(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number : **0 624 696 A2**

(12) EUROPEAN PATENT APPLICATION

(21) Application number : **94303305.0**

(51) Int. Cl.[5] : **E04C 2/54**

(22) Date of filing : **09.05.94**

(30) Priority : **09.05.93 IL 10564093**

(43) Date of publication of application :
17.11.94 Bulletin 94/46

(84) Designated Contracting States :
AT BE CH DE DK ES FR GB GR IE IT LI LU MC NL PT SE

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(54) Lightweight construction panel assembly.

(57) A lightweight construction panel assembly includes a connection strip (80) arranged to be bolted onto a support structure (98), and a plurality of panels (10) arranged for mounting onto the connection strip and in generally partially overlapping side by side arrangement with each other. Each of the plurality of panels (10) includes first and second edge portions (12,14) at opposite sides of the panel. The connection strip including a third edge portion (90). The first edge portion (12) of each panel (10) is configured for mating engagement with the third edge portion (90) of the connection strip (80) and simultaneously with the second edge portion (14) of an adjacent panel.

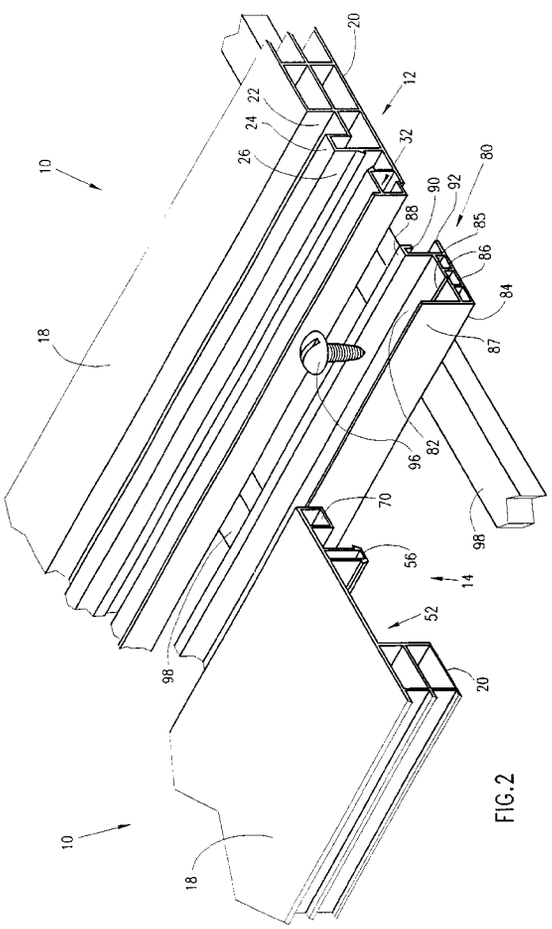

FIG.2

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FIELD OF THE INVENTION

The present invention relates generally to modular construction elements and more particularly to lightweight panels such as may be used for roofing and the like.

BACKGROUND OF THE INVENTION

There are available in the market many different types of lightweight, plastic, modular, roofing panels.

A particularly successful lightweight plastic modular roofing panel is manufactured and sold by the present applicant/assignee and is described in U.S. Patent 5,050,362. A listing of relevant prior publications and discussion of the prior art appears in the patent. U.S. Patent 5,050,362 describes a panel which is directly bolted onto a support structure.

SUMMARY OF THE INVENTION

The present invention seeks to provide a lightweight, modular construction panel assembly including a connection strip which is bolted onto a support structure and panel elements which are retained by snap fit engagement onto the support structure and to each other.

There is thus provided in accordance with a preferred embodiment of the present invention a lightweight construction panel assembly including a connection strip arranged to be bolted onto a support structure, a plurality of panels arranged for mounting onto the connection strip and in generally partially overlapping side by side arrangement onto each other, each of the plurality of panels including first and second edge portions at opposite sides of the panel, the connection strip including a third edge portion, the first edge portion of each panel being configured for mating engagement with the third edge portion of the connection strip and simultaneously with the second edge portion of an adjacent panel.

Preferably, the second edge portion of the panel overlies the first edge portion as well as the connection strip when the assembly is fully assembled.

It is a particular feature of the invention that the panel structure enables substantially unlimited longitudinal thermal expansion of the panels.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will be more fully understood and appreciated from the following detailed description, taken in conjunction with the drawings in which:

Figs. 1A, 1B and 1C are each a sectional illustration of a panel constructed and operative in accordance with a preferred embodiment of the present invention;

Fig. 2 is an exploded cut-away perspective view illustration of a construction panel assembly employing the panel of Figs. 1A, 1B and 1C;

Fig. 3 is an exploded sectional view illustration of a first stage in the mounting of the construction panel assembly of Fig. 2;

Fig. 4 is an exploded sectional view illustration of a second stage in the mounting of the construction panel assembly of Fig. 2;

Fig. 5 is an exploded sectional view illustration of a third stage in the mounting of the construction panel assembly of Fig. 2;

Fig. 6 is an exploded sectional view illustration of a final stage in the mounting of the construction panel assembly of Fig. 2; and

Fig. 7 is a cut-away perspective view illustration of a fully mounted construction panel assembly in accordance with the present invention.

DETAILED DESCRIPTION OF THE INVENTION

Reference is now made to Figs. 1A, 1B and 1C, each of which illustrates a construction panel 10 constructed and operative in accordance with a preferred embodiment of the present invention. The panel is preferably extruded of a transparent or translucent construction plastic material, such as polycarbonate and has a uniform cross sectional configuration and a desired length, which normally is greatly in excess of its width.

For the sake of clarity, it is noted that edges and all other structural features of the construction panel will be assumed to extend uniformly along the entire length of the panel and parallel to an elongate axis thereof.

As seen in Figs. 1A, 1B and 1C, panel 10 has a first edge portion 12, a second edge portion 14 and a central body portion 16. Central body portion 16 may be of any suitable width.

Figs. 1A, 1B and 1C differ from each other in the internal configuration of the central body portion 16. In the embodiment of Fig. 1A, the central body portion comprises a double layer of elongate enclosures having a generally rectangular cross section. In the embodiment of Fig. 1B, the central body portion comprises a single layer of elongate enclosures having a generally rectangular cross section. In the embodiment of Fig. 1C, the central body portion comprises an array of elongate enclosures having a generally triangular cross section.

The panel defines a top surface 18 and a bottom surface 20. The top surface 18 extends over the central body portion 16 and the entire second edge portion 14, while the bottom surface 20 extends under the central body portion 16 and most of the first edge portion. In the description and claims which follow, directions are referenced in the sense of Figs. 1A, 1B and 1C.

The first edge portion 12 will now be described in detail beginning with the portion closest to the central body portion 16 and proceeding outwardly therefrom. Adjacent the central body portion 16 there is provided a recess 22 of generally square cross section and depth approximately equal to one half of the thickness of the main body portion 16.

Adjacent to and partially defining recess 22 is a generally rectangular protrusion 24 which extends to a height just below the level of the top surface 18. Adjacent protrusion 24 is a recess 26 which extends down to bottom surface 20 and is bounded on one side by a wall 28 of protrusion 24 and on an opposite side by a wall 30 of a protrusion 32.

A pair of elongate retaining teeth 34 and 36, having downwardly inclined upper surfaces and generally flat under surfaces, generally parallel to surface 20, are disposed on respective walls 28 and 30.

Protrusion 32 is relatively low and extends to a height just above the height of teeth 34 and 36 and a width approximately twice the width of protrusion 24. Protrusion 32 has a bottom surface, part of which, indicated by reference numeral 42, is slightly raised above the level of bottom surface 20. Protrusion 32 is bounded by an outward upstanding wall 44 which extends upwardly to a height below that of the top surface of protrusion 24.

The second edge portion 14 will now be described in detail beginning with the portion closest to the central body portion 16 and proceeding outwardly therefrom. It is to be appreciated that whereas the protrusions and recesses of the first edge portion 12 are directed upwardly in the sense of Figs. 1A, 1B and 1C, the protrusions and recesses of the second edge portion 14 are directed downwardly in the sense of Figs. 1A, 1B and 1C.

Adjacent the central body portion 16 there is provided a recess 52 which extends outwardly to an inner wall 54 of a protrusion 56. Recess 52 is bounded inwardly by an outer wall 58 of the central body portion 16.

Protrusion 56 is a hollow protrusion and is outwardly bounded by a wall 62 and extends downwardly to a level which lies intermediate the levels of surfaces 18 and 20 and closer to surface 20. The bottommost edges of walls 54 and 62 are formed with outwardly extending retaining teeth 64 and 66 having inclined undersurfaces and a generally flat upper surface which lies generally parallel to surface 18. Teeth 64 and 66 are arranged for operative locking, engagement with teeth 34 and 36 respectively when respective second and first edge portions of adjacent panels 10 are arranged in locking engagement, as will be described hereinafter.

A protrusion 70, of generally square cross section extends downwardly from surface 18 to an extend approximately half way between surfaces 18 and 20 at a location spaced from protrusion 56 by a recess 72.

Reference is now made to Figs. 2 and 3 which illustrate the structure of a connection strip 80, which together with panel 10 defines the construction panel assembly of the present invention. The connection strip 80 includes a top and a bottom surface 82 and 84 respectively which are spaced by a plurality of upstanding supports 86. Top surface 82 is preferably formed with an elongate notch 85.

A first edge of the connection strip 80 is defined by an upstanding wall portion 87 which extends above upper top surface 82. A second edge of the connection strip 80 is defined by an elongate hook 88 having a downward facing lip 90 and by an extension 92 of bottom surface 84 which extends outwardly beyond hook 88 and lip 90. The connection strip 80 is provided with notch 85 to ease entry of screws 96 thereinto, for mounting attachment of the connection strip 80, and thus of the entire panel assembly, onto support structures 98.

Reference is now made to Figs. 3 - 6, which illustrate a typical sequence of steps in the assembly of a panel structure using the panel assembly of the present invention. Typically a panel 10 is located on a plurality of transverse support structures 98. As seen in Fig. 4, a connection strip 80 is wedged into locking engagement with first edge portion 12, by pivotal motion of the connection strip 80, in a direction indicated by an arrow 102. The result, illustrated in Fig. 5 is that hook 88 lies in intimate partially surrounding engagement with upstanding wall 44 and extension 92 underlies enclosure 32 in intimate contact with surface 42, flush with surface 20.

Referring now to Figs. 5 and 6, it is seen that the second edge portion of a second panel 10 is then snap fit into engagement with the connection strip 80 and the first edge portion of the first panel. The snap fit engagement is retained by locking engagement of respective tooth pair 34 and 36 on the first edge portion with tooth pair 64 and 66 on the second edge portion.

It may be seen from a consideration of Figs. 5 and 6 that protrusion 70 of the second edge portion is intimately seated in recess 22 of the first edge portion and protrusion 56 of the second edge portion is intimately seated in recess 26 of the first edge portion and retained therein by locking engagement of the tooth pairs mentioned above. It is further seen that the connection strip 80, as well as the screws 96, are entirely covered and sealed from the outside environment within recess 52.

As seen in Fig. 7, the only seam in surface 18 is at the outward edge of protrusion 70, such that any moisture entering at that seam will be collected in recess 22 and would not reach the region of recess 52.

It is a particular feature of the present invention that the panel structure enables substantially unlimited longitudinal thermal expansion of the panels. This is enabled by the fact that the panels are not bolt-

ed to transverse supports.

It is noted that connection strips 80 may be formed of any suitable material, such as plastic or aluminum. Substantially all of the stresses applied to the panels are transferred via the connection strips to structural elements of a building.

It will be appreciated by persons skilled in the art that the present invention is not limited to that which has been particularly shown and described hereinabove. Rather the scope of the present invention is defined only by the claims which follow:

Claims

1. A lightweight construction panel assembly including:
   a connection strip arranged to be bolted onto a support structure;
   a plurality of panels arranged for mounting onto the connection strip and in generally partially overlapping side by side arrangement onto each other,
   each of the plurality of panels including first and second edge portions at opposite sides of the panel,
   the connection strip including a third edge portion,
   the first edge portion of each panel being configured for mating engagement with the third edge portion of the connection strip and simultaneously with the second edge portion of an adjacent panel.

2. Apparatus according to claim 1 and wherein said second edge portion of the panel overlies the first edge portion as well as the connection strip when the assembly is fully assembled.

3. A lightweight construction panel including top and bottom surfaces and first and second edge portions at opposite sides of the panel,
   the first edge portion of each panel being configured for mating engagement with the second edge portion of an adjacent panel, and
   the top surface extending smoothly over the second edge portion, so as to entirely cover the first edge portion when two adjacent panels are in mating engagement.

4. Apparatus according to any of the preceding claims and wherein said second edge portion includes a pair of spaced protrusions which are seatable into a pair of corresponding recesses defined in said first edge portion.

5. Apparatus according to claim 4 and wherein one of said pair of spaced protrusions and a corresponding one of said pair of recesses are formed with interlocking teeth for retaining against disengagement.

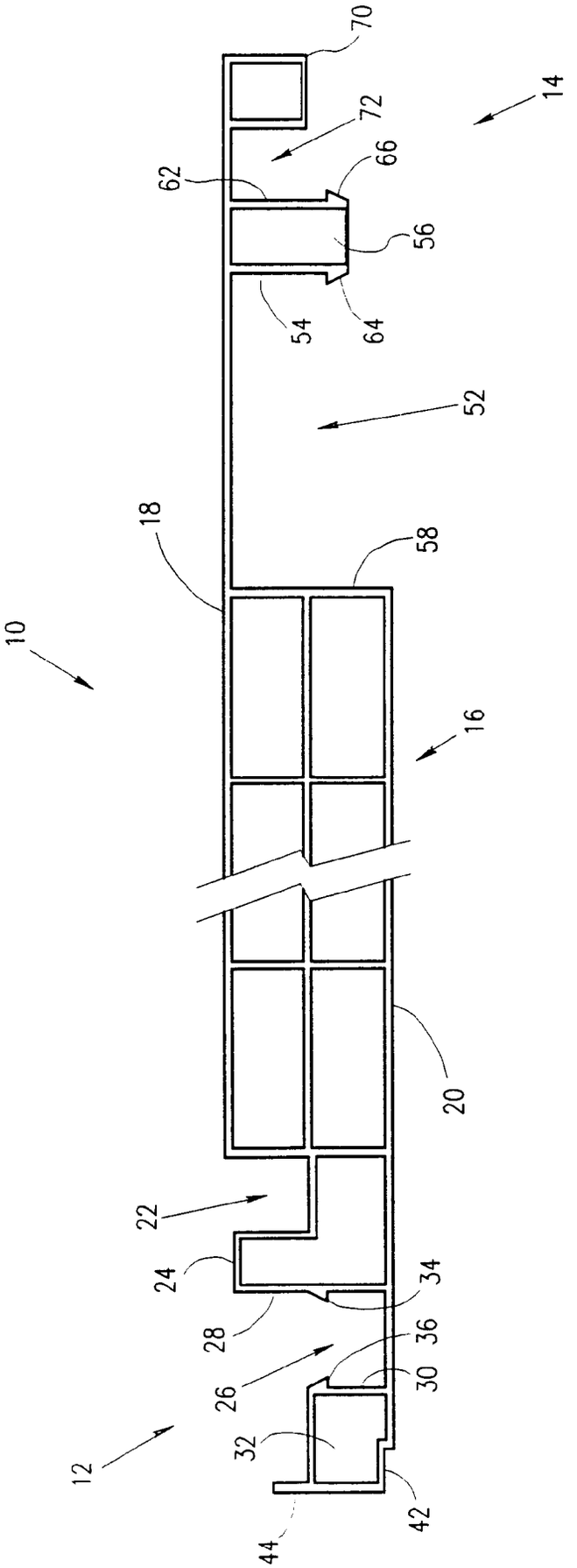
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FIG.1A

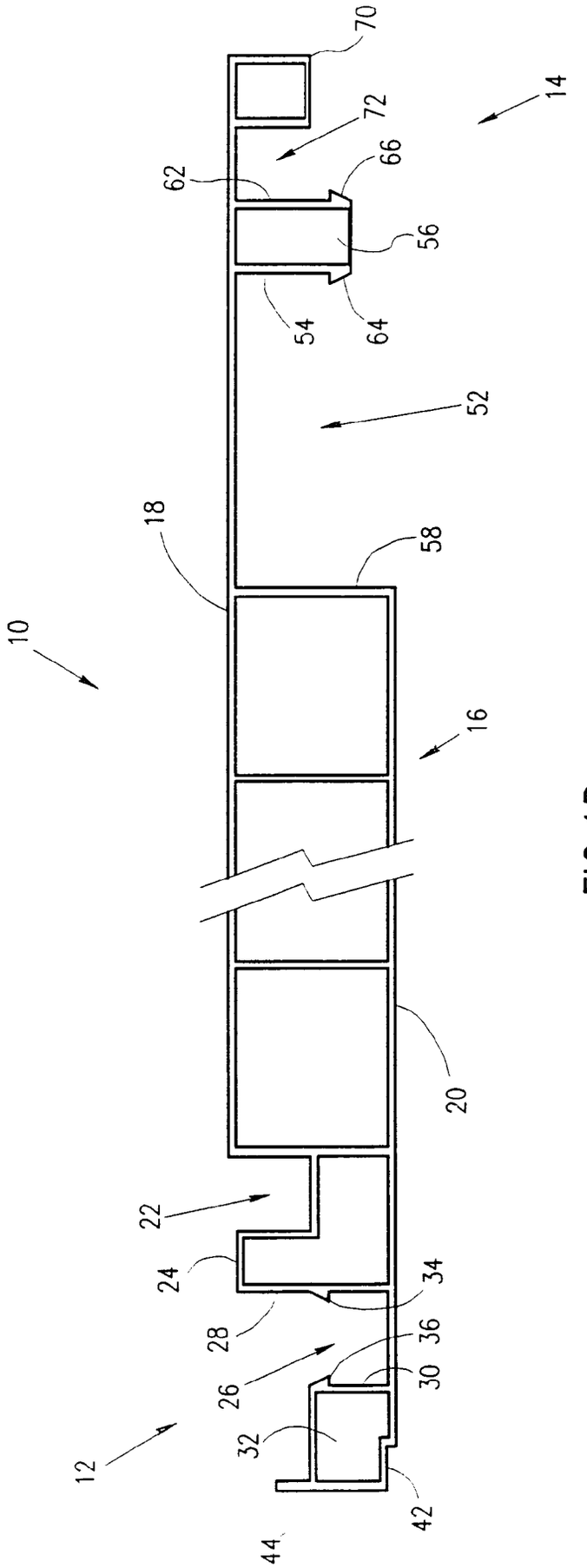
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FIG.1B

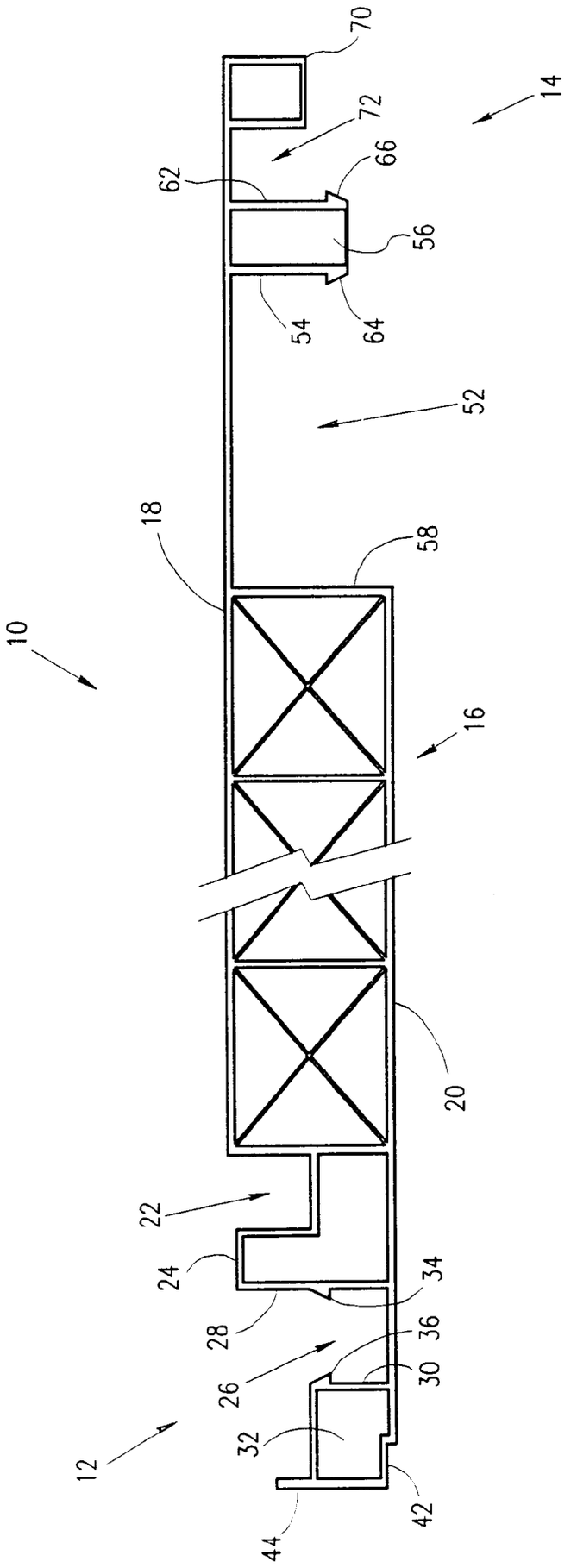
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FIG.1C

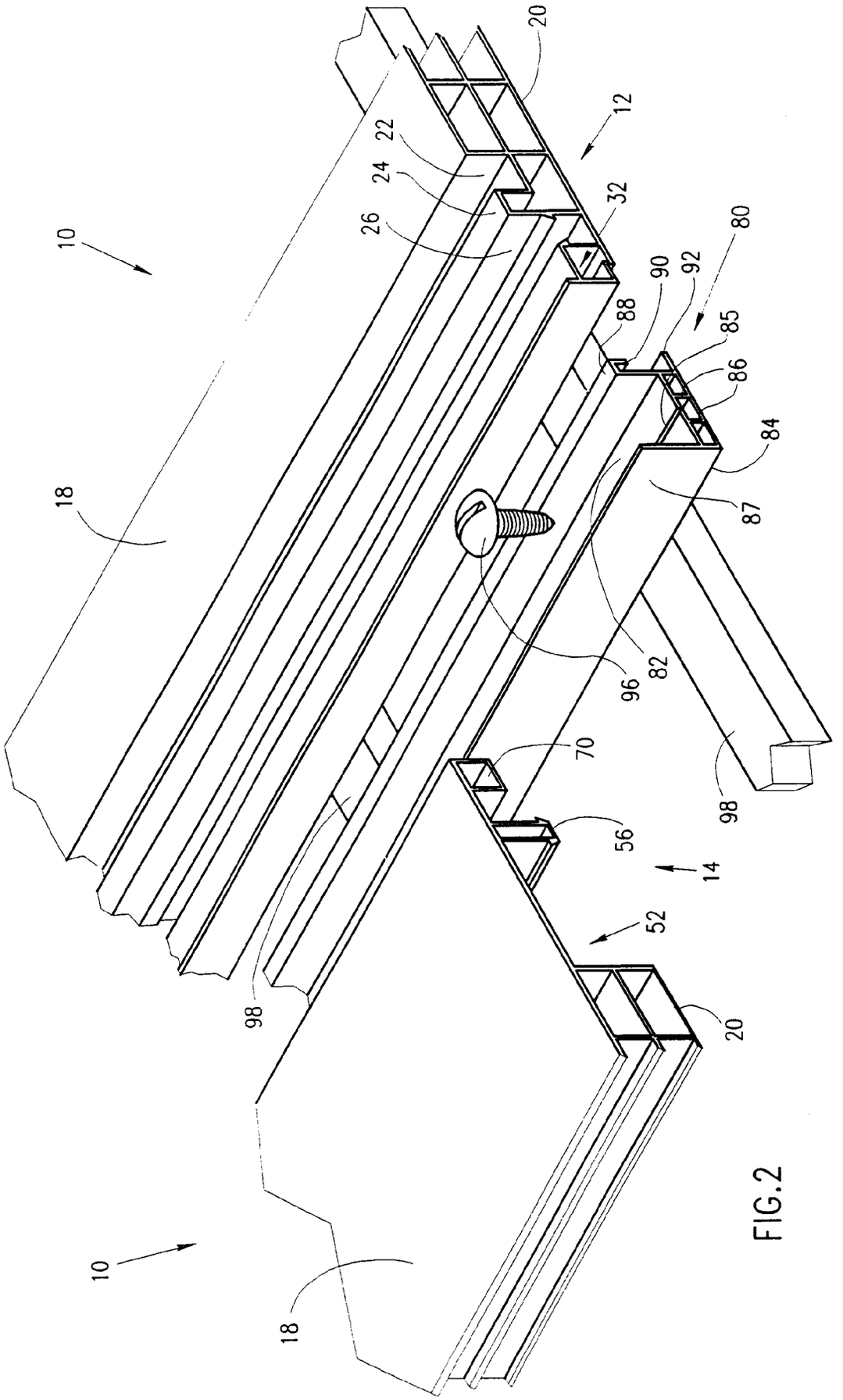
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FIG.2

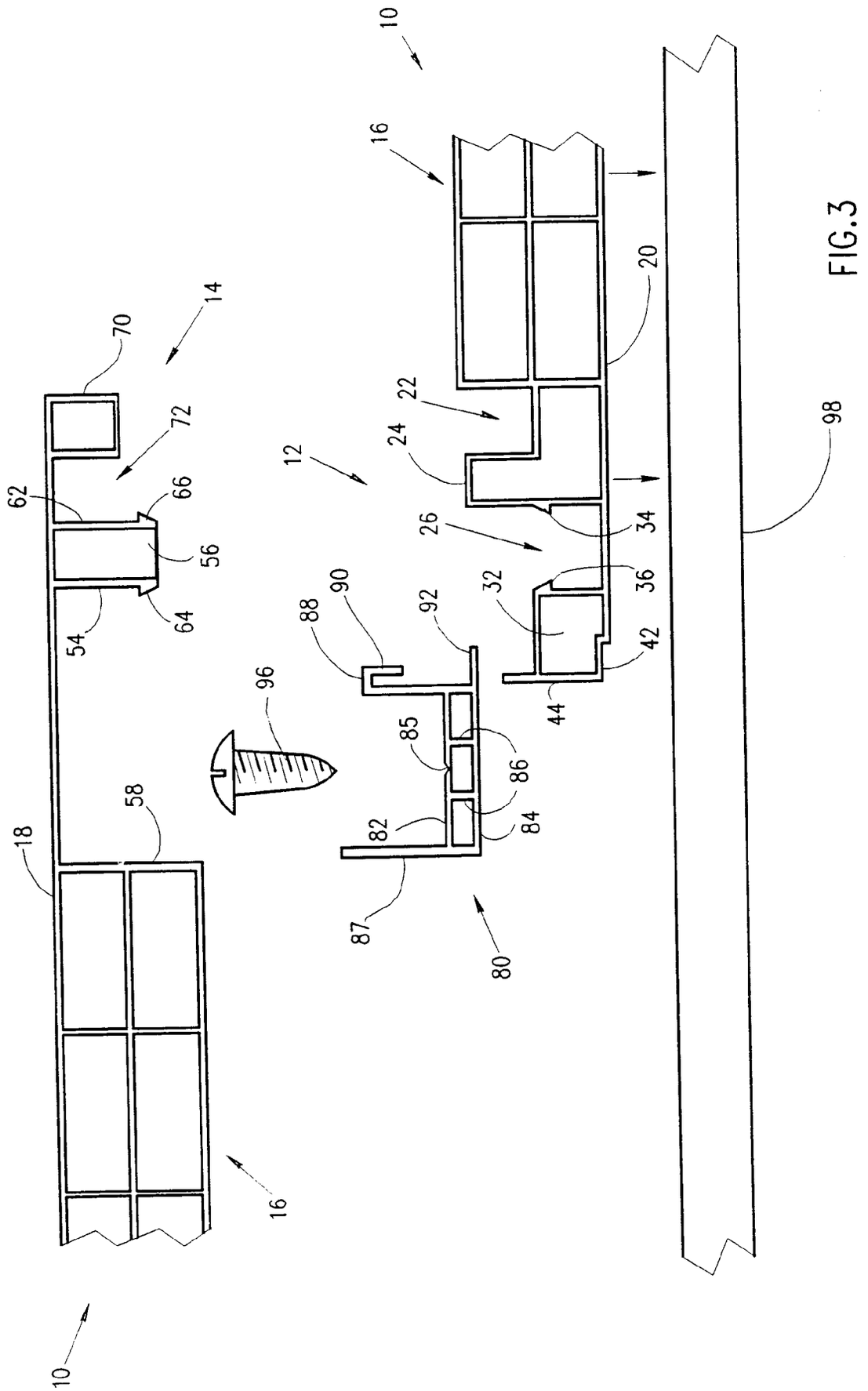
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FIG.3

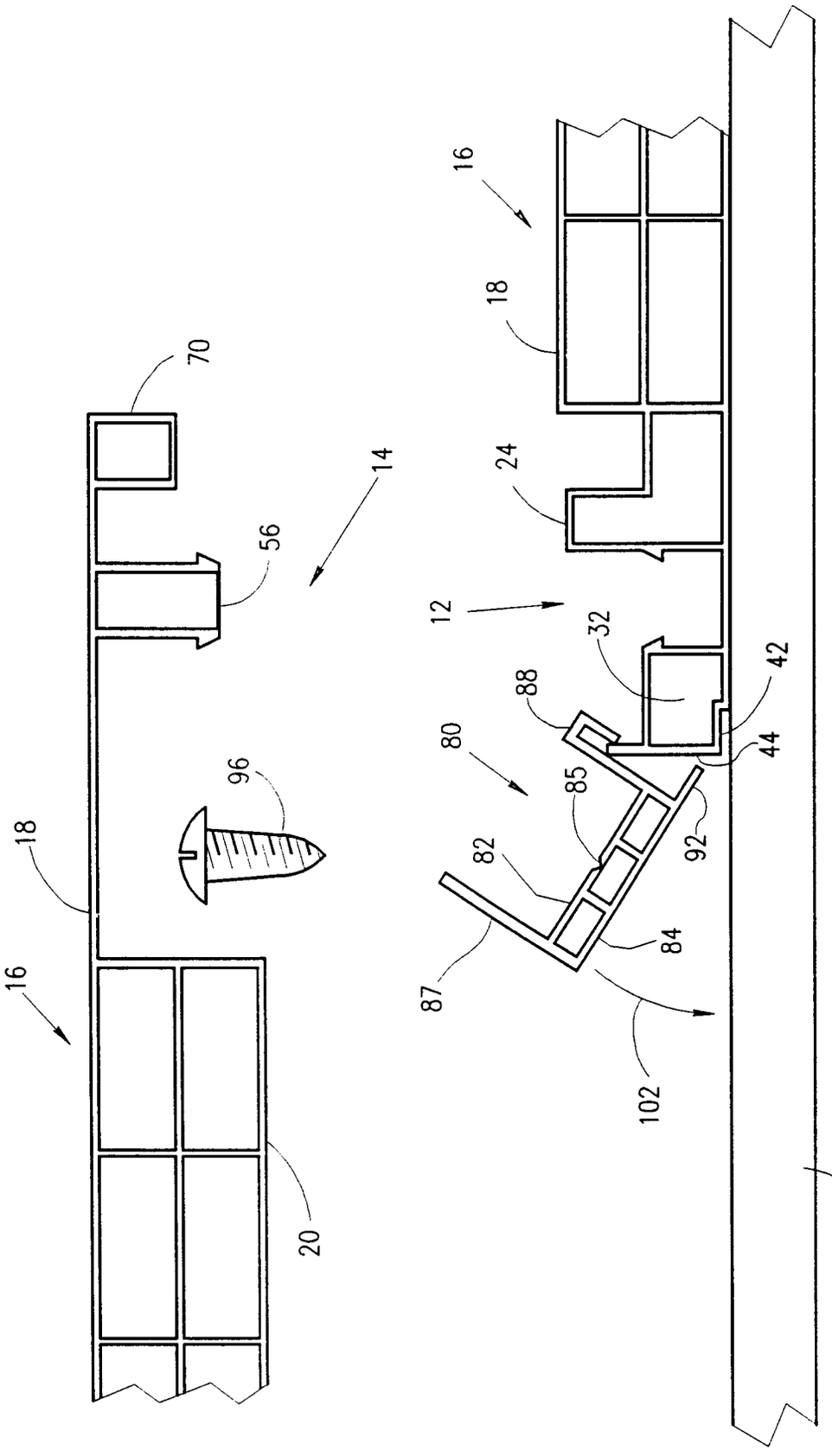

FIG.4

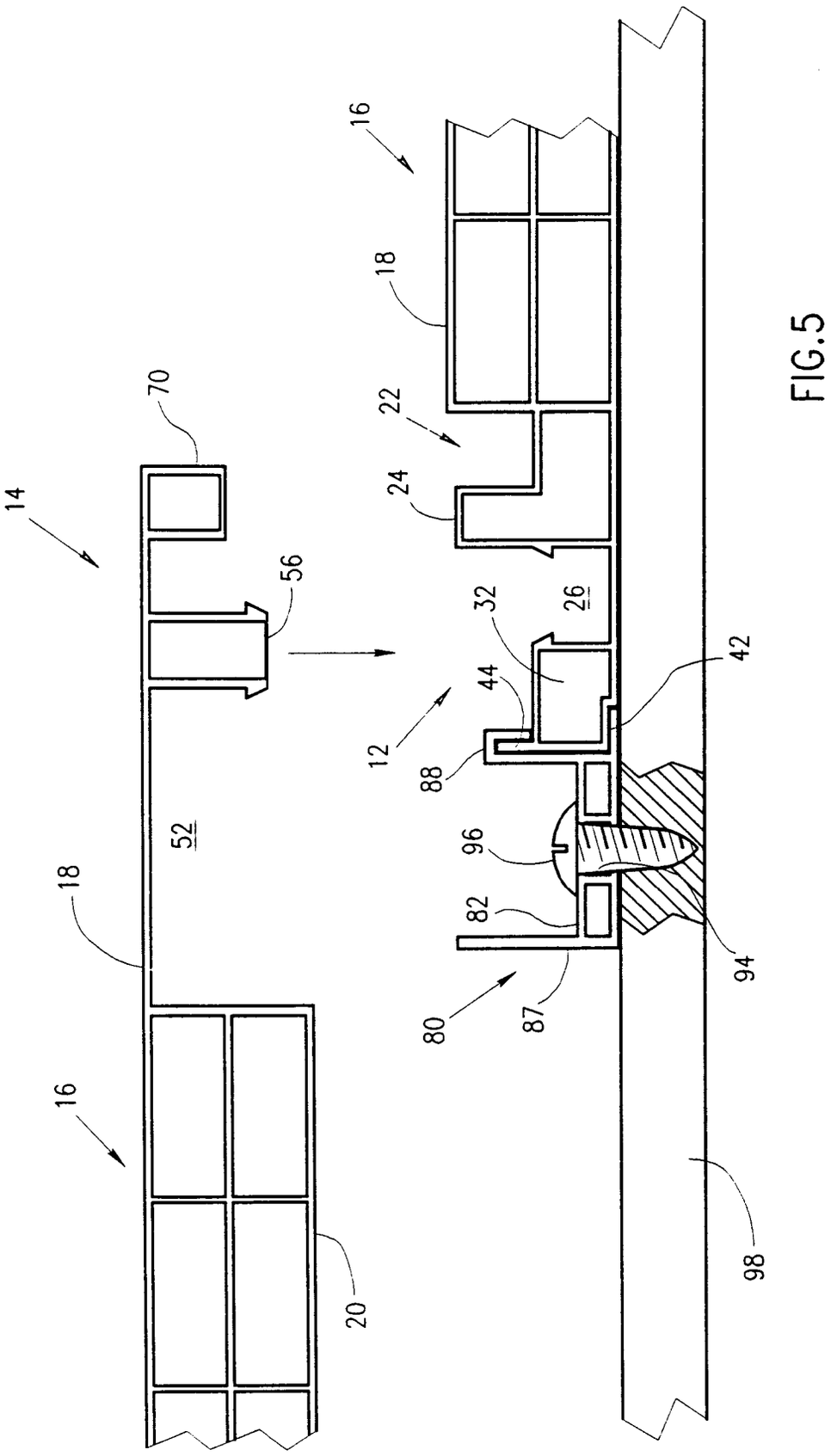

FIG.5

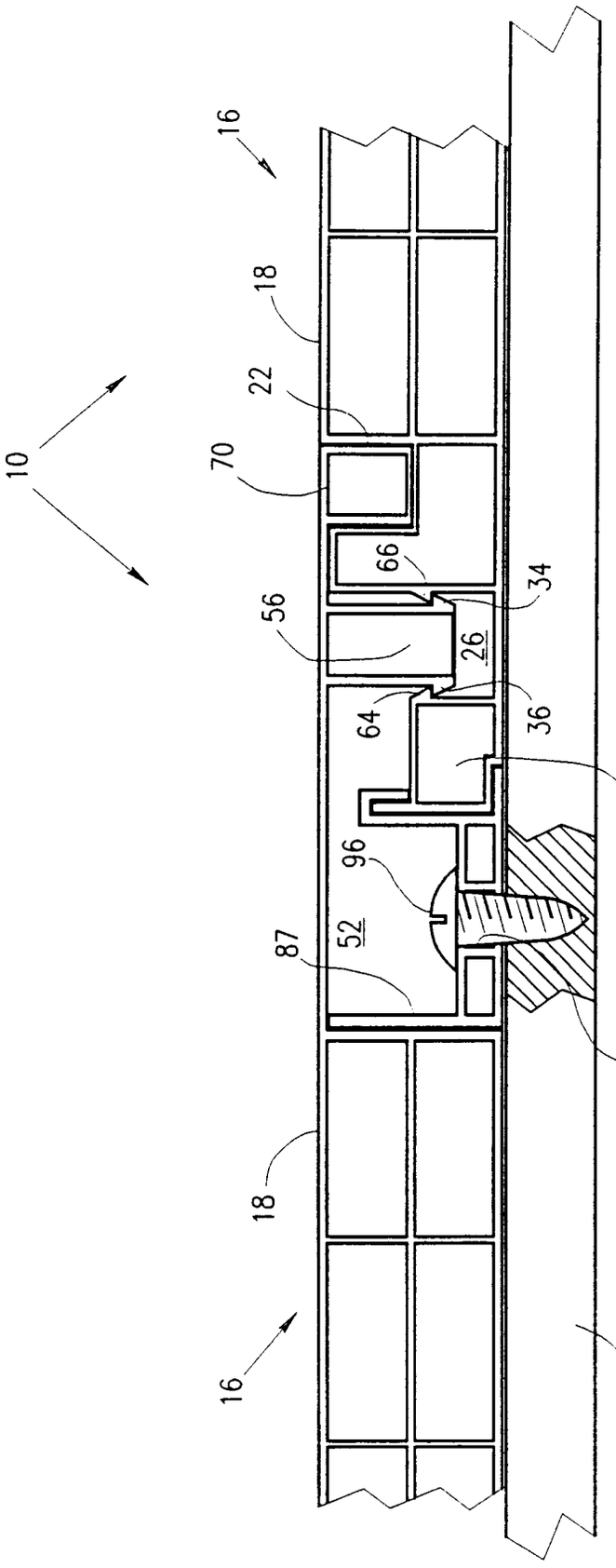

FIG.6

FIG.7