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Willerscheid(10) **Pub. No.: US 2014/0096470 A1**(43) **Pub. Date: Apr. 10, 2014**(54) **PROFILED ELEMENT AND METHOD FOR
PRODUCING A PROFILED ELEMENT**(75) Inventor: **Heiner Willerscheid, Lauf (DE)**(73) Assignee: **PROTEKTORWERK FLORENZ
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(57)

ABSTRACT

The invention relates to a profiled element with an elongated profiled body that consists of metal or plastic in particular. The profiled body comprises at least two separately designed longitudinal portions, each longitudinal portion comprising a meandering longitudinal edge and a rectilinear longitudinal edge that lies opposite the meandering longitudinal edge. The longitudinal portions are connected to each other by the rectilinear longitudinal edges. The invention further relates to such a profiled element in which the longitudinal portions can be designed separately or as a single piece, said profiled body having a substantially U- or V-shaped cross-section with two profiled limbs and a profiled connecting piece that connects the profiled limbs. The profiled limbs are formed by the bent longitudinal portion regions that comprise meandering longitudinal edges, and the respective profiled limbs are designed so as to be doubled-walled with an outer wall and an inner wall, which faces the interior of the U- or V-shaped cross-section, in at least some regions, said meandering longitudinal edges running in the inner walls of the double-walled profiled limbs at least along some sections. The invention further relates to a method for producing such profiled elements.

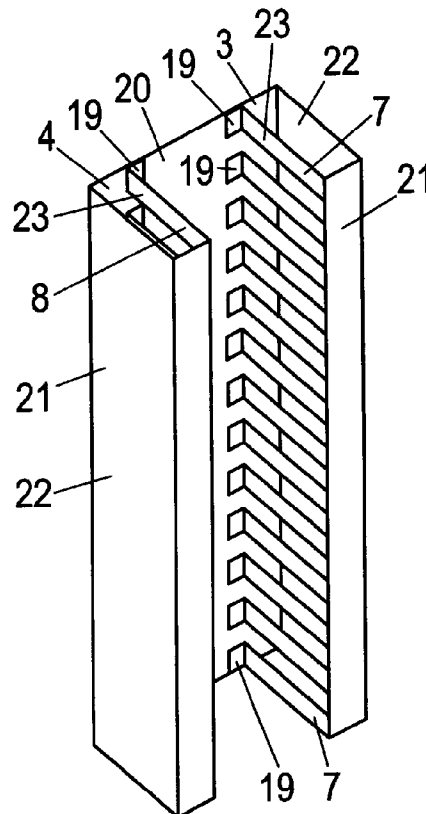


Fig.1

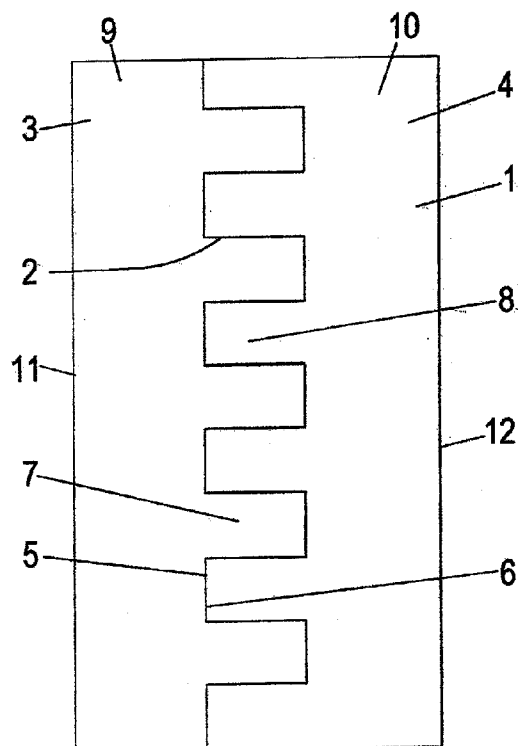
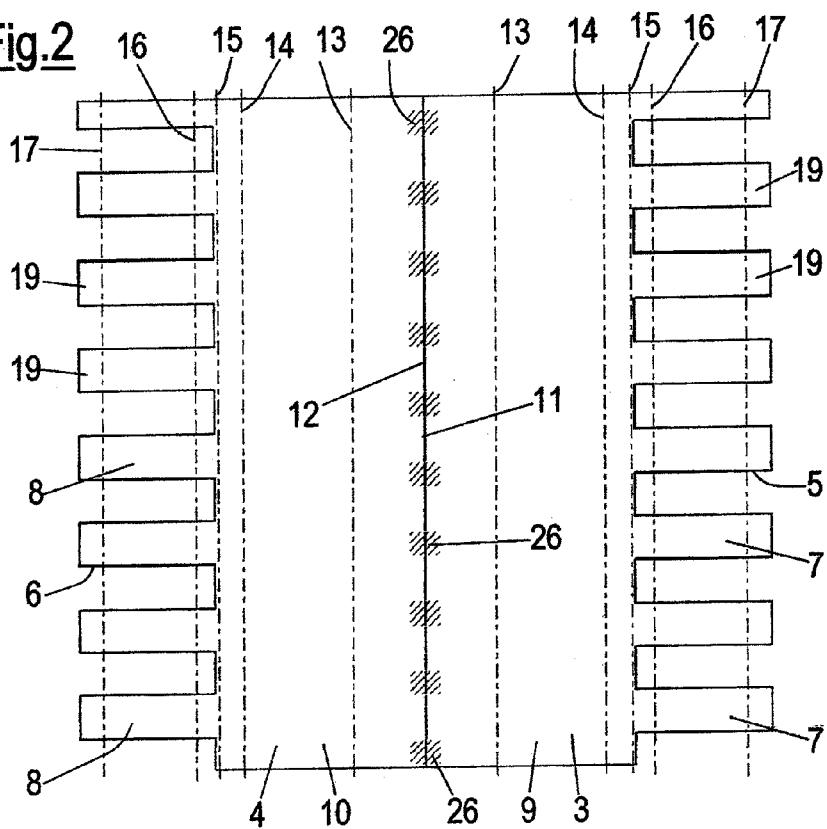
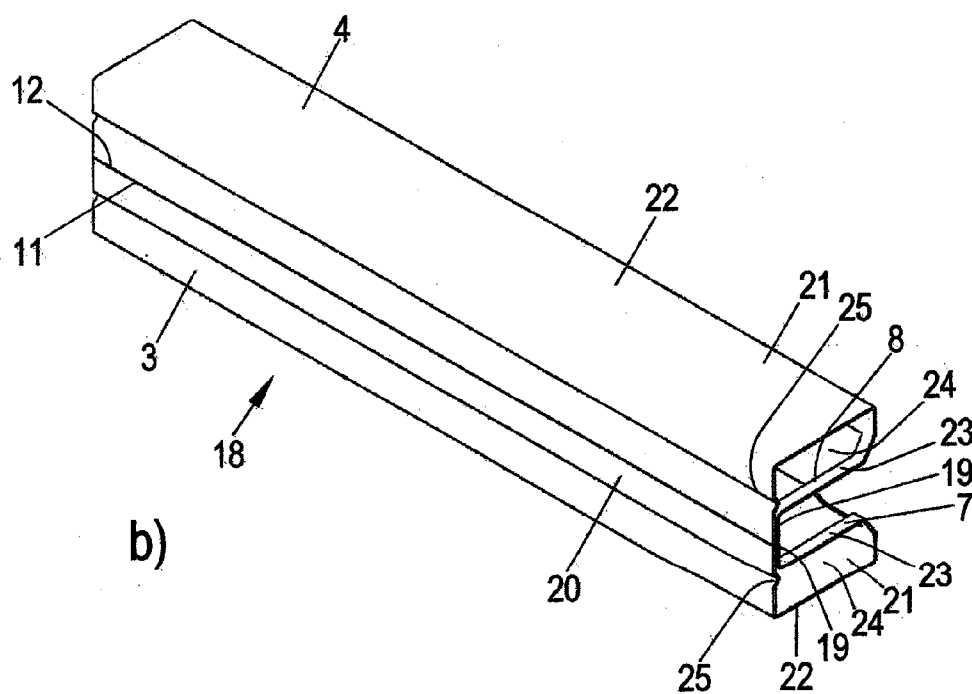
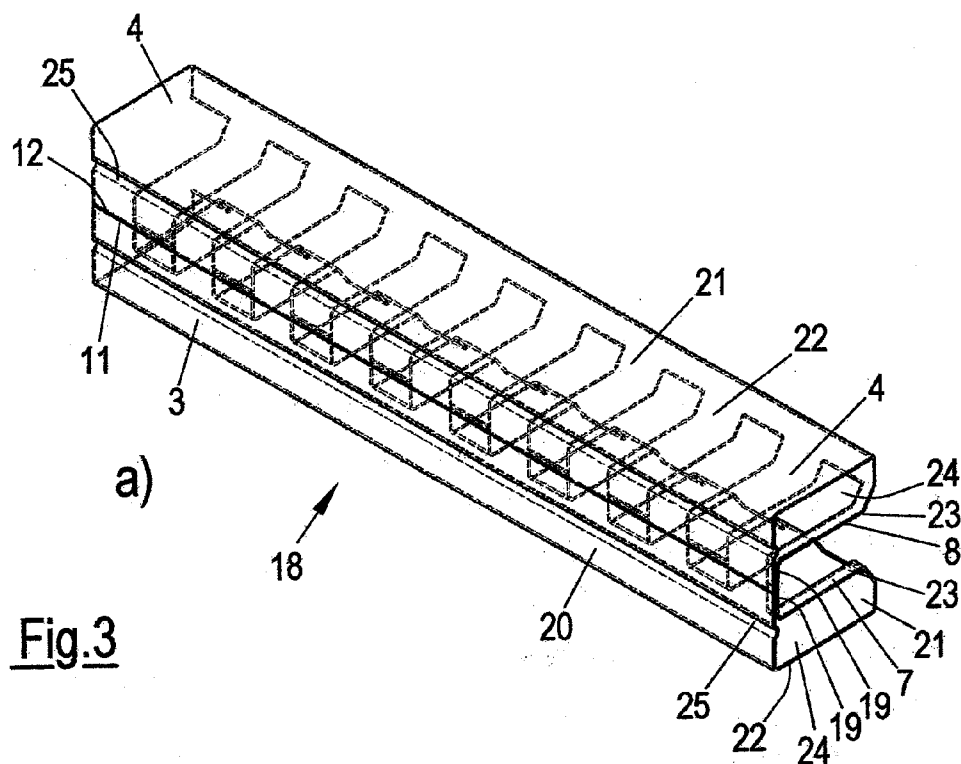


Fig.2





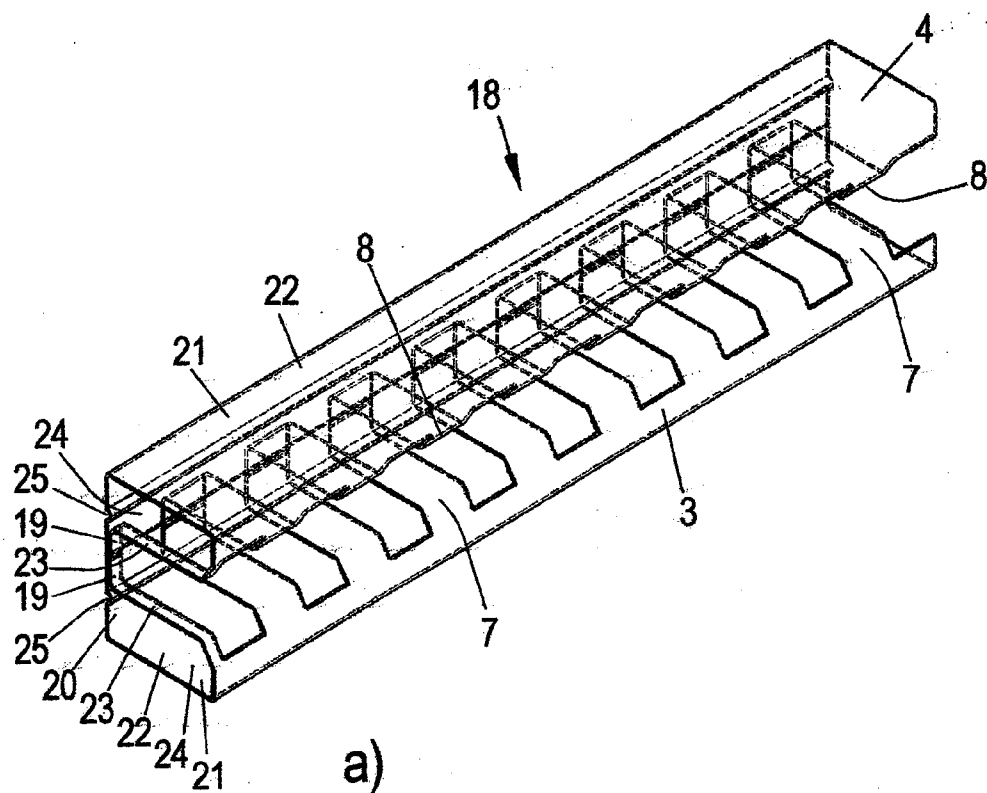


Fig.4

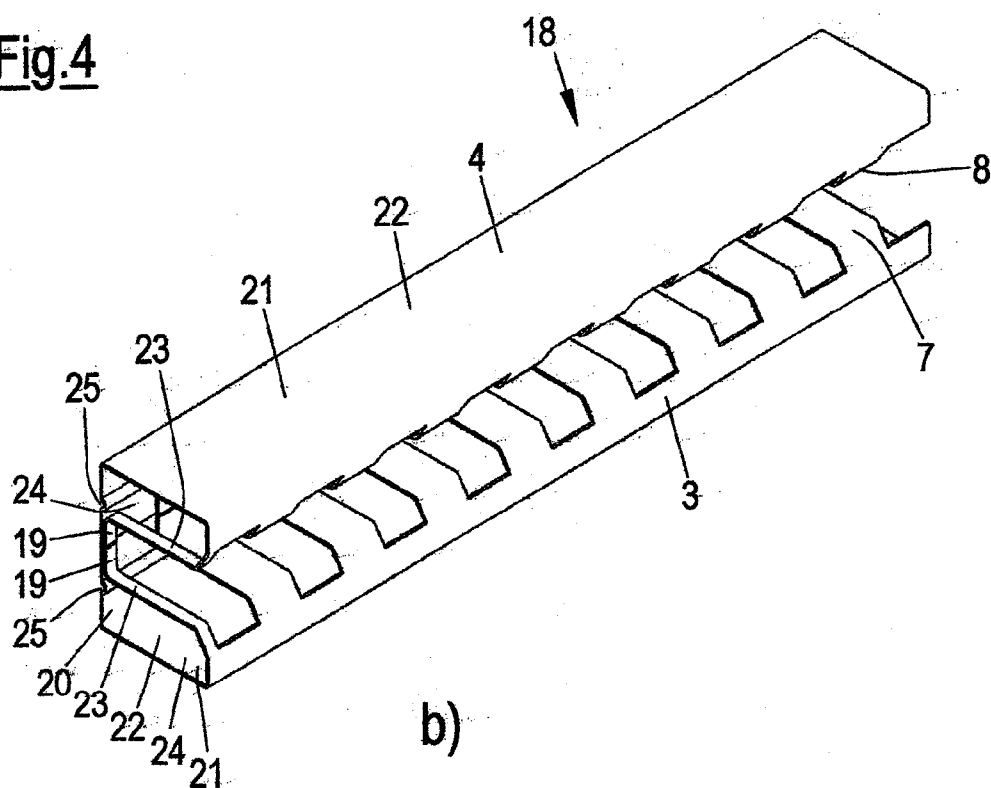


Fig.5

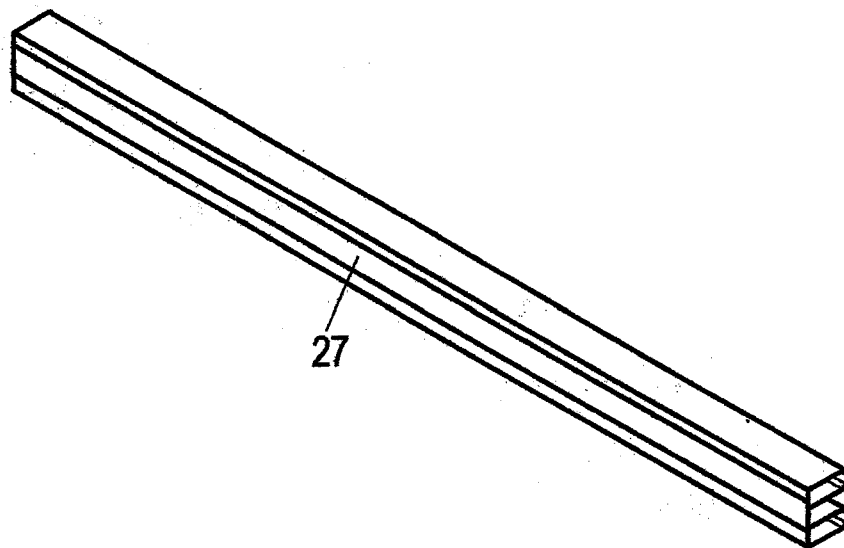


Fig.6

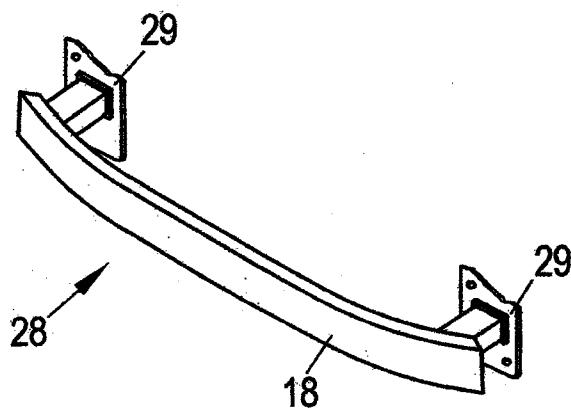
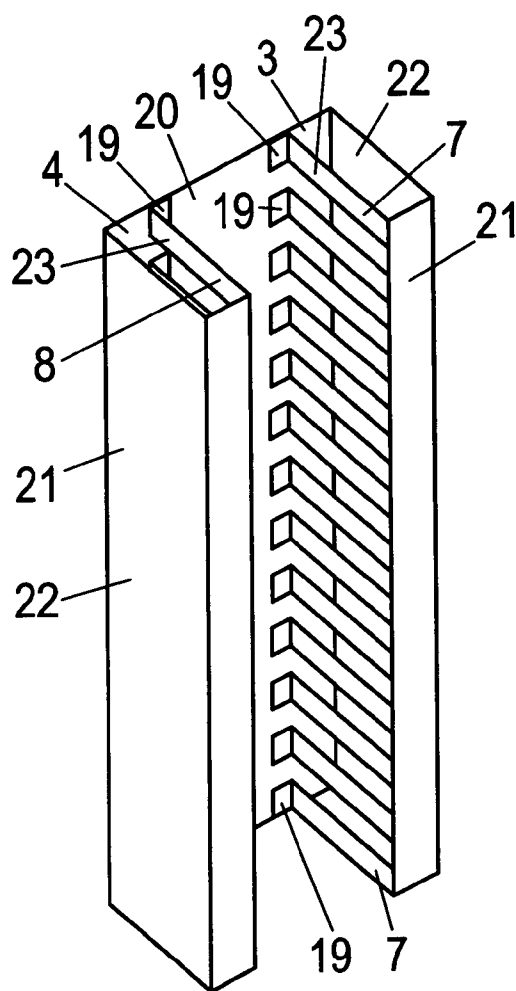


Fig.7



PROFILED ELEMENT AND METHOD FOR PRODUCING A PROFILED ELEMENT

[0001] The present invention relates to a section element, in particular to a construction section, for example a dry construction section, a facade section, a plaster section, a skirting section, a screed section a tile section or a cable carrier section, a stiffening section, in particular an automotive section, or a shelf rail or a drainage rail, having an elongated section body which in particular comprises metal or plastic. The invention is furthermore directed to a method of manufacturing such a section element.

[0002] Section elements of this kind are used, for example, as upright C sections for dry construction, but can also be configured as any other lightweight construction section elements. In many cases, the section elements, on the one hand, have to have a predefined stiffness, but, on the other hand, have to have a weight which is as low as possible. To reduce weight, openings are frequently produced, for example punched, in the section element, which has the disadvantage, however, that the punched out pieces represent waste pieces. On the one hand, the problem of disposal results in this respect and, on the other hand, the costs for the manufacture are increased by the additional punching process. Since furthermore the costs of such section elements are frequently substantially determined by the material costs, the waste pieces are undesired in the production of the holes.

[0003] It is an object of the present invention to provide a section element of the initially named kind which can be manufactured in a simple and inexpensive manner and with reduced material effort. Furthermore, a method for manufacturing such a section element should be provided.

[0004] This object is satisfied in accordance with the invention by a section element having an elongated section body which in particular comprises metal or plastic and which comprises at least two separately formed longitudinal portions, wherein each longitudinal portion comprises a meandering longitudinal edge as well as a straight-line longitudinal edge disposed opposite the meandering longitudinal edge and wherein the longitudinal portions are connected to one another via the straight-line longitudinal edges. A further section element in accordance with the invention has an elongated section body which in particular comprises metal or plastic and which comprises at least two longitudinal portions, wherein each longitudinal portion has a meandering longitudinal edge, wherein the section body has a substantially U-shaped or V-shaped cross-section having two section limbs and a section web connecting the section limbs, wherein the section limbs are formed by the bent over regions of the longitudinal portions comprising the meandering longitudinal edges and the respective section limbs are made at least regionally double walled having an outer wall and an inner wall disposed toward the interior of the U-shaped or V-shaped cross-section, and wherein the meandering longitudinal edges extend at least regionally in the inner walls of the double-walled section limbs.

[0005] In accordance with the method in accordance with the invention, two separate longitudinal portions each having a meandering longitudinal edge and a straight-line longitudinal edge disposed opposite the meandering longitudinal edge are provided for generating the section element, wherein the longitudinal portions are connected to one another via the straight-line longitudinal edges. In a further method in accordance with the invention, an elongated strip-shaped starting material having two respective outwardly disposed meander-

ing longitudinal edges are provided for producing the section element and longitudinal portions of the material strip bounded by the meandering longitudinal edges are bent over for producing the section limbs until the meandering longitudinal edges at least regionally come into contact with portions of the section body disposed between the meandering longitudinal edges, whereupon they are connected to them.

[0006] In accordance with the invention, a weight reduction of the section element is thus achieved in that, in contrast to a full-area design, the section element comprises two meandering longitudinal edges so that the weight of the section element is reduced with respect to a full-area design. A relatively large-area region in the center of the section element is produced by the connection of the two longitudinal portions via their respective straight-line longitudinal edge disposed opposite the respective meandering longitudinal edge or by a correspondingly single-part design of the two longitudinal portions, said relatively large area region having a high stiffness, whereas the meandering longitudinal edges each form the outer edges of the section element at which outer edges no corresponding stiffness is required in many applications. Furthermore, such a design is frequently also advantageous for visual reasons since the center region of the section element is formed as a closed surface in this manner. In particular when the marginal regions are deformed, for example bent over, by a further processing and are thereby no longer visible from the outside, a full-area impression of the section element is created even though material can be saved by the meandering longitudinal edge. A structure which is open or perforated at one side can thus be produced.

[0007] A particularly stiff section having a U-shaped or V-shaped cross-section is produced by the double-walled production of the section limbs of the further section element in accordance with the invention, with the desired weight reduction of the section element being achieved by the extent of the meandering longitudinal edges at least regionally in the inner walls of the double-walled section limbs despite the increase in the stiffness.

[0008] In accordance with an advantageous embodiment of the method in accordance with the invention, at least one meandering slit which extends in the longitudinal extent of the starting material and by which the starting material is divided into two separate longitudinal portions is introduced into an elongated strip-shaped starting material. No waste material which would increase the manufacturing costs arises by the production of the two longitudinal portions in this manner. In this respect, it is both possible that the two longitudinal portions produced from the originally uniform starting material are connected to one another via their straight-line longitudinal edges to produce the same section element and that two longitudinal portions which are produced in a corresponding manner from a different starting material are connected to one another to form the section element in accordance with the invention. In both cases, both the production of the waste material and the above-named further advantages are achieved.

[0009] In accordance with an advantageous embodiment of the invention, the straight-line longitudinal edges are connected to one another directly or at least via one intermediate element. The straight-line longitudinal edges can, for example, be connected to one another or optionally to the intermediate element by welding, clamping, crushing, pressing, screwing, adhesive bonding, riveting, rebating or by a pressure joining process such as clinching or crimping. The

intermediate element can in this respect advantageously be made as an elongated strip-shaped element. The intermediate element can in particular also have a thickness which is equal in size to the thickness of the longitudinal portions.

[0010] In accordance with a further preferred embodiment, the meandering longitudinal edges of the longitudinal portions are made complementary to one another. This, for example, results automatically when the longitudinal portions are manufactured from the same starting material in that a meandering longitudinal portion is introduced into the two longitudinal portions to divide the starting material.

[0011] The longitudinal portions preferably comprise the same material. This also results automatically when the two longitudinal portions are manufactured from the same starting material. In this case, the longitudinal portions form two contiguous portions of an originally uniform material strip along the meandering longitudinal edges.

[0012] The section body is advantageously formed as a thin-walled cold-formed section body. The sectional elements in accordance with the invention are thus lightweight construction sections which can be used in different manners. Applications are also conceivable, for example, in addition to the initially named uses, in the automotive sector, in switch cabinet construction, in ceiling systems or even as vine supports, wine posts or the sector of guard rails. The longitudinal portions in this respect advantageously have a thickness of approximately between 0.5 mm and 3 mm.

[0013] In accordance with a further advantageous embodiment of the invention, the straight-line longitudinal edges extend substantially parallel to the longitudinal extent of the longitudinal portion. An oblique extent is generally also conceivable as long as the longitudinal portions can be connected to one another.

[0014] In accordance with a further advantageous embodiment of the invention, the meandering longitudinal edges are connected to one another directly or via at least one further intermediate element. A closed section can be produced in this manner, for example. The straight-line longitudinal edges can in this respect preferably be connected to one another at least regionally or optionally to the further intermediate element by welding, adhesive bonding, crushing, pressing, screwing, adhesive bonding, riveting, rebating or by a pressure joining process such as clinching or crimping.

[0015] In accordance with a further preferred embodiment of the invention, the meandering longitudinal edges are connected at least regionally to portions of the section body disposed between the meandering longitudinal edges. The portions can in this respect preferably lie substantially in the region of a longitudinal central axis of the section body. It is, however, also possible that the portions lie outside the longitudinal central axis. The portions can in particular each lie, for example, in the marginal region of the section body facing the respective meandering longitudinal edge. The regions of the longitudinal portions bounded by the meandering longitudinal edges can in this manner form support elements which are supported, for example, at the rear side of the section element in its central region or in its marginal regions. The stiffness of a corresponding section element can thereby be increased.

[0016] In the case of a separate design of the longitudinal portions, the mutually connected straight-line longitudinal edges advantageously extend through the portions.

[0017] The portions can in particular be configured as areal portions and can be connected to connection regions of the longitudinal portions bounded by the meandering longitudinal

edges. A further increase in the stiffness as well as a stronger connection of the connection regions to the remaining region of the section element are achieved by the areal connection. The connection can in this respect be configured, for example, as a weld connection or as an adhesive bond connection. Other types of connection are, however, also possible such as a plug-in connection, a stamped connection, a connection by a pressure joining process such as clinching or crimping or a riveting or screwing.

[0018] In accordance with a further advantageous embodiment of the invention, the section body has a substantially U-shaped or V-shaped cross-section having two section limbs and a section web connecting the section limbs, wherein the limb sections are each formed by bent-over regions of the longitudinal portions comprising the meandering longitudinal edges. The section limbs can in this respect preferably be made at least regionally with double walls having an outer wall and an inner wall disposed toward the interior of the U-shaped or V-shaped cross-section and the meandering longitudinal edge can in each case extend at least regionally in the inner wall of the double-walled section limb. A particularly stiff section having a U-shaped or V-shaped cross-section is thereby achieved.

[0019] A hollow space extending in the longitudinal direction of the section limb is advantageously respectively formed between the walls of the double-layer section limb. A further increase in the stiffness is thereby ensured with a simultaneous material reduction and reduced weight with respect to a full section.

[0020] In accordance with a further preferred embodiment of the invention, the mutually connected straight-line longitudinal edges of the longitudinal portions are in particular arranged centrally within the section web. A symmetrical design of the section element is achieved in this manner by which the stiffness is also further increased.

[0021] A section element in accordance with the invention can advantageously be used as a force absorber, in particular as a bumper, for example of an automobile or of another vehicle. Due to the design in accordance with the invention, a weight reduction can be achieved with respect to a full-area design of a section element with approximately the same stiffness. A section element in accordance with the invention can also advantageously be used as a replacement for an upright C section.

[0022] Further advantageous embodiments are set forth in the dependent claims.

[0023] The invention will be described in more detail in the following with reference to embodiments and to the drawings; in which are shown:

[0024] FIG. 1 a material portion having a cutting pattern to produce a section element formed in accordance with the invention;

[0025] FIG. 2 a section element formed in accordance with the invention in an intermediate step of the manufacture;

[0026] FIGS. 3a) and b) a respective part view of a section element formed in accordance with the invention in a perspective representation, once with and once without covered edges being shown;

[0027] FIGS. 4a) and b) the section element in accordance with FIG. 3 in a respective different part view, once with and once without covered edges being shown;

[0028] FIG. 5 a further section element which is not manufactured in accordance with the invention;

[0029] FIG. 6 a bumper with a section element formed in accordance with the invention; and

[0030] FIG. 7 a further section element formed in accordance with the invention.

[0031] FIG. 1 shows a material strip 1, for example a sheet metal strip, which serves as a starting material for a section element in accordance with the invention. A meandering slit 2 which extends in the longitudinal extent of the material strip 1 and by which the material strip 1 is divided into two separate longitudinal portions 3, 4 is formed in the material strip 1. The longitudinal portions 3, 4 are each given a meandering longitudinal edge 5, 6 by the meandering slit 2 which contact one another seamlessly in the representation in accordance with FIG. 1. The meandering longitudinal edges 5, 6 each include edge portions extending in the longitudinal direction and extending perpendicular thereto. Other meandering extents of the longitudinal edges can also be used within the framework of this invention, for example having obliquely extending edge portions which are curved or which are entwined with one another.

[0032] Web-shaped connection regions 7, 8 of the longitudinal portions 3, 4 are respectively formed by the meandering longitudinal edges 5, 6 and are each connected in one piece to elongated portions 9, 10 of the longitudinal portions 3, 4 and project laterally beyond them. As can furthermore be seen from FIG. 1, the web-shaped connection regions 7 are bounded by the meandering longitudinal edge 5 and the web-shaped connection regions 8 are bounded by the meandering longitudinal edge 6.

[0033] The longitudinal portion 3 comprises a straight-line longitudinal edge 11 which is disposed opposite the meandering longitudinal edge 5 and which simultaneously forms a first outer edge of the material strip 1. In a corresponding manner, the longitudinal portion 4 comprises a straight-line longitudinal edge 12 which is disposed opposite the meandering longitudinal edge 6 and which forms the second outer edge of the material strip 1.

[0034] To produce the section element in accordance with the invention, the material strip 1 is divided into the two longitudinal portions 3, 4 by introducing the meandering slit 2, for example by a laser cutting process, a rotary cutting process or another suitable cutting process, and the two longitudinal portions 3, 4 are subsequently arranged such that their straight-line longitudinal edges 11, 12 contact one another as is shown in FIG. 2. In this position, the two longitudinal portions 3, 4 are connected to one another, for example, welded, in particular laser welded, to one another along the mutually connecting straight-line longitudinal edges 11, 12. An overlapping connection is also possible in this respect.

[0035] Subsequently, the longitudinal portions 3, 4 are each bent over along bend lines 13 to 17 shown by dashed lines and extending in the longitudinal direction of the longitudinal portions 3, 4 until a section body 18 of the section element arises which has a U-shaped cross-section such as is shown in FIGS. 3 and 4. The longitudinal portions 3, 4 are in this respect bent over in the same direction by 90° in each case along the bend lines 13, 14, while a bending by only approximately 45° takes place in the same direction along the bend lines 15 and 16. The two longitudinal portions 3, 4 are finally bent over by 90° in the opposite direction about the bend line 17 so that end portions 19 of the web-shaped connection portions 7, 8 come into contact areally with the rear side of the central region of the section body 18.

[0036] This central region forms a section web 20 of the section body 18 which respective substantially symmetrically formed section limbs 21 laterally adjoin.

[0037] The section limbs 21 are formed as double-walled, with the respective outwardly disposed outer wall 22 being formed by the regions of the longitudinal portions 3, 4 disposed between the bend lines 13, 14 and by the inner wall 23 disposed toward the interior of the U-shaped cross-section being formed by the bent over connection regions 7, 8.

[0038] A respective hollow space 24 which extends in the longitudinal direction of the section limbs 21 and which extends over the total length of the section body 18 is formed between the outer walls and inner walls 22, 23.

[0039] The end portions 19 of the connection regions 7, 8 are connected, in particular welded, to the section web 20, so that a high stiffness of the total section body 18 is achieved.

[0040] It can furthermore be recognized from FIG. 3 that two stiffening beads 25 are formed in the section web 20 which extend in the longitudinal extent and which additionally increase the stiffness of the section body 18. In this respect, the bent over end portions 19 of the connection regions 7, 8 are arranged between the stiffening beads 24 and are thus connected to portions 26 (FIG. 2) of the section body 18 which are arranged, with respect to the representation in accordance with FIG. 2, centrally between the outwardly disposed meandering longitudinal edges 5, 6. As can furthermore be recognized from FIG. 2, the mutually connected straight-line longitudinal edges 11, 12 extend through the portions 26. The portions 26 can generally also be arranged off-center so that e.g. a more or less large spacing is present between the respective mutually oppositely disposed end portions 19 of the respective connection regions 7, 8. Section elements having a wider section web 20 can thereby also be formed.

[0041] The bend lines 13 to 17 do not have to be arranged exactly as described, but can rather be arranged at larger or smaller spacings from one another as required. Furthermore, in particular the bend lines 15, 16 can also be replaced with a single bend line about which a bending takes place by preferably 90° so that ultimately a U-shaped cross-section of the section body 18 is in turn produced. The inner walls 22, 23 can also be made extending obliquely so that the section body 18 has a V-shaped cross-section.

[0042] It is generally also possible that the connection regions 7, 8 are fastened, for example welded, directly to the section web 20 at their outwardly disposed regions of the meandering longitudinal edges 5, 6 so that an abutting edge to face connection without bent over end portions 19 is realized. Other types of connection are also possible, such as a plug-in connection with slits and tongues or a connection by a pressure joining process.

[0043] The section element in accordance with FIGS. 3 and 4 can be used instead of an upright C section, for example. Further uses are also possible, in particular also as force absorbers in accordance with FIG. 6.

[0044] FIG. 6 shows a section body 27 which was not formed in accordance with the invention, but rather from a uniform, full-area material strip without meandering longitudinal edges and thus without openings by a corresponding bending. With respect to the section body 18 in accordance with the invention, the section body 27 is heavier, on the one hand, and a higher material effort is required to produce the section body 27, on the other hand.

[0045] In FIG. 6, a bumper 28 is shown which is made as a force absorber and which comprises a section element formed in accordance with the invention and having a section body 18. Fastening elements 29, via which the bumper 28 can be fastened in a normal manner, for example, to a motor vehicle, are formed at the two lateral, slightly bent ends of the section body 18.

[0046] Despite the small material consumption, the section element formed in accordance with the invention has the required stiffness since the connection regions 7, 8 bounded by the meandering longitudinal edges 5, 6 form support elements which reliably take up forces which usually arise from the front on the bumper 28 on an accident.

[0047] While it has been described up to now that the longitudinal portions 3, 4 are each formed separately and are connected to one another via their straight-line longitudinal edges 11, 12, the longitudinal portions 3, 4 can also be made in one piece with one another in all described embodiments. The lines of the longitudinal edges 11, 12 shown in the Figures in this case do not represent longitudinal edges, but only the imaginary center line of the longitudinal portions 3, 4, formed in one piece with one another.

[0048] Accordingly, a section element in accordance with the invention is shown in FIG. 7 which can replace an upright C section, for example. In this respect, elements which are the same or similar are designated by the same reference numerals as with respect to the previously described embodiments. The section element shown is configured in a similar manner to the section element of FIGS. 3 and 4, with the longitudinal portions 3, 4, however, being made in one piece with one another. Furthermore, the section web 20 is wider than in FIGS. 3 and 4 so that there is a larger spacing between the mutually respectively oppositely disposed end portions 19 of the connection regions 7, 8 so that, if required, openings and/or stiffening beads can be formed in the section web 20. Additional stiffening beads can also be provided in the section limbs 21. This also applies to the previously described embodiments. The section element in accordance with FIG. 7 can generally also have separately formed longitudinal portions 3, 4.

REFERENCE NUMERAL LIST

[0049] 1 material strip

2 meandering slit

3 longitudinal portion

4 longitudinal portion

5 meandering longitudinal edge

6 meandering longitudinal edge

7 connection regions

8 connection regions

9 elongated portion

10 elongated portion

11 straight-line longitudinal edge

12 straight-line longitudinal edge

13 bend line

14 bend line

15 bend line

16 bend line

17 bend line

18 section body

19 end portions

20 section web

21 section limb

22 outer walls

23 inner walls

24 hollow spaces

25 stiffening beads

26 portions

27 section body

28 bumper

29 fastening elements

1-27. (canceled)

28. A section element having an elongated section body comprising at least one of metal and plastic, the section element comprising at least two longitudinal portions, wherein each longitudinal portion has a meandering longitudinal edge, wherein the section body has a substantially U-shaped or V-shaped cross-section having two section limbs and a section web connecting the section limbs, wherein the section limbs are formed by bent over regions of the longitudinal portions comprising the meandering longitudinal edges and the respective section limbs are made at least regionally double-walled having an outer wall and an inner wall disposed toward the interior of the U-shaped or V-shaped cross-section, wherein the meandering longitudinal edges extend at least regionally in the inner walls of the double-walled section limbs,

and wherein the meandering longitudinal edges are at least regionally connected to portions of the section body disposed between the meandering longitudinal edges.

29. A section element in accordance with claim 28,

wherein the said portions of the section body lie substantially in the region of a longitudinal central axis of the section body.

30. A section element in accordance with claim 28,

wherein the said portions of the section body are formed as areal portions and are connected to connection regions of the longitudinal portions bordered by the meandering longitudinal edges.

31. A section element in accordance with claim 28,

wherein the meandering longitudinal edges are connected to one another directly or via at least one intermediate element.

32. A section element in accordance with claim 28,

wherein the meandering longitudinal edges are connected to one another at least regionally or optionally to the intermediate element by welding, clamping, crushing, pressing, screwing, adhesive bonding, riveting, rebating or by a pressure joining process such as clinching or crimping.

33. A section element in accordance with claim 28,

wherein the longitudinal portions are formed in one piece with one another.

34. A section element in accordance with claim 28,

wherein the longitudinal portions are formed separately and are connected to one another.

35. A section element in accordance with claim 34,

wherein each longitudinal portion comprises a straight longitudinal edge disposed opposite its meandering longitudinal edge and the longitudinal portions are connected to one another via the straight longitudinal edges either directly or via at least one intermediate element.

36. A section element in accordance with claim 35,

wherein the mutually connected straight longitudinal edges extend through the sections.

37. A section element in accordance with claim **35**, wherein the straight longitudinal edges extend substantially in parallel with the longitudinal extent of the longitudinal portions.

38. A section element in accordance with claim **35**, wherein the mutually connected straight longitudinal edges of the longitudinal portions are arranged centrally within the section web.

39. A section element in accordance with claim **35**, wherein the straight longitudinal edges are connected to one another or to the intermediate element by welding, clamping, crushing, pressing, screwing, adhesive bonding, riveting, rebating or by a pressure joining process such as clinching or crimping.

40. A section element in accordance with claim **34**, wherein the longitudinal portions form two contiguous portions of an originally uniform material strip along the meandering longitudinal edges.

41. A section element in accordance with claim **28**, wherein the meandering longitudinal edges of the longitudinal portions are made complementary to one another.

42. A section element in accordance with claim **28**, wherein the longitudinal portions comprise the same material.

43. A section element in accordance with claim **28**, wherein the section body is a thin-walled, cold-formed section body.

44. A section element in accordance with claim **28**, wherein the longitudinal portions have a thickness of approximately between 0.5 mm and 3 mm.

45. A section element in accordance with claim **28**, wherein a respective hollow space extending in the longitudinal direction of the section limb is formed between the walls of the double-walled section limb.

46. A section element in accordance with claim **28** and realized as one element of the group of elements comprising, a construction element, a dry construction section, a facade section, a plaster section, a skirting section, a screed section, a tile section, a cable carrier section, a stiffening section, an automotive section, a force absorbing section, a bumper, a shelf rail and a drainage rail.

47. A method of manufacturing a section element in accordance with claim **28**, wherein an elongated strip-shaped starting material having two respective outwardly disposed meandering longitudinal edges is provided for producing the section element; and wherein longitudinal portions of the material strip bounded by the meandering longitudinal edges are bent over to produce the section limbs until the meandering longitudinal edges come into contact at least regionally with portions of the section body disposed between the meandering longitudinal edges and are connected to them.

48. A method of manufacturing a section element in accordance with claim **47**, wherein two separate longitudinal portions each having a meandering longitudinal edge and each having a straight longitudinal edge disposed opposite the meandering longitudinal edge for producing the section element are provided; and in that the longitudinal portions are connected to one another via the straight longitudinal edges.

49. A method in accordance with claim **48**, wherein at least one meandering slit which extends in the longitudinal extent of the starting material and by which the starting material is divided into the two separate longitudinal portions is introduced into an elongated strip-shaped starting material.

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