer. The height of the

panels forming the second layer correspond substantially to the full height of the mounting channels 28 such that the top flange 34 of the mounting channels lies flat against the top surface of the second rigid panels and the bottom flange of the mounting channels lies flat against the bottom face of the second insulating layer.

The second rigid insulating panels 36 are rectangular in shape so as to be elongate in the lateral direction of the building for mounting in laterally extending rows between adjacent ones of the mounting channels 28. Within each row, a plurality of the panels 36 are abutted in series with one another to form a uniform layer of material. The panels 36 having a width which spans a full width between two adjacent rows of the mounting channels 28 such that each adjacent row of panels 36 is separated only by the thickness of the sheet-metal forming the upstanding flanges 32. Each mounting channel is formed of rigid sheet-metal which is cut and folded to define the desired shape of the channel similarly to the formation of the mounting clips.

Similarly, to the first insulating layer, the rows of panels 36 forming the second insulating layer and the mounting channels 28 are installed together by installing a first row of mounting channels 28 followed by a first row of second rigid insulating panels 36 abutted snuggly against the upstanding flanges 32 of the first row of mounting channels. A subsequent row of mounting channels 28 are then installed against the previously installed row of panels 36, followed by a subsequent row of mounting channels. Installation continues row by row across the full length of the building in the longitudinal direction such that adjacent rows of the second rigid insulating panels are separated only by the sheet metal thickness of the upstanding flanges of the mounting channels.

The roofing system further comprises a heat radiating barrier layer 38

formed of a heat radiating material. More particularly, the material of the barrier layer comprises flexible sheets of material which are typically dispensed from rolls. The sheet of material includes a fibrous insulating core with a metallic foil material spanning both top and bottom faces of the fibrous insulating core. The insulating core spans most of the thickness of the barrier layer relative to the foil faces. Adjacent rows are mounted to span across the roof by closely abutting the insulating cores of adjacent rows such that laterally protruding flanges of the foil facing material are arranged to overlap the seams between adjacent rows of the core material. The seams between adjacent rows of the heat radiating material of the barrier layer remain unsealed to allow some breathability and moisture venting through the heat radiant barrier layer 38.

The roofing system further includes exterior sheets 40 of the roof finishing material fully spanning over the barrier layer 38. In the illustrated embodiment, the exterior sheets comprise standing seam roofing panels mounted to span transversely across the mounting channels 28 in the longitudinal direction of the building such that each roofing panel spans across a plurality of channels. Conventional mounting clips for mounting into the seam of a standing seam roofing material are used by fastening the base of the standing seam mounting clips to the top flange 34 of respective ones of the mounting channels using suitable fasteners. The mounting clips for securing the exterior sheets 40 of the roofing panels are fastened through the material of the barrier layer 38. The exterior sheets 40 of the roof finishing material are mounted such that the finished layer of finishing material remains breathable to enable venting of moisture from the second insulating layer upwardly through the barrier layer and the exterior sheets 40 in the finished assembly of the roofing system.

Turning now more particularly to the embodiment of Figures 1 through 4, the building in this instance comprises a frame having a plurality of rafters 50 extending in the longitudinal direction of the building which supports a plurality of purlins 52 spanning across the rafters in the lateral direction of the building. A structural sheeting 54, for example rigid corrugated metal sheeting, is mounted in panels to form a uniform layer across the top side of the purlins 52 for defining the upper supporting surface of the building upon which the roofing system 10 is installed. In this instance the mounting clips 18 of the roofing system are typically fastened through the sheeting 54 for direct fastened connection to underlying purlins 52 respectively.

Turning now more particularly to the embodiment of Figures 5 through 8, the building in this instance comprises a plurality of concrete panels 60 extending in the longitudinal direction of the building between respective underlying load beams supporting the concrete panels thereon. Each concrete panel 60 has a beam profile for resisting bending which includes a flat top 62 defining the upper supporting surface of the building upon which the roofing system is installed. In this instance, the mounting clips 18 are secured directly to the concrete material of the panels 60 by fastening through the shielding layer 16 with suitable fasteners anchored within respective bores in the concrete material.

Turning now to the embodiment of figures 9 and 10, the building structure may generally take the form of either one of the embodiments of figure 1 or figure 5, but with the addition of a fireproof layer 42 of fire resistant material incorporated into the roofing system between the first layer of insulating panels 26 and the upper supporting surface 14 of the building. The roofing system in each instance also includes a thermal break between the mounting channels and the upper

supporting surface of the building as described in further detail below. The fireproof layer is preferably formed of fire rated drywall panels for example panels having a gypsum core between opposed faces of paper-like material of the type manufactured by Gyprock. In either embodiment of figure 9 or figure 10, the upper supporting surface of the building may comprise (i) concrete panels, (ii) corrugated material spanning over a supporting frame structure of the building, or (iii) any other form of suitable loadbearing structure, for example metal Q Deck.

In the embodiment of figure 9, the components of the roofing system are assembled in an identical manner to the embodiment of figure 1, but the height of the first rigid insulating panels 26 is reduced by the thickness of the fireproof layer 42. The fireproof layer is assembled from panels of drywall which are abutted in series to form rows each having an overall width fully spanning the width between corresponding adjacent rows of mounting clips. The combined height of the fireproof layer and the first rigid insulating panels 26 corresponds approximately to the height of the mounting clips between the top and bottom flanges thereof.

When mounting the fireproof layer according to figure 9, a thermal break is preferably provided by a strip 44 of heat insulating material mounted between the bottom flange of each mounting clip and the remaining components of the roofing system therebelow including the upper supporting surface of the building and the vapour barrier layer 16 thereon if provided. The strip 44 may comprise a sheet of insulating foam material provided with adhesive thereon for securement to the bottom side of the bottom flange.

In a variation of the embodiment of figure 9, the strip of heat insulating material for providing a thermal break may be instead provided on the top side of the top flange of the mounting clip as shown in broken line and represented by reference

character 44'. In this instance the thermal break is provided between the mounting clips 18 and the mounting channels thereabove secured to the top flange of the mounting clips using fasteners penetrated through the material of the thermal break.

Turning now to the embodiment of figure 10, in this instance the drywall material forming the fireproof layer 42 may be applied directly to the upper supporting surface of the building, followed by the vapour barrier layer 16 spanning over top of the fireproof layer 42. The mounting clips 18 in this instance are mounted in the same manner as the embodiments of figure 1 and figure 5 such that the first rigid insulating panels 26 span the full height of the mounting clips between the top and bottom flanges thereof. Fastening of the mounting clips 18 relative to the building includes fastening through the vapour barrier layer 16 and the fireproof layer 42 therebelow for securement into the upper supporting surface of the building therebelow. In this instance, the fireproof layer also provides the function of a thermal break between the mounting clip 18 and the upper supporting surface of the building structure.

In further embodiments, different configurations of shielding layer and barrier layer may be substituted, or omitted depending upon the application. Similarly, various exterior finishing materials can be used in place of standing seam roofing panels. The rigid insulating panels may be formed of any commercially available material commonly used for providing insulation against heat loss, for example expanded polystyrene and the like. In the illustrated embodiment, the panels of the first layer have a height of approximately 8 inches while the panels of the second layer have a height of approximately 1.5 inches, however in further embodiments, the second layer may have a thickness which is closer to or greater than the first layer.

Since various modifications can be made in my invention as herein above described, and many apparently widely different embodiments of same made,

it is intended that all matter contained in the accompanying specification shall be interpreted as illustrative only and not in a limiting sense.

CLAIMS:

1. A rigid insulation roofing system for a building including a plurality of main structural members spanning over an interior of the building and an upper supporting surface spanning an outer side of the main structural members, the roofing system comprising:

a plurality of mounting clips for being mounted on the upper supporting surface of the building in rows extending in a longitudinal direction of the building in which the rows are spaced apart from one another in a lateral direction of the building, each mounting clip including a bottom flange at a bottom end of the mounting clip for being secured to the upper supporting surface, an upstanding flange extending upwardly from the bottom flange, and a top flange at a top end of the mounting clip;

a plurality of first rigid insulation panels for being mounted in rows received between respective ones of the rows of mounting clips and having a thickness which spans a height of the upstanding flanges between the top and bottom flanges of the mounting clips;

a plurality of mounting channels for being mounted to extend in the lateral direction across a plurality of the rows of mounting clips overtop of the first rigid insulation panels, each mounting channel including a bottom flange at a bottom end of the mounting channel for being secured to the top flanges of respective ones of the mounting clips, an upstanding flange extending upwardly from the bottom flange, and a top flange at a top end of the mounting channel;

a plurality of second rigid insulation panels for being mounted in rows between respective ones of the mounting channels and having a thickness which spans a height of the upstanding flanges between the top and bottom flanges of the mounting channels;

a plurality of exterior sheets of exterior finishing material for being mounted to the top flanges of the mounting channels to span overtop of the second rigid insulation panels.

2. The system according to claim 1 wherein the rows of the first rigid insulation panels are separated only by a thickness of the upstanding flanges of the mounting clips.

3. The system according to either one of claims 1 or 2 wherein the first rigid insulation panels are each elongate in the longitudinal direction of the building.

4. The system according to any one of claims 1 through 3 wherein the rows of second rigid insulation panels are separated only by a thickness of the upstanding flanges of the mounting channels.

5. The system according to any one of claims 1 through 4 wherein the second rigid insulation panels are each elongate in the lateral direction of the building.

6. The system according to any one of claims 1 through 5 wherein each mounting clip is generally Z shaped in profile.

7. The system according to any one of claims 1 through 6 wherein each mounting channel is generally Z shaped in profile.

8. The system according to any one of claims 1 through 7 wherein the first rigid insulation panels and the mounting clips have a prescribed height which is greater than a prescribed height of the second rigid insulation panels and the mounting channels.

9. The system according to any one of claims 1 through 8 further comprising a barrier layer of heat radiant material spanning over top of the second

rigid insulation panels, in which the exterior sheets are secured to the top flanges of the mounting channels through the barrier layer.

10. The system according to any one of claims 1 through 9 wherein the exterior sheets comprise standing seam roof panels.

11. The system according to any one of claims 1 through 10 wherein the exterior sheets form a breathable layer such that moisture is arranged to be vented externally from the second rigid insulation panels through the exterior sheets.

12. The system according to any one of claims 1 through 11 wherein cross bracing support is provided to the mounting clips primarily by the first rigid insulation panels.

13. The system according to any one of claims 1 through 12 further comprising a shielding layer of ice shielding material for spanning over the upper supporting surface of the building, in which the mounting clips are secured to the upper supporting surface of the building through the shielding layer.

14. The system according to any one of claims 1 through 13 wherein the main structural members of the building comprise rafters extending in the longitudinal direction of the building, purlins extending across the rafters in the lateral direction of the building, and rigid sheeting extending over the purlins, in which the mounting clips are secured to the purlins through the rigid sheeting.

15. The system according to any one of claims 1 through 13 wherein the main structural members comprise roofing panels formed of concrete having a top side defining the upper supporting surface of the building, in which the mounting clips are secured into the concrete forming the roofing panels.

16. The system according to any one of claims 1 through 15 further comprising a layer of fire resistant material between the upper supporting surface of

the building and the first rigid insulating panels.

17. The system according to any one of claims 1 through 16 further comprising a thermal break formed of heat insulating material between the mounting clips and the upper supporting surface of the building.

18. The system according to any one of claims 1 through 17 further comprising a thermal break formed of heat insulating material between the mounting clips and the mounting channel.

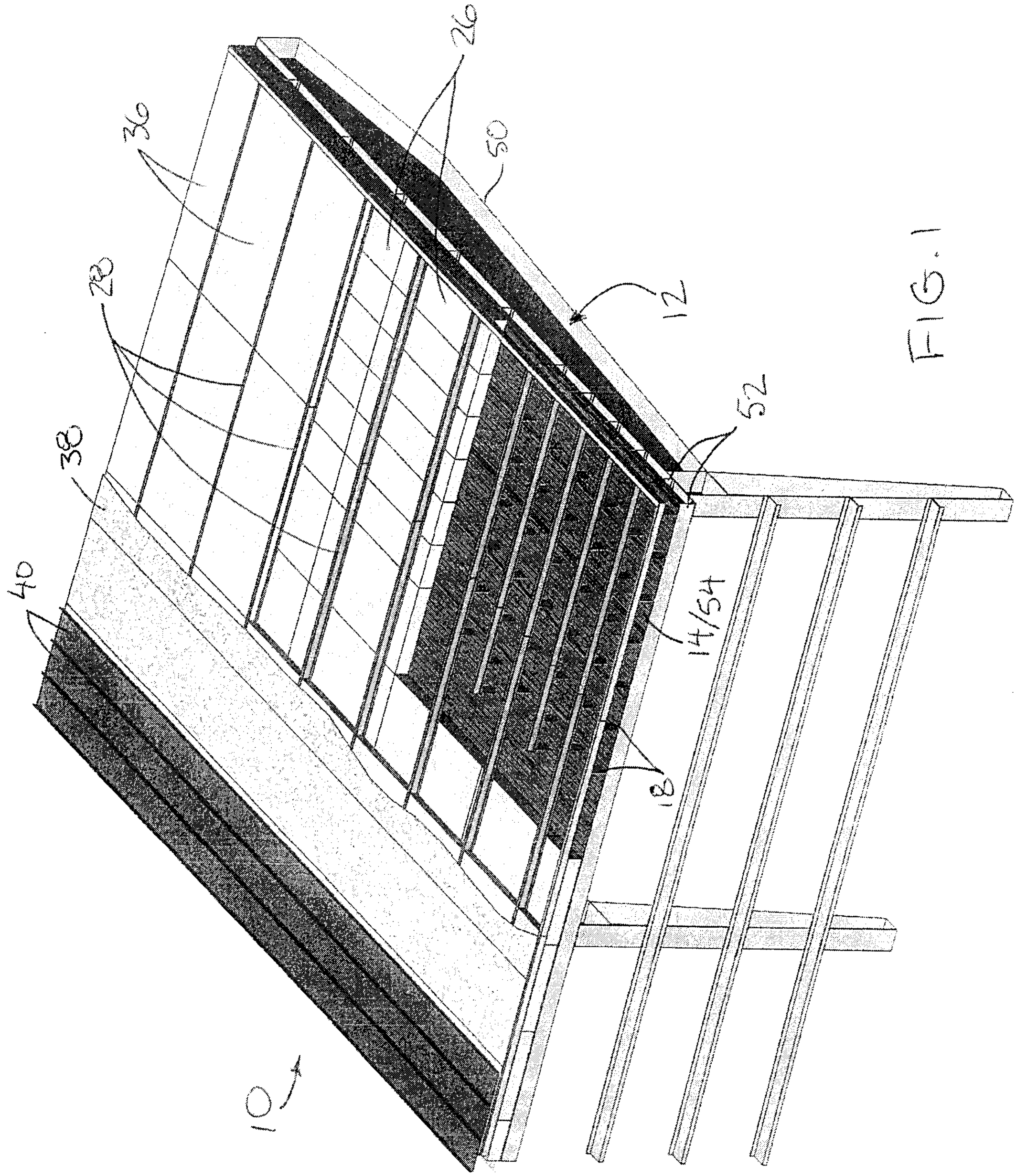


FIG. 1

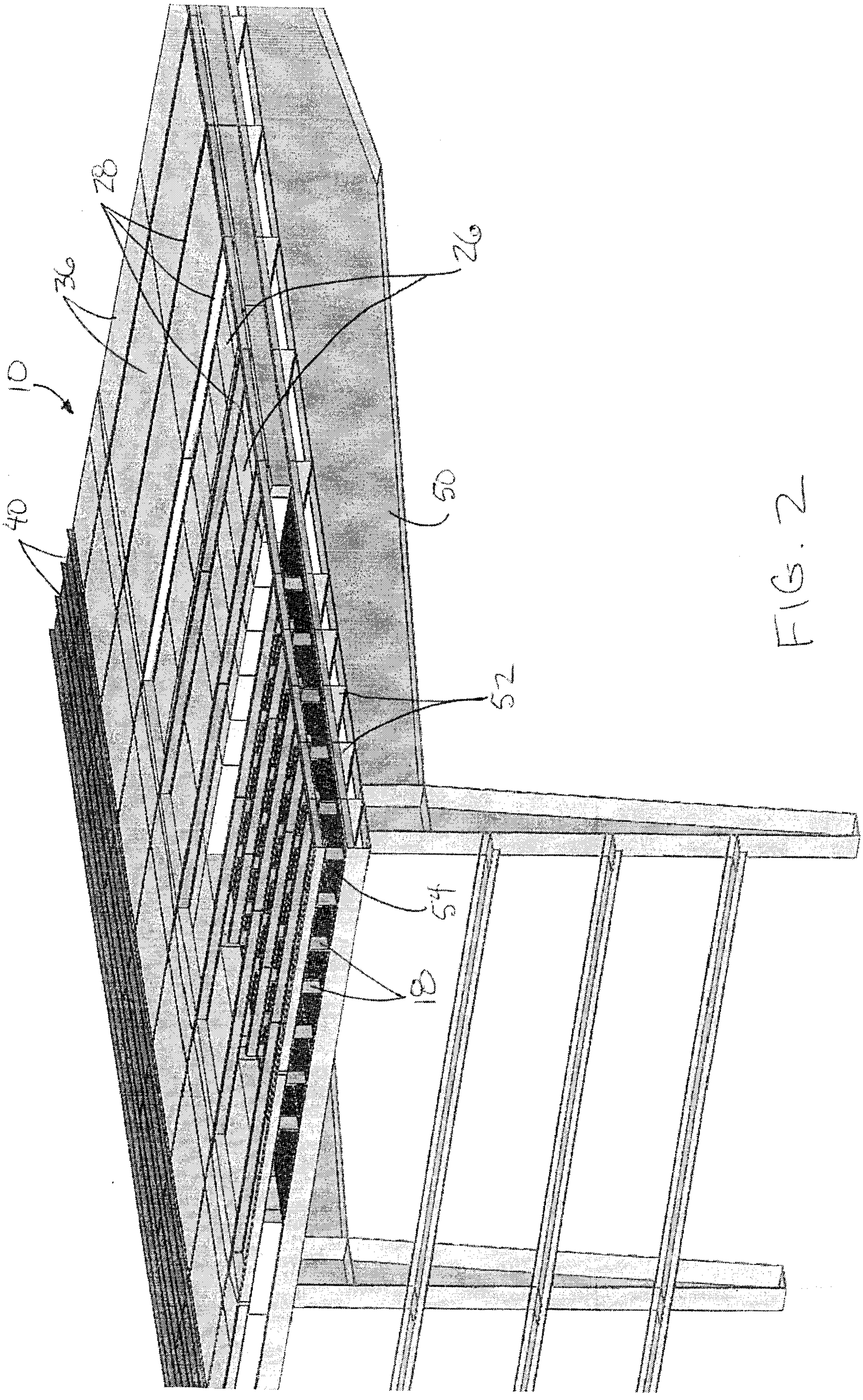
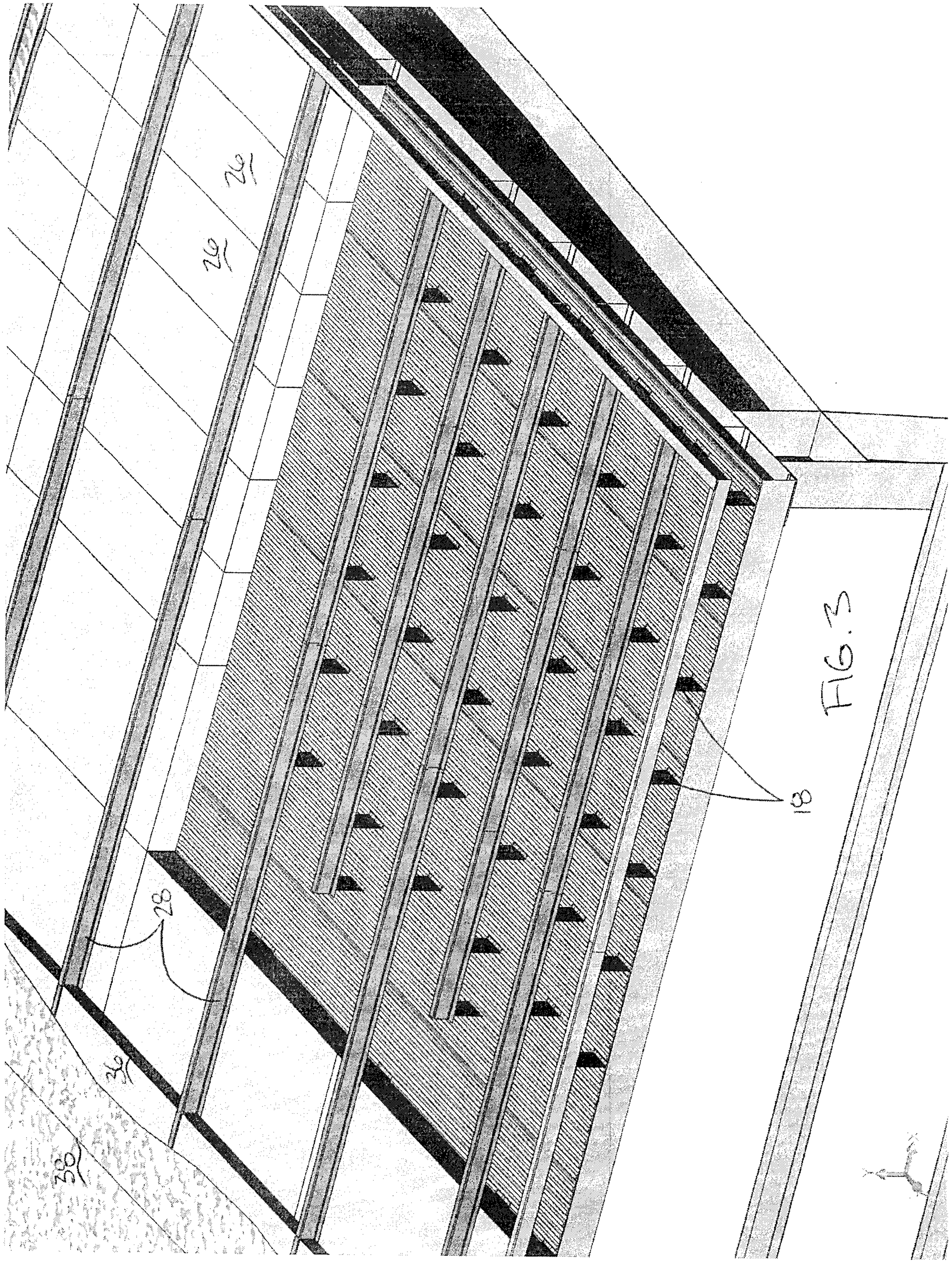


FIG. 2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29
FIG. 3
38
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30
20

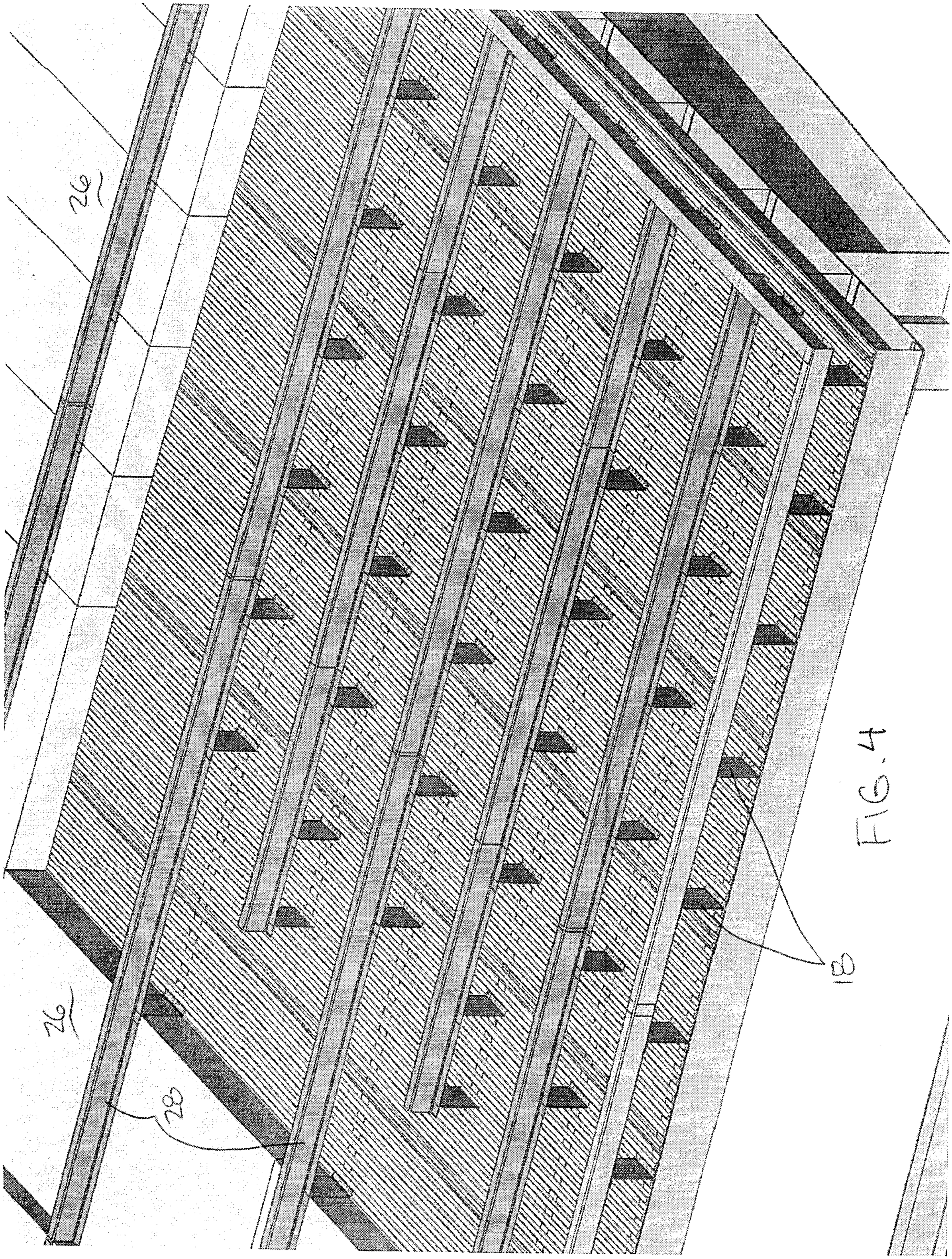


FIG. 4

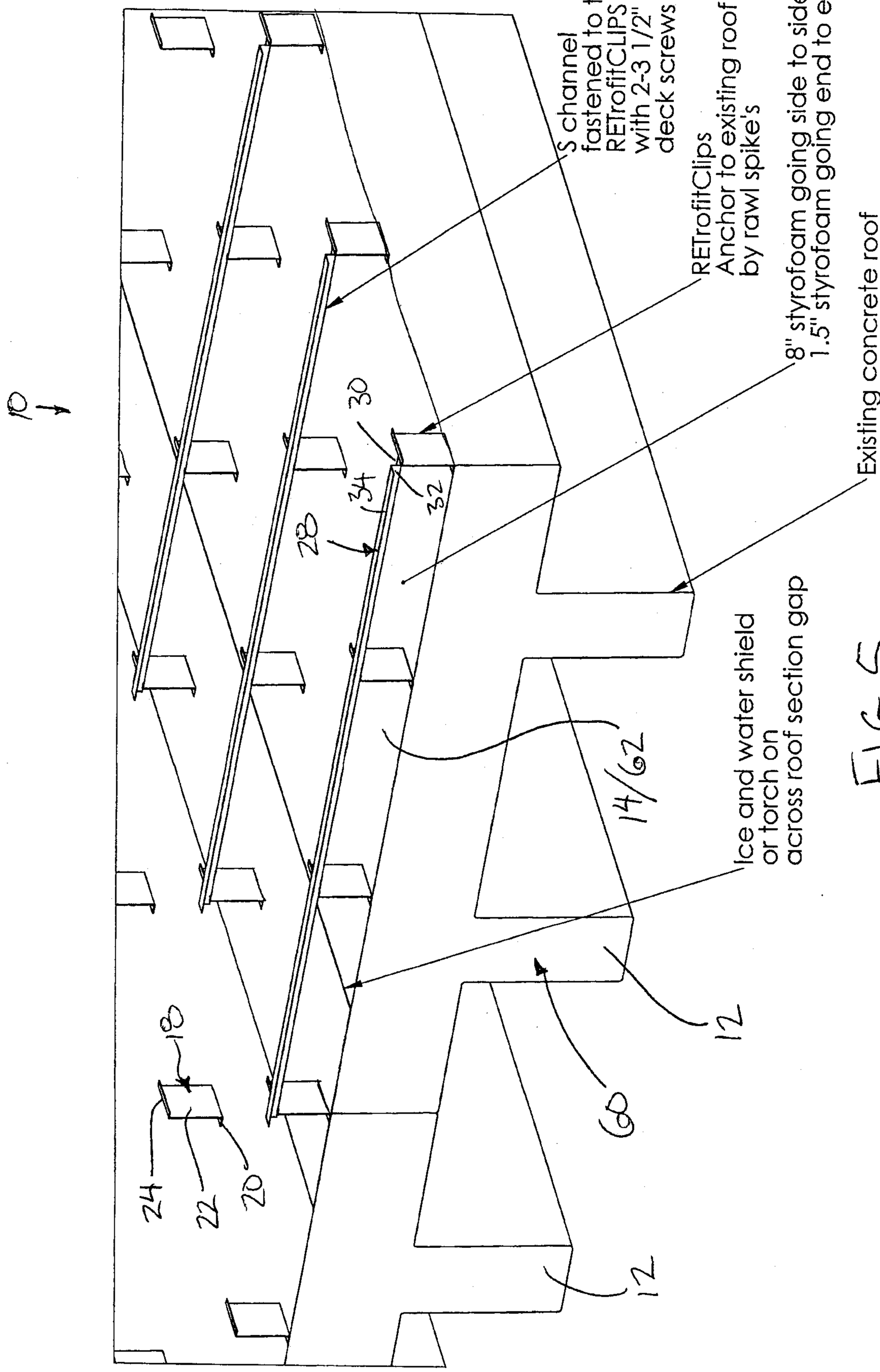

10
S channel
fastened to the
RETrofitCLIPS
with 2-3 1/2"
deck screws
RETrofitClips
Anchor to existing roof
by rawl spike's
8" styrofoam going side to side
1.5" styrofoam going end to end
Existing concrete roof
30
34
32
28
14/62
Ice and water shield
or torch on
across roof section gap
18
24
22
20
60
12
12

FIG. 5

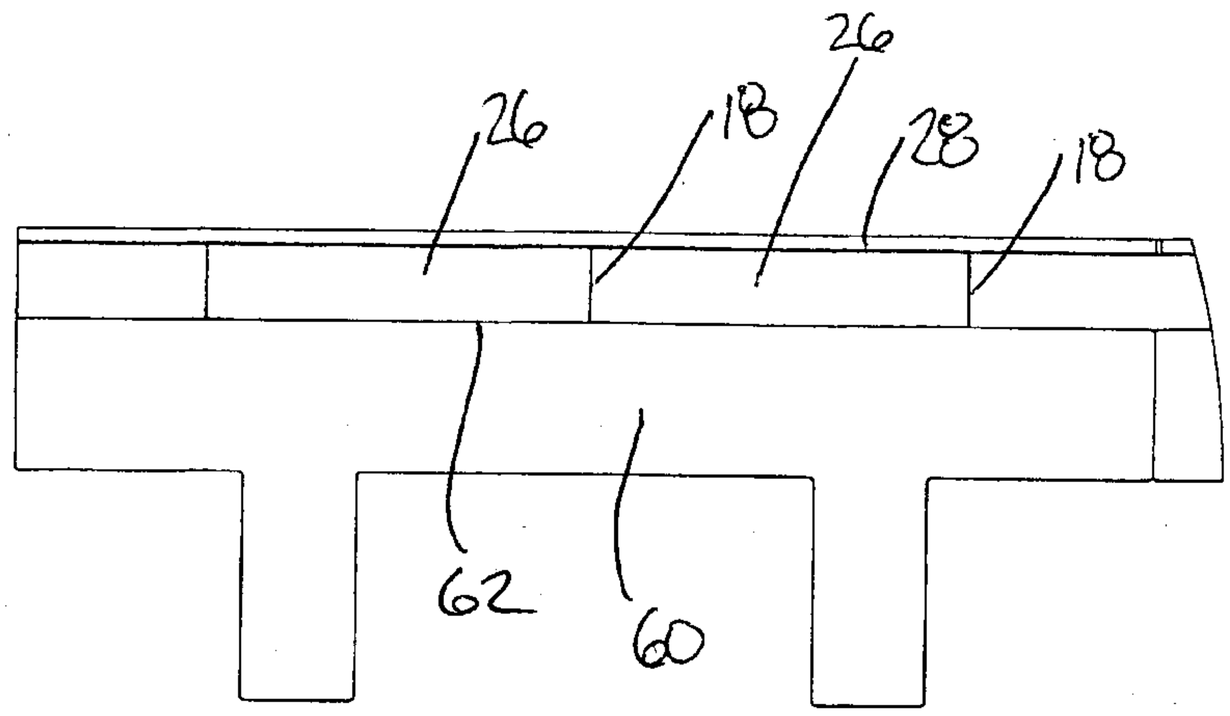


FIG. 6

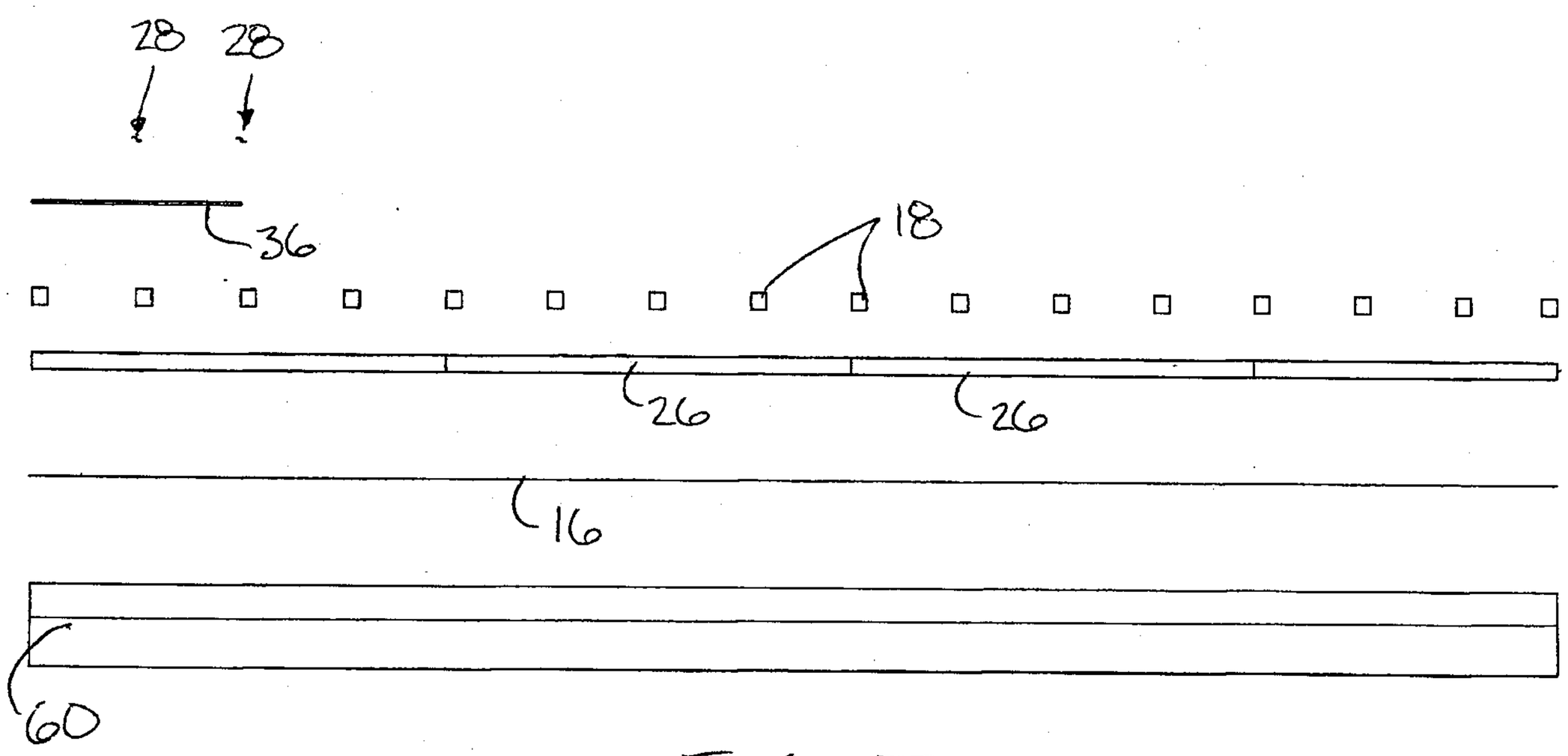


FIG. 7

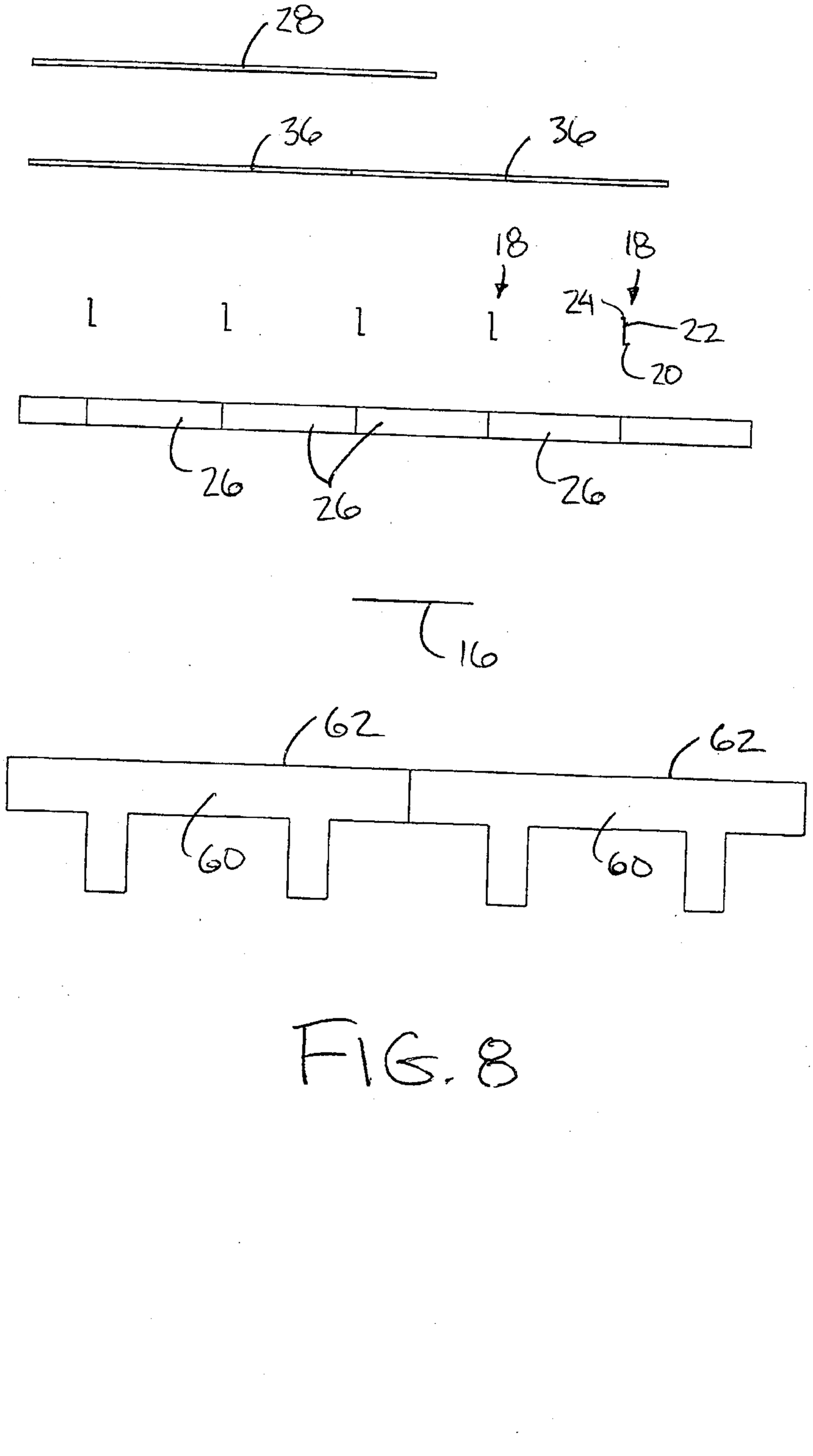


FIG. 8

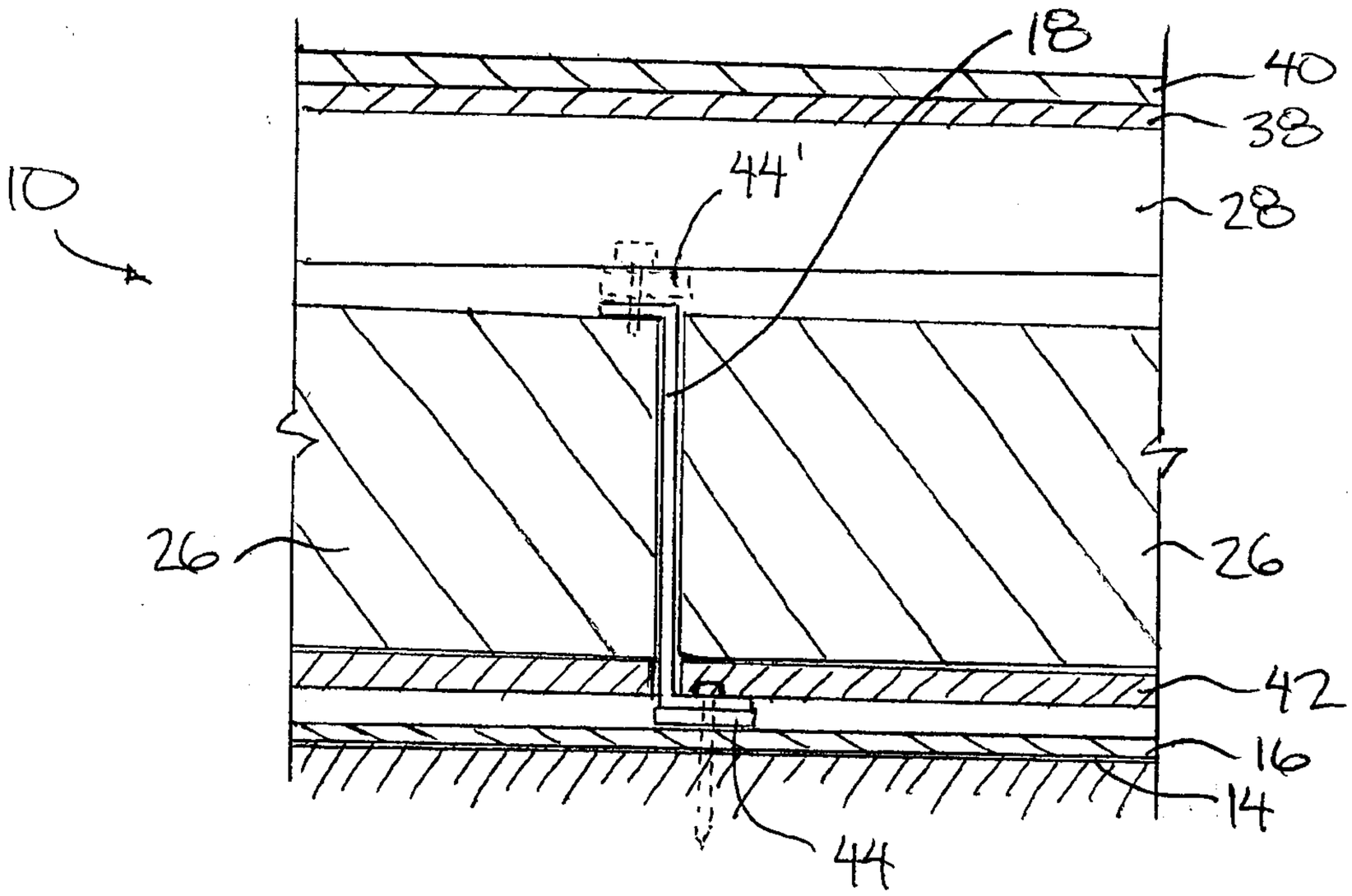


FIG. 9

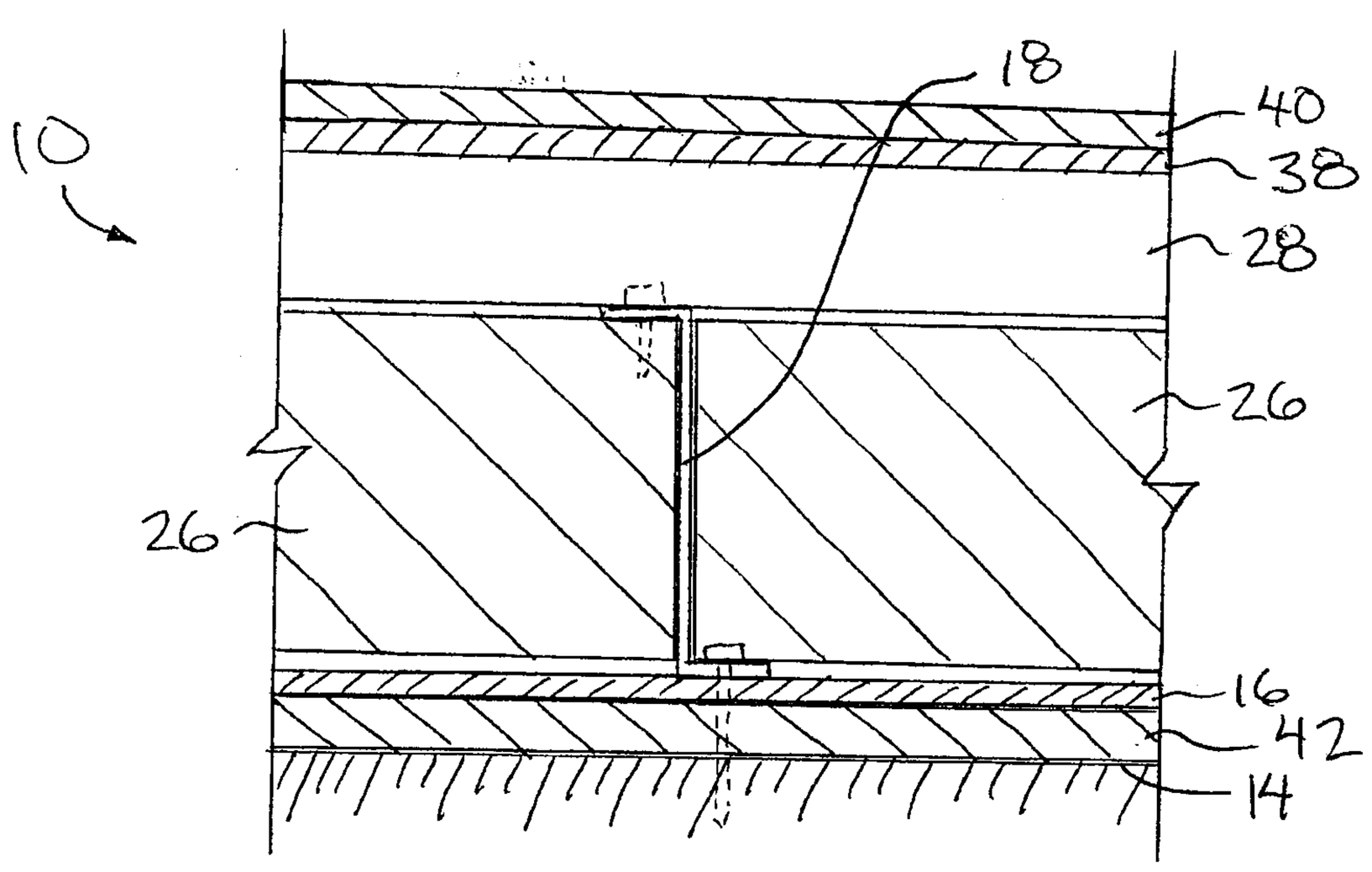
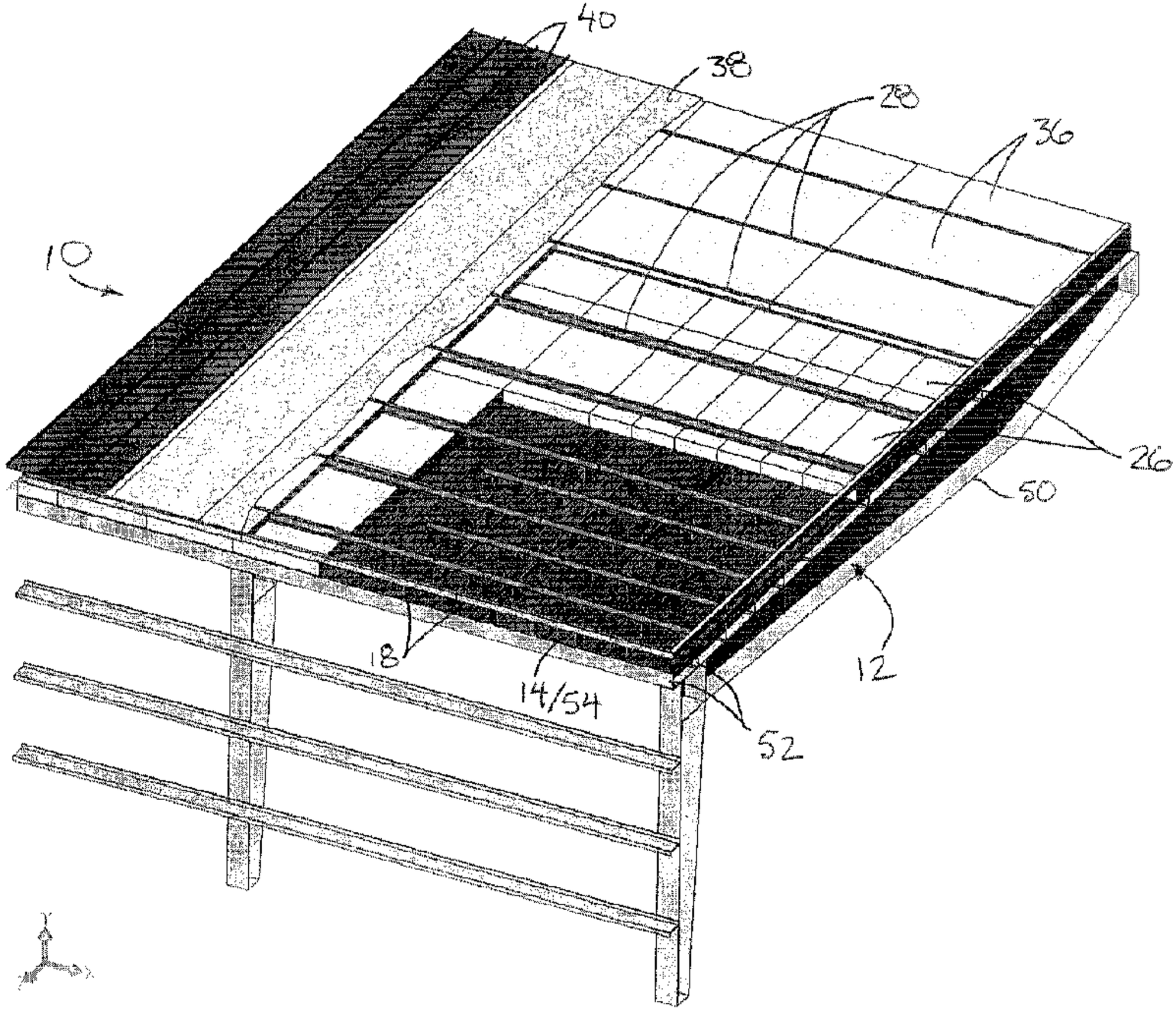


FIG. 10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