



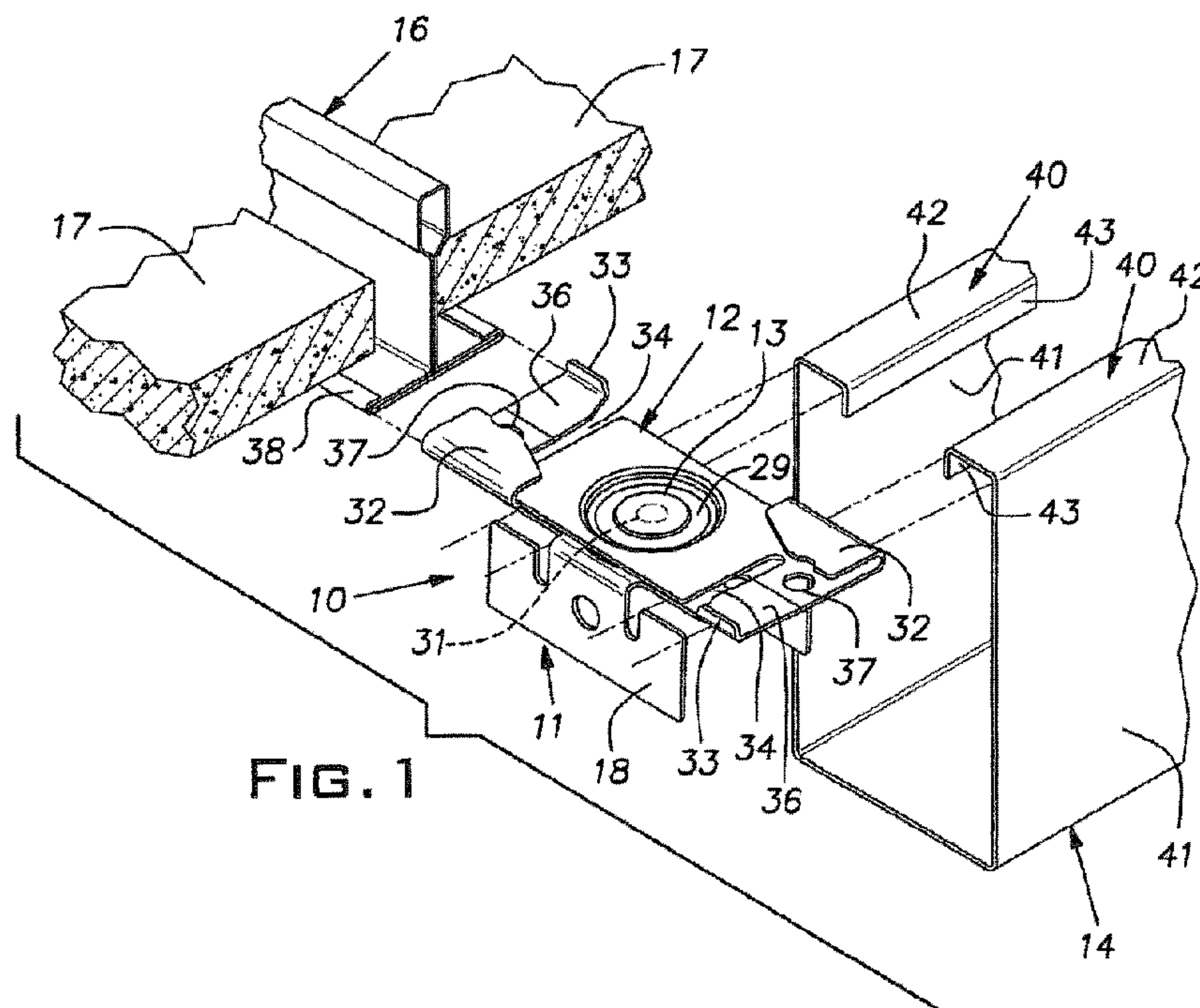
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(57) **Abrégé/Abstract:**

Clips that engage with special top flanges on elongated U-shaped acoustical baffles. One clip form suspends the baffles from grid tees in horizontal or inclined orientations or from cables or rods. Another clip form aligns to and joins intersecting baffles.

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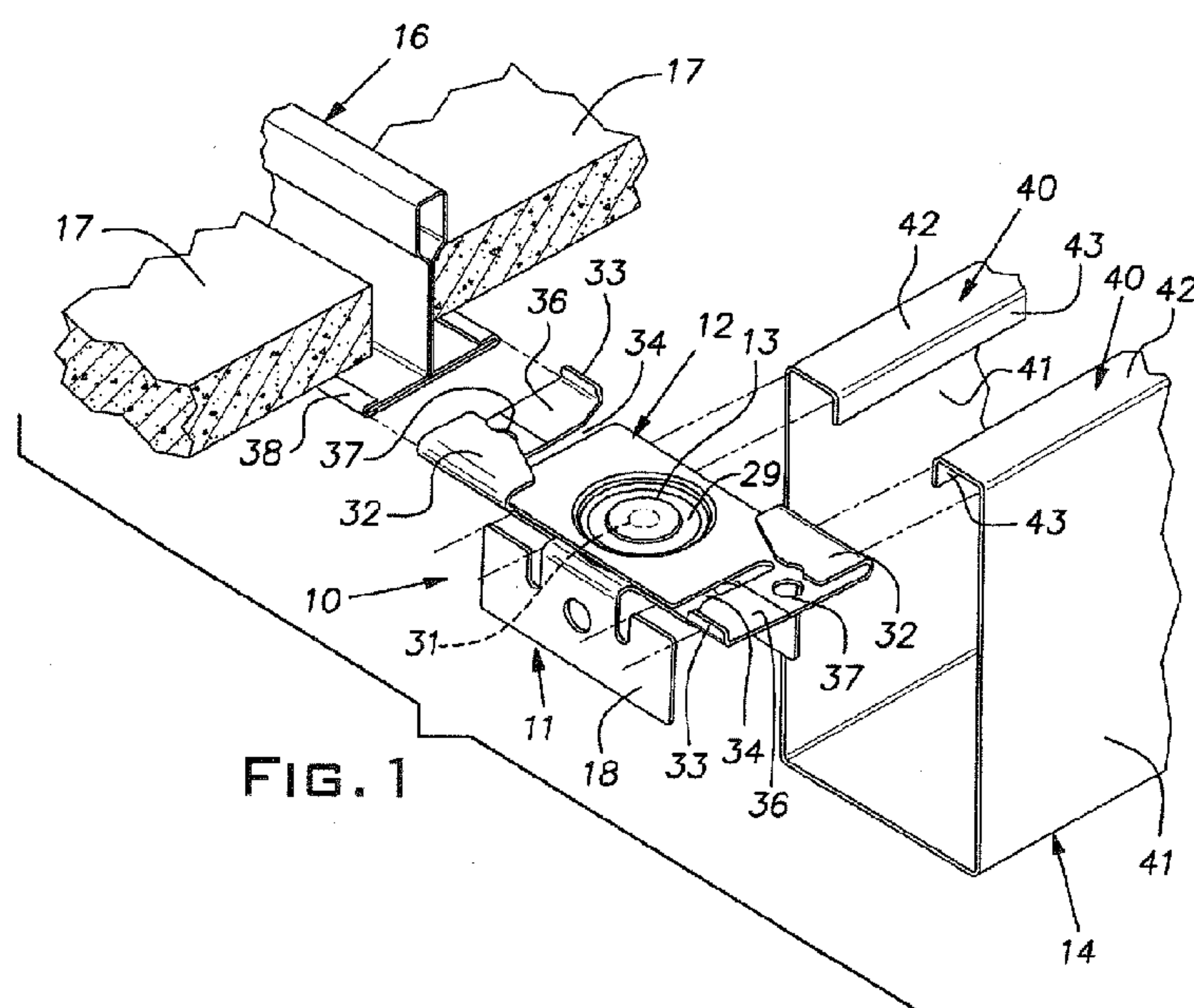
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METAL BAFFLES**BACKGROUND OF THE INVENTION**

The invention relates to acoustical baffles and for clips
5 for suspending the baffles.

PRIOR ART

Acoustical baffles are used to absorb noise in enclosed
occupied spaces. A common type of baffle is fabricated from
10 sheet metal formed into an elongated panel or shaft of U-
shaped cross-section. The sheet metal can be perforated to
improve sound absorption and sound absorbing material can be
positioned in the interior of the baffle. Acoustical baffles
have been suspended on conventional suspended ceiling grid in
15 so-called "open plenum" spaces and have been suspended
directly from cables.

There is a need for systems and componentry that afford
strong suspended assemblies capable of resisting wind loads or
other disturbances without a need for separate fasteners.
20 Suspension clip components should be inexpensive to
manufacture and allow for baffle suspension from planar,
inclined or curved ceiling grid as well as directly from
overhead vertical cable.

25 **SUMMARY OF THE INVENTION**

The invention provides a baffle geometry and
complementary suspension clip that achieves high separation
force resistance without supplemental fasteners. The
disclosed clip can be arranged to attach to ceiling grid in
30 transverse or other orientations and can be arranged on
inclined or vertically curved grid runners while allowing the
baffle to hang in a vertical orientation. Additionally, the
clip can be carried directly on vertical suspension cable or
wire.

The disclosed baffle is characterized by mounting flanges that interlock with complementary slots on the suspension clip. The geometries of the baffle flanges and clip slots are highly resistant to separation when the baffle is subjected to lateral forces.

The disclosed clip in one arrangement is assembled with a grid tee connector preferably with a pivot joint for transverse or parallel relation between the baffle and supporting grid tee. The connector has a low profile that allows the baffle and clip to be used in installations where the supporting grid tees also carry ceiling tile. In another arrangement, the baffle clip and grid tee connections are joined with an intermediate horizontal pin joint that with two other pivot joints gives the clip three degrees of freedom, enabling the clip to connect with an inclined grid member while allowing the baffle to hang in a vertical orientation.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an exploded perspective diagrammatic view of a ceiling grid, ceiling tile, acoustical baffle and a clip assembly of the invention;

FIG. 2 is a perspective view of a clip element of the invention used in the clip assembly of FIG. 1 and in other arrangements;

FIG. 3 is a perspective view of a clip assembly of the invention having three axes of freedom;

FIG. 4 is an elevational view of the clip of FIG. 3;

FIG. 5 is a diagrammatic view of a baffle arrangement in which the clip of FIG. 3 is used;

FIG. 6 is a perspective view of a clip of the invention for joining intersecting baffles;

FIG. 7 is an edge view of a long side of the clip of FIG. 6; and

FIG. 8 is a perspective view of intersecting baffles joined by the clip of FIG. 6.

DESCRIPTION OF THE PREFERRED EMBODIMENT

5 In the foreground of FIG. 1 is shown a sheet metal clip assembly 10 comprising a unitary baffle support clip or part 11 and a unitary grid tee engaging clip or part 12. The parts 11 and 12 are pivotally joined together by a metal rivet 13. A portion of an acoustical baffle 14 is shown in the
10 background at the right in FIG. 1. Portions of a grid tee 16 and ceiling tile 17 supported on the grid tee are shown in the background on the left in FIG. 1.

FIG. 2 illustrates the baffle suspending clip part 11 which has an inverted U-shape with depending parallel legs or
15 flanges 18 and a central rectangular web 19. The web 19 has a central circular raised embossment 21 with a central hole 22. Small holes 23 for fastening screws are stamped in adjacent ends of the web 19. At tops of the ends of both legs 18 are stamped L-shaped slots 24. Each of the four slots 24 have a
20 horizontal portion 26 open to the end of the clip and a blind vertical portion 27 extending downwardly from the horizontal portion. The web 19, at each end of the clip 11 extends over a space defined by an imaginary projection of opposed slots 24. Holes 28 in the legs 18 can be used to suspend cables,
25 tie straps or the like.

The unitary grid tee clip part 12 has a generally rectangular profile in plan view. A centered circular embossed depression 29 has a central hole 31. Ends of the clip 12 are diagonally symmetrical with a bent over tab 32 at
30 one edge and a short bent up tab 33 on an opposite edge. A slot 34 is cut in the body of the clip 12 to form a cantilevered spring arm 36 on each end of the clip 12. Each arm 36 extends from adjacent a free end of the bent over tab 32 and resiliently supports the bent up tab 33 in the

illustrated position. Fastener receiving holes 37 are formed adjacent a base of each spring arm 36. Heads of fasteners, such as self-tapping sheet metal screws located in the holes 37 have sufficient clearance provided by the embossments 27, 21 to allow the parts to pivot relative to one another.

The clip assembly 10 can be installed on a conventional grid tee 12 by initially misaligning it counter-clockwise looking down relative to the grid tee so that the grid tee flange passes between the bent over tabs 32 when the assembly is raised against a flange 38 of the tee 16. The spring arms 36 and tabs 33 are temporarily deflected downwardly relative to the clip proper as the clip is pushed up against the flange 38. The clip 12 is then rotated clockwise so that the bent over tabs 32 grip the top of the flange 38 and the bent up tabs 33 snap up at the edge of the flange to thereby lock the clip 12 on the grid tee 16. In severe service applications, the clip 12 can be fixed to the grid tee 16 by driving self-tapping screw fasteners through the holes 37 into the flange 38.

The bent over tabs 32 and the bent up tabs 33 have low profiles and do not extend appreciably above the grid tee flange 38. This is a benefit when ceiling tiles 17 are used in combination with the baffles 14. A bent over tab 32 lies flat against the top side of the flange 38 so that it only raises a ceiling tile locally above the flange a distance essentially equal to the thickness of the sheet metal from which it is made.

The acoustical baffle 14 of the invention is typically roll formed or press brake formed from an elongated strip of sheet metal into a U-shaped cross-section. The illustrated cross-section is rectangular but other U-shaped forms, such as V-shapes and rounded shapes are contemplated. By way of example the baffle can be 1-1/2 inch wide and 4 inch or 6 inch deep with a length of 12, 10, 8, 6, 4, and 2 feet. Upstanding

or vertical walls 41 of the baffle 14 are characterized by
inturned flanges 40 having a horizontal part 42 extending from
a wall 41 and a depending vertical part 43 extending
downwardly from the respective horizontal part and terminating
5 at a longitudinal edge of the sheet material from which a
baffle 14 is made.

The baffle flanges 40 are proportioned to slide endwise
through the clip slots 24. A strong connection between the
clip 11 and a baffle 14 is formed when the flanges 38 are
10 received in both sets of the clip slots 24. The connection is
highly resistant to lateral forces on the baffle 14 because
the vertical flange parts 43 resist lateral pull out by
engagement with the vertical portions 27 of the slots 24 and
the web 19 of the clip 11 restrains the horizontal part 42 of
15 the baffle flange 40 against upward movement.

Where the grid tee engaging part 12 is rotated 90 degrees
relative to the baffle support part 11 from the position
illustrated in FIG. 1, self-tapping screws can be driven
through the preformed holes 23 into the baffle horizontal
20 flange parts 42 to augment the strength of the connection
between the clip 11 and baffle 14.

In the view of FIG. 1 the baffle 14 is transverse to the
grid tee 16. The baffle 14 can be supported in parallel
relation to the grid tee 16 when the grid tee clip 12 is
25 rotated 90 degrees relative to the baffle supporting part or
clip 11. Moreover, the clip 11 can be oriented at other
angles, enabling the baffle 14 to be supported diagonally
relative to a grid tee 16.

FIGS. 3 and 4 illustrate a modified form of clip assembly
30 50. The baffle support clip 11 and grid tee engaging clip 12
are structurally and functionally identical to those described
above as they interact with a baffle and grid tee. The clip
assembly 50 affords two additional axes of freedom obtained by
a pivot joint 51 interposed between the parts 11, 12. The

pivot joint 51 is made by a pair of preferably identical U-shaped sheet metal brackets 52 pivotally joined by a rivet 53. The rivet 53 is assembled through holes 54 in each bracket leg 56. Webs 57 have holes 58 for receiving associated rivets 13 assembled through respective holes in the baffle support clip 11 and grid tee engaging clip 12. The rivets are set loose enough to allow relative pivotal movement of the parts in which they are assembled. The center axis of the rivet or pin 53 is perpendicular to the center axes of the other rivets 13.

The clip assembly 50, for example, allows a baffle 14 to be suspended in a vertical orientation from an inclined grid tee 16 as shown in FIG. 5 or a grid tee that is curved in a vertical plane where the baffle 14 is transverse to the grid tee.

The baffle support clip 11 and a baffle 14 with which it is assembled can be suspended directly by a cable or rod having an end fitting and threaded through the central hole 22.

FIGS. 6, 7 and 8 illustrate a stamped sheet metal clip 60 useful for joining intersecting baffles 14 of the disclosed type. The clip 60 has an elongated rectangular profile in plan view with a width slightly narrower than the width of a baffle and a length exceeding three times its width. The clip 60 is symmetrical about its mid-length having a center section 61 and end sections 62 on opposite edges of the center section. The center section 61 has a pair of depending tabs 63. The tabs 63 are in planes parallel to the lengthwise direction of the clip 60 and are aligned with each other on a line transverse to the length of the clip. Vertical edges 64 on each tab 63 are spaced to provide a close fit with opposed vertical flange parts 43 of a baffle 14. The two tabs 63 when positioned in the top of a baffle 14 make the clip 60 self-aligning to the baffle in a direction transverse to the baffle. Holes 66 are located to overlies the horizontal flange

parts 42 and receive self-tapping screws driven into the flange to securely fix the clip 60 to the transverse baffle 14. Each end section 62 includes a pair of depending longitudinally spaced and aligned tabs 67. The width of the tabs 67 is the same as the spacing of the faces of the vertical parts 43 of the baffle flanges 38 so that when inserted in the top of a baffle 14, they index or align the clip 60 and baffle. Holes 68 for self-tapping screws are located to overlie the horizontal parts 42 of the baffle flanges 40. The screws lock the clip 60 on a baffle oriented in the longitudinal direction of the clip 60. Slots 71 are cut out of the clip body at the transverse junction of each end section 62 and the center section 61. The clip is slightly offset along the line of the slots 71 so that the end sections 62 are slightly higher, for example, 1/32 inch, than the center section 61.

FIG. 8 illustrates an intersection between two baffles joined by the clip 60. The clip center section 61 overlies a "through" baffle 14 and an end section 62 overlies a cross baffle 14 abutting the through baffle. The clip 60 secures the baffles 14 together in abutting relation with screws driven through the holes 66, 68 into the underlying baffle flanges 38.

Where another cross baffle 14 is to be installed at the same location along the through baffle 14 in line with the illustrated baffle on the opposite side of the through baffle, it is secured with the clip in the manner described. Where only one cross baffle 14 is to be used at the same location, one of the end sections 62 is cut off at the slots 71. The slight elevation of a side section 62 above the center section 61 serves to hold a cross baffle 14 slightly higher than the through baffle 14. This avoids a gap at the bottom of the cross baffle which would otherwise occur if the baffle bottoms were at the same level due to the radius of the bend of the

sheet material where the bottom and side of the through runner meet.

While the invention has been shown and described with respect to particular embodiments thereof, this is for the purpose of illustration rather than limitation, and other variations and modifications of the specific embodiments herein shown and described will be apparent to those skilled in the art all within the intended spirit and scope of the invention. Accordingly, the patent is not to be limited in scope and effect to the specific embodiments herein shown and described nor in any other way that is inconsistent with the extent to which the progress in the art has been advanced by the invention.

WHAT IS CLAIMED IS:

1. A clip for suspending an elongated U-shaped sheet metal baffle comprising a stamped sheet metal body, the body having a U-shaped configuration that is inverted in use, the body having a central generally horizontal web and two
5 generally vertical, mutually parallel flanges depending from the web, each flange having ends with a slot at each end, each slot having a generally right angle shape, the slots of one flange being aligned with the slots of the other flange on lines perpendicular to the flanges, each slot being adjacent
10 the web, open at an end of a respective flange, extending horizontally inwardly adjacent the web and downwardly away from the web at a distance from the flange end, the web having ends extending longitudinally beyond the downward portions of an adjacent pair of flange slots whereby said web ends serve
15 to vertically restrain right angle shaped flanges at upper ends of U-shaped baffles.

2. A clip as set forth in claim 1, including a central hole in the web for suspending the clip.

3. A clip as set forth in claim 2, including a rivet in the central hole connecting the clip body to a grid attachment clip.

4. A clip as set forth in claim 2, including a rivet in a hole connecting to one of a pair of U-shaped mutually pivoting parts, the other of the pair of mutually pivoting parts being connected to a grid tee attachment clip.

5. A clip as set forth in claim 1, wherein flanges have aligned holes.

6. In combination, an elongated baffle and a suspension clip, the baffle having a U-shaped cross-section including spaced generally vertically extending sidewalls, an upper edge of each sidewall having inwardly directed flanges, the flanges
5 having a horizontal portion adjacent a respective sidewall and a vertical portion spaced from the respective sidewall and depending from the horizontal portion, the suspension clip having an inverted U-shape body, including a horizontal web and depending flanges at opposite sides of the web, the
10 flanges each having opposed ends and a slot at each end adjacent the web, each slot extending generally horizontally inwardly from the associated flange end to a vertical slot, the vertical slot extending downwardly away from the web, the flanges of the baffle being disposed in the slots of the clip,
15 the web at each end of the clip overlying a respective flange of the baffle and confining a respective flange to the slot.

7. The combination of claim 6, wherein said web has a central hole enabling the clip to be suspended by an element extending upwardly through said hole.

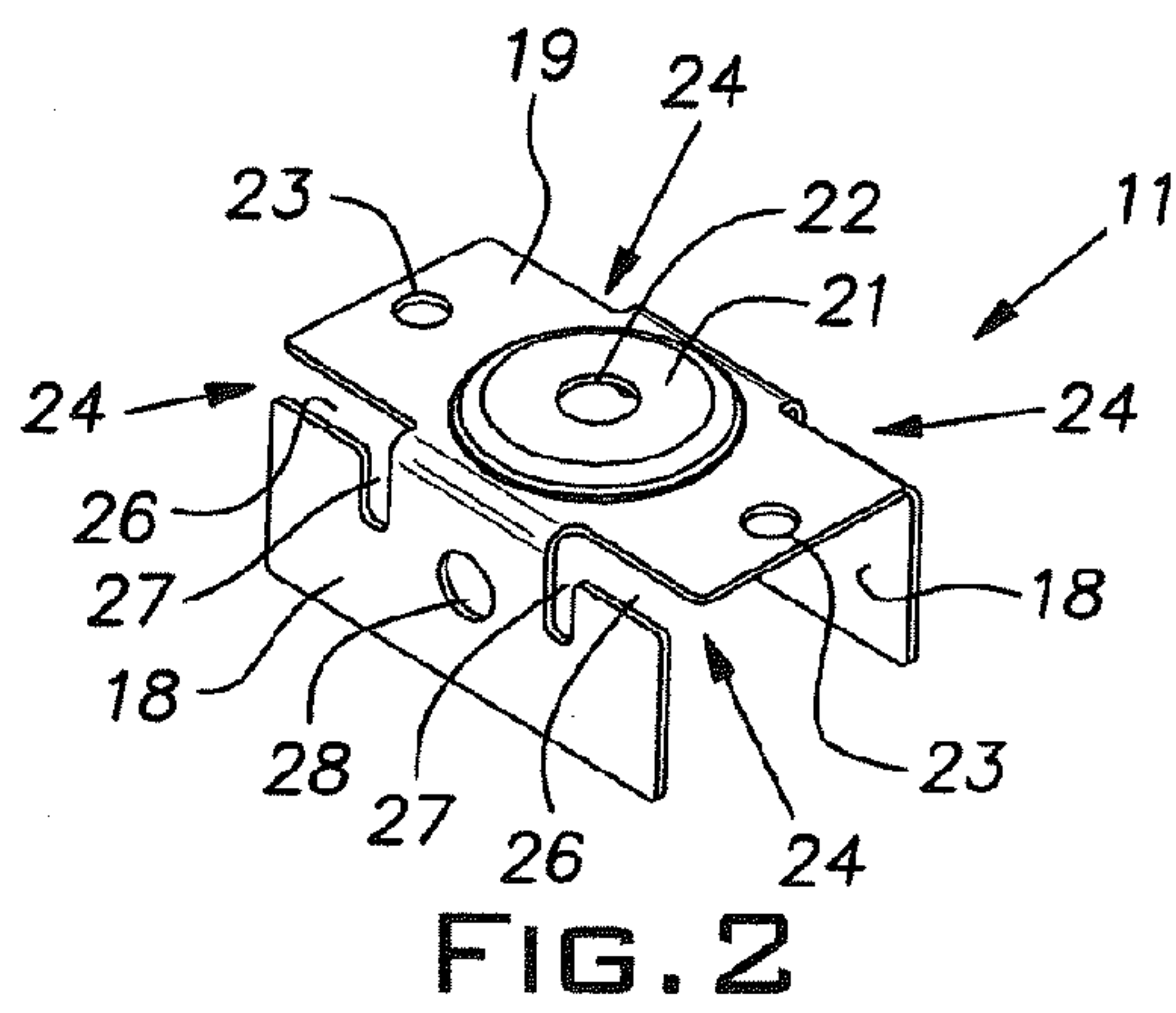
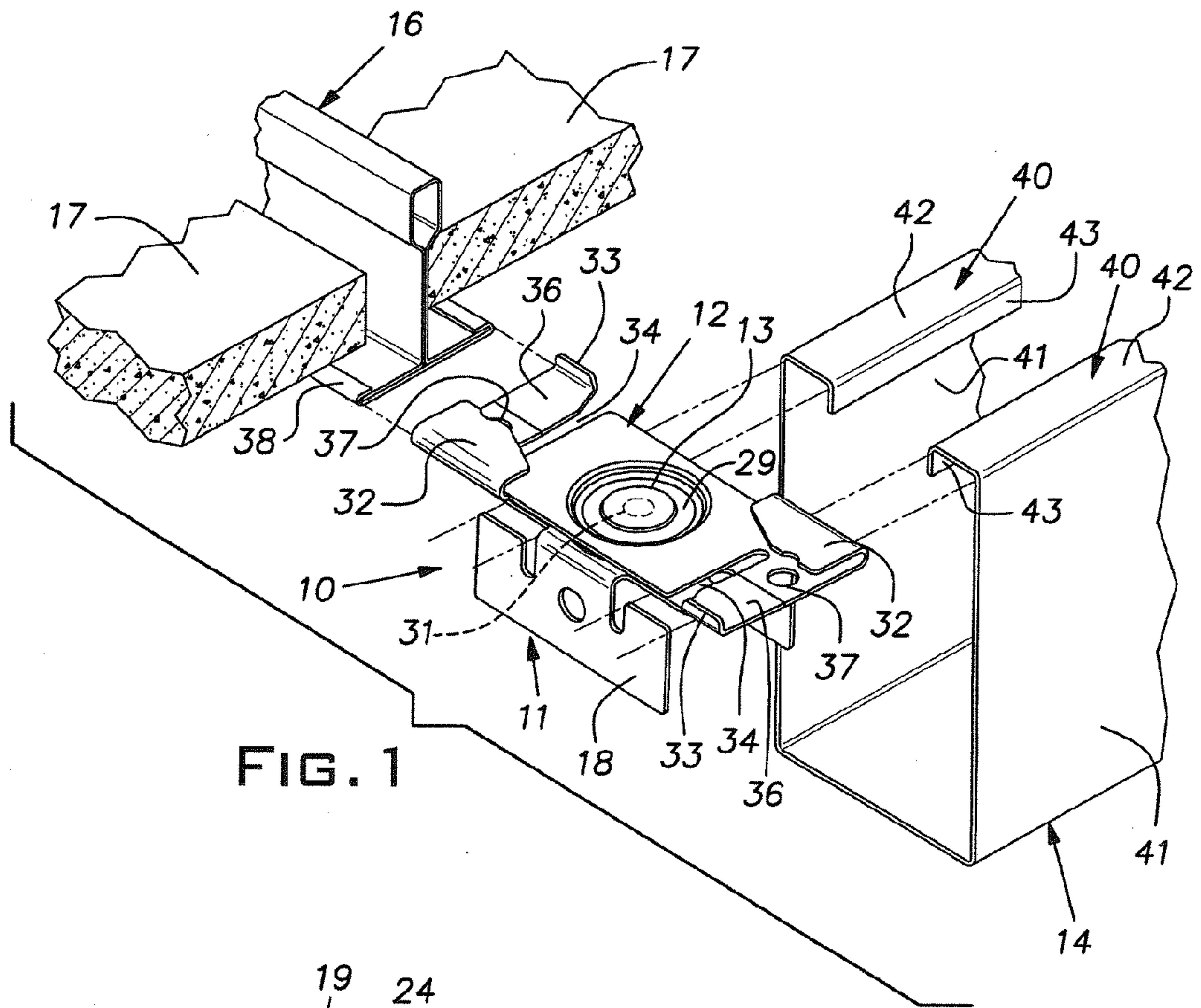
8. The combination of claim 7, wherein said clip is attached to a grid tee engaging clip by a rivet comprising said element.

9. A clip assembly comprising a baffle engaging clip joined to a grid tee engaging clip, the baffle engaging clip being constructed and arranged to support a U-shaped acoustical baffle having inturned flanges at upper ends of
5 generally vertical sidewalls by engaging undersides of the sidewall flanges, the grid tee engaging clip being constructed and arranged to support the baffle engaging clip by engaging upper sides of a grid tee flange, the baffle engaging clip and the grid tee engaging clip being joined by a bracket assembly

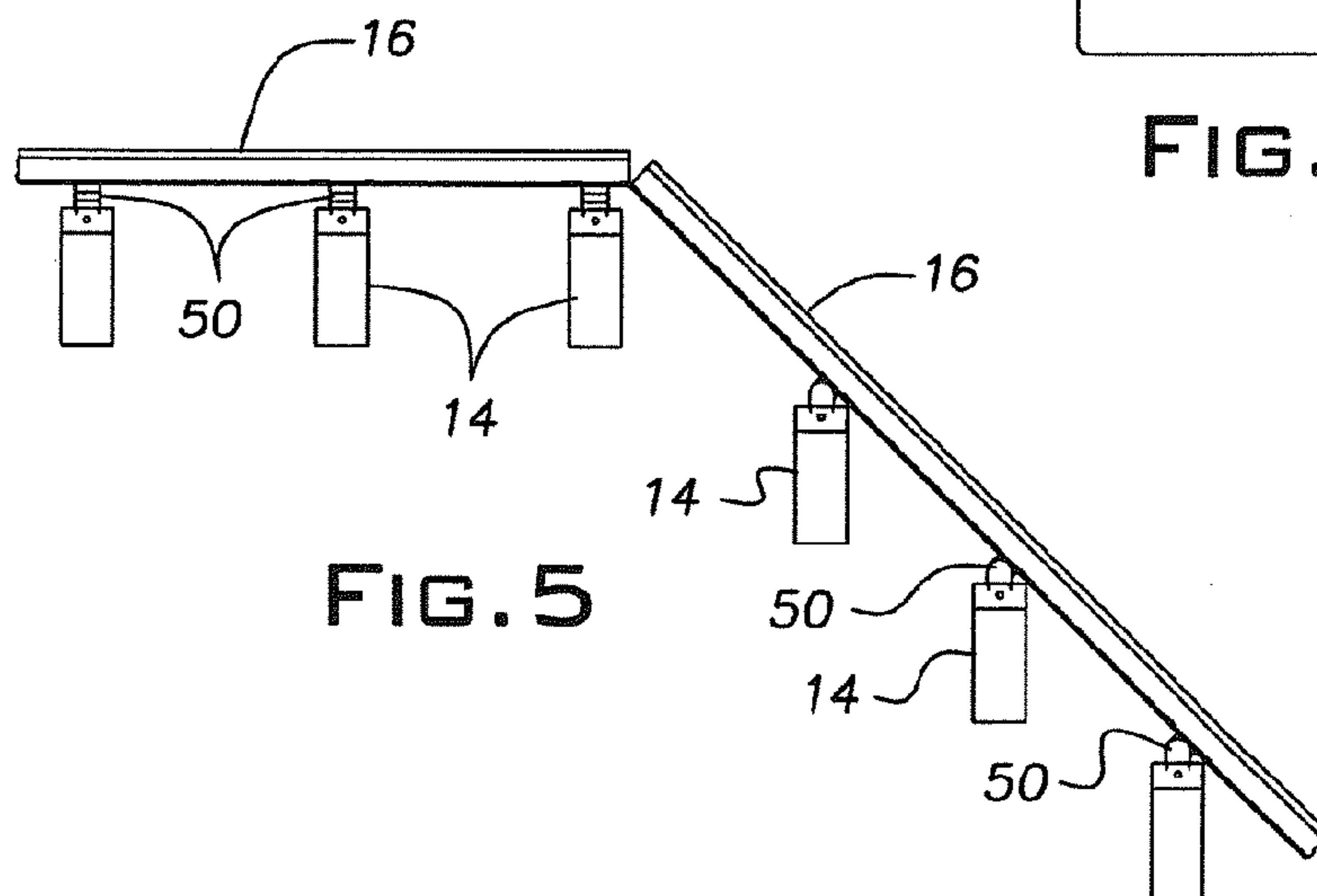
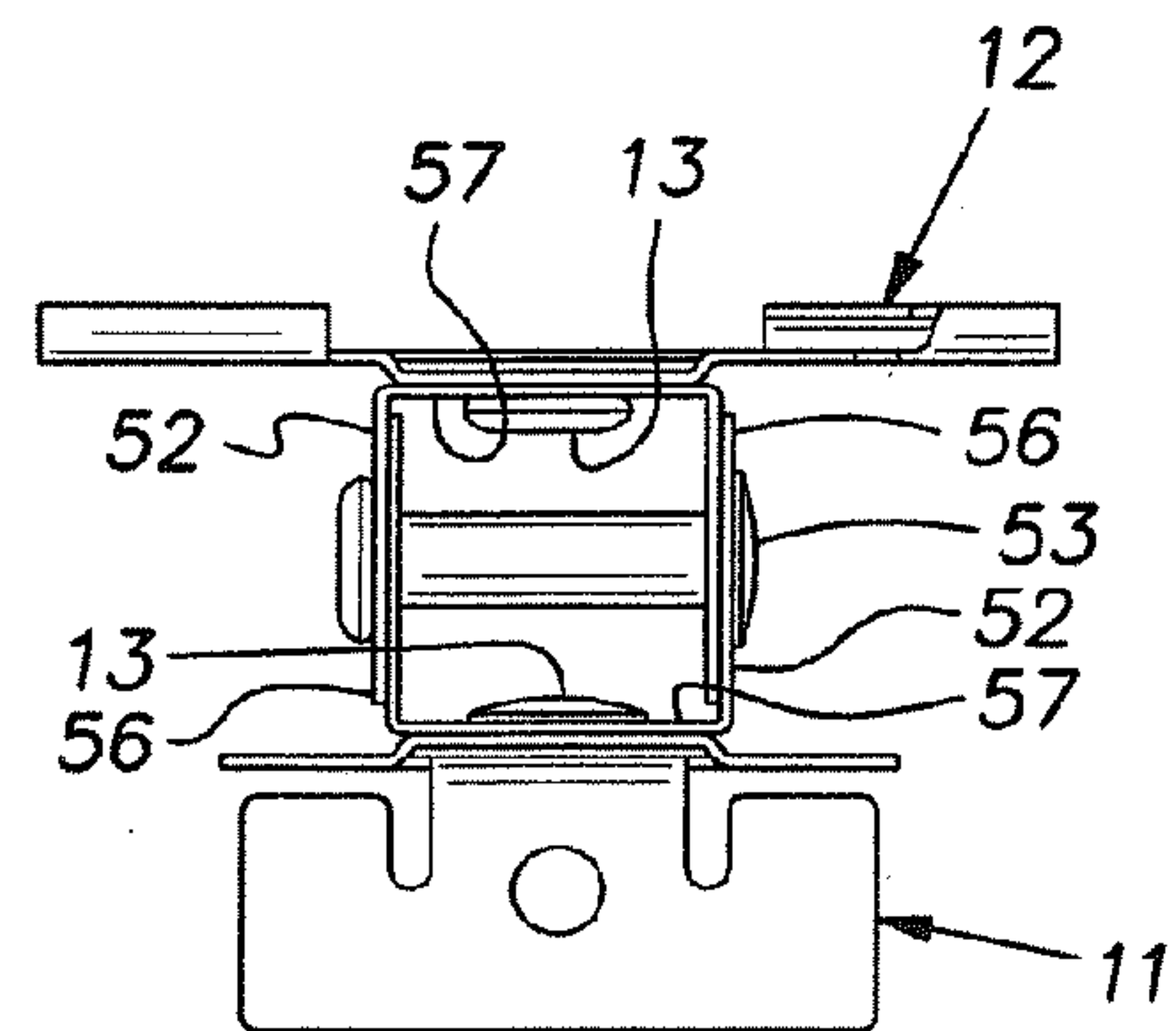
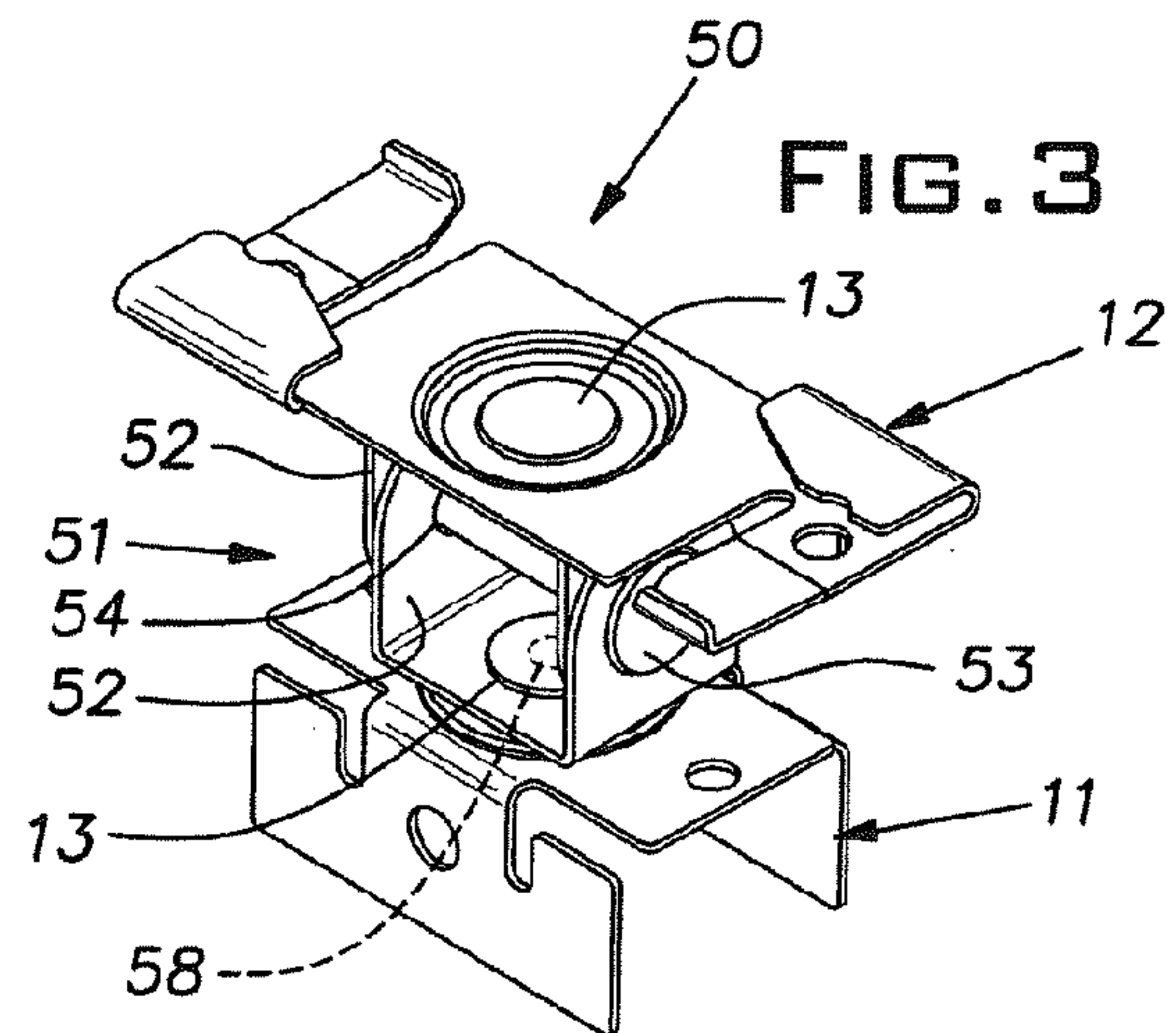
10 having one part pivotally connected to the baffle engaging clip about a first axis, a second part pivotally connected to the grid tee engaging part about a second axis, the first and second parts being pivotally connected together about a third axis perpendicular to both said first and second axes.

10. An elongated sheet metal clip for joining generally U-shaped acoustical baffles where a through baffle is intersected by one or two cross baffles abutting the through baffle, the clip having a center section and two end sections
5 separated by the center section, the center and end sections being situated along a longitudinal axis, the center section having a pair of depending tabs aligned on a line perpendicular to the longitudinal axis, each end section having a pair of depending tabs all aligned on a line parallel
10 to the longitudinal axis, a width of each of the tabs being the same.

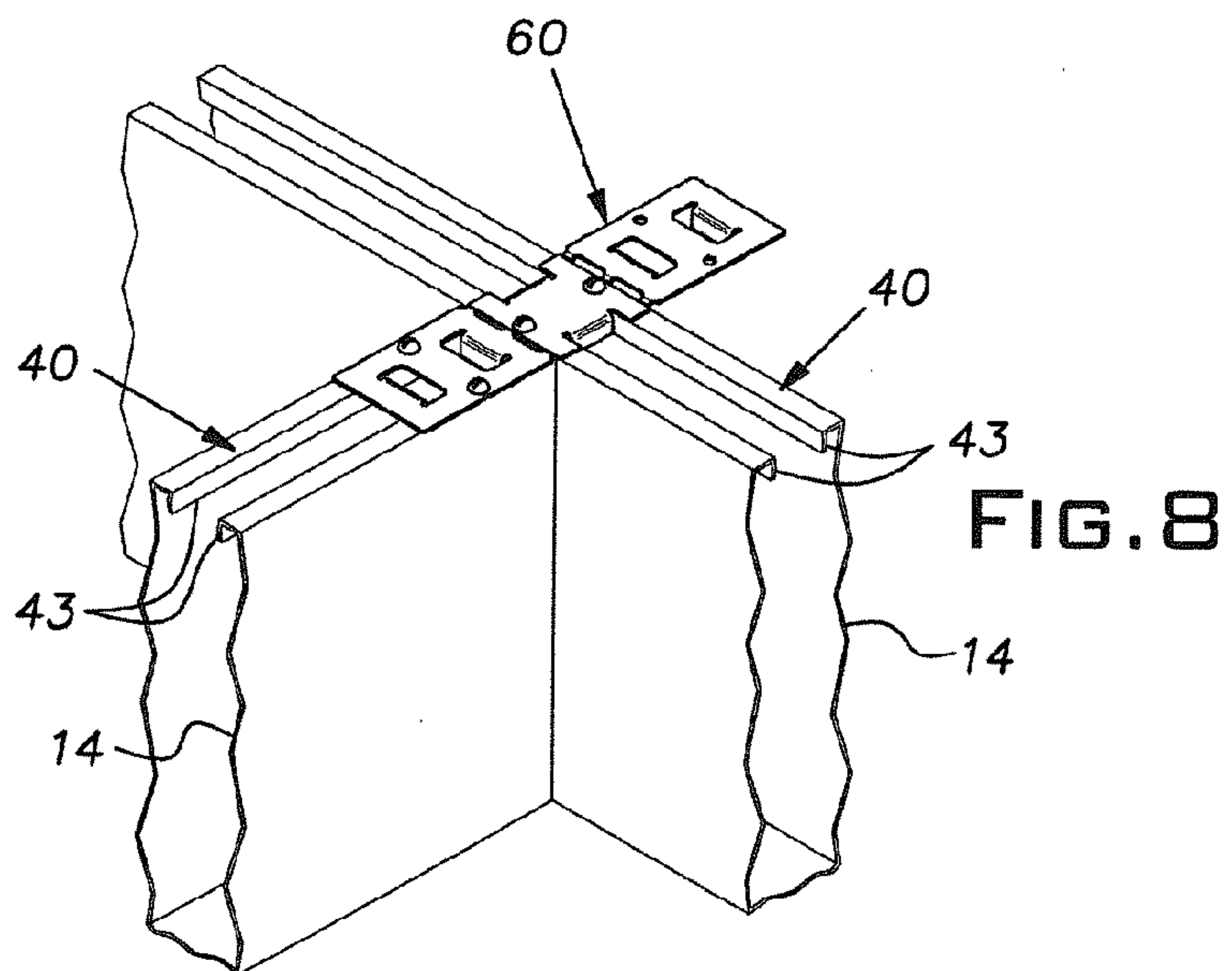
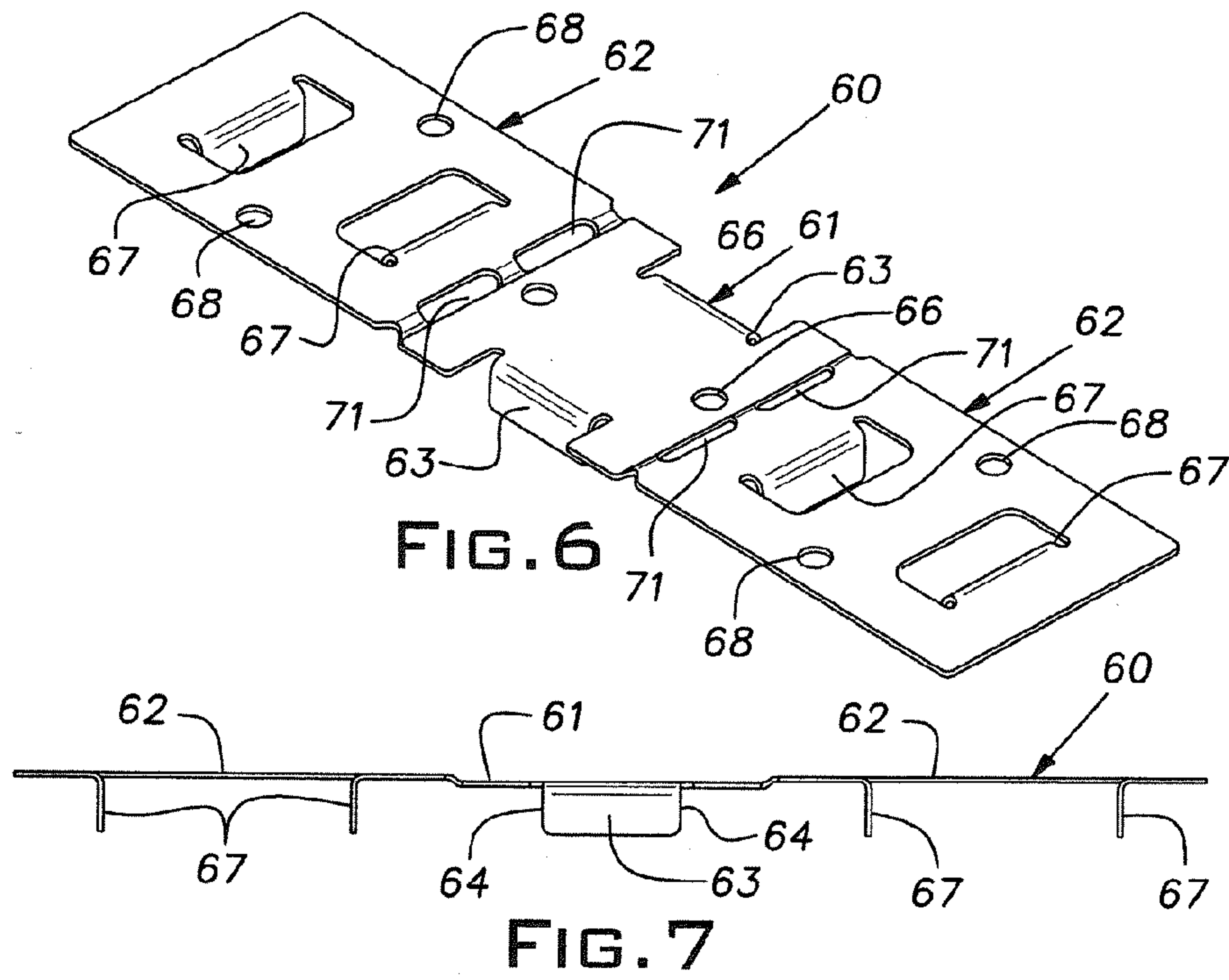
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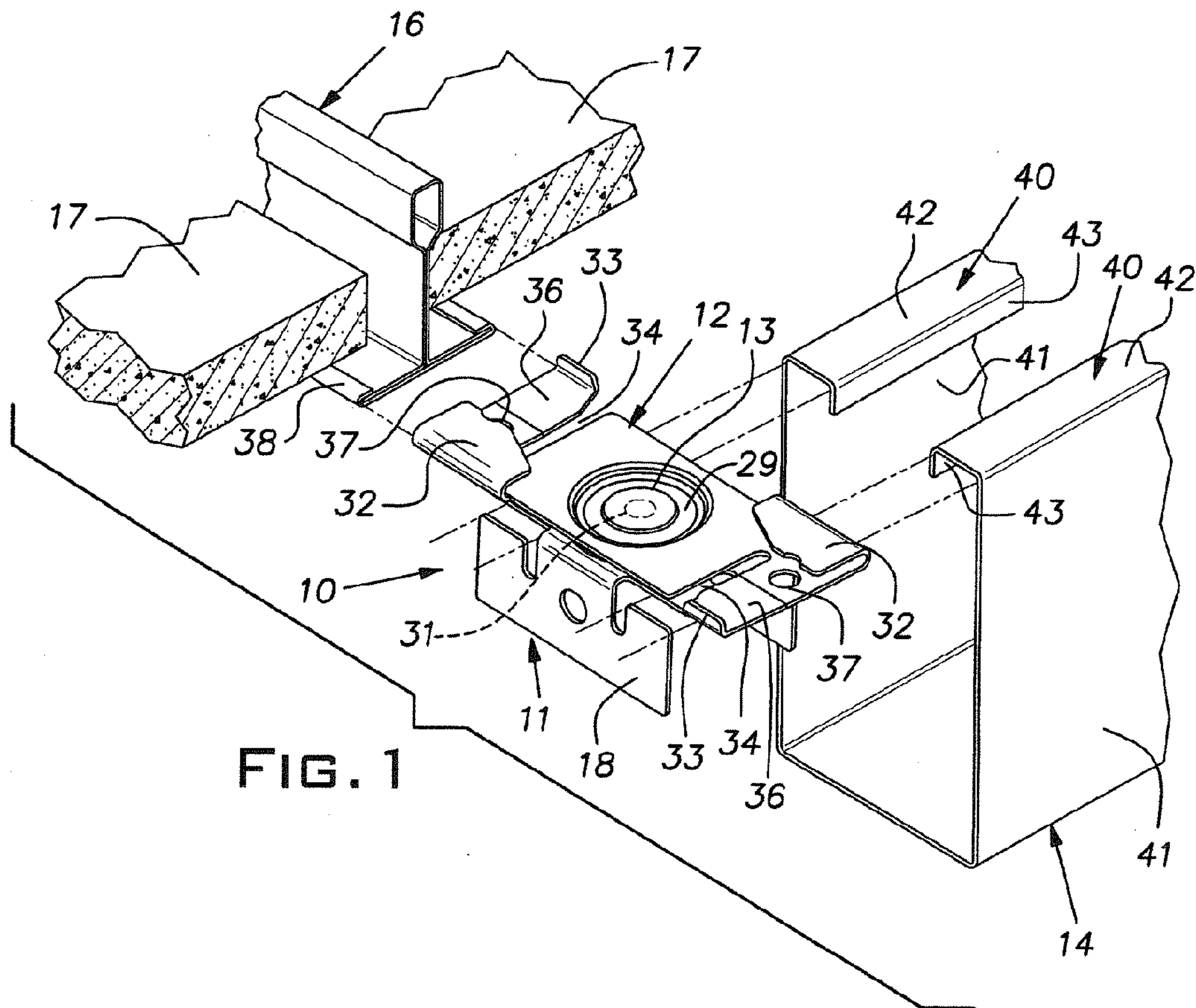


FIG. 1