



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
06.06.2007 Bulletin 2007/23

(51) Int Cl.:
E01F 15/04 ^(2006.01)

(21) Application number: **05425858.7**

(22) Date of filing: **01.12.2005**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC NL PL PT RO SE SI SK TR
Designated Extension States:
AL BA HR MK YU

(72) Inventor: **Cucchietti, Massimo**
10134 Torino (IT)

(74) Representative: **Spandonari, Carlo**
Spandonari & Modiano S.r.l.
Corso Duca degli Abruzzi 16
10129 Torino (IT)

(71) Applicant: **Tubosider S.p.A.**
14100 Asti (IT)

(54) **Impact-resistant beam for guardrail-type crash barriers**

(57) The beam comprises an impact-resistant channel supportable on a row of upright posts (12). The channel incorporates stiffeners (30), each of which has an outer profile matching with the inner profile of the channel

(20) along three walls thereof. Each stiffener consists of a metal plate (30) having a main wall (32) arranged transversely to the channel, and lateral, square-bent edges (34, 36, 38, 40) matching with three corresponding walls of the channel (20).

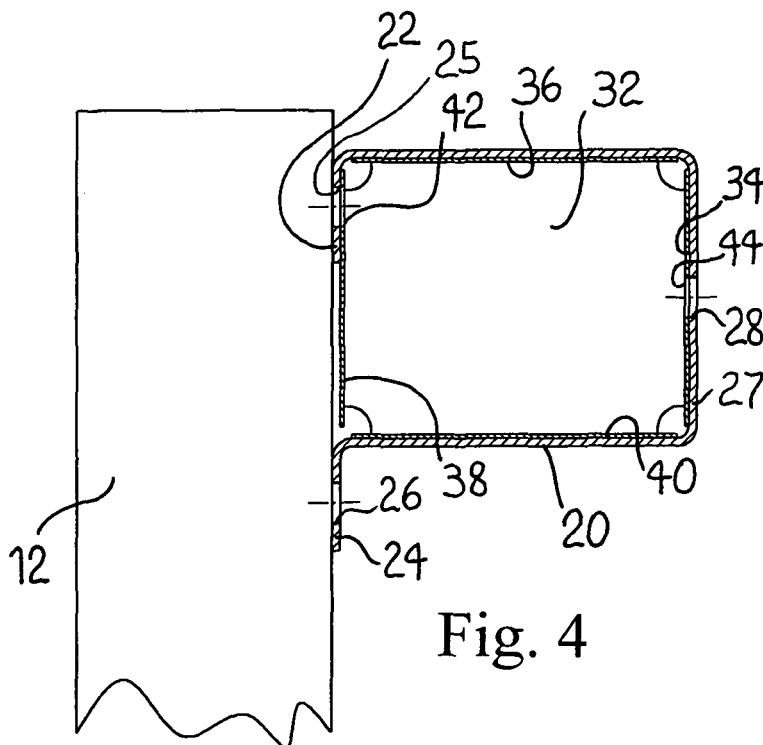


Fig. 4

Description

[0001] The present invention relates to a ribbed beam suitable for resisting the impact of vehicles against a crash barrier, for use along the edge of roads or bridges, traffic dividers, and the like.

[0002] As known, crash barriers made of steel usually comprise posts, which are stuck in the ground or anchored to structures and support longitudinal elements, usually called beams, having the scope of resisting the impact of vehicles and directing them back on the roadway. The dimensions and/or the geometry of the beams are designed so that they have a predetermined resistance to torsional and/or bending stress, in order to obtain the desired performance. Particularly, the barrier is required to have a certain flexibility which allows it to resist the impact without any part of it to break, as well as to prevent the vehicle from jumping over the barrier or over-turning.

[0003] Nowadays, beams with different geometry or thickness are used depending on the desired performance, i.e., on the level of resistance required. However, it would be desirable to have a more flexible system which allows barriers with different mechanical features to be obtained by using equal-sized beams, whereby the manufacturing and designing cost are reduced and the replacement operations are made more versatile.

[0004] Therefore, it is a main object of the present invention to provide a beam for guardrail-type crash barriers, in which the mechanical features, particularly, the resistance to torsional and bending stress, may be varied with high flexibility without changing the size and/or the geometry of the beam.

[0005] The above object and other advantages, which will better appear below, are achieved by a beam for guardrail-type crash barriers having the features recited in claim 1, while the other claims state other advantageous, though secondary features of the invention.

[0006] The invention will be now described in more detail with reference to a few preferred, non-exclusive embodiments, shown by way of non limiting example in the attached drawings, wherein:

Fig. 1 is a view in transverse, cross-section of a road flanked by a guardrail-type crash barrier according to the prior art;

Fig. 2 is a side elevation view from a first viewpoint of a portion of a crash barrier according to a preferred embodiment of the invention;

Fig. 3 is a side elevation view from an opposite viewpoint of the portion of crash barrier of Fig. 2;

Fig. 4 is a cross-section view of the crash barrier of Fig. 2 along line IV-IV;

Fig. 5 is a perspective view of a fragment of the crash

barrier of Fig. 2;

Fig. 6 shows a plan view of the blank from which an element of the barrier according to the invention is formed;

Fig. 7 is a view similar to Fig. 5, showing the crash barrier according to the invention in a different operative configuration;

Fig. 8 is a view similar to Fig. 4, showing an alternative embodiment of the crash barrier according to the invention.

[0007] In Fig. 1, a paved roadway 10 is flanked by a conventional crash barrier comprising upright posts such as 12 rising from the bare ground 14 and supporting a metal channel 16. The dimensions of the channel are designed so that it has a predetermined resistance to torsional and bending stress, according to the requirements of the specific application. Therefore, when different mechanical features are required, e.g., a higher resistance to torsional stress, the channel must be entirely redesigned, e.g., by changing the thickness and/or the dimensions of its walls.

[0008] Figs. 2-5 show a crash barrier similar to the barrier of Fig. 1, but incorporating an improved beam according to the invention in lieu of channel 16. The beam comprises a metal channel 20 whose opposite, longitudinal edges 22, 24 are bent at right angles to the same direction, whereby one first edge 22 projects inwards of the channel and one second edge 24 projects outwards of it. Bent edges 22, 24 of the channel are perforated with pairs of equally-spaced slots 25, 26 respectively. The back wall 27 of the channel is also perforated with elongated, equally-spaced slots such as 28.

[0009] A plurality of equally-spaced stiffeners are arranged within channel 20, each of which consists of a shaped steel plate 30 formed into a box having a rectangular, main wall 32 arranged transversely to the channel, and four lateral, square-bent ledges 34, 36, 38, 40 matching with the inner profile of channel 20. Elongated slots 42, 44 formed in the two opposite, lateral ledges 34, 38, match with the back wall 27 and with the first edge 22 of the channel respectively, and are located so that they are aligned to the slots 25, 26, 28 in the channel, in order to allow the stiffener to be fastened to the channel by bolts (not shown). The other two lateral ledges 36, 40 are welded to the inside of the side walls of the channel.

[0010] The stiffeners can be manufactured in series in a conventional way in the field from a steel sheet sheared into the blank shown in Fig. 6, with a rectangular, middle area forming the main wall 32 of the stiffener, and four rectangular, lateral wings forming the lateral ledges 34, 36, 38, 40. The slots in the stiffener may be formed subsequently by milling or, preferably, during the shearing operation. Finally, the lateral ledges of the stiffener are bent at right angles and then welded and bolted to the

channel.

[0011] In operation, the beam is bolted to the posts at the slots 25, 26 on the edges of the channel. The stiffeners, which are welded and bolted within channel 20, act as localized stiffening points with respect to the torsional and bending stress, whereby the overall stiffness of the beam is increased. Particularly, the lateral ledges 36, 40, which are welded to the lower and upper walls of the channel respectively, help in reinforcing the beam with respect to the shearing and bending stress on a horizontal plane. The stiffness of the beam is increased by increasing the number of stiffeners, whereby it will be convenient to design the channel so that, without stiffeners, it has the minimum mechanical features required for use on the road as a guardrail.

[0012] The channel may whether be used directly as a barrier or, as shown in Fig. 7, as a supporting spacer for a impact-resistant, ondulated metal band 46 of a known type. In this case, band 46 is also advantageously bolted to the slots 28 made in the back wall of the channel together with the stiffeners.

[0013] Fig. 8 shows an alternative embodiment of the barrier according to the invention, in which the opposite, longitudinal edges 122, 124 of channel 120 are both bent inwards at right angles. Therefore, with this embodiment, the lateral ledge 138 in front of the posts matches with, and is bolted to, both edges 122, 124.

[0014] A few preferred embodiments of the invention have been described herein, but of course many changes maybe made by the person skilled in the art within the scope of the inventive concept. For instance, though in the Figures the stiffeners are equally spaced along the channel, this arrangement should be regarded as preferred but not necessary. In addition, the stiffeners could be fastened to the channel in a different way from what described above, e.g., all the four lateral ledges could be welded to the channel. Furthermore, differently from what shown in Figs. 2, 3, the stiffeners and the posts could also be bolted together to the same group of slots 25, 26 in the channel.

3. The beam of claim 2, **characterized in that** said plate comprises at least three of said square-bent, lateral ledges (34, 36, 38, 40) matching with two side walls and with the back wall (27) of the channel (20) respectively.
4. The beam of claim 2 or 3, **characterized in that** at least one of the opposite, longitudinal edges (22) of the channel (20) is bent inwards at right angles, and one of said lateral ledges (38) matches with it.
5. The beam of claim 3 or 4, **characterized in that** the two lateral ledges (36, 40) matching with the side walls are welded thereto.
6. The beam of claim 4 or 5, **characterized in that** the lateral ledge (38) matching with the inwards bent edge (22) is bolted thereto.
7. The beam of any of claims 3 to 6, **characterized in that** the lateral ledge (34) matching with the back wall (27) is bolted thereto.
8. The beam of claim 6 or 7, **characterized in that** the inwards bent edge (22) and the ledge (38) matching therewith have respective, aligned slots for their mutual connection by bolts.
9. The beam of any of claims 3 to 8, **characterized in that** the back wall (27) and the ledge (34) matching therewith have respective, aligned slots for their mutual connection by bolts, as well as for connection of a impact-resistant, metal band (46).

Claims

1. A beam for crash barriers, comprising an impact-resistant channel supportable on a row of upright posts (12), **characterized in that** said channel incorporates stiffeners (30) each having an outer profile matching with the inner profile of the channel (20) along at least two walls thereof.
2. The beam of claim 1, **characterized in that** each of said stiffeners consists of a metal plate (30) having a main wall (32) arranged transversely to the channel, and at least two lateral, square-bent edges (34, 36, 38, 40) matching with two corresponding walls of the channel (20).

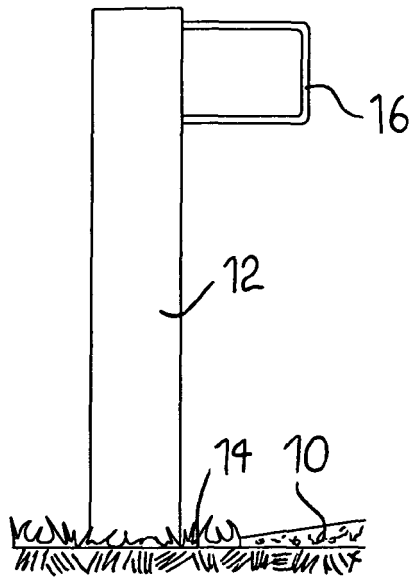


Fig. 1

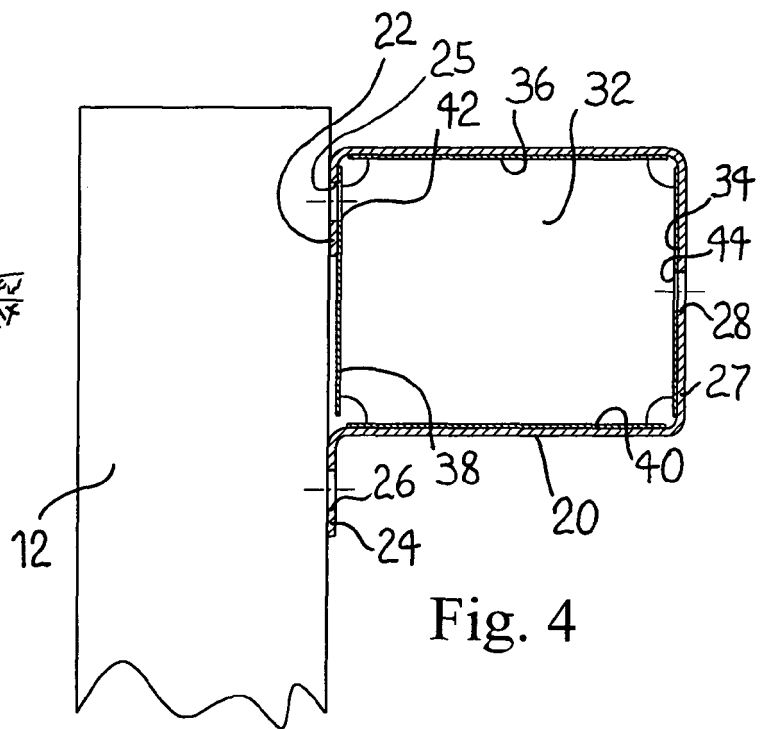


Fig. 4

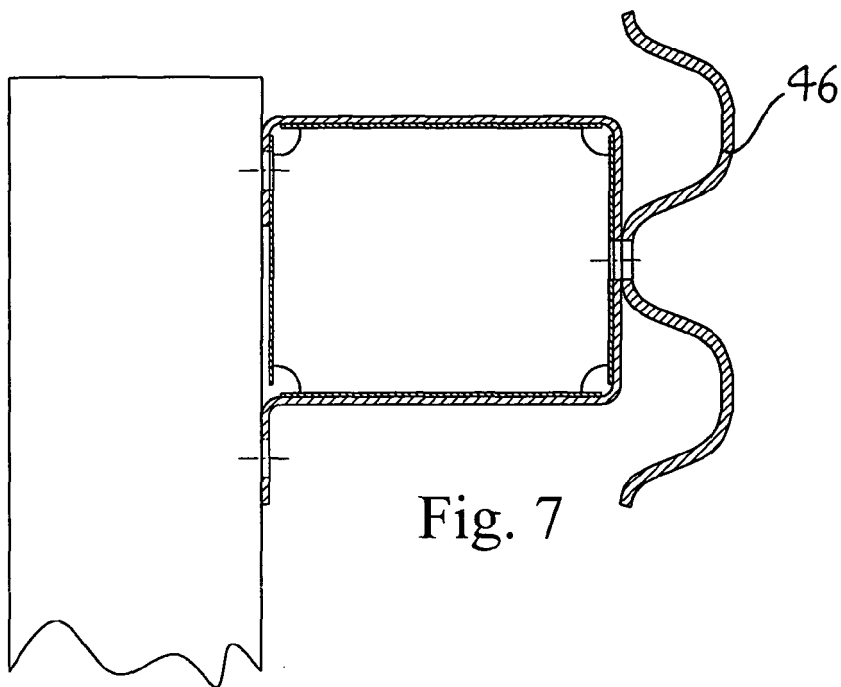
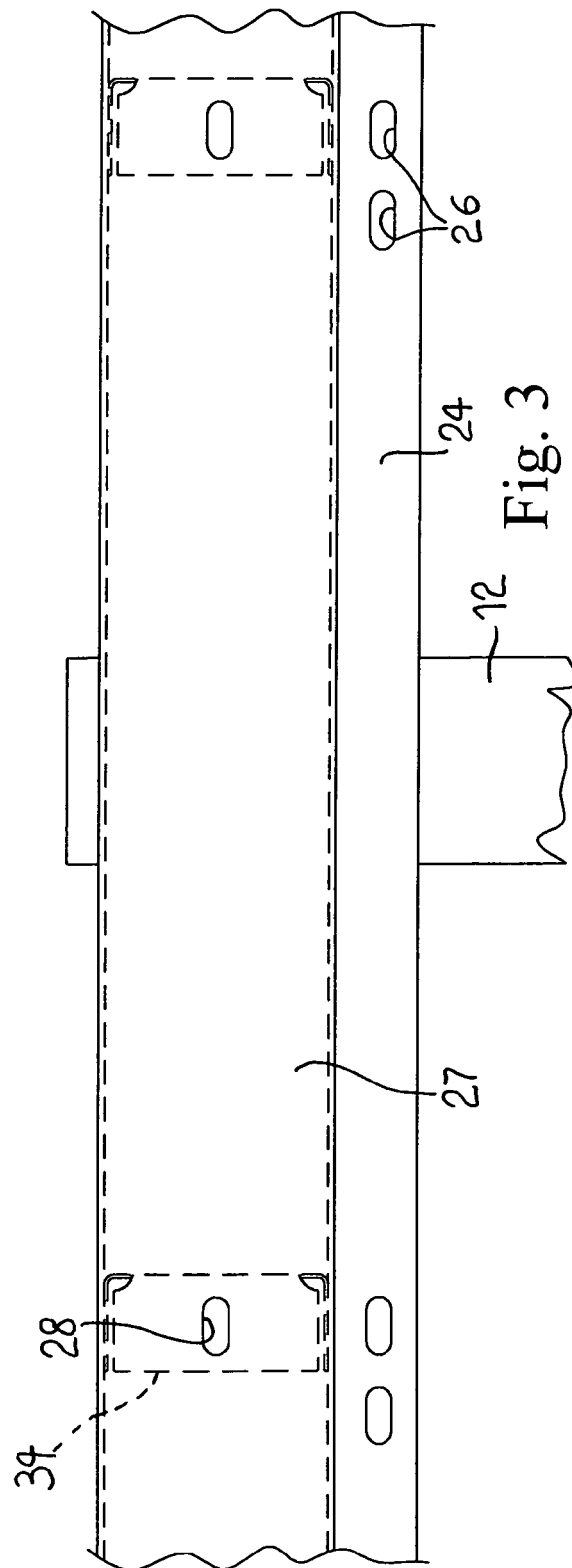
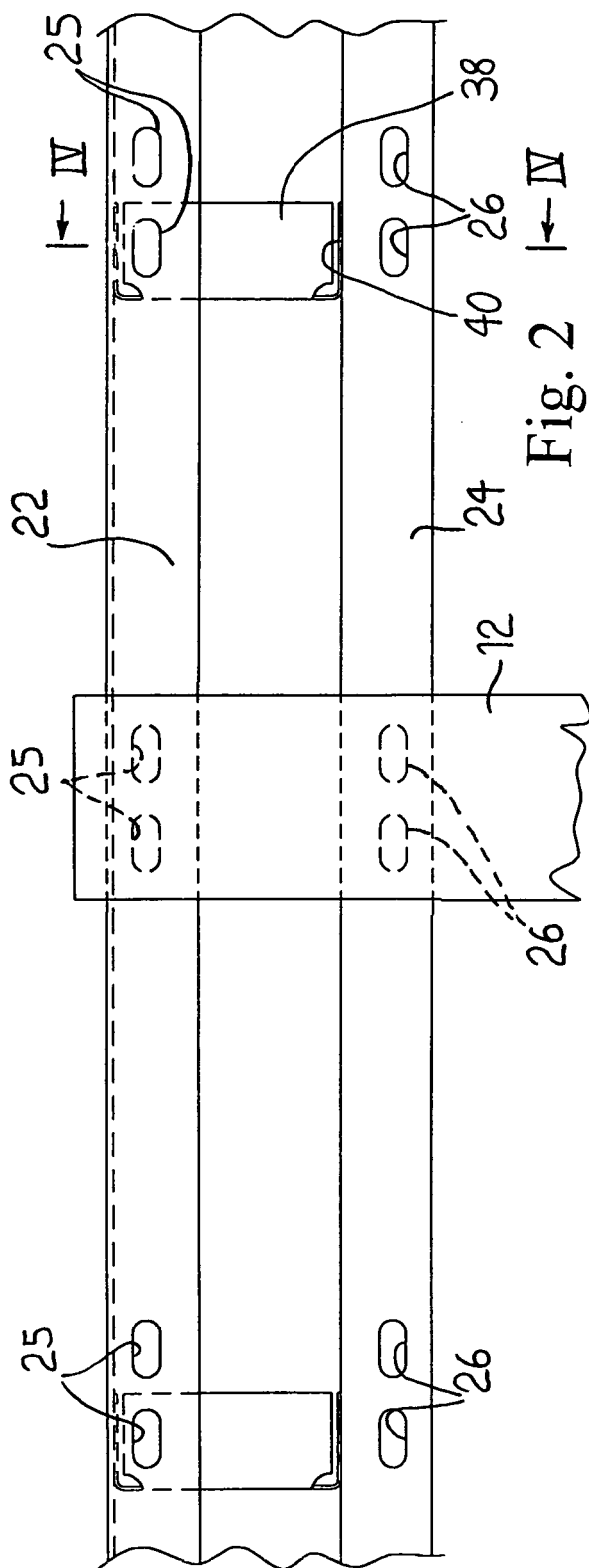
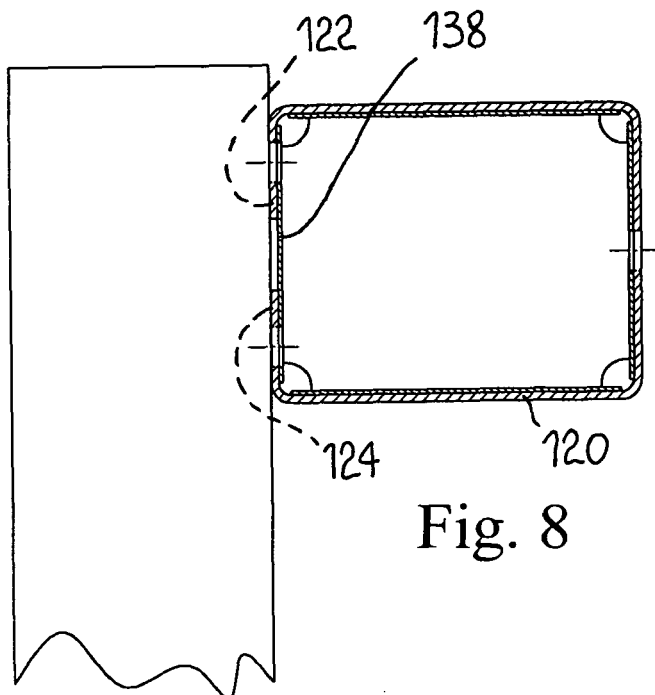
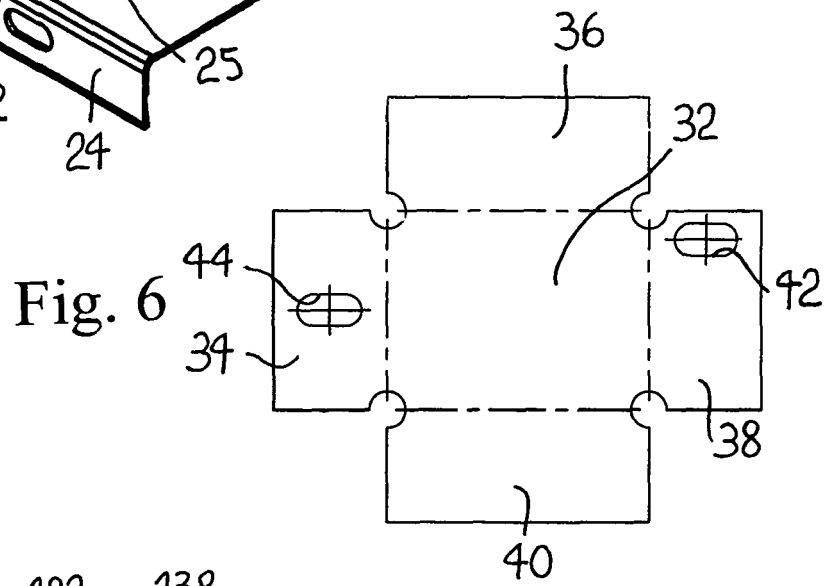
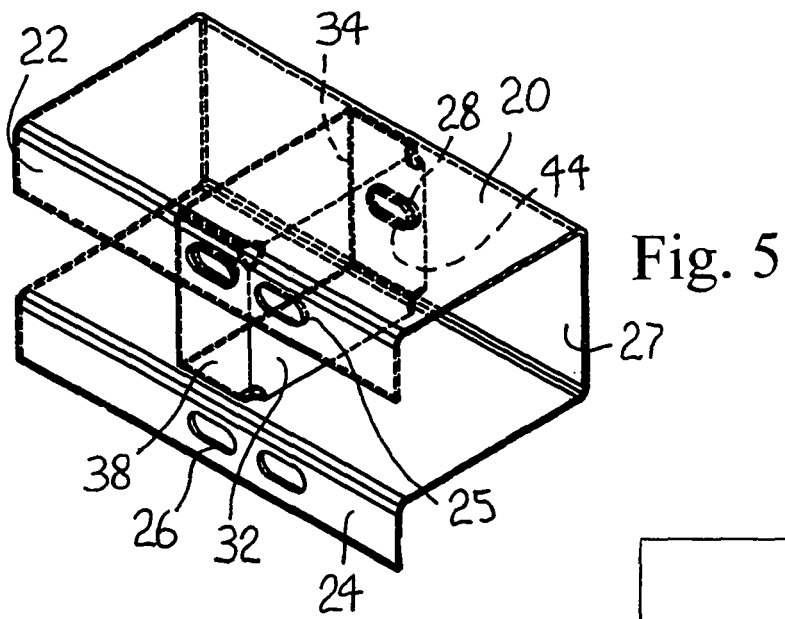


Fig. 7







DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	EP 1 418 274 A (SPIG SCHUTZPLANKEN-PRODUKTIONS-GESELLSCHAFT MBH & CO.KG) 12 May 2004 (2004-05-12) * paragraphs [0040] - [0042]; figure 5 * -----	1-3	INV. E01F15/04
X	EP 0 604 277 A (LES PROFILES DU CENTRE; LES PROFILES DU CENTRE S.A) 29 June 1994 (1994-06-29) * column 13, lines 29-49; figure 10 * -----	1	
X	US 3 603 562 A (ERNEST GLAESENER) 7 September 1971 (1971-09-07) * column 3, lines 23-41 * * column 4, lines 35-62; figure 5 * -----	1	
X	CH 489 669 A (MORTEO SOPREFIN S.P.A) 30 April 1970 (1970-04-30) * column 3, lines 11-38; figures 1,2 * -----	1	
A	DE 196 01 377 A1 (STUDIENGESELLSCHAFT FUER STAHLSCHUTZPLANKEN EV, 57072 SIEGEN, DE) 17 July 1997 (1997-07-17) * figures 1,2 * -----	1,9	TECHNICAL FIELDS SEARCHED (IPC) E01F
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 5 May 2006	Examiner Flores Hokkanen, P
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	

 2
EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 05 42 5858

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

05-05-2006

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 1418274	A	12-05-2004	AT 267920 T	15-06-2004
			DE 50200483 D1	22-07-2004

EP 0604277	A	29-06-1994	AT 220148 T	15-07-2002
			DE 69332074 D1	08-08-2002

US 3603562	A	07-09-1971	AT 324393 B	25-08-1975
			BE 727926 A	16-07-1969
			CH 493702 A	15-07-1970
			DE 1815645 A1	16-10-1969
			DK 131693 B	18-08-1975
			ES 156663 U	16-02-1979
			FR 1595168 A	08-06-1970
			GB 1252167 A	03-11-1971
			LU 55865 A1	25-04-1969
			NL 6818796 A	13-10-1969
			NO 127931 B	03-09-1973
			SE 347309 B	31-07-1972

CH 489669	A	30-04-1970	FR 1572041 A	20-06-1969

DE 19601377	A1	17-07-1997	AT 184942 T	15-10-1999
			WO 9726411 A1	24-07-1997
			EP 0874940 A1	04-11-1998
			ES 2139437 T3	01-02-2000
			TR 9801329 T2	21-10-1998
