Office de la Propriété Intellectuelle du Canada
Un organisme d'Industrie Canada

Canadian Intellectual Property Office
An agency of Industry Canada

CA 2564519 C 2014/01/28

(11)(21) 2 564 519

(12) BREVET CANADIEN
CANADIAN PATENT

(13) C

(86) Date de dépôt PCT/PCT Filing Date: 2004/04/29
(87) Date publication PCT/PCT Publication Date: 2005/11/10
(45) Date de délivrance/Issue Date: 2014/01/28
(85) Entrée phase nationale/National Entry: 2006/10/23
(86) N° demande PCT/PCT Application No.: MX 2004/000029
(87) N° publication PCT/PCT Publication No.: 2005/106317

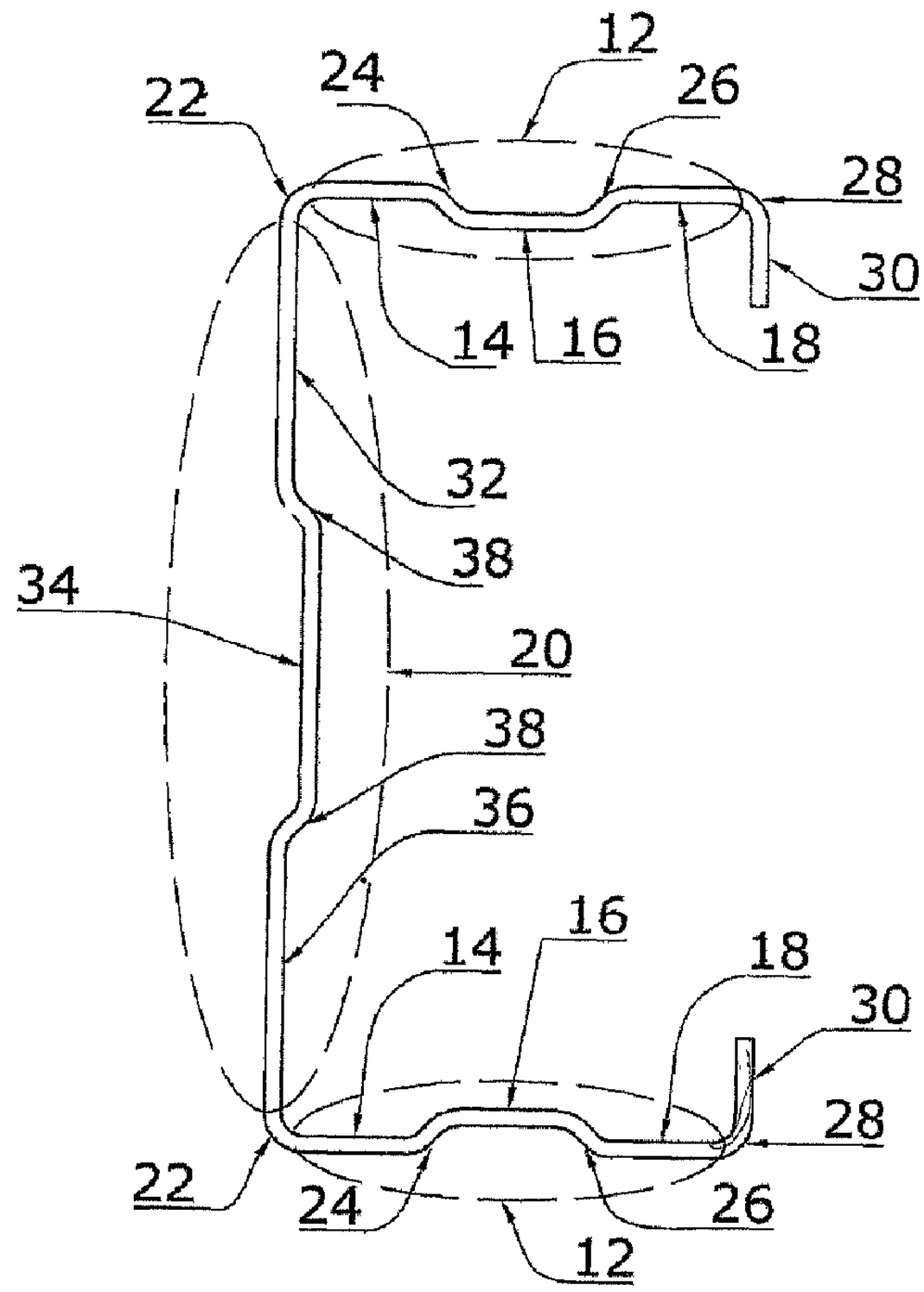
(51) Cl.Int./Int.Cl. *F16S 3/08* (2006.01),
E04C 3/00 (2006.01)

(72) Inventeur/Inventor:
MARTINEZ-CEPEDA, FEDERICO, MX

(73) Propriétaire/Owner:
MARTINEZ-CEPEDA, FEDERICO, MX

(74) Agent: RIDOUT & MAYBEE LLP

(54) Titre : PROFIL RENFORCE ET RAINURE
(54) Title: GROOVED STIFFENED PROFILE



(57) Abrégé/Abstract:
A shaped metal beam is described, having a generally C-shaped profile which includes a central part, opposed sidewalls extending along the lateral sides of the central part, and opposed flanges extending from the sidewalls comprising inwardly-turned walls

CA 2564519 C 2014/01/28

(11)(21) 2 564 519

(13) C

(57) Abrégé(suite)/Abstract(continued):
opposed to and parallel to the central part. The central part, sidewalls and flanges define a hollow interior open to one side. The central part and the sidewalls each comprise first and second flat outer sections adjacent to the lateral sides thereof, the flat outer sections being co-planar, and a third section intermediate between the lateral sides. The third section comprises a central channel recessed towards the interior of the beam having a flat floor and non-parallel, converging channel sidewalls. The width of the respect outer sections and channel may all be substantially equal within each of the central part and sidewalls.

ABSTRACT

A shaped metal beam is described, having a generally C-shaped profile which includes a central part, opposed sidewalls extending along the lateral sides of the central part, and opposed flanges extending from the sidewalls comprising inwardly-turned walls opposed to and parallel to the central part. The central part, sidewalls and flanges define a hollow interior open to one side. The central part and the sidewalls each comprise first and second flat outer sections adjacent to the lateral sides thereof, the flat outer sections being co-planar, and a third section intermediate between the lateral sides. The third section comprises a central channel recessed towards the interior of the beam having a flat floor and non-parallel, converging channel sidewalls. The width of the respect outer sections and channel may all be substantially equal within each of the central part and sidewalls.

GROOVED STIFFENED PROFILE

SCOPE OF THE INVENTION

This is a new grooved stiffened profile with mechanical characteristics superior to already known structural profiles, that can be used in building frameworks for roofing or large architectural vaults, that efficiently supports dead weight.

The qualities of its maximum work stress notoriously compete with conventional profiles because of the stiffeners included in it. Additionally, the weight per lineal meter is less than the first, which makes this invention a versatile profile for building roof frameworks and wide vaults.

Therefore, the scope of the invention is subscribed to the universe of structural profiles used in building frames.

HISTORY OF THE INVENTION

In Mexico, as well as in other countries, roofs are built on constructions that have no intermediary supports, and outside walls or columns that are separated more than 10 m (40 feet); therefore, and for economic reasons, builders resort to the use of a structural system other than simply supported beams. The structural configuration used for this purpose is called a roof framework; a framework is a structural configuration of elements

normally supported at the ends and formed by a series of elements, normally straight, laid out in a certain order and connected one to another, in such manner that stress transmitted from one element to another is the same or is uniformly distributed. As a triangle is the only polygon with a form that can be geometrically modified without changing the length of one or more of its sides, the framework essentially consists of a system of triangles.

In steel frameworks it is common practice that angles be connected among themselves by a connecting plate and rivets, screws and nuts, or welding, forming rigid connections; the stability of a framework does not depend on the rigidity of its joints.

We know that steel profiles have been greatly substituting other elements such as wood, mainly because longer open spaces can be built with steel.

Steel structural profiles most frequently used in the construction of buildings are beams with (WF) wide flanges; standard I beams, grooved sections, angles and plates.

After numerous investigations, a profile has been developed with the technical and mechanical characteristics of the conventional profiles described, but featured for being stiffened, which provides it more rigidity, and appears as an element that supports more loads, and therefore, the same stress as a conventional profile

support; with the use of the profile being proposed; this profile supports more stress, which permits us to reduce weight and build structures with wider open spaces.

BRIEF DESCRIPTION OF DRAWINGS

FIG. 1 is a sectional view of the stiffened profile;

FIG. 2 is a perspective of the stiffened profile.

DESCRIPTION OF THE INVENTION

Referring to the drawings described above, the stiffened profile of this invention is formed by a machined part (**10**) in a grooved form, that fundamentally includes a central part (**20**), some flanges (**12**) located in the upper and lower parts and some finished ends (**30**), placed at the ends of the machined part (**10**).

These flanges (**12**) or sides consist of a flat surface, divided into three parts or sections: a first section (**14**) with a flat surface, joined at one end to the central part (**20**) by means of a bend (**22**), that with respect to the central part (**20**) is placed at a ninety degree angle, and at the other end, with a bend (**24**) to an intermediate section (**16**) with a flat surface, displaced from the axis of the flanges (**12**), and forming the stiffened section, followed by a second bend (**26**) to a third section (**18**) with a flat surface, that is placed at the same level as the first section (**14**) followed by a bend (**28**) with one of the finished ends (**30**), in such manner that these are at a

ninety degree angle from the flanges (**12**), the axis of the section (**16**) which, because of the bends, is displaced from the central part of the first section (**14**) and of the third section (**18**), in such manner that the middle section (**16**) will be parallel to those sections.

On the other hand, the central part (**20**) that also has a flat surface, consists of three sections: a first section (**32**) with a flat surface, joined at the upper end to the bend (**22**) of the top flange (**12**), that will be at a ninety degree angle, to continue on to a middle section (**34**) with a flat surface, which is displaced from the axis of the central part (**20**), forming the stiffened section, and joined through some bends (**38**), followed by a third section similar to the first (**36**) with a flat surface, placed at the same level as the first section (**32**), ending with a second bend (**22**) at the lower flange (**12**) that will be at a ninety degree angle with respect to the central part (**20**).

Finally, the finished ends (**30**) of the machined part (**10**) consist of a flat and short-sized part at a ninety degree angle with respect to the flanges, serving both as an extremity and as base, and joint for a similar profile meeting it, thus duplicating the resistance of the profile.

THE BEST MANNER OF CARRYING OUT THE INVENTION

To form the profile described above, a shaping or rolling machine will be necessary, whereby, through various steps, the necessary bends will be made until the complete figure of the profile is obtained. A quality material with an adequate thickness must be used in order that it submit to bending in every step in the shaping machine without cracking or being damaged.

When using a shaping machine and not a bending press, one must be sure that the finished product will have the shape and measurements required in each of the sizes to be produced. With such production equipment one can also obtain prefabricated parts cut to size.

SUMMARY OF THE INVENTION

According to one aspect, the invention relates to a formed metal beam having a generally C-shaped profile which includes a central part, opposed sidewalls extending along the lateral sides of the central part, and opposed flanges extending from the sidewalls comprising inwardly-turned walls opposed to and parallel to the central part. The central part, sidewalls and flanges define a hollow interior open to one side. The central part and the sidewalls each comprise first and second flat outer sections adjacent to the lateral sides thereof, the flat outer sections being co-planar, and a third section intermediate between the lateral sides. The third section comprises a central channel recessed towards the interior of the beam having a flat floor and non-parallel, converging channel sidewalls. The width of the respect outer sections and channel may all be substantially equal within each of the central part and sidewalls.

In another aspect, the beam has smoothly curved bends of 90 degrees where the central part joins with the sidewalls and the sidewalls join with the flanges.

In another aspect, the invention relates to method of forming a beam as described herein, comprising the steps of providing a flat metal blank, and forming the beam by shaping the blank with a rolling machine or shaping machine in a plurality of rolling or shaping operations.

CLAIMS:

1. A formed metal beam having a generally C-shaped profile comprising a central part, opposed sidewalls extending along the lateral sides of said central part, and opposed flanges extending from said sidewalls comprising inwardly-turned walls opposed to and parallel to said central part, said central part, sidewalls and flanges defining a hollow interior open to one side, said central part and said sidewalls each comprising first and second flat outer sections adjacent to the lateral sides thereof, said flat outer sections being co-planar, and a third section intermediate between said lateral sides, said third section comprising a central channel recessed towards the interior of said beam having a flat floor and non-parallel, converging channel sidewalls.

2. The beam of claim 1 comprising smoothly curved bends of 90 degrees where said central part joins with said sidewalls and said sidewalls join with said flanges.

3. The beam of claim 1 wherein the transverse width of the outer sections of the central part and the transverse width of the floor of the channel of said central part are substantially equal.

4. The beam of claim 1 wherein the transverse width of the outer sections of the sidewalls and the transverse width of the floor of the channel of said sidewalls are substantially equal.

5. A method of forming the beam of any one of claims 1-4, comprising the steps of providing a flat metal blank, and forming said beam by shaping the blank with a rolling machine or shaping machine in a plurality of rolling or shaping operations.

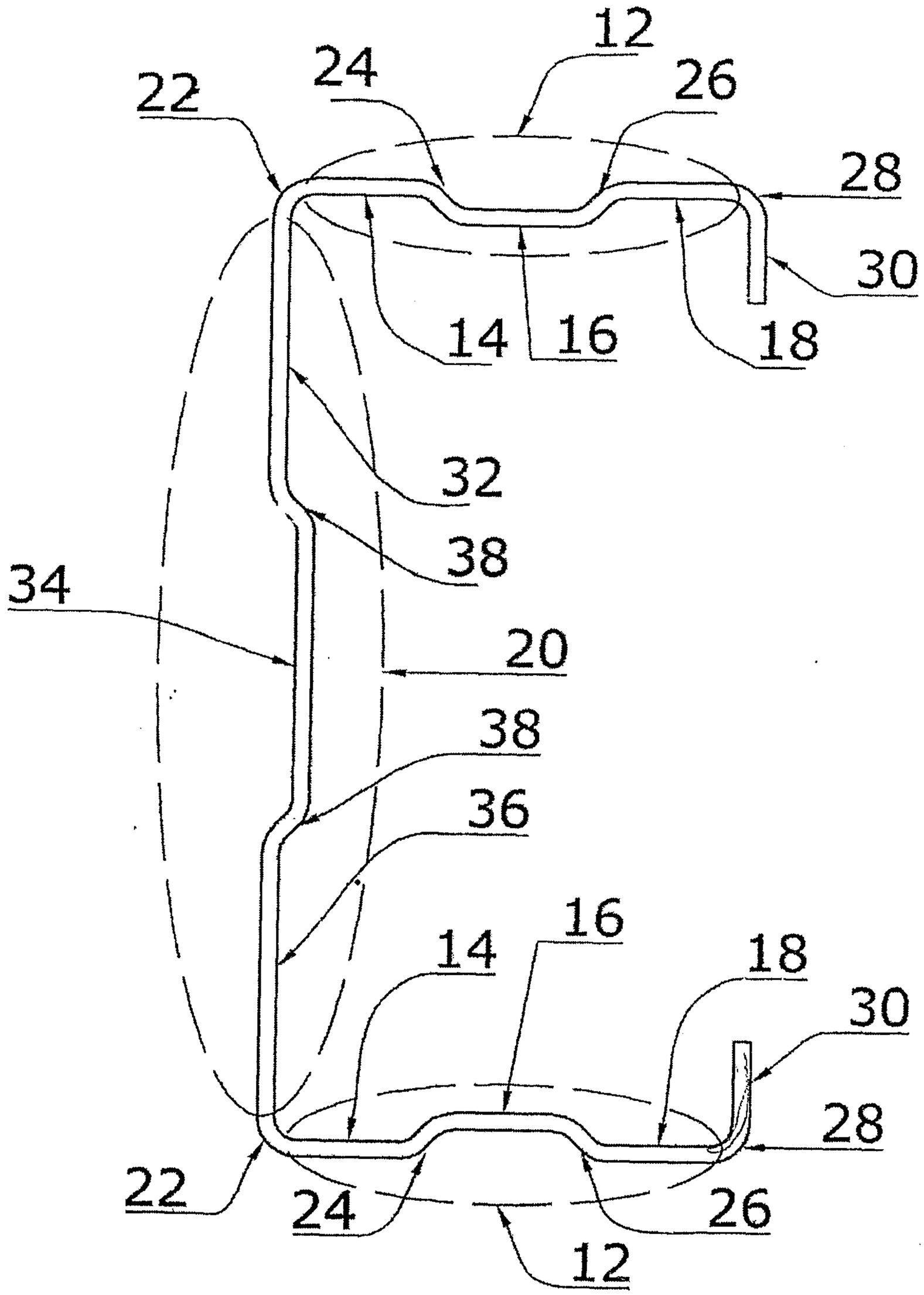


Figure 1

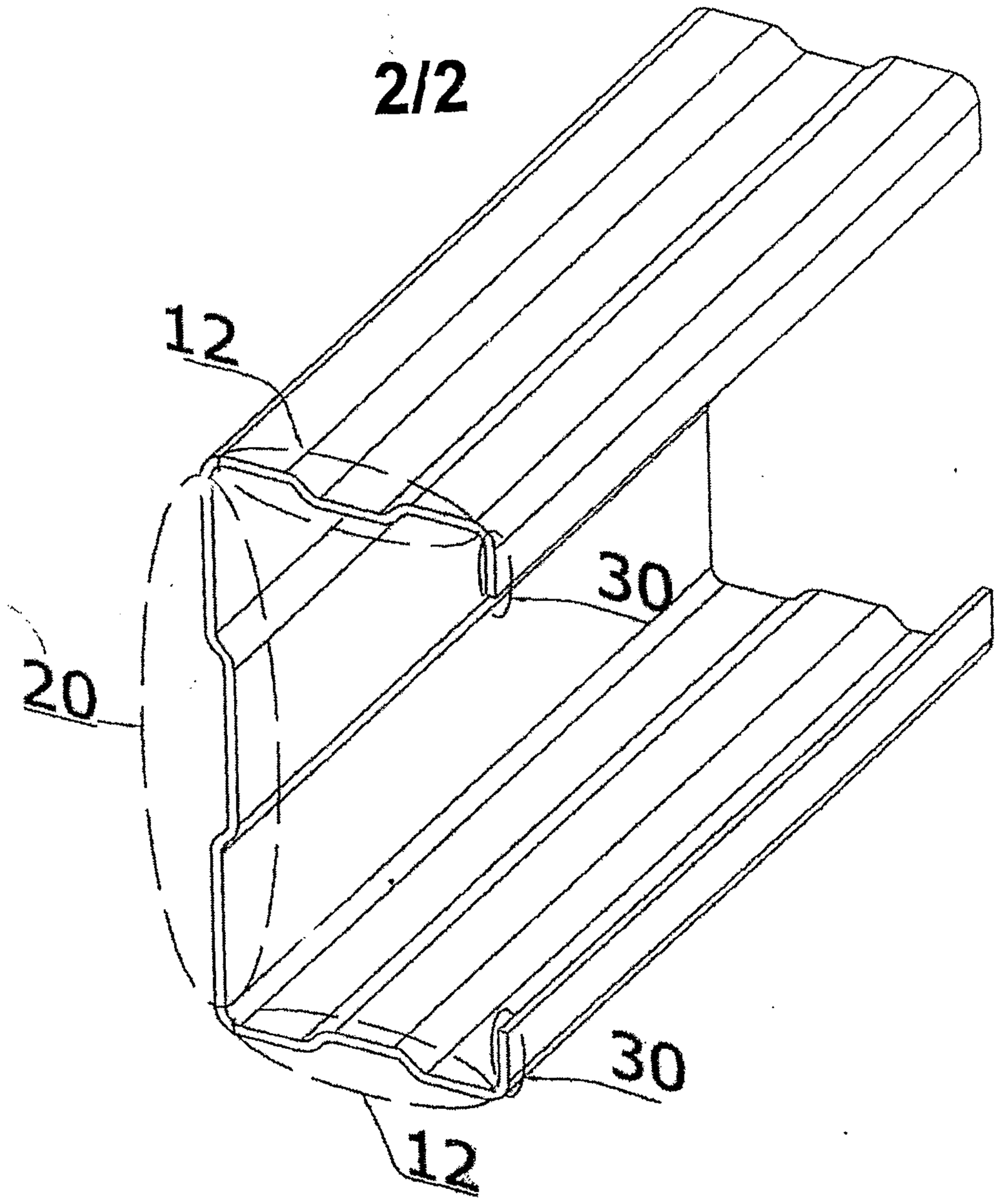
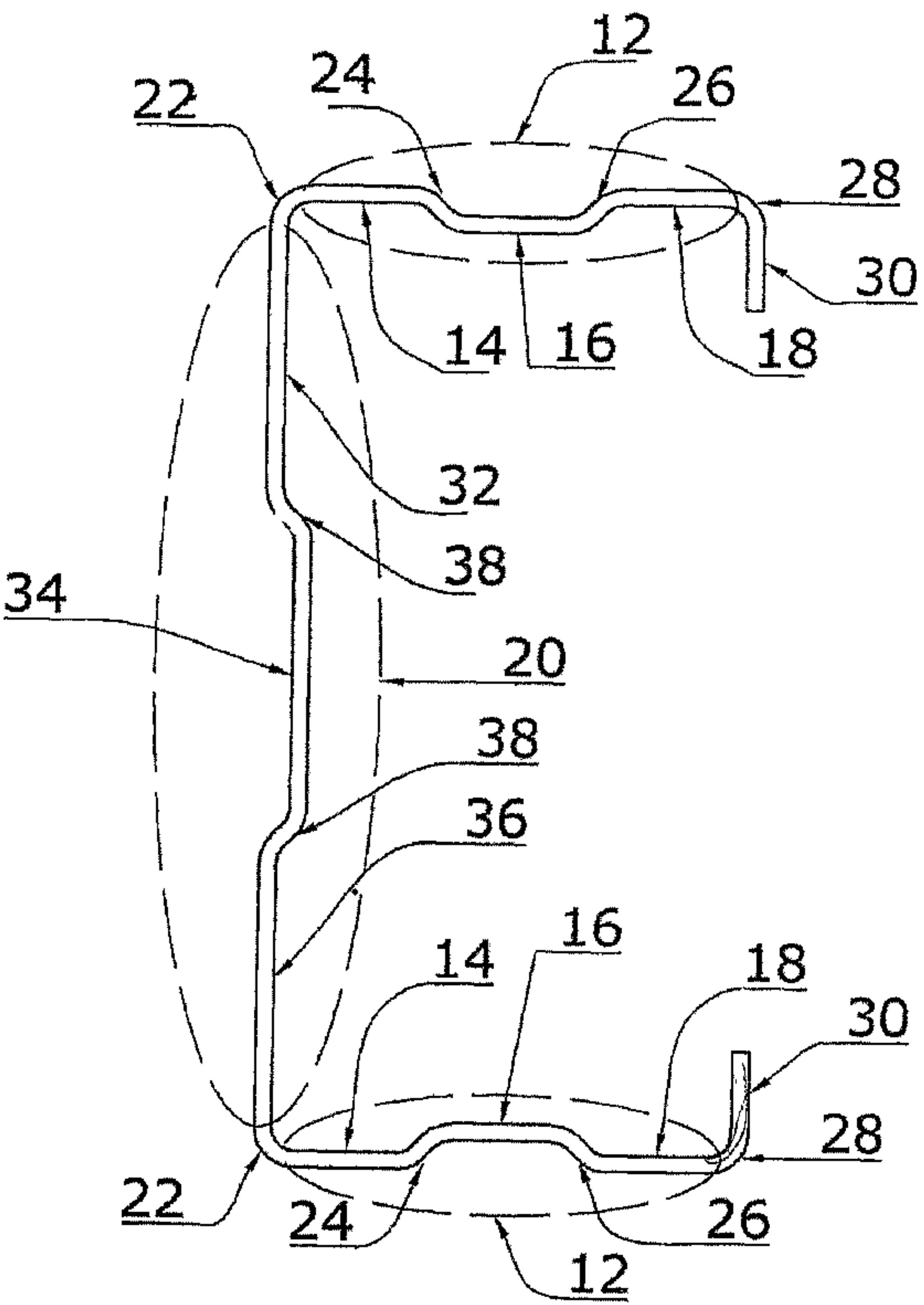


Figure 2


12
24
26
22
28
30
14
16
18
32
38
34
20
38
36
14
16
18
30
28
22
24
26
12