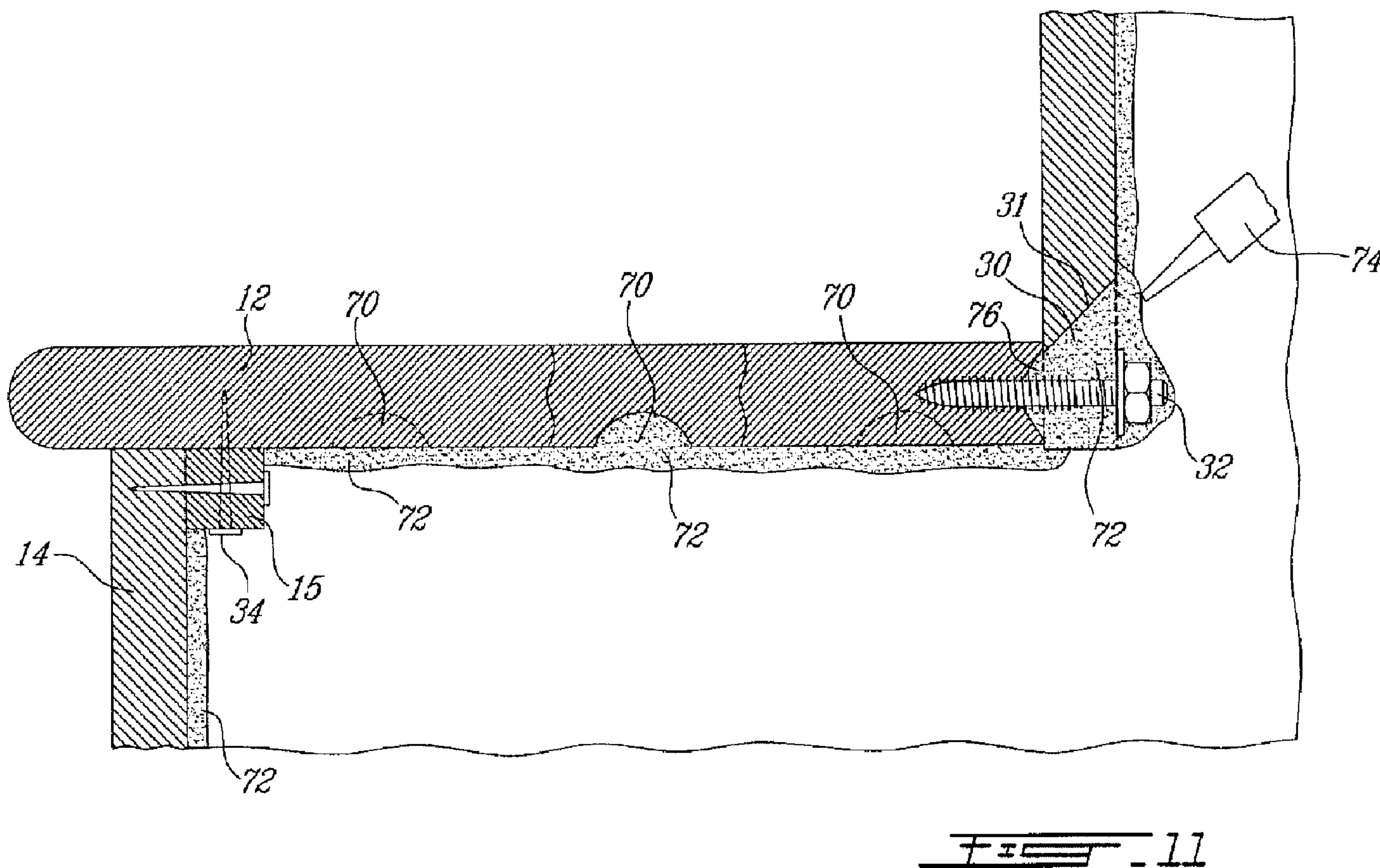




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(54) Titre : SYSTEME D'ESCALIER MODULAIRE ET ENSEMBLE POUR CELUI-CI
 (54) Title: MODULAR STAIRWAY SYSTEM AND KIT THEREFOR



(57) Abrégé/Abstract:

A stairway system kit and method for assembling the kit are provided the system including pre-fabricated components such as steps stringers decorative mouldings and panels or boards etc on site. The kit comprises a step module and an adjacent step

(57) **Abrégé(suite)/Abstract(continued):**

module the step module comprising a riser and a tread the riser being adapted to abut the tread on a first side thereof and being adapted to define a fastener-mating portion on a second side thereof. The tread is adapted to be secured atop the riser on one side thereof. The adjacent step module comprises a riser and a tread the adjacent step module being adapted to be assembled with the step module by engaging a fastener with the fastener-mating portion of the step module and securing the fastener to the tread of the adjacent step module to secure the two step modules together.

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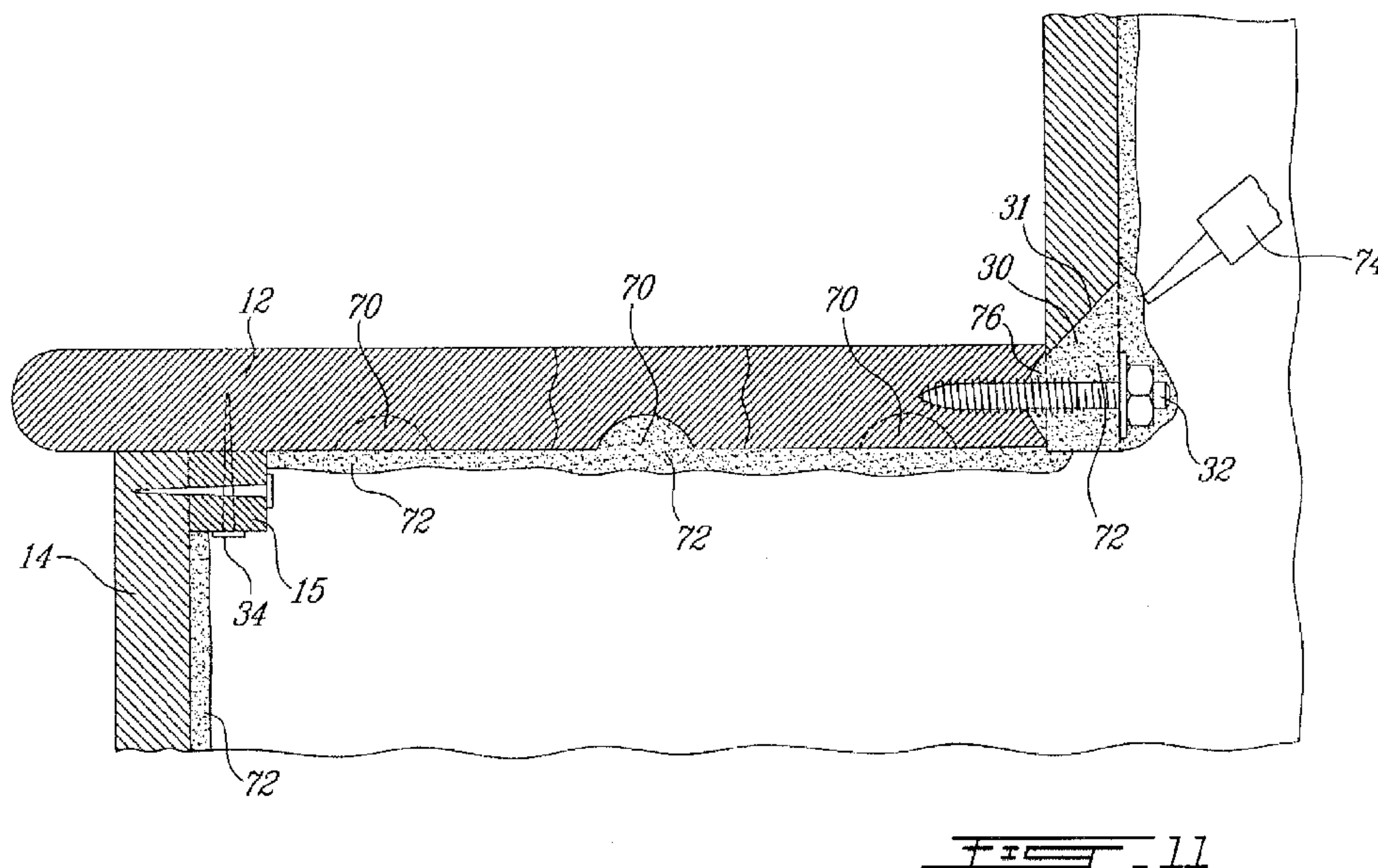


FIG. 11

(57) Abstract: A stairway system kit and method for assembling the kit are provided the system including pre-fabricated components such as steps stringers decorative mouldings and panels or boards etc on site. The kit comprises a step module and an adjacent step module the step module comprising a riser and a tread the riser being adapted to abut the tread on a first side thereof and being adapted to define a fastener-mating portion on a second side thereof. The tread is adapted to be secured atop the riser on one side thereof. The adjacent step module comprises a riser and a tread the adjacent step module being adapted to be assembled with the step module by engaging a fastener with the fastener-mating portion of the step module and securing the fastener to the tread of the adjacent step module to secure the two step modules together.

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1 TITLE

2 MODULAR STAIRWAY SYSTEM AND KIT THEREFOR

3 CROSS REFERENCE TO RELATED APPLICATIONS

4 This Application claims priority on U.S. Provisional Applications No. 60/935,418
5 and No. 61/064,575 filed respectively on August 10, 2007 and March 13, 2008,
6 which are herein incorporated by reference.

7 FIELD OF THE INVENTION

8 The present invention relates to stairways and, more particularly, to modular
9 stairways made of pre-fabricated components such as steps, stringers, etc.,
10 typically in the form of a kit for assembly on site.

11 BACKGROUND OF THE INVENTION

12 Typically, staircases are completely produced on site with the various wood
13 components being cut to size as the staircase is progressively erected on site.

14 Also, it has been proposed to completely assemble a staircase in the factory
15 such that a pre-assembled staircase is delivered to the construction site for
16 direct and easy installation thereat. Such a modular staircase is disclosed in
17 Canadian Patent Application No. 2,149,981 naming Raymond Couture as
18 inventor and laid-open for public inspection on November 24, 1995.

19 Furthermore, in Canadian Patent Application No. 2,276,988, also naming
20 Raymond Couture as inventor, and laid-open for public inspection on December
21 30, 1999, a modular staircase is proposed, which includes a permanent framing
22 made of metallic stringers and vertically extending step supports that are
23 secured along the stringers. Each step support includes upper and front flanges
24 adapted to be secured respectively to a tread and to a riser of each step of the
25 staircase. If the staircase has a partly exposed side, various decorative or
26 finishing wooden components, including treads, risers, false or decorative
27 stringers, mouldings, etc., are provided to cover any exposed structural metallic

1 framework and particularly the stringers.

2 Moreover, in United States Patent No. 4,422,270 naming Leopold Lapointe and
3 Donat Pelletier as inventors and issued on December 27, 1983, a modular, self
4 supporting flight of stairs is proposed. The flight of stairs described therein
5 comprises at least one pair of stringer units for supporting at least one tread
6 thereon and bolted thereto. The stringer units each comprise a side plate and a
7 fixation plate extending outwardly therefrom and parallel thereto for fixing a
8 fixation of a first unit to a side plate of an adjacent unit by riveting or bolting. A
9 two-part stringer unit comprising intersecting oblong slots allows for step height
10 adjustments.

11 In United States Patent No. 2,593,683, naming G.W. Lyons as inventor, and
12 issued on April 22, 1953, a vertically adjustable staircase is proposed. The flight
13 of stairs described therein comprises sectional stringers formed of prefabricated
14 sheet metal tread-supporting plates, each plate comprising a vertical body
15 portion, two vertical and parallel longitudinal flanges perpendicular thereto and a
16 horizontal rectangular top flange for supporting a tread thereon and bolted
17 thereto. One of the longitudinal flanges of a given plate comprises a plurality of
18 sets of perforated holes for combining with a set of corresponding perforated
19 holes in an adjacent longitudinal flange of an adjacent plate thereby providing
20 adjustable fastening means therefor.

21 Furthermore, PCT Patent Publication No. WO 2005/090705-A1 published on
22 September 29, 2005 in the name of Raymond Couture, discloses staircases
23 that are constructed of modular stringers for the on-site installation of the
24 staircases in a residential, commercial or industrial setting. Kits for erecting the
25 staircases include matingly or cooperatively coupling step support units defining
26 the staircase stringers, a set of steps adapted to be mounted thereon, as well
27 as various finishing elements and modules to provide a finished look to the
28 completed staircases. The staircases include self-supporting staircases, linear
29 staircases, curling or spiralling staircases and adjustable variations thereof.

30 Therefore, it is desirable to provide a modular stairway system, typically in the

1 form of a kit, which can be assembled to erect a stairway on site.

2 **SUMMARY OF THE INVENTION**

3 It is therefore an aim of the present invention to provide a novel stairway
4 system, in the form of a kit.

5 One aspect of the present invention provides a kit having a step module
6 adapted to be assembled adjacent to other step modules.

7 Another aspect of the present invention provides a step module including a
8 tread and a riser wherein the riser is adapted to be connected with the tread of
9 another adjacent step module. The connection between the riser of one module
10 and the step of the other module provides a riser-height adjustment mechanism.

11 One other aspect of the present invention provides a step module including a
12 tread and a riser that can be assembled dry (e.g. without glue) with an adjacent
13 step and riser module. The dry-assembly allows relative adjustments between
14 the adjacent modules.

15 Another aspect of the present invention provides a step module including a
16 tread and a riser that can be dry-assembled with an adjacent step module. The
17 dry-assembly is adapted to be glued once the adjacent step modules are
18 correctly assembled and in appropriate positions.

19 A further aspect of the present invention provides, for a step module having a
20 step and a riser, a series of bolts fastened to the tread in a position to interact
21 with the riser such that the riser can be selectively adjusted and fastened to the
22 tread. The bolts is provided in a recess adapted to receive glue to substantially
23 permanently secure the tread to the riser once the riser is properly secured to
24 its associated tread with the series of bolts.

25 One aspect of the present invention provides a method of assembling step
26 modules without glue, adjusting the position of the riser of one step module in
27 respect with the tread of another adjacent step module and, when the position
28 of the riser in respect with the adjacent tread is properly positioned, applying

1 glue between the riser and the adjacent tread to substantially permanently
2 secure the riser to the tread.

3 Another aspect of the present invention provides a moulding disposed between
4 stringers and the wall to provide a substantially gap-less finish that follows the
5 contour of the wall. The moulding rests on one side thereof in a groove defined
6 in the stringer, with the moulding being adapted on an opposite side thereof to
7 contact the wall. The moulding is shaped and/or made of a material chosen
8 such as to provide flexibility for the moulding such that it can follow the contour
9 of the wall.

10 One other aspect of the present invention provides a kit for erecting a stairway
11 comprising a step module and an adjacent step module, the step module
12 comprising a riser and a tread, the riser being adapted to abut the tread on a
13 first side thereof and being adapted to define a fastener-mating portion on a
14 second side thereof, the tread being adapted to be secured atop the riser on
15 one side thereof, the adjacent step module comprising a riser and a tread, the
16 adjacent step module being adapted to be assembled with the step module by
17 engaging a fastener with the fastener-mating portion of the step module and
18 securing the fastener to the tread of the adjacent step module to secure the two
19 step modules together.

20 Another aspect of the present invention provides a method for building a
21 stairway comprising providing a step module, the step module comprising a
22 riser and a tread, the riser being adapted to abut the tread on a first side thereof
23 and being adapted to define a fastener-mating portion on a second side thereof,
24 the tread being adapted to be secured atop the riser on one side thereof;
25 providing an adjacent step module, the adjacent step module comprising a riser
26 and a tread; and assembling the adjacent step module with the step module by
27 engaging a fastener with the fastener-mating portion of the step module and
28 securing the fastener to the tread of the adjacent step module to secure the two
29 step modules together.

30 One aspect of the present invention provides a kit for erecting a self-supporting

1 stringerless stairway comprising: a first step module and a second step module,
2 the first step module comprising a riser and a tread, the riser being adapted to
3 abut the tread on a first side thereof and being adapted to define a fastener-
4 mating portion on a second side thereof, the tread being adapted to be secured
5 atop the riser on one side thereof, the second step module comprising a riser
6 and a tread, the tread being adapted to receive a fastener on a first side thereof
7 and to be secured atop the riser on a second side thereof, the second step
8 module being adapted to be assembled with the first step module by engaging
9 the fastener with the fastener-mating portion of the first step module and with
10 the tread of the second step module.

11 An additional aspect of the present invention provides a step module for
12 erecting a stairway, the step module comprising a tread comprising a foot
13 contacting surface, a proximal side surface, a distal side surface and lateral side
14 surfaces, the tread comprising a fastener-receiving portion disposed on the
15 distal side surface for substantially orthogonally securing a fastener thereto, and
16 a riser comprising a proximal surface, an upper side surface and a lower side
17 surface, the riser comprising a fastener-mating portion substantially
18 orthogonally disposed on the proximal surface in a vicinity of the lower side
19 surface, the fastener-mating portion and the fastener-receiving portion being
20 adapted to cooperate with the fastener to secure two step modules together and
21 to adjust a distance between the treads of the two step modules.

22 An aspect of the present invention provides a riser for use in a step for erecting
23 a stairway, the riser comprising a proximal surface, opposed side surfaces and
24 opposed upper and lower surfaces, the proximal surface being provided with an
25 elongated opening adapted to receive a fastener to secure a tread thereto, the
26 elongated opening being adapted to provide a distance adjustment between
27 treads of adjacent steps.

28 Another aspect of the present invention provides a riser for use in a step for
29 erecting a stairway, the riser comprising opposed upper and lower ends, the
30 lower end being provided with an elongated opening adapted to receive a

1 fastener to secure a tread thereto, the elongated opening being adapted to
2 provide a distance adjustment between treads of adjacent steps.

3 Another aspect of the present invention provides a tread for use in a step for
4 erecting a stairway, the tread comprising a foot supporting surface, opposed
5 side surfaces and opposed distal and proximal surfaces, the distal surface
6 being provided with a securing material receiving portion adapted to receive a
7 securing material therein when at least a portion of the stairway is dry-
8 assembled to substantially permanently secure the tread to a corresponding
9 adjacent riser.

10 Another aspect of the present invention provides a tread for use in a step for
11 erecting a stairway, the tread comprising a foot supporting surface, opposed
12 front nose and rear ends, the rear end being provided with a securing material
13 receiving portion adapted to receive a securing material therein when at least a
14 portion of the stairway is dry-assembled to substantially permanently secure the
15 tread to a corresponding adjacent riser.

16 Other aspects, objects, advantages and features of the present invention will
17 become more apparent upon reading of the following non-restrictive description
18 of embodiments thereof, given by way of example only with reference to the
19 accompanying drawings.

20 BRIEF DESCRIPTION OF THE DRAWINGS

21 In the appended drawings:

22 Figure 1 is a perspective view of a stairway, shown in an assembled state
23 thereof, constructed from a kit in accordance with an illustrative embodiment of
24 the present invention, wall and floor portions being also herein shown;

25 Figure 2 is a perspective view of the stairway of Figure 1, illustratively showing
26 various details of components thereof;

27 Figure 3 is an enlarged perspective view of the portion of the stairway defined
28 by bubble 3-3 in Figure 2;

- 1 Figure 4 is a bottom rear perspective view of part of the stairway of the
- 2 illustrative embodiment of the present invention shown in Figures 1 and 2;
- 3 Figure 5 is a vertical cross-sectional view taken along line 5-5 of Figure 2;
- 4 Figure 6 is an angled cross-sectional view taken along line 6-6 of Figure 2;
- 5 Figure 7 is a vertical cross-sectional view taken along line 7-7 of Figure 2;
- 6 Figure 8 is a vertical cross-sectional view taken along line 8-8 of Figure 2;
- 7 Figure 9A is a perspective view from underneath of an assembled tread and
- 8 riser;
- 9 Figure 9B is a cross-section taken along line 9B-9B of Figure 9A;
- 10 Figure 10 is a perspective view from underneath of a series of assembled step
- 11 modules;
- 12 Figure 11 is a left side elevational sectional view of an assembled tread and
- 13 riser as depicted on Figure 9A;
- 14 Figure 12 is a perspective view depicting a step module with an exploded
- 15 stringer;
- 16 Figure 13 is a left side elevational view showing *inter alia* an uppermost riser of
- 17 a series of assembled step modules;
- 18 Figure 14 is a sectional view of a moulding disposed between a stringer and a
- 19 wall;
- 20 Figure 15 is a perspective view of the stringer of Figure 14;
- 21 Figure 16 is a perspective view of a variant stringer;
- 22 Figure 17 is a perspective view of the uppermost riser of a staircase;
- 23 Figure 18 is a left elevational sectional view of a tread and riser;

- 1 Figure 19 is a front elevational sectional view of a stringer;
2 Figure 20 is a schematic of a stairway with a table of rises and steps; and
3 Figure 21 (on two sheets) is a table of rises and steps in accordance with the
4 schematic of Figure 20.

5 **DESCRIPTION OF ILLUSTRATIVE EMBODIMENT(S) OF THE INVENTION**

6 With reference to the appended drawings, a stairway S constructed from a
7 stringer and step support kit in accordance with an illustrative embodiment of
8 the present invention will now be presented. The stairway S is adapted to be
9 erected on site, using components of the kit to be described hereinafter, and for
10 instance on a flooring F and, on one side thereof, against a wall W in the case
11 of a stairway S that has an exposed side, as herein illustrated.

12 The kit is comprised, for example, of six basic components, that is (1) a set of
13 steps 10, each comprising a tread 12 and a riser 14 that are pre-assembled
14 together, the tread 12 atop the riser 14, with an elongated triangular support 15
15 (Figures 4 and 7) being mounted on a hidden side of the junction of the tread 12
16 with the riser 14; (2) finishing triangular members 16 for the exposed side of the
17 stairway S; (3) a structural and finish stringer 18 (e.g. in the form of a board)
18 adapted to be mounted on the wall side (on the left-hand side in Figure 1) of the
19 stairway S, the stringer 18 being, for instance, 8 inches wide and supplied in
20 lengths of 8 feet; (4) a finishing board 20 adapted to be mounted on the
21 exposed side (on the right-hand side in Figure 1) of the stairway S, the finishing
22 board 20 being, for instance, 6 inches wide and supplied in lengths of 8 feet; (5)
23 an anchoring unit 22 (see Figures 4 and 7) for joining an upper end of the
24 stairway S to an upper floor structure 24, the anchoring unit 22 including a finish
25 riser 24 and a pair steel angle brackets 26; and (6) a moulding 28 adapted to be
26 positioned atop the stringer 18 and to lean against and to follow the contour of
27 the wall W for hiding imperfections in the wall W.

28 The steps 10, the finishing triangular members 16, the structural and finish
29 stringer 18, the finishing board 20, the anchoring unit 22 and the moulding 28

1 are typically made of wood products, except for instance for the steel angle
2 brackets 26 of the anchoring unit 22. The present kit thus allows for various
3 decorative finishes.

4 Three (3) vertical "grooves" 30 are defined at the base of the risers 14 of the
5 steps 10, as well seen in Figures 2, 3, 4, 7, 8, 9, 10 and 11. These grooves 30
6 can be slots or oblong holes made in the riser material to allow for a height
7 adjustment between the steps 10 to be done from behind the stairway S, using
8 one bolt 32 per groove 30. Each bolt 32 is driven, from behind the stairway S,
9 through the bottom part of the riser 14 of one step 10 and into a rear end of the
10 tread 12 of an adjacent step 10, thereby allowing for an easy minimum vertical
11 adjustment, from 0 to $\frac{3}{4}$ " per step 10. The groove 30 also provides an access
12 through the riser 14 to apply glue 74 to permanently secure the tread 12 with
13 the riser 14.

14 The kit of the present invention provides the user with the possibility of erecting
15 a stairway in various heights and shapes, using the same components. Some of
16 these components require a few simple cuts, namely to the ends of the
17 structural and finish stringer 18 and to the finishing board 20.

18 Before ordering the kit, precautions must be taken. For instance, the orientation
19 of the stairway (right or left) is first determined and established from the bottom
20 of the stairway to be erected. Second, the total height of the stairway opening
21 should be measured from floor finish to floor finish (F.F. to F.F.), herein from F
22 to U.

23 Before starting to assemble and erect the stairway S, the user should check and
24 correct, if necessary, the squaring and leveling of the walls W to which the
25 stairway S will be installed as well as the flooring F. The user must substantially
26 precisely measure the height of finished floor to finished floor (F.F. to F.F.)
27 between which the stairway S will be erected. If the finish of one or the other
28 floors is missing, the user has to simulate the finish by using, for instance, a
29 small strip of wood (of a same thickness as that of the floor finish to come).

1

Stair Angle Based On Rise and Run

| Run⇒ Rise↓ | 10" | 10.5" | 11" | 11.5" | 12" | 12.5" | 13" | 13.5" | 14" |
|---------------|-----|-------|-----|-------|-----|-------|-----|-------|-----|
| 5" | 27° | 25° | 24° | 23° | 22° | 21° | 20° | 20° | 20° |
| 5.25" | 28° | 27° | 26° | 25° | 24° | 23° | 22° | 21° | 21° |
| 5.5" | 29° | 28° | 27° | 26° | 25° | 24° | 23° | 22° | 21° |
| 5.75" | 30° | 29° | 28° | 27° | 26° | 25° | 24° | 23° | 22° |
| 6" | 31° | 30° | 29° | 28° | 27° | 26° | 25° | 24° | 23° |
| 6.25" | 32° | 31° | 30° | 29° | 28° | 27° | 26° | 25° | 24° |
| 6.5" | 33° | 31° | 30° | 29° | 28° | 27° | 27° | 26° | 25° |
| 6.75" | 34° | 32° | 31° | 30° | 29° | 28° | 27° | 27° | 26° |
| 7" | 35° | 34° | 32° | 31° | 30° | 29° | 28° | 27° | 27° |
| 7.25" | 36° | 35° | 33° | 32° | 31° | 30° | 29° | 28° | 27° |
| 7.5" | 37° | 36° | 34° | 33° | 32° | 31° | 30° | 29° | 28° |
| 7.75" | 38° | 36° | 35° | 34° | 33° | 32° | 31° | 30° | 29° |

2

3 To establish the height of the risers 14, a chart such as that enclosed above
 4 and on Figures 20 and 21 can be used. These charts show how to establish the
 5 height of the risers 14 from the floor-to-floor height measurements. Riser height
 6 means therein height top-to-top of the steps 10 or treads 12. The present pre-
 7 fabricated stairways are typically available in two standard width sizes, namely
 8 36 inches and 42 inches.

9 After having established the height of the risers 14 (e.g. with the
 10 aforementioned chart), the user then places the step modules or steps 10
 11 upside down on a table and attaches them together in a staircase-form using
 12 the bolts 32 although the bolts 32 are not tightened firmly. The user then begins
 13 assembly of the stairway S, starting with its attachments at the base of the riser
 14 14 of a first step 10 and the back of the tread 12 of a second step 10 located
 15 adjacent under the first step. The relative position of the steps 10 is thus

1 adjusted by sliding the steps 10 along each other, guided by the bolts 32
2 engaged in the grooves 30 defined in the risers 14. Once the steps 10 are
3 precisely positioned, a small bead of for instance P.L. 400 adhesive is placed
4 and the three (3) bolts 32 for each assembly of a pair of adjacent steps 10 are
5 tightened to retain the steps 10 in their exact relative position.

6 As best seen on Figures 9A, 9B, 10 and 11, a cavity 76 is disposed on the end
7 portion of the tread 12 at the base of the bolts 32 to receive glue 74. The cavity
8 76 extends transversally beyond the width of the groove 30 to ensure that glue
9 74 will contact both the tread 12 and its associated riser 14. Alternatively, the
10 cavity 76 can have the shape of a groove 80 (see Figures 9A and 9B) along the
11 side of the tread 12, or being a round recess 82 (see Figure 9A), to facilitate the
12 manufacturing of the cavity 76. The cavity 76 also provides a space to glue the
13 bolt 32 and its nut therein to the tread 12 and riser 14 to provide an even more
14 rigid assembly. The inside wall of the slot 30 toward the proximal side of the
15 riser 14 is provided with an angle, or a radius 31 (see Figures 3, 7, 8 and 9A),
16 opening toward the rear side of the riser 14. The angle or the radius 31 provides
17 room to insert the tip of a glue 74 container behind the nut and washer
18 assembled to the bolt 32. Therefore, once the steps 10 have been adjusted
19 relative to one another so as to provide the desired height for the stairway S,
20 the risers 14 are "locked" to the treads 12 of respective adjacent lower steps 10,
21 via the bolts 32. Once the adjustment step modules 10 are "locked" together
22 glue is applied to permanently secure the assembly.

23 The precise adjustment (both exactly the same measurement) of the two (2)
24 riser positioning clamps (not herein shown, but used temporarily to attach the
25 steps 10 together until the bolts 32 are tightened) is important because it is one
26 of the main operations to assure the self alignment of the whole stairway S. This
27 type of alignment made without glue is called dry alignment. A dry alignment is
28 a stairway erection that can be adjusted if needed before the erection is
29 permanently secured in place.

30 Figures 9A through 11 also teach a gluing pattern 72 where glue 74 is applied
31 to secure the triangular element 16 to the riser 14 and to the tread 12. It is

1 understood that the triangular element 16 is preferably disposed in the vicinity of
2 the sides of the step and that vicinity, within the scope of the present disclosure,
3 encompass to dispose the triangular element 16 on the side edge of a step.
4 Additional cavities 70 are provided on the underside lateral edge of the tread
5 12. These cavities 70 are disposed to be contiguous with one side of the
6 triangular element 16 to facilitate application of the glue 74 and increase the
7 glued surface area between the tread 12 and the triangular element 16. The
8 number and the shape of the cavities 70 can differ from what is actually
9 depicted on the Figures without departing from the scope of the present
10 invention.

11 The user then installs the upper part of the stairway S, which is the anchoring
12 unit 22. The finish riser 24 is glued (with, for instance, a bead of white carpenter
13 glue) and fastened with, for example, four (4) to five (5) #8 x 1½" wood screws
14 40 (see Figure 7) to the back of the tread 12 of the uppermost step 10. It is
15 noted that the finish riser 24 should be cut at the same height as the height of
16 other assembled risers 14. This operation shall be undergone prior to assembly
17 of the last step.

18 To assemble the stringer 18 to the now assembled steps 10, it is preferable to
19 position the stairway S on its side, i.e. with a wall side thereof facing upwardly.
20 Then, for instance, a fine bead of white carpenter glue is applied to the ends of
21 the treads 12 and risers 14. Thereafter, the stringer 18 is fastened into place
22 along the steps 10 using screws 34 (see Figures 2 and 4), ensuring that the
23 upper grooved side of the stringer 18 is flush with the step nosing. As to the
24 screws 34, there are used, for instance, three (3) screws #8 x 1½" for each
25 tread 12 and riser 14. For example, the user can start by placing one screw 34
26 at ¾" from the edge of the stringer 18 at each step nosing. Afterwards, the user
27 can install the remaining required screws 34. It is noted that a small template
28 (not shown) is provided to mark the screw positioning. As the stringer 18 is now
29 assembled to the steps 10, any stringer surplus can be cut at both ends of the
30 stairway S.

1 The stairway S can now be mounted in place. The two steel angle brackets 26
2 are first fastened with screws 42 to the upper floor structure U, approximately 9
3 inches lower than a finished surface 44 of the upper floor structure U (i.e. $7\frac{1}{2}$ " +
4 $1\frac{1}{2}$ "). The top of the stairway S is then simply dropped onto these two steel
5 angle brackets 26. Once the stairway S is adjusted, leaving an equal space of \pm
6 $\frac{1}{4}$ " from stair to wall surface (using wood shingle shims 46, Figure 6), the
7 stairway S can be fastened firmly to the upper floor structure U, using for
8 instance five (5) #8 x 2" wood screws 48 (Figure 7), and to the wall studs, using
9 for instance two (2) #8 x 2" wood screws per wall stud, not shown.

10 One or more appropriate spacers 50 can be used, as seen in Figure 7. Then, a
11 last riser 52 which completes the stairway S under the nose of the upper floor
12 structure U is simply slipped into place. The back side of the riser 52 must be
13 pre-glued and firm pressure applied. One can apply two (2) heavy beads of
14 adhesive P.L. 400, laid horizontally.

15 The finishing moulding 18, wall side, can now be installed on the stringer 18. To
16 do so, the upper end of the stringer 18 defines a longitudinal groove 36,
17 whereas a lower end of the moulding 28 is provided with a longitudinal cut-out
18 38, as best seen in Figure 6. The cut-out 38 engages partly the groove 36 and
19 also sits atop the stringer 18 with the moulding 28 being angled upwardly
20 towards the wall W and leaning thereagainst. As it can be appreciated from
21 Figure 5, the narrow thickness of the moulding 28 in conjunction with its angle
22 toward the wall W provides sufficient flexibility to the moulding 28 to follow the
23 contour of the wall W and prevent apparent gaps between the moulding 28 and
24 the wall W.

25 Small beads of, for instance, P.L. 400 adhesive are laid in the groove 36 of the
26 stringer 18 and at the upper back of the moulding 28. Small screws and plastic
27 washers are provided to keep the moulding 28 in place during the setting of the
28 adhesive. The moulding 28, with this inclination, thus hides surface variations in
29 the wall W (and gaps produced thereby between the wall W and the stringer 18
30 of the moulding 28) for ensuring an easy and almost perfect adjustment.

1 Figures 14 to 16 show variant stringers 18' and 18" provided respectively with
2 grooves 36' and 36".

3 Now turning to the exposed side of the stairway S, it is noted that the exposed
4 side of a stairway is usually closed (underneath) by a small support wall Y (see
5 Figures 1 and 2) onto which the stairway S rests. In the case where the
6 underside of a stairway is open, e.g. if there is another stairway going to a lower
7 floor, the small support wall Y is then replaced by a small beam, which
8 dimensions will vary according to the length of the staircase.

9 For example, if such a stairway has a length of 6 to 8 steps, two (2) pieces of 2"
10 x 6" studs will be sufficient to provide an adequate support for the stairway. In
11 both cases, 5/8" thick small plywood brackets are furnished to join the support
12 wall Y or the beam to the back step corner and riser, which are simply screwed
13 under the interior face; once the adhesive is set, this will prevent vibrations and
14 squeaking of the stairway S. It is noted that this operation should be done after
15 the stairway S has been put in place and before the installation of the triangular
16 elements 16 and of the finishing board 20.

17 At this stage, the small finishing triangular elements 16 are installed to close the
18 angles (triangular openings) between the back ends of the risers 14 and the
19 exposed ends of the treads 12. Each triangular element 16 defines a lower
20 tongue 54 (Figure 8). A fine bead of P.L. 400 adhesive can be applied to the
21 angled side and to the top side of the triangular element 16, this top side being
22 provided with small dowels 56 which are adapted to register with pre-drilled
23 holes defined under the end of the tread 12 so as to assemble the triangular
24 element 16 to the tread 12. A light pressure will suffice to secure it in place. This
25 same operation will apply to all other triangular elements 16. Adhesive can also
26 be provided on the front vertical sides of the triangular elements 16 so as to
27 also glue them to the back of the risers 14. The triangular element 16
28 substantially increases the rigidity of the assembled step by further securing the
29 tread and the riser together. Each step has its pair of associated triangular
30 elements 16 disposed on each lateral side of the step thus increasing the
31 overall rigidity of the whole stairway.

1 Now there remains the finishing board 20 to be installed. The finishing board 20
2 defines an upper deep groove 58 (Figure 8) which is adapted to receive and
3 conceal the tongues 54 of the triangular elements 16, once assembled. As well
4 as solidifying the whole unit, the finishing board 20 will hide any disparities
5 caused by the height of the risers 14 that has been chosen for the stairway S.
6 Before being put into place, a lower end of the finishing board 20 needs to be
7 cut at the surface level of the flooring F. Once it has been verified that that the
8 finishing board 20 can slide in and fit in well and that the upper part of the
9 finishing board 20 touches all back inferior corners of the steps 10, the finishing
10 board 20 is removed and a bead of adhesive is applied into the groove 58.
11 before the finishing board 20 is put back firmly into place, in its position shown
12 in Figures 1 and 2. The finishing board 20 is then held in place until the, for
13 instance, P.L. 400 adhesive is cured (a few minutes). The user should ensure,
14 while pressing the finishing board 20 in place, that it is vertically level.

15 Finally, excess white carpenter glue can be simply cleaned with a wet cloth,
16 whereas excess P.L. 400 adhesive coming out of joints can be simply cut with a
17 blade, after initial curing. The user should let the adhesive cure for a day before
18 subjecting it to heavy use.

19 It is to be understood that the invention is not limited in its application to the
20 details of construction and parts illustrated in the accompanying drawings and
21 described hereinabove. The invention is capable of other embodiments and of
22 being practiced in various ways. It is also to be understood that the phraseology
23 or terminology used herein is for the purpose of description and not limitation.
24 Hence, although the present invention has been described hereinabove by way
25 of illustrative embodiments thereof, it can be modified, without departing from
26 the spirit, scope and nature of the subject invention. Indeed, various
27 modifications thereof will be apparent to those skilled in the art without
28 departing from the spirit and scope of the invention.

1 What is claimed is:

2 1. A kit for erecting a stairway comprising: a step module and an adjacent
3 step module, the step module comprising a riser and a tread, the riser being
4 adapted to abut the tread on a first side thereof and being adapted to define a
5 fastener-mating portion on a second side thereof, the tread being adapted to be
6 secured atop the riser on one side thereof, the adjacent step module comprising
7 a riser and a tread, the adjacent step module being adapted to be assembled
8 with the step module by engaging a fastener with the fastener-mating portion of
9 the step module and securing the fastener to the tread of the adjacent step
10 module to secure the two step modules together.

11 2. The kit for building a stairway of claim 1, wherein the tread of the
12 adjacent step-module is adapted to receive the fastener on a first side thereof
13 and adapted to be secured atop the riser on a second side thereof.

14 3. The kit for building a stairway of claim 1, wherein the fastener-mating
15 portion is adapted to provide a riser height adjustment between the step
16 modules.

17 4. The kit for building a stairway of claim 3, wherein the riser height
18 adjustment is about between 0 millimeter and 25 millimeters long.

19 5. The kit for building a stairway of claim 1, wherein the fastener-mating
20 portion is a slot.

21 6. The kit for building a stairway of claim 5, wherein the slot is a plurality of
22 slots and the fastener is a plurality of fasteners.

23 7. The kit for building a stairway of claim 1, wherein at least one of the step
24 modules further comprises a support member disposed on a hidden side of the
25 step, between the tread and the riser, to further secure the tread with the riser.

26 8. The kit for building a stairway of claim 1, wherein at least one of the step
27 modules further comprises a substantially triangular junction element adapted to

1 be disposed between the tread and the riser to further secure the step with the
2 riser.

3 9. The kit for building a stairway of claim 8, wherein the step modules
4 defines lateral sides, the substantially triangular junction element being adapted
5 to be disposed in a vicinity of a lateral side.

6 10. The kit for building a stairway of claim 8, wherein an interface between
7 the substantially triangular junction element and at least one of the tread and
8 the riser is adapted to receive a securing material.

9 11. The kit for building a stairway of claim 10, wherein the interface further
10 defines a securing material receiving portion.

11 12. The kit for building a stairway of claim 10, wherein the securing material
12 is glue.

13 13. The kit for building a stairway of claim 1, wherein the two step modules
14 are adapted to be dry-assembled before being permanently secured.

15 14. The kit for building a stairway of claim 1, wherein an interface between
16 the two step modules is adapted to be further secured with a securing material.

17 15. The kit for building a stairway of claim 14, wherein the securing material
18 is glue.

19 16. The kit for building a stairway of claim 14, wherein the interface further
20 defines a securing material receiving portion.

21 17. The kit for building a stairway of claim 16, wherein the securing material
22 receiving portion at least partially surrounds the fastener mating portion.

23 18. The kit for building a stairway of claim 16, wherein the securing material
24 is adapted to be introduced through the fastener-mating portion.

25 19. The kit for building a stairway of claim 1, further comprising a stringer
26 adapted to be disposed on a wall where the step module is adjacent to the wall.

1 20. The kit for building a stairway of claim 1, further comprising a finishing
2 board adapted to be disposed on a lateral side of the step module.

3 21. A method for building a stairway comprising:

4 providing a step module, the step module comprising a riser and a tread,
5 the riser being adapted to abut the tread on a first side thereof and being
6 adapted to define a fastener-mating portion on a second side thereof, the tread
7 being adapted to be secured atop the riser on one side thereof;

8 providing an adjacent step module, the adjacent step module comprising
9 a riser and a tread; and

10 assembling the adjacent step module with the step module by engaging
11 a fastener with the fastener-mating portion of the step module and securing the
12 fastener to the tread of the adjacent step module to secure the two step
13 modules together.

14 22. The method for building a stairway of claim 21, wherein the tread of the
15 adjacent step-module is adapted to receive the fastener on a first side thereof
16 and adapted to be secured atop the riser on a second side thereof.

17 23. The method for building a stairway of claim 21, wherein the fastener-
18 mating portion is adapted to provide a riser height adjustment between the step
19 modules.

20 24. The method for building a stairway of claim 23, wherein the riser height
21 adjustment is about between 0 millimeter and 25 millimeters long.

22 25. The method for building a stairway of claim 21, wherein the fastener-
23 mating portion is a slot.

24 26. The method for building a stairway of claim 25, wherein the slot is a
25 plurality of slots and the fastener is a plurality of fasteners.

1 27. The method for building a stairway of claim 21, wherein at least one of
2 the step modules further comprises a support member disposed on a hidden
3 side of the step, between the tread and the riser, to further secure the tread with
4 the riser.

5 28. The method for building a stairway of claim 21, wherein at least one of
6 the step modules further comprises a substantially triangular junction element
7 adapted to be disposed between the tread and the riser to further secure the
8 step with the riser.

9 29. The method for building a stairway of claim 28, wherein the step modules
10 defines lateral sides, the substantially triangular junction element being adapted
11 to be disposed in a vicinity of a lateral side.

12 30. The method for building a stairway of claim 28, wherein an interface
13 between the substantially triangular junction element and at least one of the
14 tread and the riser is adapted to receive a securing material.

15 31. The method for building a stairway of claim 30, wherein the interface
16 further defines a securing material receiving portion.

17 32. The method for building a stairway of claim 30, wherein the securing
18 material is glue.

19 33. The method for building a stairway of claim 21, wherein the two step
20 modules are adapted to be dry-assembled before being permanently secured.

21 34. The method for building a stairway of claim 21, wherein an interface
22 between the two step modules is adapted to be further secured with a securing
23 material.

24 35. The method for building a stairway of claim 34, wherein the securing
25 material is glue.

26 36. The method for building a stairway of claim 34, wherein the interface
27 further defines a securing material receiving portion.

1 37. The method for building a stairway of claim 36, wherein the securing
2 material receiving portion at least partially surrounds the fastener mating
3 portion.

4 38. The method for building a stairway of claim 36, wherein the securing
5 material is adapted to be introduced through the fastener-mating portion.

6 39. The method for building a stairway of claim 21, further comprising a
7 stringer adapted to be disposed on a wall where the step module is adjacent to
8 the wall.

9 40. The method for building a stairway of claim 21, further comprising a
10 finishing board adapted to be disposed on a lateral side of the step module.

11 41. A kit for erecting a self-supporting stringerless stairway comprising: a first
12 step module and a second step module, the first step module comprising a riser
13 and a tread, the riser being adapted to abut the tread on a first side thereof and
14 being adapted to define a fastener-mating portion on a second side thereof, the
15 tread being adapted to be secured atop the riser on one side thereof, the
16 second step module comprising a riser and a tread, the tread being adapted to
17 receive a fastener on a first side thereof and to be secured atop the riser on a
18 second side thereof, the second step module being adapted to be assembled
19 with the first step module by engaging the fastener with the fastener-mating
20 portion of the first step module and with the tread of the second step module.

21 42. A step module for erecting a stairway, the step module comprising:

22 a tread comprising a foot contacting surface, a proximal side
23 surface, a distal side surface and lateral side surfaces, the tread comprising a
24 fastener-receiving portion disposed on the distal side surface for substantially
25 orthogonally securing a fastener thereto; and

26 a riser comprising a proximal surface, an upper side surface and a
27 lower side surface, the riser comprising a fastener-mating portion substantially
28 orthogonally disposed on the proximal surface in a vicinity of the lower side

1 surface, the fastener-mating portion and the fastener-receiving portion being
2 adapted to cooperate with the fastener to secure two step modules together and
3 to adjust a distance between the treads of the two step modules.

4 43. A riser for use in a step for erecting a stairway, the riser comprising a
5 proximal surface, opposed side surfaces and opposed upper and lower
6 surfaces, the proximal surface being provided with an elongated opening
7 adapted to receive a fastener to secure a tread thereto, the elongated opening
8 being adapted to provide a distance adjustment between treads of adjacent
9 steps.

10 44. A riser for use in a step for erecting a stairway, the riser comprising
11 opposed upper and lower ends, the lower end being provided with an elongated
12 opening adapted to receive a fastener to secure a tread thereto, the elongated
13 opening being adapted to provide a distance adjustment between treads of
14 adjacent steps.

15 45. A tread for use in a step for erecting a stairway, the tread comprising a
16 foot supporting surface, opposed side surfaces and opposed distal and proximal
17 surfaces, the distal surface being provided with a securing material receiving
18 portion adapted to receive a securing material therein when at least a portion of
19 the stairway is dry-assembled to substantially permanently secure the tread to a
20 corresponding adjacent riser.

21 46. A tread for use in a step for erecting a stairway, the tread comprising a
22 foot supporting surface, opposed front nose and rear ends, the rear end being
23 provided with a securing material receiving portion adapted to receive a
24 securing material therein when at least a portion of the stairway is dry-
25 assembled to substantially permanently secure the tread to a corresponding
26 adjacent riser.

1/16

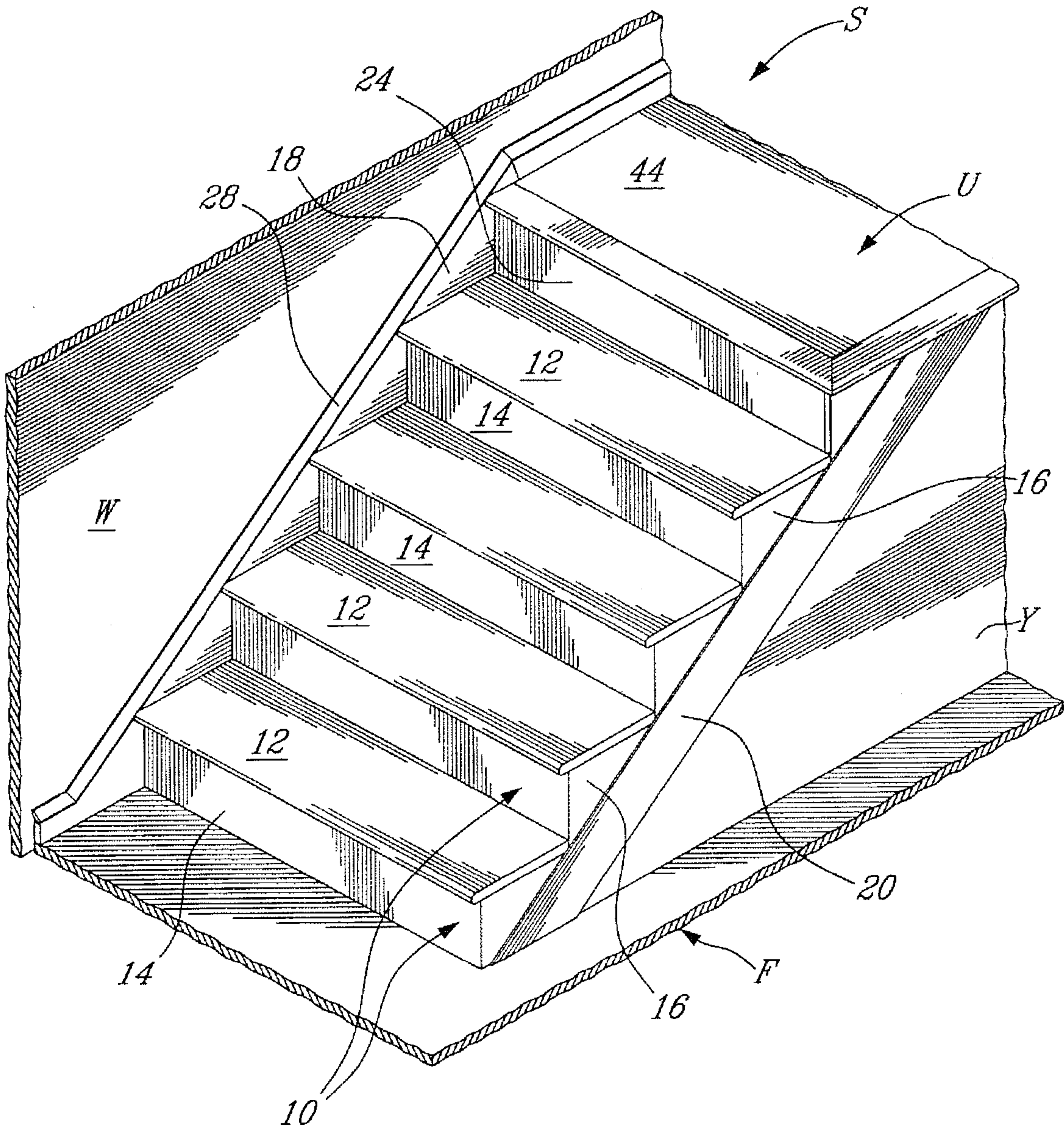


FIG. 1

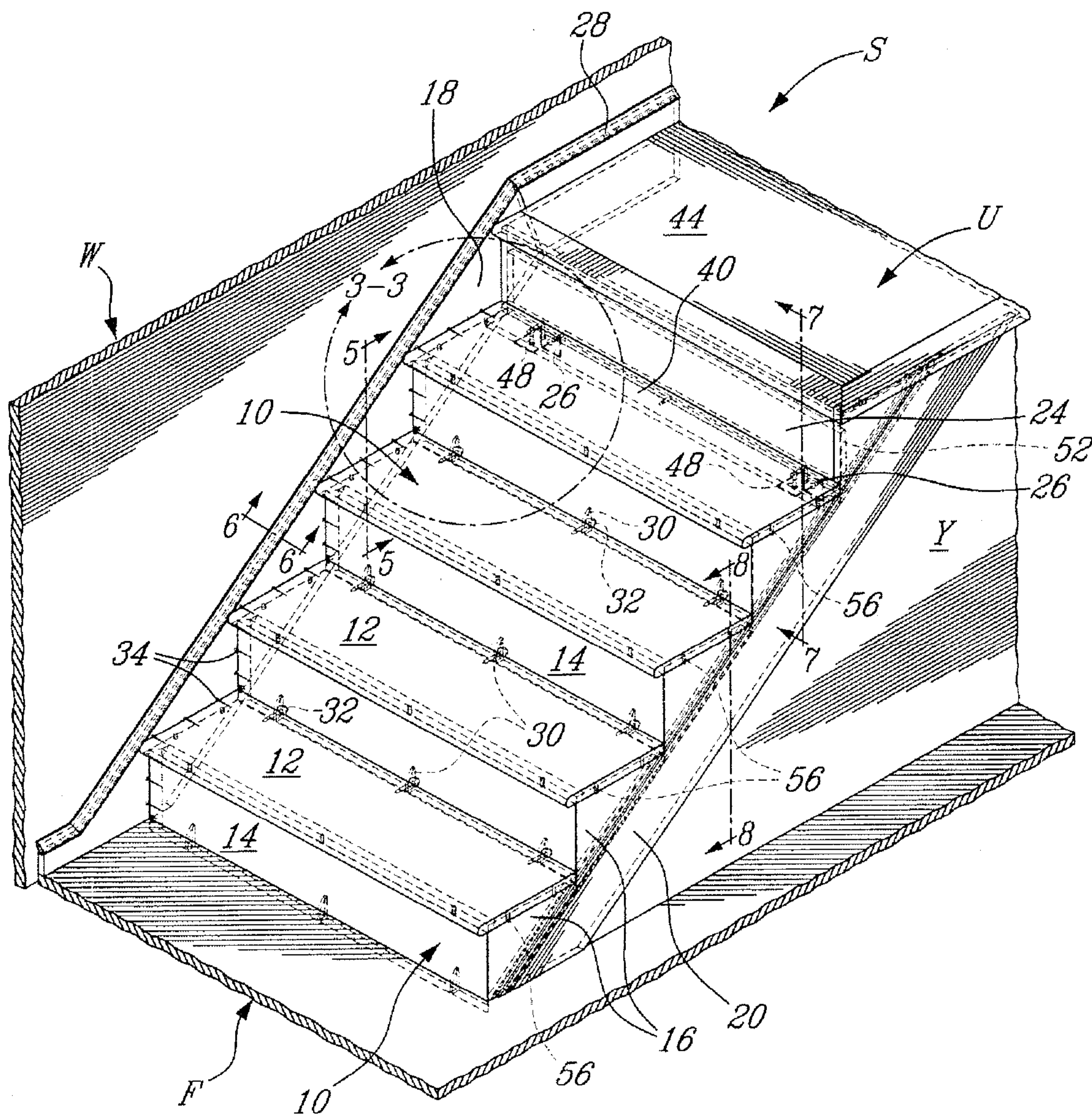


FIG. 2

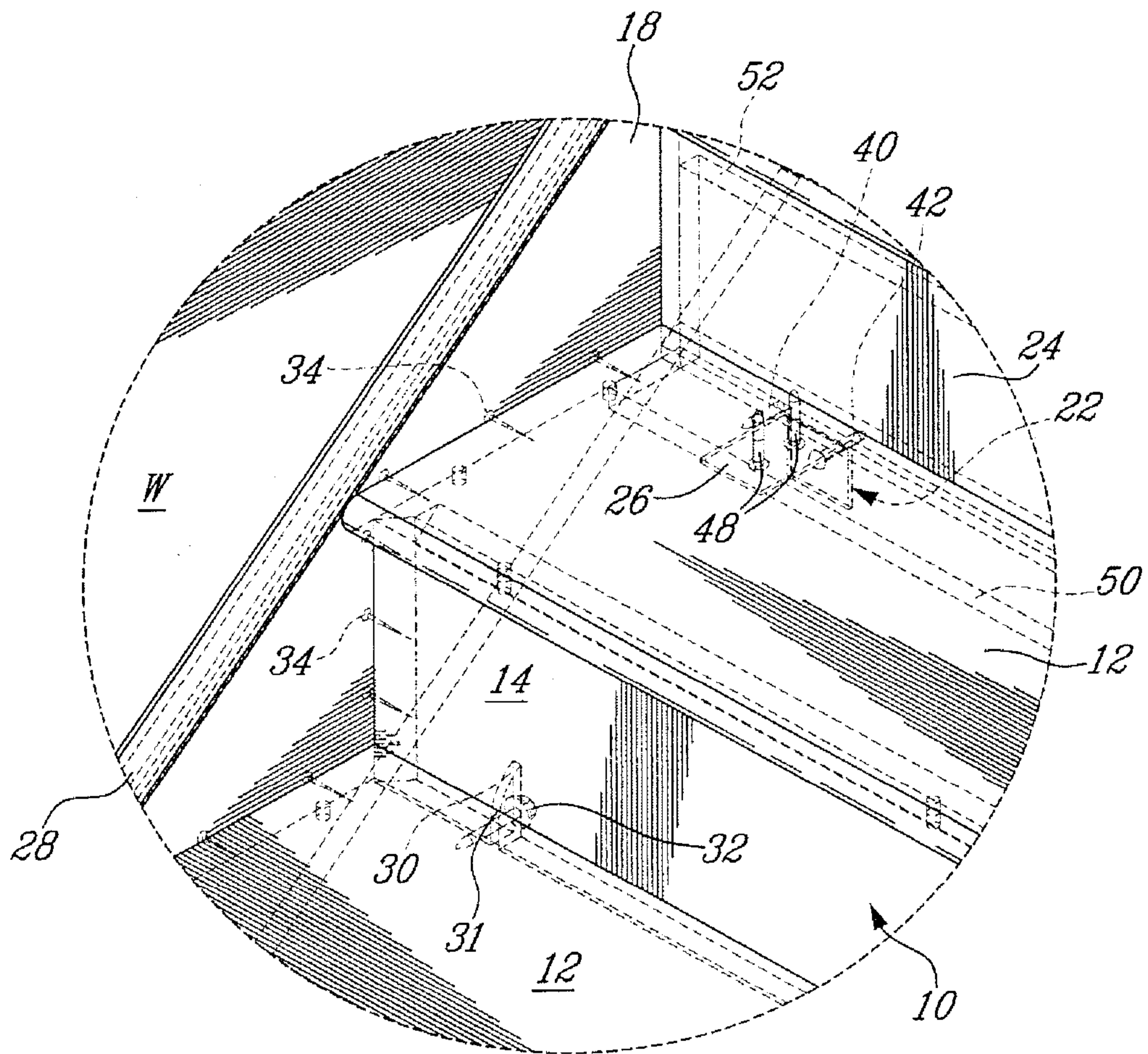
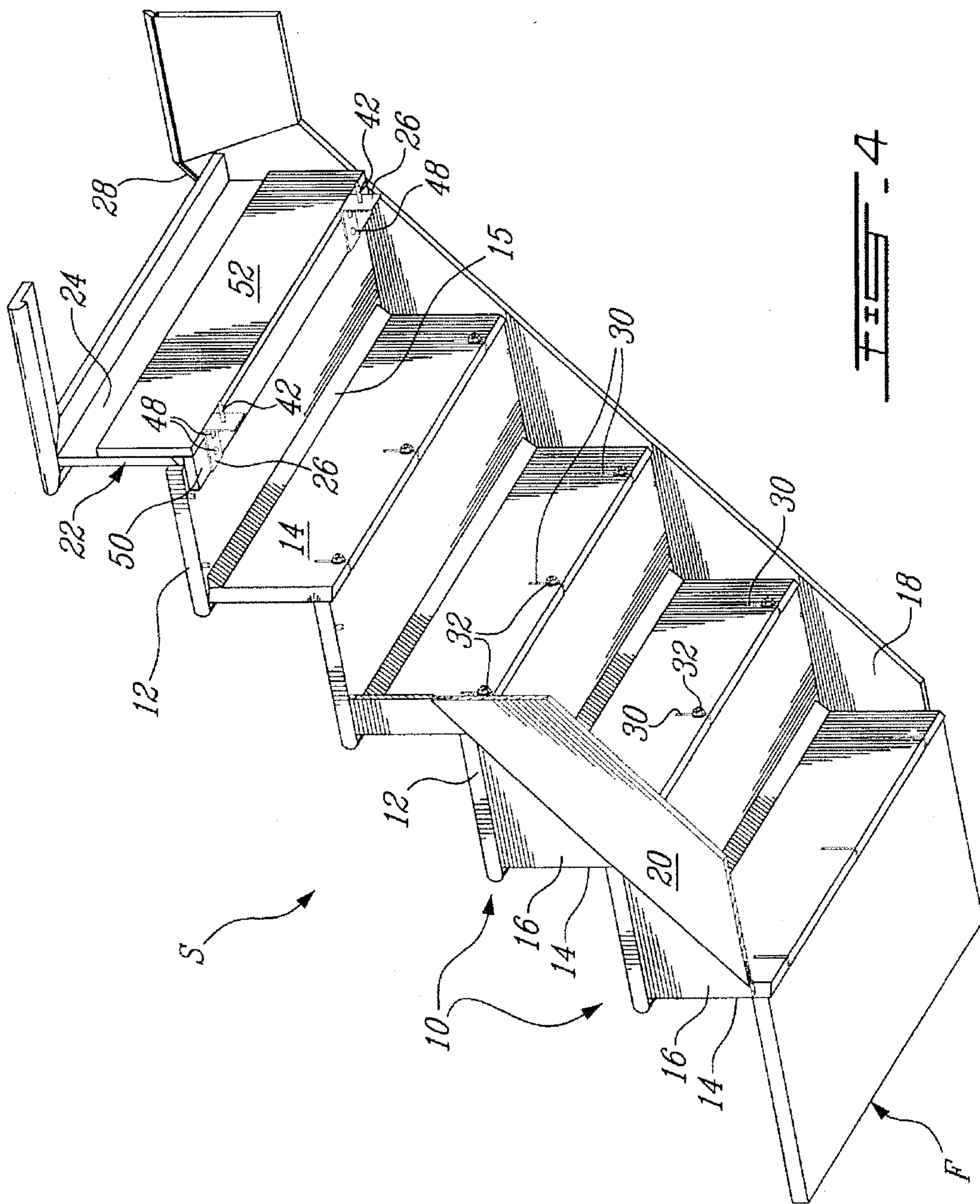
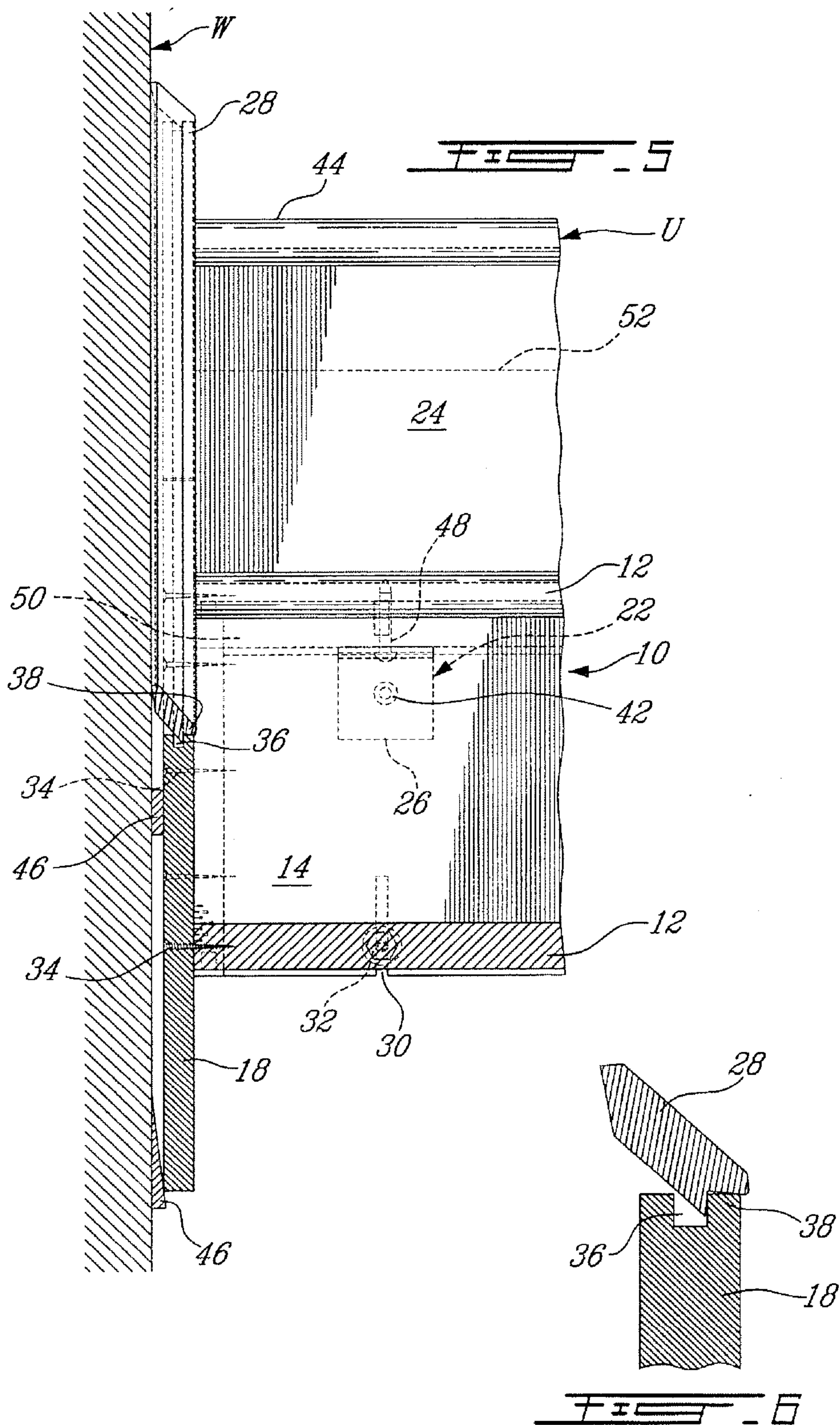
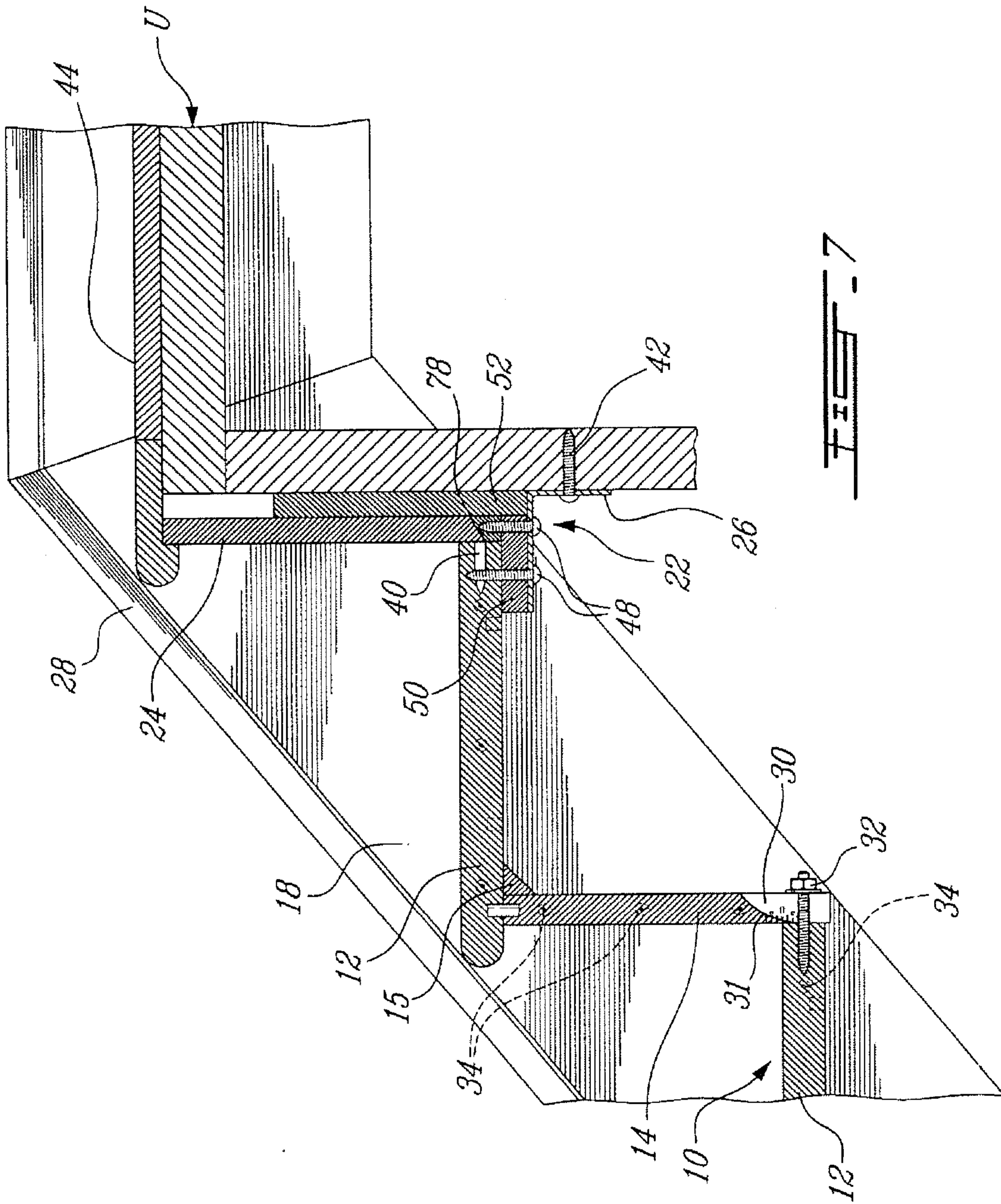


FIG. 3







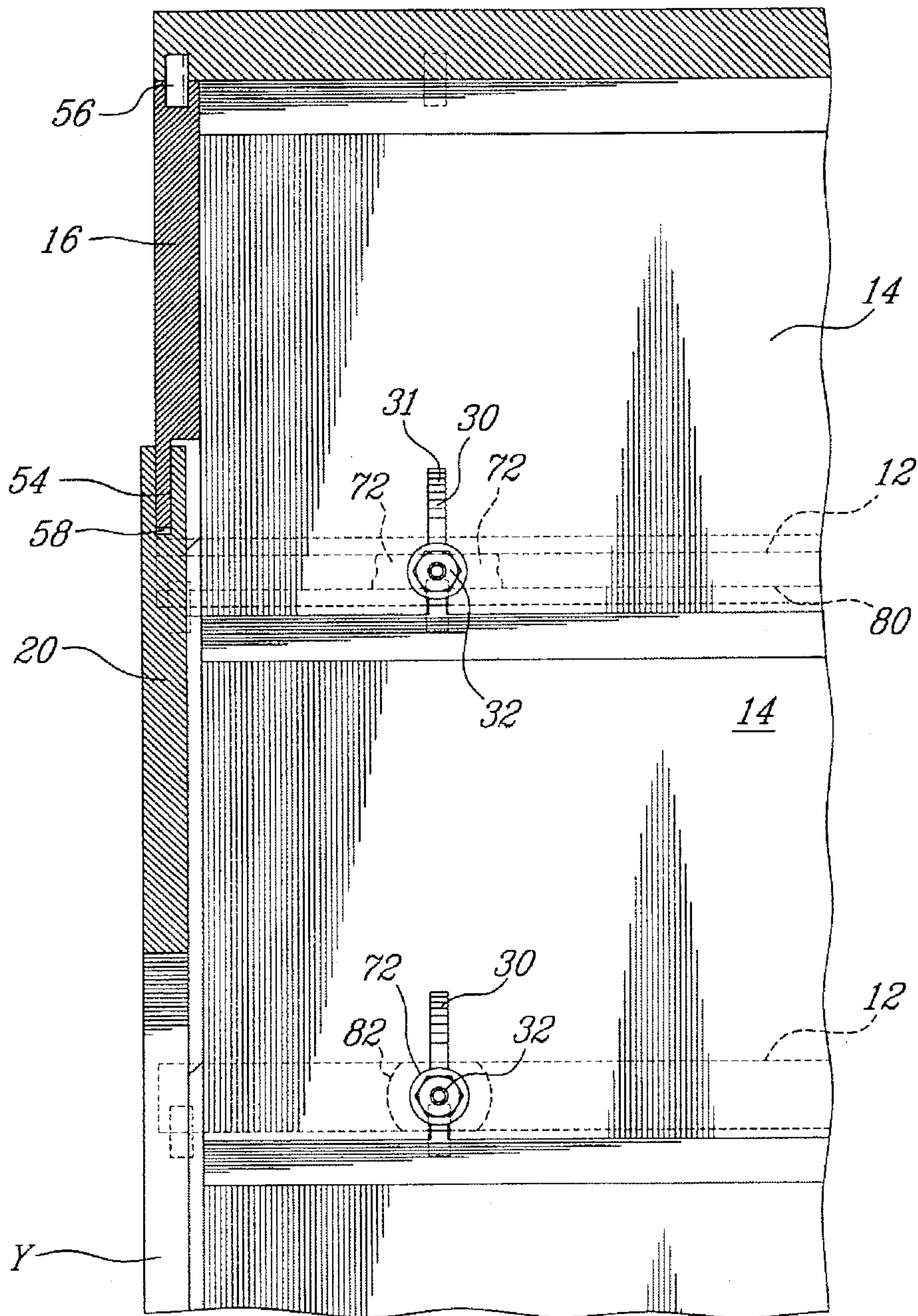
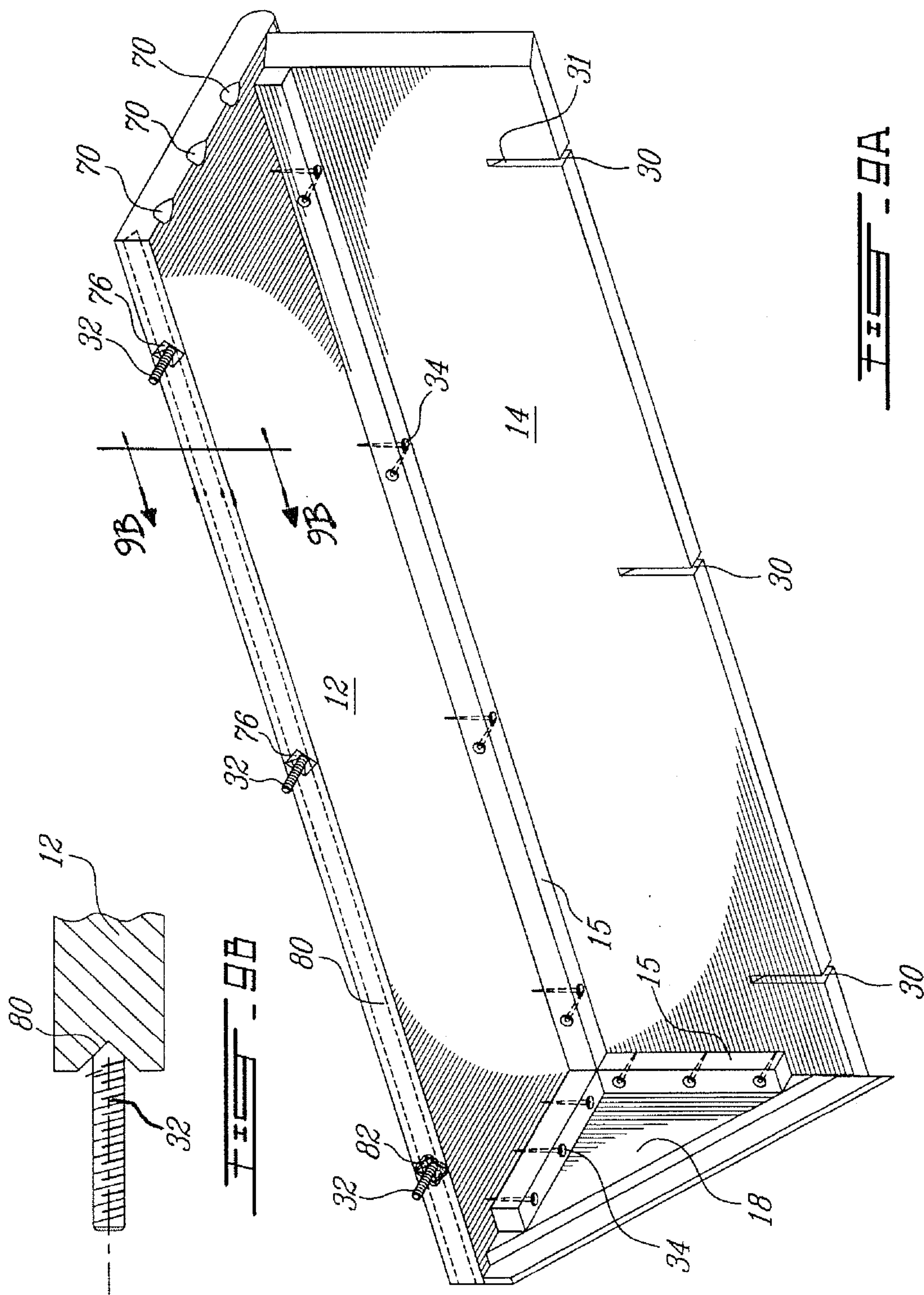
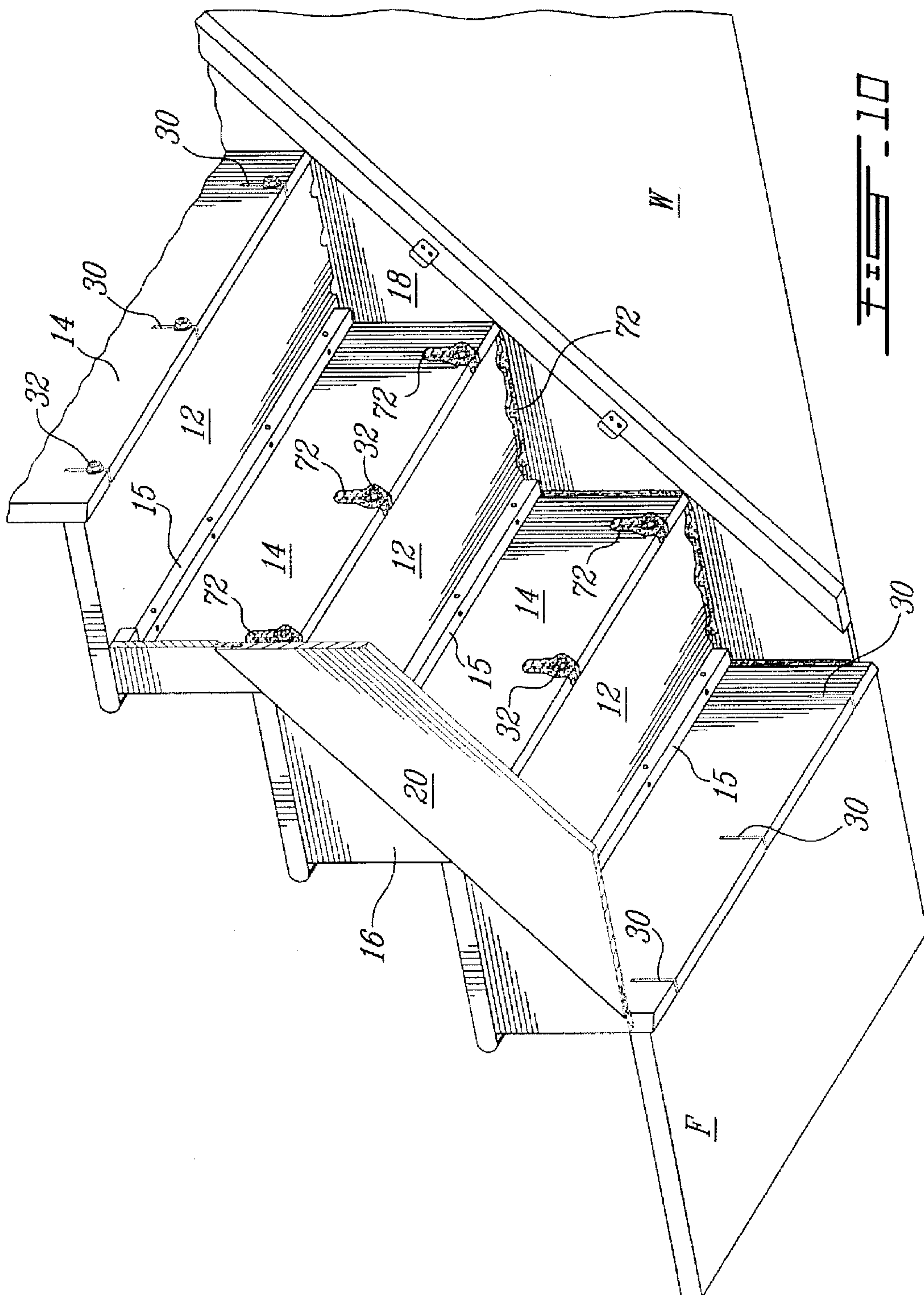


FIG. 8





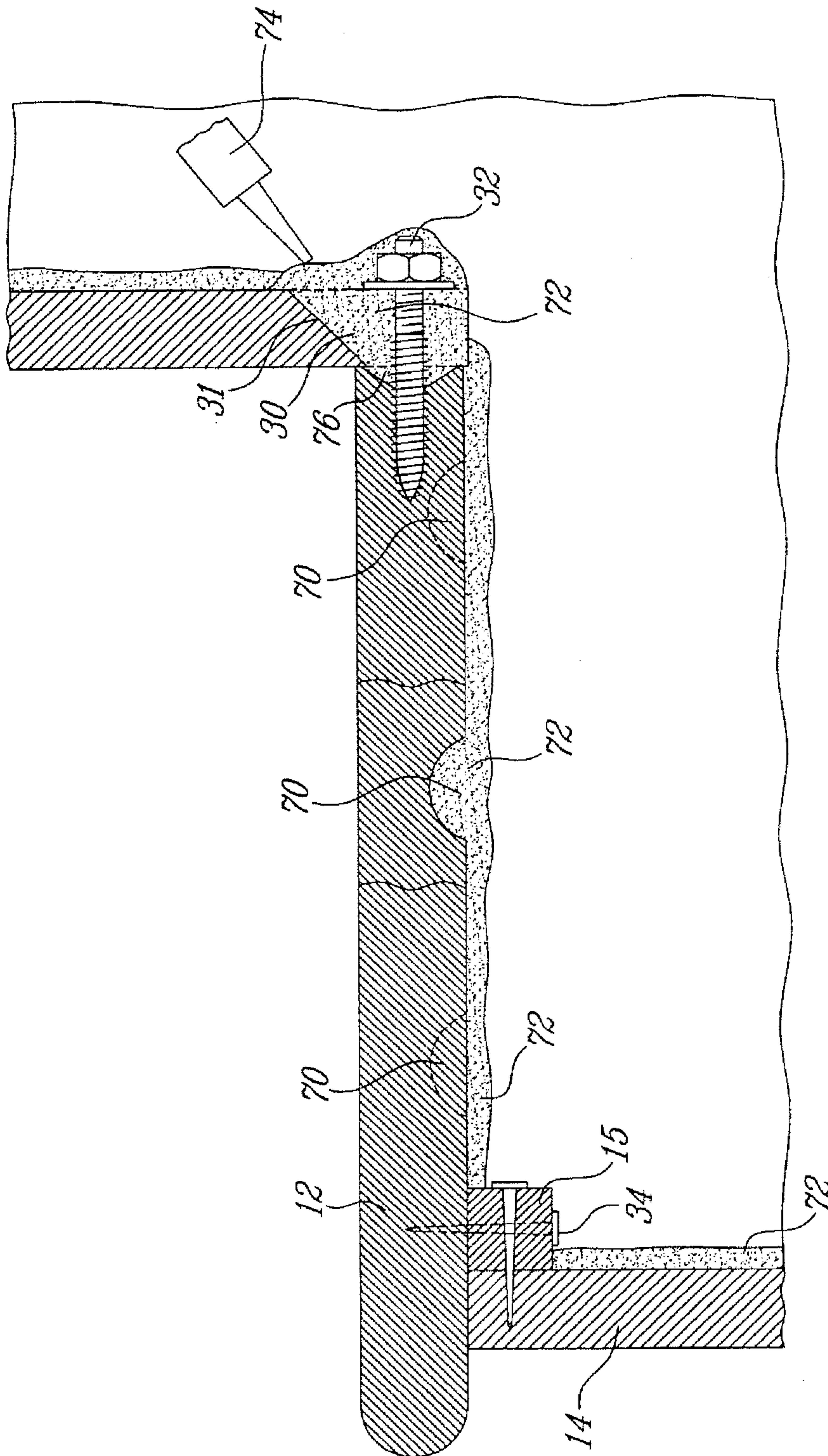


FIG. 11

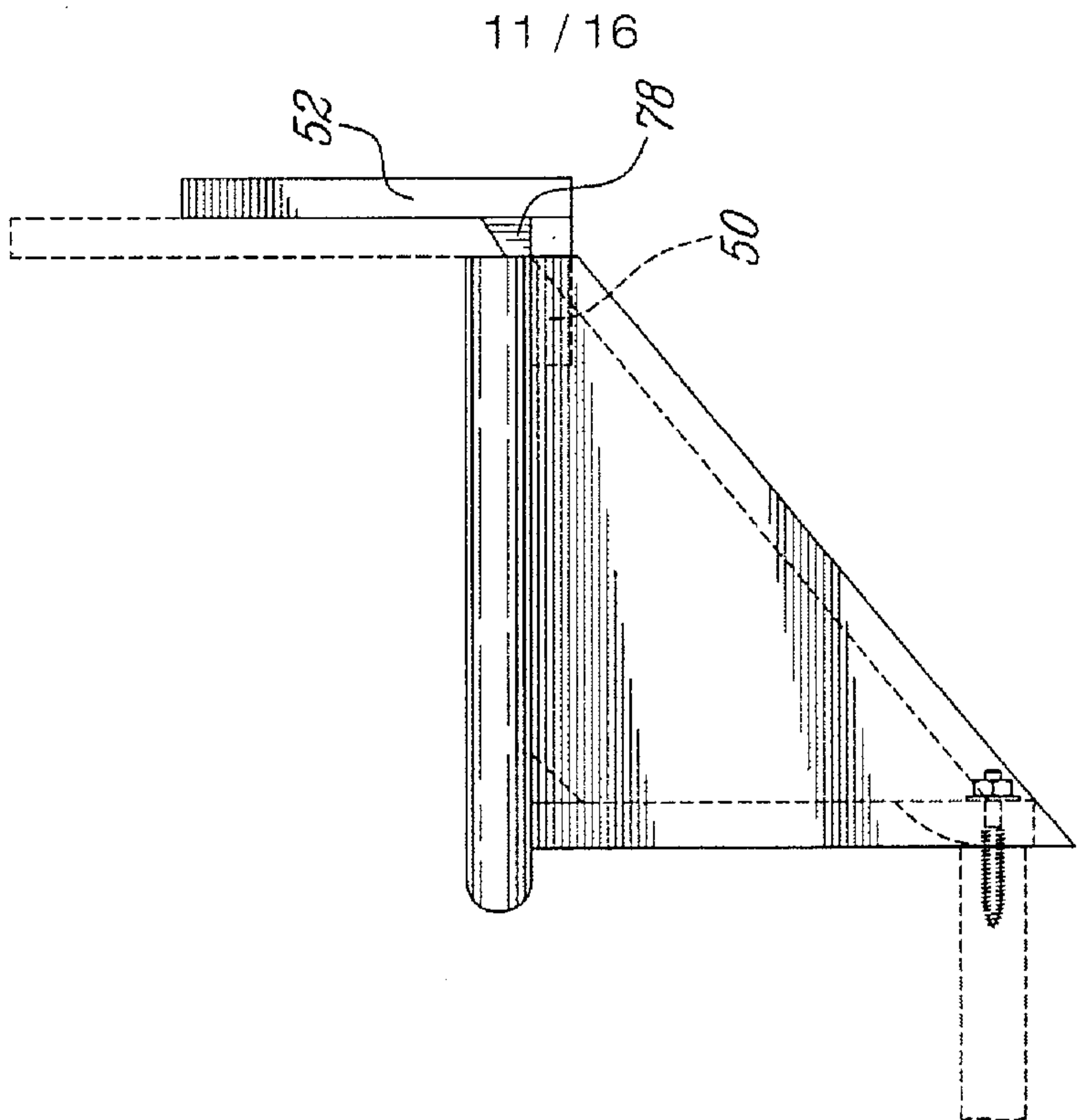


FIG. 11

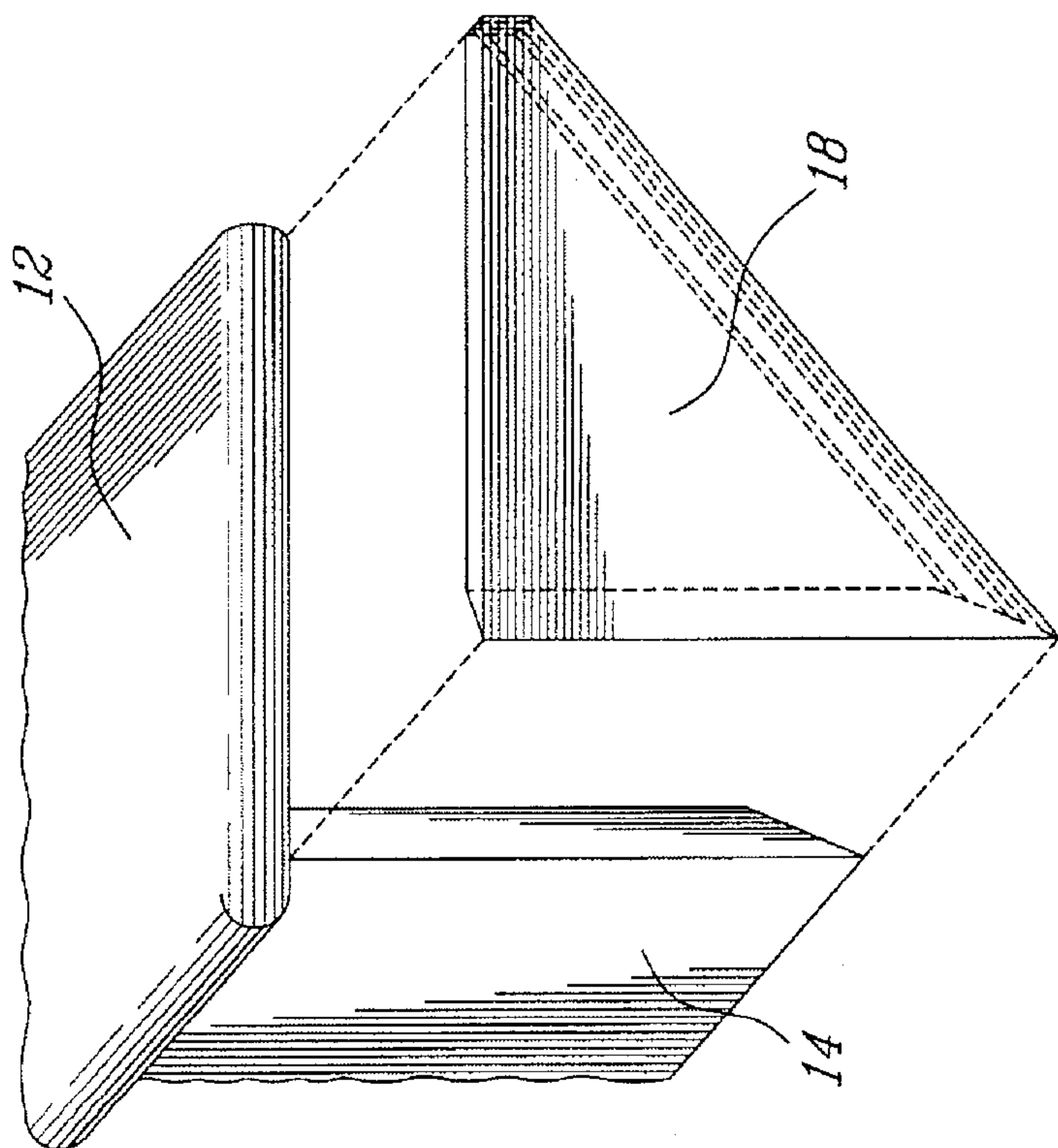
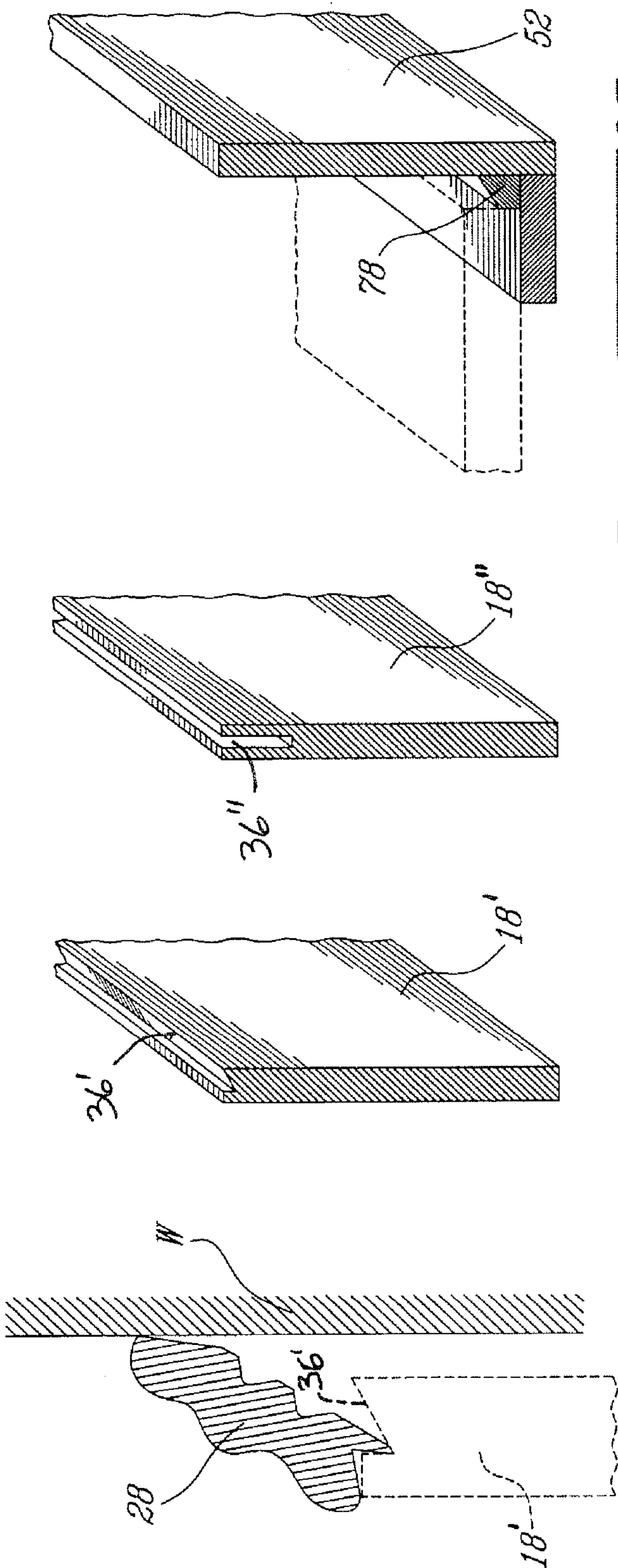
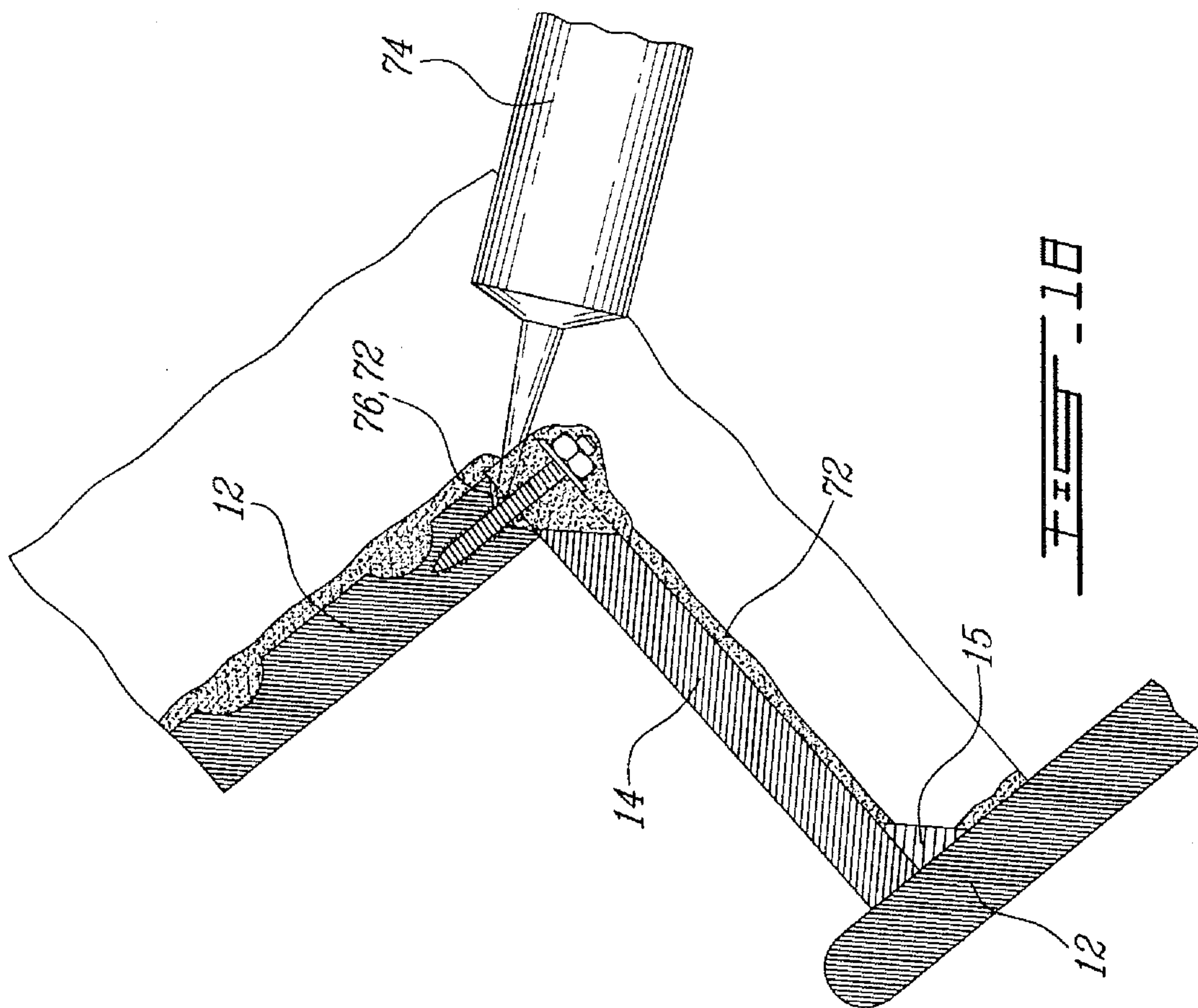
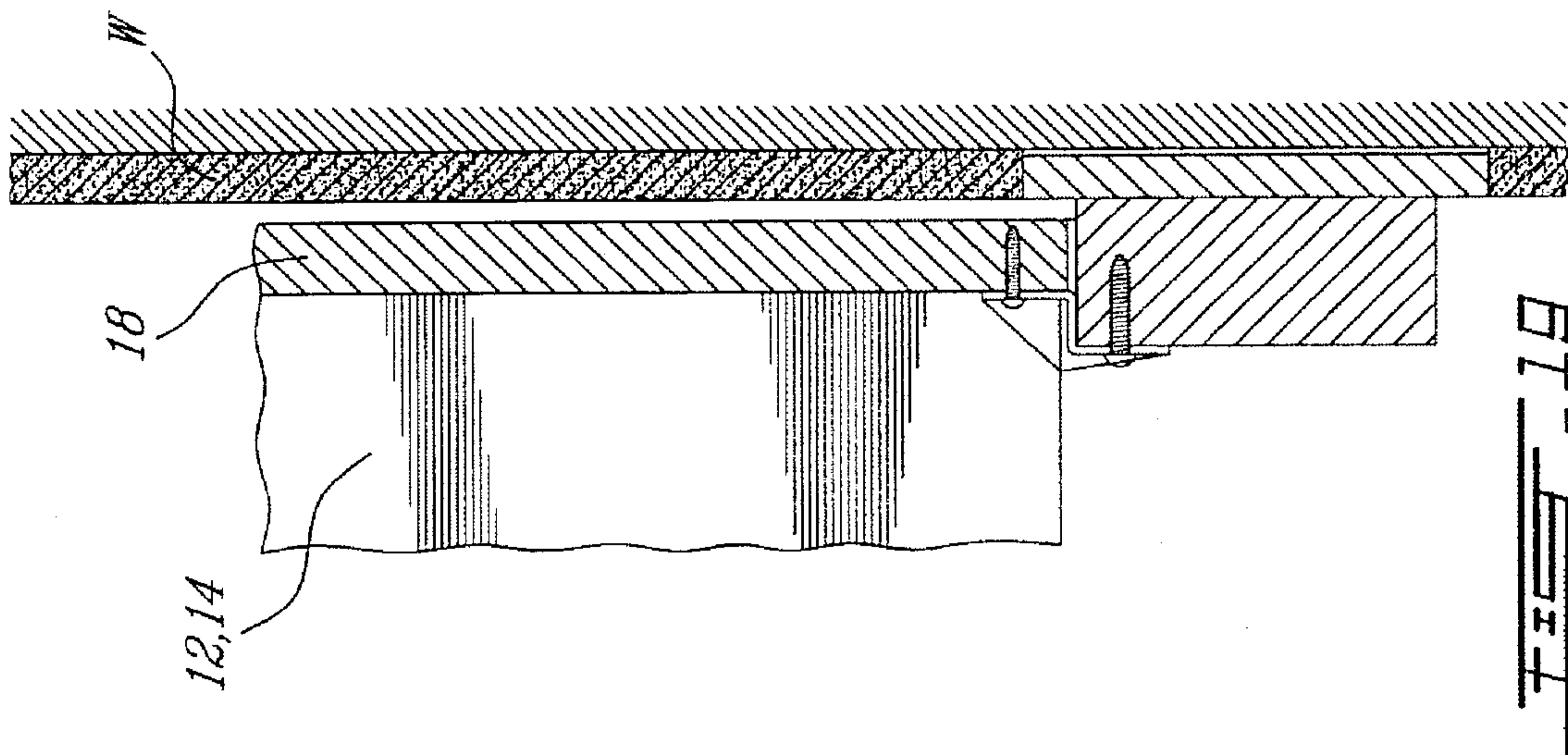


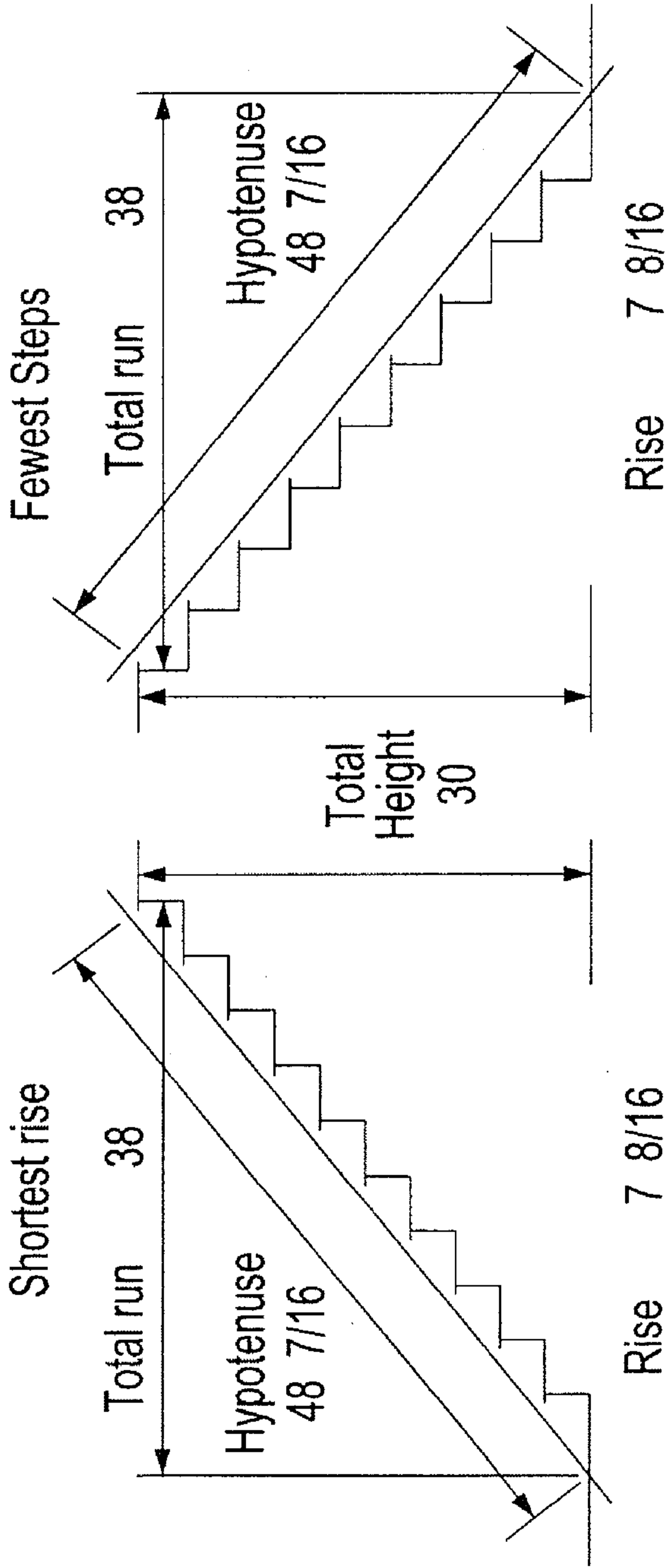
FIG. 12

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Type the total finished floor to finished floor height in the green box in the middle of the page.



3 Step modules to purchase

3 Step modules to purchase

| Shortest rise | | Fewest Steps | | | |
|---------------|-------------|--------------|-----------|------------|-------------------|
| Total height | # of risers | Rise | Total Run | Hypotenuse | # of step modules |
| 30 | 4 | 7 8/16 | 38 | 48 7/16 | 3 |

FEIS - 20

Fewest Steps

| Inches Fraction | # of risers | Rise | Total Run | Hypotenuse | # of step modules |
|-----------------|-------------|--------|-----------|------------|-------------------|
| 98 7/16 | 13 | 7 9/16 | 114 | 150 10/16 | 12 |

Shortest rise

| Inches Fraction | # of risers | Rise | Total Run | Hypotenuse | # of step modules |
|-----------------|-------------|--------|-----------|------------|-------------------|
| 98 7/16 | 14 | 7 1/16 | 123 8/16 | 157 15/16 | 13 |

Formulas above seem to box in the minimum run to 7 inches and maximum to 8 inches. Tuning is rounded to 1/16 of an inch. Is this detailed enough ? 13 steps x 1/32 error adds up to 7/16 inch heres a sample table

15 / 16

| | | | | | | | | | | |
|----------|----|--------|----------|-----------|----|----|---------|----------|-----------|----|
| 105 8/16 | 15 | 7 1/16 | 133 | 169 12/16 | 14 | 14 | 7 9/16 | 123 8/16 | 162 7/16 | 13 |
| 105 | 14 | 7 8/16 | 123 8/16 | 162 2/16 | 13 | 14 | 7 8/16 | 123 8/16 | 162 2/16 | 13 |
| 104 8/16 | 14 | 7 7/16 | 123 8/16 | 161 12/16 | 13 | 14 | 7 7/16 | 123 8/16 | 161 12/16 | 13 |
| 104 | 14 | 7 7/16 | 123 8/16 | 161 7/16 | 13 | 13 | 8 | 114 | 154 5/16 | 12 |
| 103 8/16 | 14 | 7 6/16 | 123 8/16 | 161 2/16 | 13 | 13 | 7 15/16 | 114 | 154 | 12 |
| 103 | 14 | 7 6/16 | 123 8/16 | 160 13/16 | 13 | 13 | 7 15/16 | 114 | 153 10/16 | 12 |
| 102 8/16 | 14 | 7 5/16 | 123 8/16 | 160 8/16 | 13 | 13 | 7 14/16 | 114 | 153 5/16 | 12 |
| 102 | 14 | 7 5/16 | 123 8/16 | 160 3/16 | 13 | 13 | 7 14/16 | 114 | 153 | 12 |
| 101 8/16 | 14 | 7 4/16 | 123 8/16 | 159 14/16 | 13 | 13 | 7 13/16 | 114 | 152 10/16 | 12 |
| 101 | 14 | 7 3/16 | 123 8/16 | 159 9/16 | 13 | 13 | 7 12/16 | 114 | 152 5/16 | 12 |

FEET - 21

| Inches Fraction | Total height | # of risers | Rise | Total Run | Hypotenuse | # of step modules | # of risers | Rise | Total Run | Hypotenuse | # of step modules |
|-----------------|--------------|-------------|--------|-----------|------------|-------------------|-------------|---------|-----------|------------|-------------------|
| | 98 7/16 | 14 | 7 1/16 | 123 8/16 | 157 15/16 | 13 | 13 | 7 9/16 | 114 | 150 10/16 | 12 |
| | 100 8/16 | 14 | 7 3/16 | 123 8/16 | 159 4/16 | 13 | 13 | 7 12/16 | 114 | 152 | 12 |
| | 100 | 14 | 7 2/16 | 123 8/16 | 158 15/16 | 13 | 13 | 7 11/16 | 114 | 152 10/16 | 12 |
| | 99 8/16 | 14 | 7 2/16 | 123 8/16 | 158 10/16 | 13 | 13 | 7 10/16 | 114 | 151 5/16 | 12 |
| | 99 | 14 | 7 1/16 | 123 8/16 | 158 5/16 | 13 | 13 | 7 10/16 | 114 | 151 | 12 |
| | 98 8/16 | 14 | 7 1/16 | 123 8/16 | 158 | 13 | 13 | 7 9/16 | 114 | 150 11/16 | 12 |
| | 98 | 14 | 7 | 123 8/16 | 157 11/16 | 13 | 13 | 7 9/16 | 114 | 150 5/16 | 12 |
| | 97 8/16 | 13 | 7 8/16 | 114 | 150 | 12 | 13 | 7 8/16 | 114 | 150 | 12 |
| | 97 | 13 | 7 7/16 | 114 | 149 11/16 | 12 | 13 | 7 7/16 | 114 | 149 11/16 | 12 |
| | 96 8/16 | 13 | 7 7/16 | 114 | 149 6/16 | 12 | 13 | 7 7/16 | 114 | 149 6/16 | 12 |
| | 96 | 13 | 7 6/16 | 114 | 149 1/16 | 12 | 12 | 8 | 104 8/16 | 141 14/16 | 11 |
| | 95 8/16 | 13 | 7 6/16 | 114 | 148 11/16 | 12 | 12 | 7 15/16 | 104 8/16 | 141 9/16 | 11 |
| | 95 | 13 | 7 5/16 | 114 | 149 6/16 | 12 | 12 | 7 15/16 | 104 8/16 | 141 4/16 | 11 |
| | 95 3/16 | 13 | 7 5/16 | 114 | 149 8/16 | 12 | 12 | 7 15/16 | 104 8/16 | 141 6/16 | 11 |

16 / 16

FEES - 21 (continue)

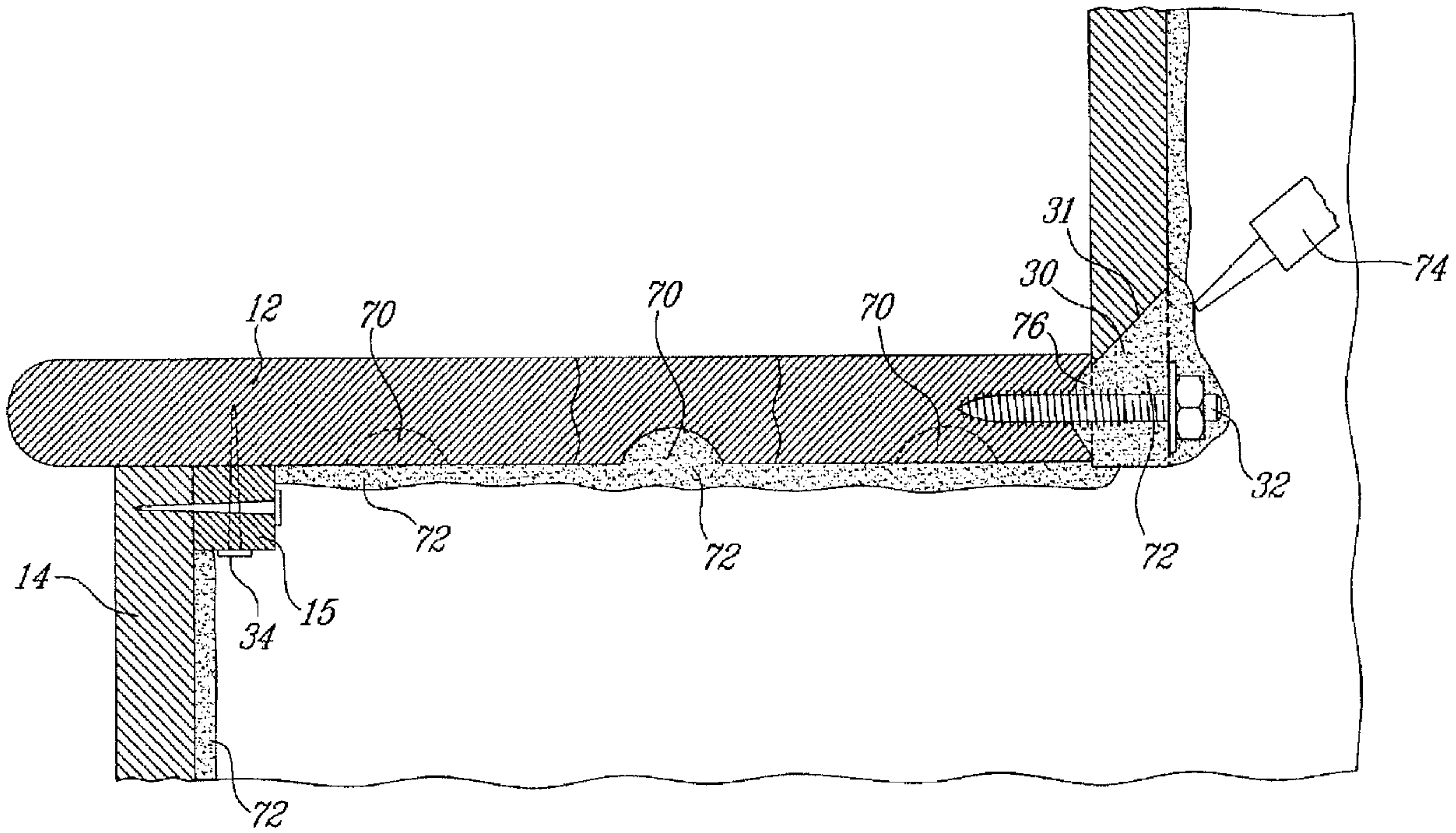


FIG. 11