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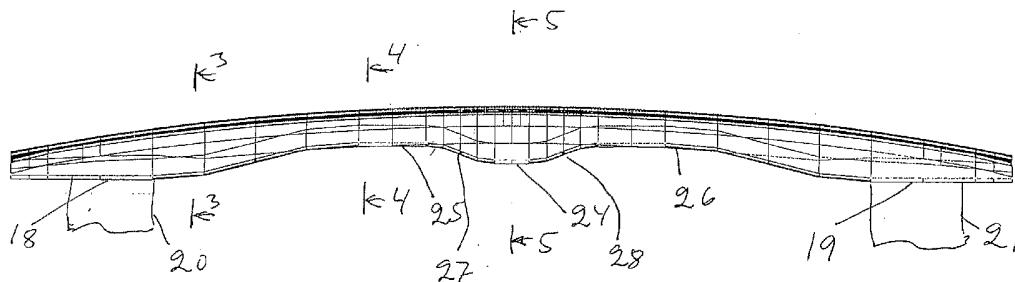
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(54) Title: BUMPER BEAM FOR A VEHICLE



(57) Abstract: A bumper beam for a vehicle in the form of a hat beam is adapted to be mounted with its opening facing outwards from the vehicle. The beam has a web height that varies along the beam. The web height in portions (25,26) between a central portion (24) and side portions (18,19) on each side of the central portion has a reduced web height as compared with both the central portion and the side portions.

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Bumper beam for a vehicle

Technical field

This invention relates to a bumper beam for a vehicle in the form of a hat beam adapted to be mounted with its opening facing outwards from the vehicle.

Technical background

Usually, one wants to make bumper beams as stiff as possible so that their collapsing is delayed when they hit a barrier. In particular for a rear bumper, one of the most common accidents is however a vehicle backing onto a narrow pole on a parking lot. A bumper beam that, in a backing accident, is strong when hitting a barrier may not yield when hitting a narrow pole close to the centre of the vehicle. It will instead fold and collapse completely. WO 00/66400 shows a bumper beam in the form of a hat beam that has its web height reduced towards its centre.

Object of invention and brief description of the invention

It is an object of the invention to provide a bumper beam that is optimally adapted to take up energy well at various kinds of collisions.

This is achieved primarily in that the webs of the beam in portions between a central portion and side portions on both sides of the central portion have a reduced height as compared with both the central portion and the side portions.

Brief description of the drawings

The figures show a bumper beam that is only an example of the invention.

Figure 1 is a computer-drawn view of the bumper beam seen from above.

Figure 2 is a computer-drawn perspective view of the bumper beam shown in figure 1.

Figures 3, 4 and 5 are transverse sections taken along the respective lines 3-3, 4-4 and 5-5.

Description of the illustrated and preferred embodiment

The bumper beam shown on the figures is made of metal. It can suitably be made of hardenable sheet steel that is hot-stamped and hardened in a single step in the so called press-hardening process. The high-strength steel may have a yield strength over 1200 MPa (N/mm²) or over 1500 MPa.

The bumper beam is a hat beam (it has a hat profile) with a central flange 11, two webs 12,13 and two side flanges 14,15. The side flanges have upstanding edges 16,17. The beam has two fastening portions 18,19 in one and the same plane. These fastening portions are fastened to supporting parts 20,21 of the vehicle. The webs 12,13, and thus the profile height of the beam, are high in the central portion 24 of the beam and in connection with the fastening portions 18,19, but they are considerably lower in the portions 25,26 therebetween. The web height in the portions with reduced height 25,26 should be at most $\frac{3}{4}$, rather $\frac{2}{3}$ or preferably at most half of the web height at the central portion 24. Each one of the transitions 27,28 between the central portion and the height-reduced portions has a length that is at most $\frac{1}{10}$ of the total length of the beam. Thereby, the central flange will have rather abrupt bends and these bends will stabilise the webs and reduce their tendency to bend outwardly away from each other when the beam is loaded close to its centre.

The illustrated beam has thus a central portion and portions in connection with the fastening of the beam, all of which are strong and between these portions are weaker portions.

Buckling of the beam causes more damage the closer to the middle it is since the longest moment arm will be there. If the profile is strong and does not bend, a thin pole will buckle the beam to a sudden collapse. If the profile is more yielding by

having the weakened portions 25,26, a buckling is delayed when the beam is hit close to its midpoint.

The beam will have somewhat impaired qualities in collisions with a barrier because of its yieldability but the invention will provide an optimum compromise between the qualities for various kinds of crashes and better overall qualities.

The described beam is made of hot stamped and hardened sheet steel, suitably boron alloyed manganese steel. Alternatively, it can be cold formed of high strength cold forming steel. It can also be made of another metal than sheet steel, for example aluminium.

Claims

1. A bumper beam for a vehicle in the form of a hat beam adapted to be mounted with its opening facing outwards from the vehicle.
characterised in that the webs of the beam in portions (25,26) between a central portion (24) and side portions (18,19) on both sides of the central portion have a reduced height as compared with both the central portion and the side portions.
2. A bumper beam according to claim 2, **characterised in** that the height of the webs in the reduced portions is at most $\frac{3}{4}$ of the height of the webs at the central portion
3. A bumper beam according to claim 2, **characterised in** that the height of the webs in the reduced portions (25,26) is at most $\frac{2}{3}$ of the height of the webs at the central portion.
4. A bumper beam according to claim 3, **characterised in** that the height of the webs in the reduced portions (25,26) is at most $\frac{1}{2}$ of the height of the webs at the central portion(24).
5. A bumper beam according to claim 2 or 3, **characterised in** that each one of the transitions (27,28) between the central portion (24) and the reduced portions (25,26) has a length that is at most $\frac{1}{10}$ of the total length of the beam.

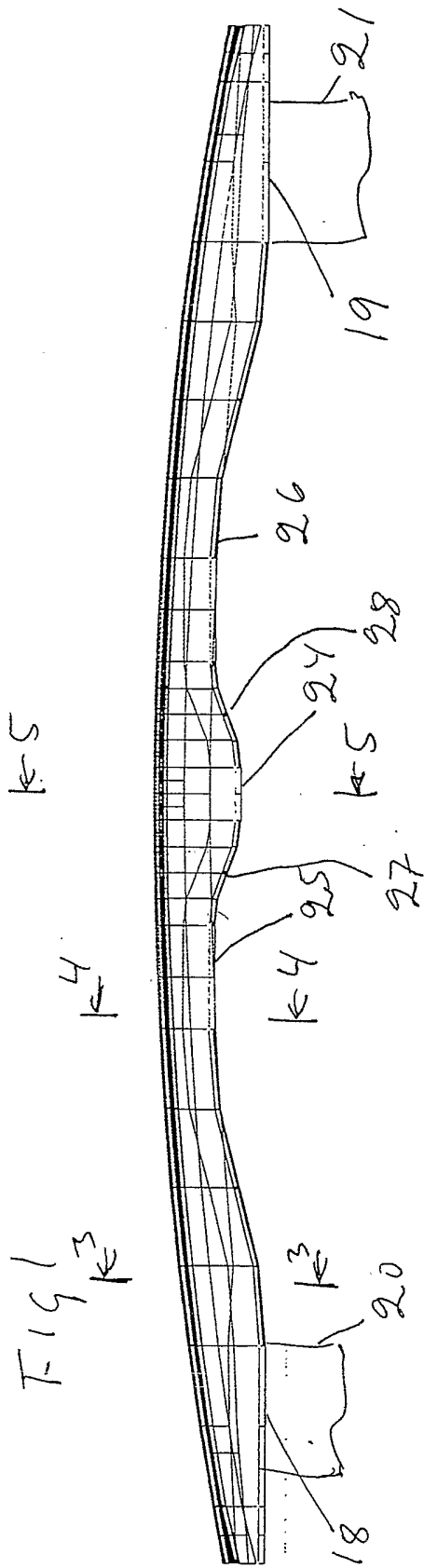


FIG 2

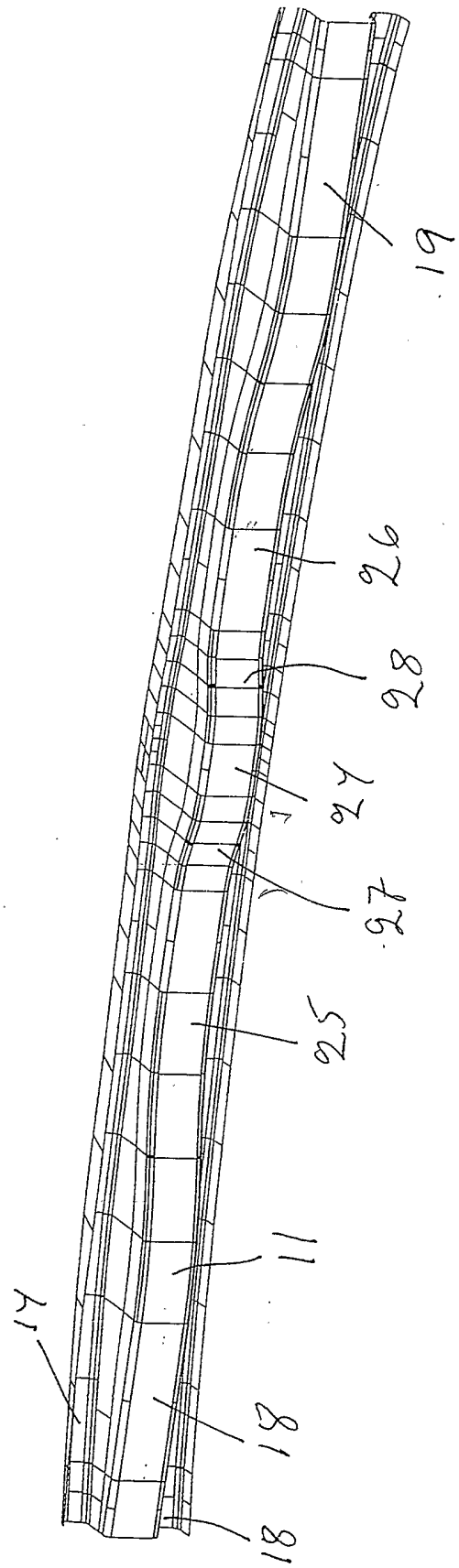


FIG 5

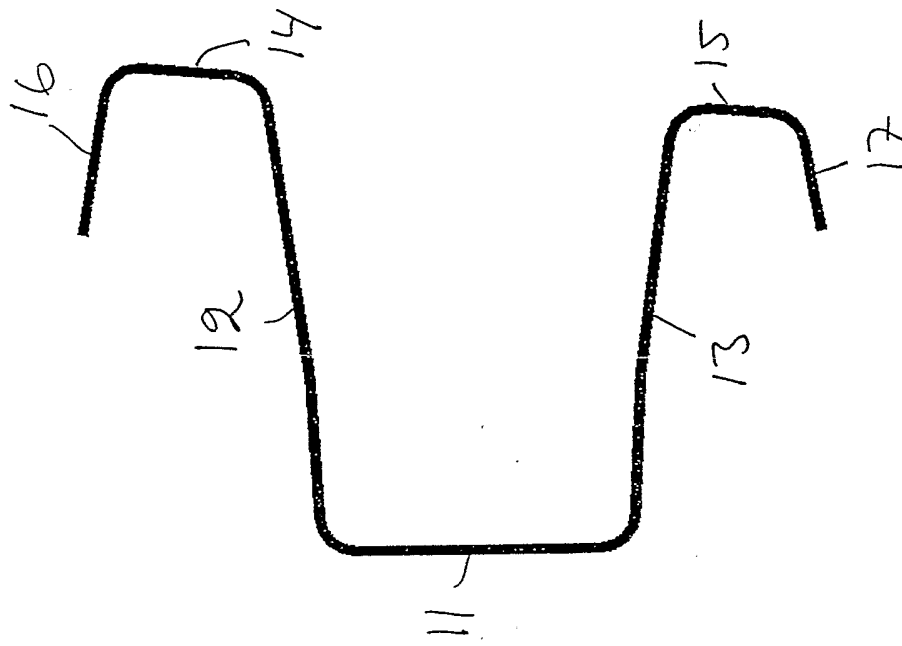


FIG 4

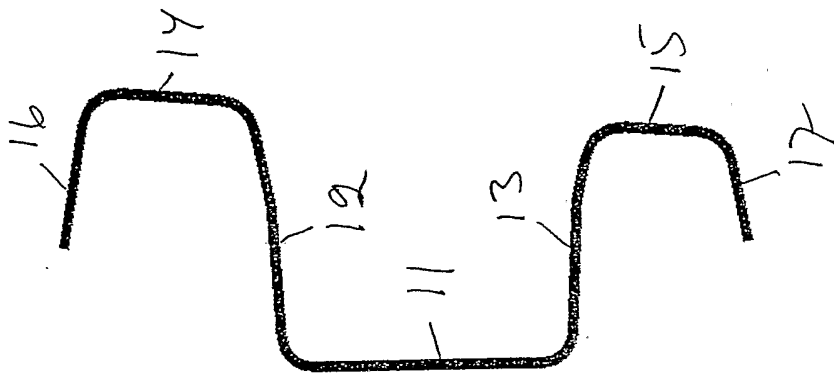
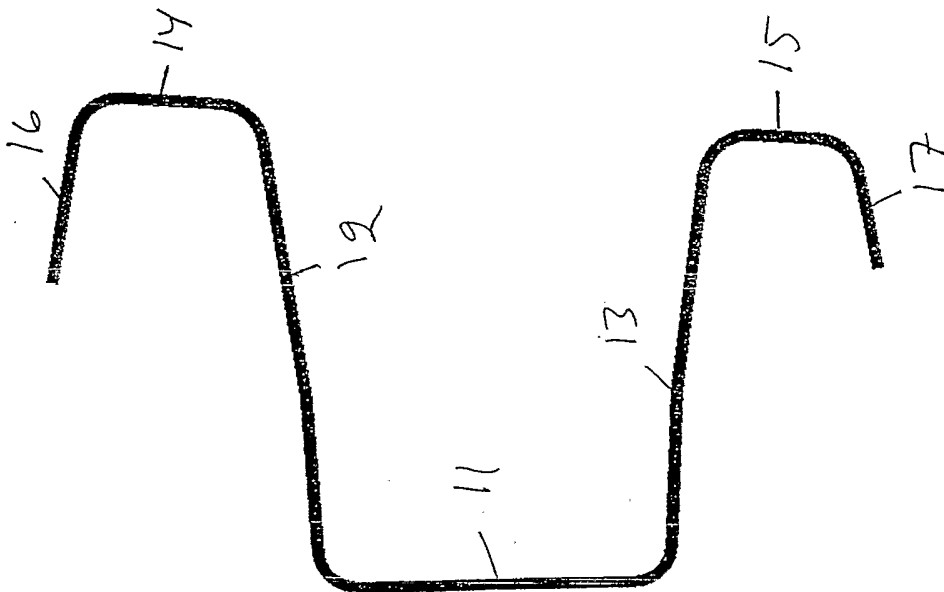


FIG 3



INTERNATIONAL SEARCH REPORT

International application No.
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A. CLASSIFICATION OF SUBJECT MATTER

IPC7: B60R 19/02
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: B60R

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-INTERNAL, WPI DATA, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 0230714 A1 (SSAB HARDTECH AB), 18 April 2002 (18.04.2002), figure 1, abstract --	1-5
Y	WO 9915365 A1 (NORSK HYDRO ASA), 1 April 1999 (01.04.1999), figure 1, abstract --	1-5
A	WO 0078575 A1 (NORSK HYDRO ASA), 28 December 2000 (28.12.2000) --	1-5
A	WO 9747496 A1 (HYDRO RAUFOSS AUTOMOTIVE AS), 18 December 1997 (18.12.1997) --	1-5

Further documents are listed in the continuation of Box C. See patent family annex.

* Special categories of cited documents:	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance	"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E" earlier application or patent but published on or after the international filing date	"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&" document member of the same patent family
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"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search 1 October 2004	Date of mailing of the international search report 01-10-2004
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Name and mailing address of the ISA/ Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. +46 8 666 02 86	Authorized officer Hans Nordström/EK Telephone No. +46 8 782 25 00
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INTERNATIONAL SEARCH REPORT

International application No.
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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
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