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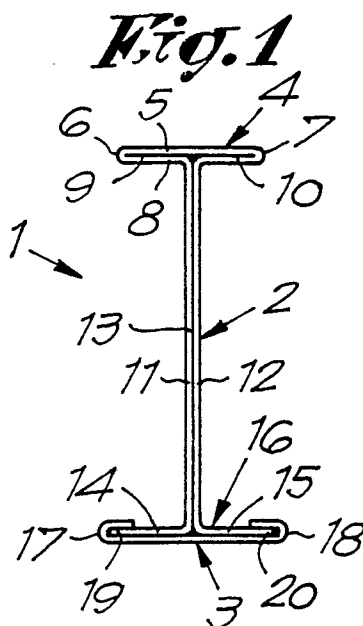
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(54) **Runner for a suspended ceiling, ceiling grids obtained thereby and connectors used therefor.**

(57) The invention relates to a runner (1) for a suspended ceiling, characterized thereby that it mainly consists of a double-web roll-formed I-runner (1), which in itself is formed by an I-shaped element (2) that shows a double-web body (13) and one double-web flange (4), and of a strip (3) co-operating with the other flange (16) of said I-shaped element (2).



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Runner for a suspended ceiling, ceiling grids obtained thereby and connectors used therefor

The present invention relates to a runner for a suspended ceiling as well as to ceiling grids obtained thereby and connectors (spacer clips) used therefor.

It is known to compose suspended ceilings with ceiling grids under which or between which ceiling panels are fitted, said ceiling grids being composed by means of steel runners. In order to not make havier this construction unnecessarily, roll-formed runners are used. Up to now mainly double-web reverse T-runners or angle runners have been applied. It is also known herein to use single-web, roll-formed I-runners. These runners, however, have the disadvantage that the greatest spans, in other words the greatest distance between two suspension points upon applying light-weight ceiling tiles, must not exceed 1.5 m, and upon applying heavier tiles and in the case of fire-resisting constructions should amount to only 1.2 m at most. Hence, said runners are not suited for places wherein not enough points of suspension can be provided.

It is also known, in order to achieve that ceiling grids should resist as long as possible in the case of a fire, to provide said T-runners with zones allowing their expansion. Such zones are formed by local weakenings or cut-outs in the runners, which in the case of an expansion of the latter provide for a local deformation that does not exercise a prejudicial influence on the ceiling grid. The use of such local weakenings, however, is only suited for the relatively light-weight ceiling-grid runners and in no respect are suited for heavier runners such as e.g. I-runners.

So, it is an object of the present invention to provide for a runner for suspended ceilings by means of which great spans between two suspension points can be realized.

Another object of the present invention is to provide for a connector by means of which in the first instance relatively heavy runners such as those of the invention can be connected in line and wherein, secondly, by using them, a connection is obtained that can take up the expansion of the runners. Especially a connector is concerned which is intended for taking care of the connection of I-runners.

So, the present invention relates to a runner for suspended ceilings characterized thereby that it mainly consists of a double-web roll-formed I-runner, which in itself is formed by an I-shaped element having a double-web body and a double-web flange as well as a strip co-operating with the other flange of said I-shaped element.

The present invention also provides ceiling grids for suspended ceilings characterized thereby that a number of their runners and preferably the main runners consist of said I-runners.

Further, the present invention provides a connector for ceiling runners in line and especially for the I-runners according to the invention, said connector mainly consisting of two elements which respectively can co-operate with both sides of the bodies of both runners, and means allowing the connection between the elements on the one hand and the respective runners on the other hand, said means allowing the longitudinal displacement of at least one of said runners.

In view of better showing the characteristics of the present invention, some preferred embodiments are described hereinafter by way of examples without limiting the scope of the invention and with reference to the accompanying drawings, wherein :

Figure 1 represents the runner according to the invention;

Figures 2 to 5 represent parts of ceiling grids wherein the runner according to the invention is being applied;

Figure 6 represents a perspective view of the connector as well as a connection obtained thereby; and

Figure 7 represents a cross-section according to line 7-7 in figure 6.

As represented in figure 1, the runner according to the present invention mainly consists of a double-web roll-formed I-runner 1 that is formed by an I-shaped element 2 and a strip 3. The I-shaped element 2 has a flange 4 formed by an outer wall 5, which at the edges 6 and 7 of said flange 4 is hemmed and blends with the inner wall 8 of said flange 4. Both thus formed parts 9 and 10 of this inner wall 8, substantially in the middle of flange 4 are hemmed perpendicularly out of the plane of said flange and hereby blend with two adjacent walls 11 and 12 forming the body 13 of said I-shaped element 2. Finally, each of said walls 11 and 12 blends with outer ends 14 and 15 respectively that are hemmed perpendicularly, in opposite directions outwardly from the body 13, said outer ends constituting the second flange 16 of the I-shaped element 2. Strip 3 adapts itself to said second flange 16 and can co-operate herewith by means of hook-shaped hemmed sides 17 and 18 respectively that slip over the edges 19 and 20 of flange 16.

As is represented in figures 2 to 5, the main characteristic of the ceiling grids according to the present invention is that their main runners consist of one or more I-runners 1 as described hereinbefore. As is represented in figures 2 and 3, transverse splines can be provided in body 13, wherein, e.g., T-runners 21 with coupling hooks 22 can be fitted in such a way that said second flange 16 is on a level with the flanges 22 of the reverse T-runners 21.

As is represented in figure 4, e.g., a ceiling grid can consist of parallel I-runners 1 finding themselves at relatively large distance A, e.g. 2.4 m, from one another, and heavy T-runners 24 forming transverse connections therebetween and finding themselves at distances B of 1.2 m for instance. Between them can be placed light-weight T-runners that can support the ceiling tiles. Such a ceiling grid has the advantage that it can be suspended completely by means of fasteners exclusively by the I-runners.

As is represented in figure 5, still other runners known by themselves can either be laid on the I-runners 1 according to the present invention or be fixed below them.

The ceiling grid according to the invention can also show cross tees consisting of the abovesaid I-runners. Preferably special spacer clips - (connectors) are used herein that allow to connect the transverse and longitudinal I-runners on one and the same level. These spacer clips are disclosed in a separate Patent Application of the Applicant.

In all of the abovesaid ceiling grids the I-runners preferably are applied in such a way that the strip is at the underside.

This strip can be visibly fitted or access-fitted and be provided with all kinds of caps or coatings. The two-part character of the I-runner 1, formed by the I-shaped element 2 and the strip 3, offers the advantage that only the strips 3 can be provided with all kinds of caps or coatings of any colour. In consequence, these different caps and coatings have not to be taken into account in the manufacturing process of said I-shaped element 2.

As represented in figures 2, 5 and 6 the I-runners are fixed to hangers 27 by means of reverse tees 26 that act on their upper flange 4. Of course, the I-runners according to the present invention can be suspended in other ways too, wherein optionally known hangers can be used.

In figures 6 and 7 a connector 28 according to the present invention is represented. Said connector provides for the connection of two ceiling runners in line, e.g. two runners 1 and 29 as described above, said connection allowing a longitudinal expansion of the runners. Connector 28 consists mainly of two elements 30 and 31 that can co-

operate at least with the sides 32 and 33 of the bodies of both runners 1 and 29 respectively, and of means for connecting these elements 30 and 31 at the one hand and the respective runners 1 and 29 respectively at the other hand. Said means allow the displacement of at least one of the runners 1 and 29 in their longitudinal direction. The elements 30 and 31 are U-shaped, all this in such a way that the central parts 34 and 35 adapt themselves to the sides 32 and 33 of the bodies of the runners 1 and 29. The means that allow to provide a connection between the elements 30 and 31 and the runners 1 and 29 consist mainly of holes 36 and 37 that are applied correspondingly in the elements 30 and 31 and that can co-operate with the bores 38 in the bodies of the runners 1 and 29. For allowing the expansion of the runners 1 and 29 to take place, at least the holes 36, as represented in figure 6, or the holes 37 are executed oblongly according to the longitudinal direction of said runners 1 and 29. The connection between the elements 30 and 31 and the runners 1 and 29 takes place by means of bolts not represented in the figures.

Upon using connector 28, of course a free space 39 is left between the outer ends of runners 1 and 29. The whole can be sealed at the bottom by means of a closing strip 40.

It is represented in figure 6 too that according to the present invention said reverse tees 26 can also be applied in upright position. They are then executed in such a way that the hemmed edges 41 of the horizontal flange 42 can co-operate with the underside of an I-runner 1 or 29, whereas at the other hand they have an internally tapering cut-out 43 at the outer end of the central wall 44 that can co-operate with the enlarged upper edge 45 of a reverse T-runner.

The present invention is by no means restricted to the embodiments described as examples and represented in the accompanying drawings, but such I-runner as well as the ceiling grids obtained by it and the connector used therein can be realized in any forms and dimensions whatsoever, without departing from the scope of the present invention.

Claims

1. Runner for a suspended ceiling, characterized thereby that it mainly consists of a double-web roll-formed I-runner (1), which in itself is formed by an I-shaped element (2) that shows a double-web body (13) and one double-web flange (4), and of a strip (3) co-operating with the other flange (16) of said I-shaped element (2).

2. Runner according to claim 1, characterized thereby that said I-shaped element (2) shows a flange (4) formed by an outer wall (5) which at the edges (6, 7) of said flange (4) is hemmed and blends with an inner wall (8) of said flange (4), and wherein both thus formed parts (9, 10) of said inner wall (8), substantially in the middle of said flange - (4) are hemmed perpendicularly out of the plane of said flange and hereby blend with two adjacent walls (11, 12) constituting the body (13) of said I-shaped element (2) and wherein finally each of said walls (11, 12) blends with outer ends (14, 15) respectively that are hemmed perpendicularly, in opposite directions outwardly from said body (13), said outer ends constituting the second flange (16) of the I-shaped element (2).

3. Runner according to claim 2, characterized thereby that said strip (3) adapts itself to said second flange (16) and by means of hook-shaped hemmed sides (17, 18) slips over the edges (19, 20) of said flange 16.

4. Ceiling grid for a suspended ceiling, characterized thereby that at least one of its runners consists of an I-runner (1, 29) as described in any of the foregoing claims, wherein said I-runners (1, 29) are applied in such a way that said strip (3) is at the underside.

5. Ceiling grid for a suspended ceiling, characterized thereby that the main runners consist of I-runners as described in any of claims 1 to 4.

6. Ceiling grid according to claim 4 or 5, characterized thereby that it is fixed to hangers (27) by means of reverse tees (26) that act on the upper flanges (4) of said I-runners (1, 29).

7. Ceiling grid according to claim 4, 5 or 6, wherein reverse tees are applied under said I-runners, characterized thereby that the connection takes place by means of a tee (26), which at its horizontal flange (42) is provided with hemmed edges (41) that co-operate with the underside of said I-runner (1, 29), whereas at the outer end of the central wall (44) of said tee (26) an internally tapering cut-out (43) is provided that co-operates with the enlarged upper edge (45) of said reverse T-runner.

8. Connector for runners in line of a suspended ceiling, said runners consisting of I-runners as described in claims 1, 2 or 3, characterized thereby that it mainly consists of two elements (30, 31) that can co-operate at least with the sides (32, 33) of the bodies of both runners (1, 29), and of means for connecting said elements (30, 31) at the one hand, said means allowing the displacement of at least one of said runners (1, 29) in their longitudinal direction.

9. Connector according to claim 8, characterized thereby that said elements (30, 31) that can co-operate with both sides (32, 33) of bodies of

said runners (1, 29) are U-shaped, whose central parts (34, 35) adapt themselves to the sides (32, 33) of the bodies of said runners (1, 29).

10. Connector according to claims 8 and 9, characterized thereby that the means that allow a connection between said elements (30, 31) and said runners (1, 29) consist mainly of holes (36, 37) that are applied correspondingly in the elements (30, 31).

11. Connector according to claim 8, 9 or 10, characterized thereby that at least a number of holes (36) are executed oblongly according to a direction corresponding to the longitudinal direction of said runners (1, 29).

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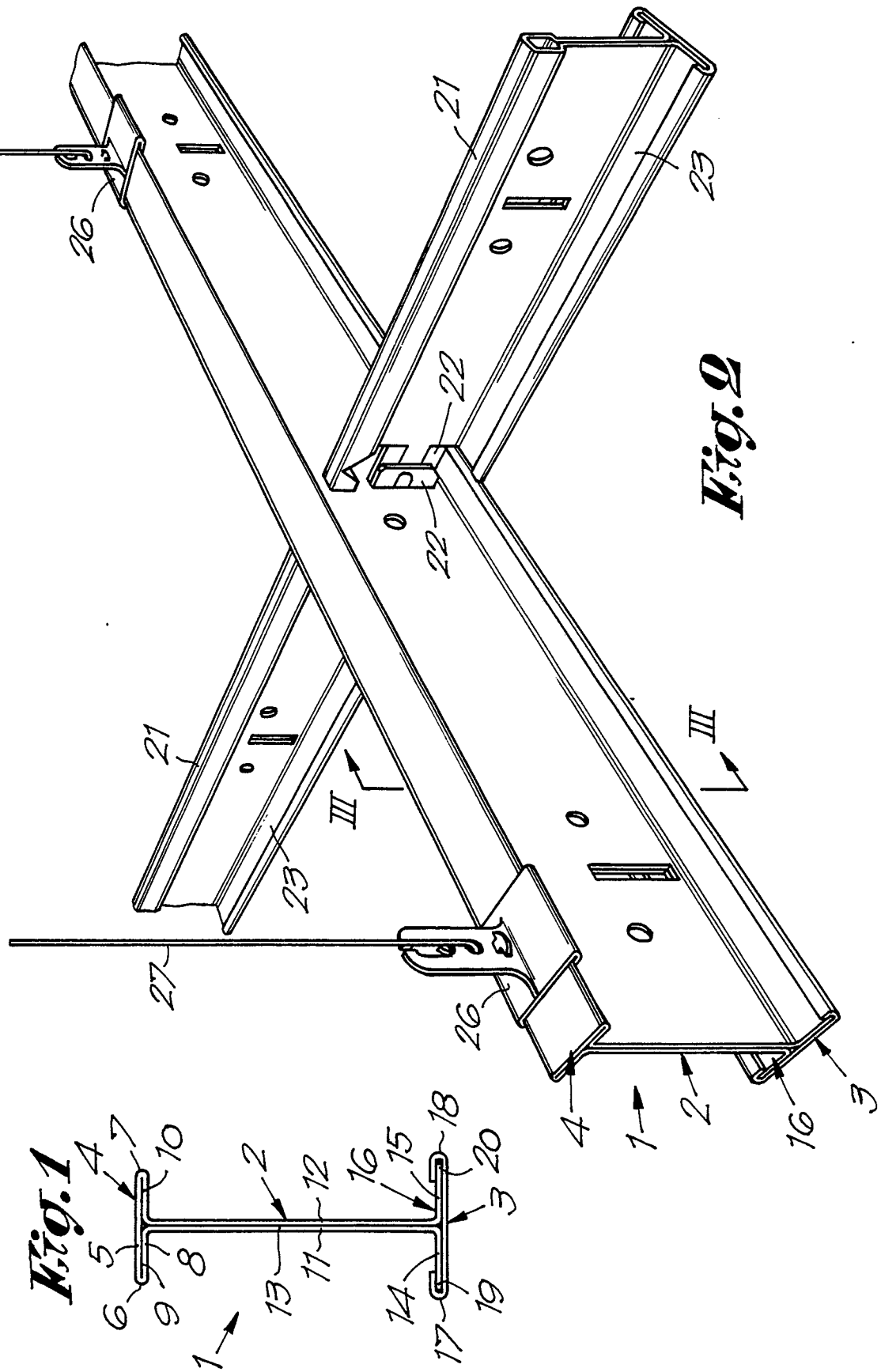
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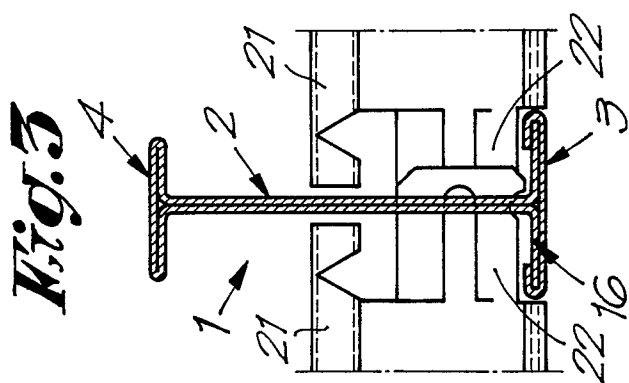
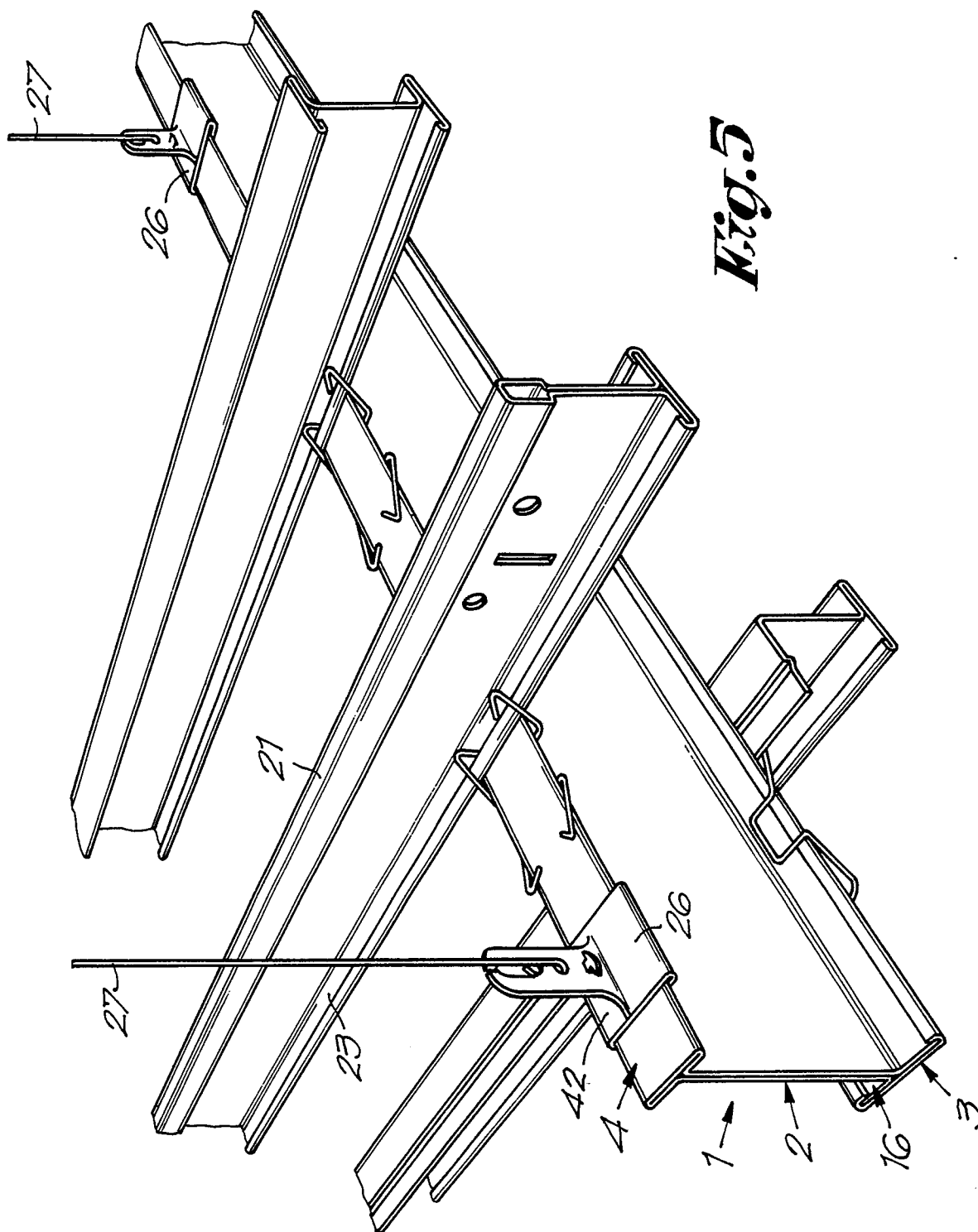
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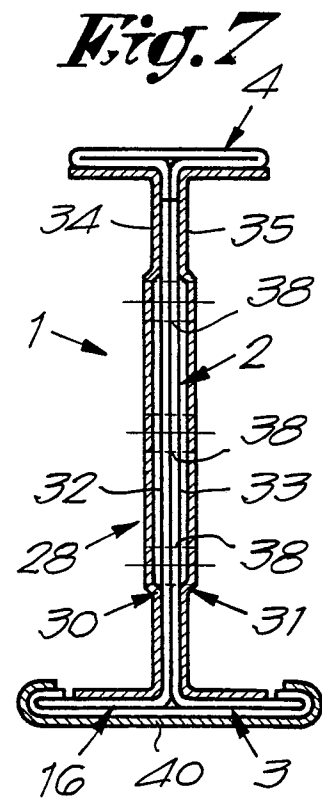
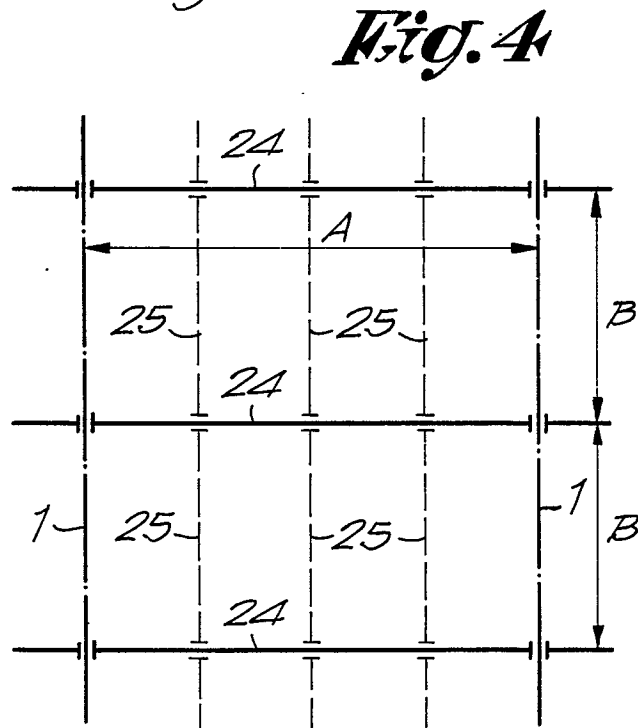
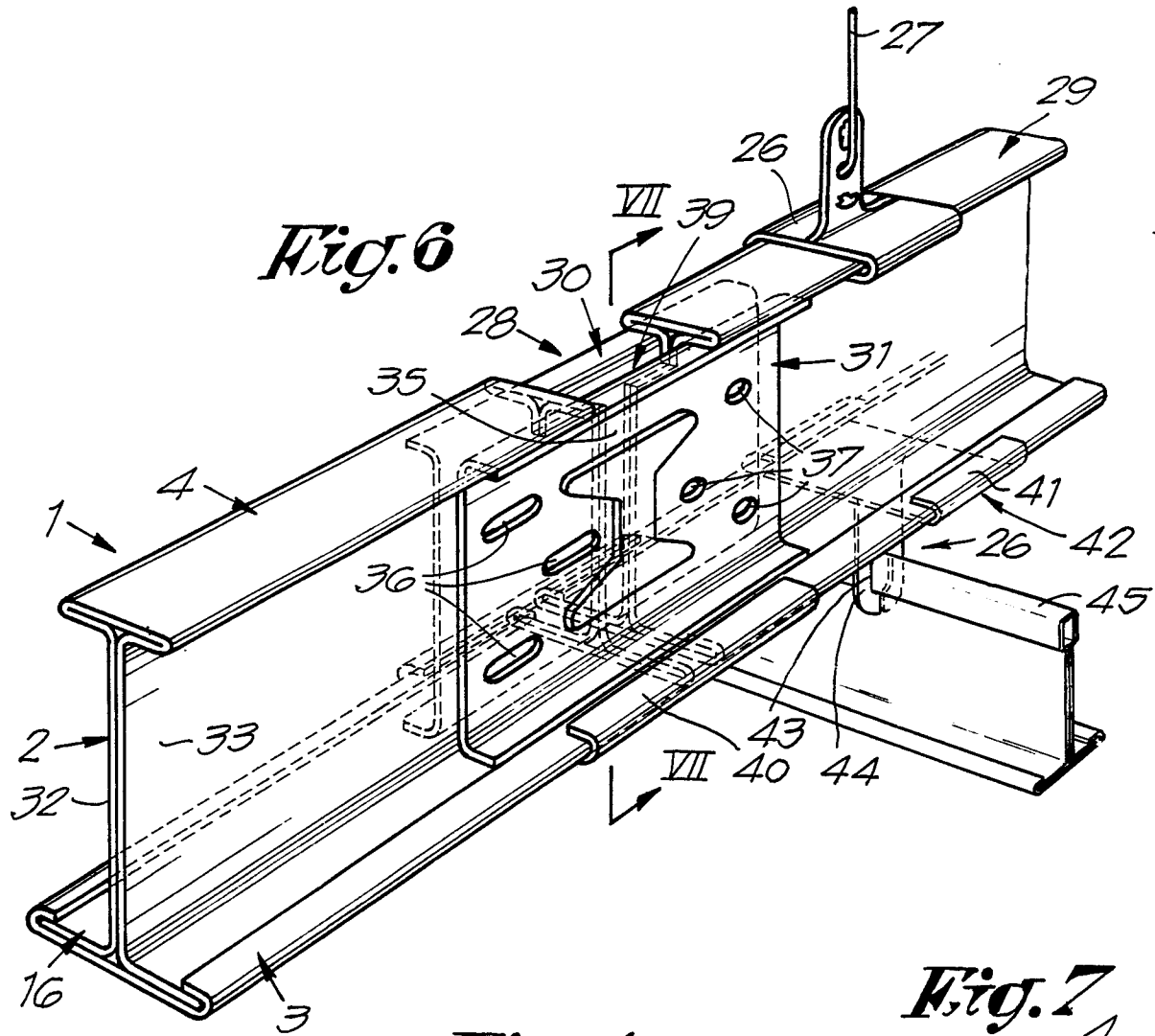
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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
Y	US-A-2 307 653 (WRIGHT) * Page 2, left-hand column, lines 19-40; figures 1,7,11 *	1-5	E 04 B 5/55
Y	--- US-A-3 606 417 (ROUSEY) * Column 2, lines 27-36; figure 1 *	1-5	
A	--- FR-A-1 286 613 (ISOTICH) * Page 2, left-hand column, paragraphs 5-9; page 2, right-hand column, paragraph 1; figures 1,5,6 *	6,7	
A	--- US-A-3 618 176 (BARNES) * Figures 1-5 *	1,3,7	
A	--- GB-A-1 057 551 (LICKLITER) * Page 2, lines 21-48,94-110; figure 1 *	8,9,10,11	TECHNICAL FIELDS SEARCHED (Int. Cl.4) E 04 B E 04 C
A	--- US-A-3 189 138 (ZNAMIROWSKI) * Column 2, lines 51-72; column 7, lines 5-20; figures 8-13 *	1,3,8,9,10,11	
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The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 10-11-1986	Examiner CHESNEAUX J.C.
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	



DOCUMENTS CONSIDERED TO BE RELEVANT			Page 2
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
A	FR-A-1 491 402 (FERODO) * Page 2, left-hand column, paragraph 12; page 2, right-hand column, paragraphs 1-3; figures * -----	1, 4, 5, 6	
			TECHNICAL FIELDS SEARCHED (Int. Cl.4)
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 10-11-1986	Examiner CHESNEAUX J.C.
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