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(72) GLUSCHKE, KONRAD, DE
(72) DIERSCH, RUDOLF, DE
(72) METHLING, DIETER, DE
(71) GNB GESELLSCHAFT FÜR NUKLEAR-BEHALTER MBH, DE

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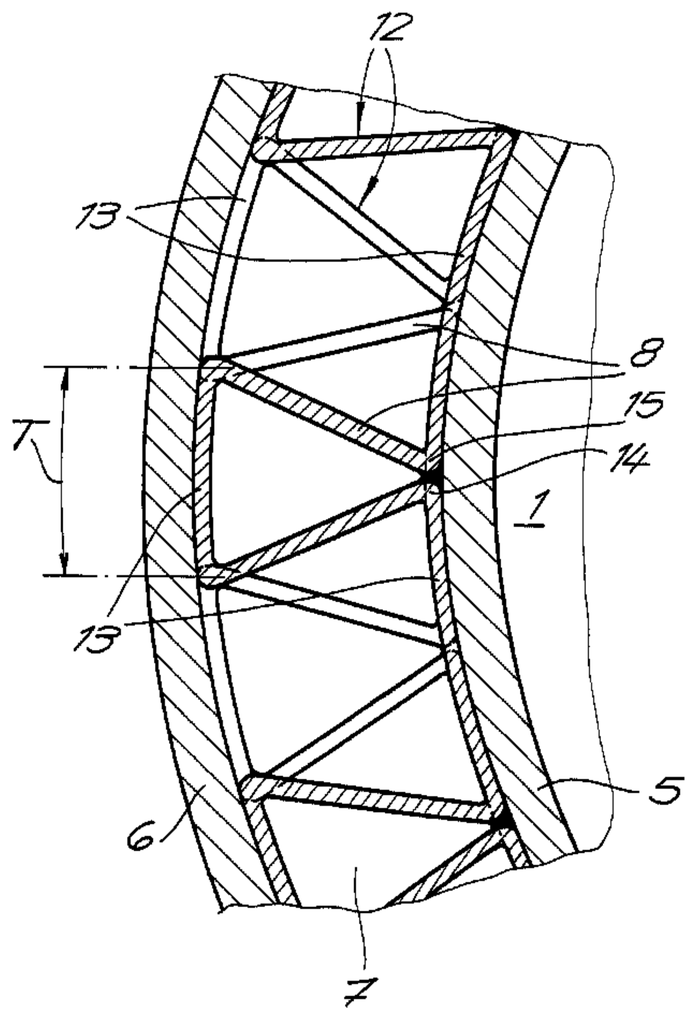
(54) **CONTENANT DE TRANSPORT ET/OU D'ENTREPOSAGE D'ELEMENTS RADIOACTIFS DEGAGEANT DE LA CHALEUR ET UNE METHODE POUR SA PRODUCTION**

(54) **TRANSPORT AND/OR STORAGE CONTAINER FOR RADIOACTIVE HEAT-EVOLVING ELEMENTS, AND A METHOD OF PRODUCING THE SAME**



(57) A transport and/or storage container for radioactive, heat-evolving elements, comprises a container shell (2) defining a container interior (1), a container base (3) and at least one container lid (4) . The container shell (2) consists of a metal inner shell (5) and a metal outer shell (6) disposed at a distance from the inner shell (5), the intermediate space (7) formed between the inner shell (5) and the outer shell (6) being filled with a filler. The inner shell (5) and the outer shell (6) are interconnected by substantially radially disposed heat-dissipating metal elements (8). The production and function of the metal elements (8) are particularly favourable if the metal elements (8) are formed by the webs of at least one open meander ring (12), the connecting shoulders (13) of which bear with prestressing alternately against the inner shell (5) and the outer shell (6). To make a container of this kind, the meander rings (12) are each clamped by an outer clamp ring to the inner shell (5) and consecutively released during the fitting of the outer shell (6).

Transport and/or storage container for radioactive heat-evolving elements, and a method of producing the same

A B S T R A C T

A transport and/or storage container for radioactive, heat-evolving elements, comprises a container shell (2) defining a container interior (1), a container base (3) and at least one container lid (4). The container shell (2) consists of a metal inner shell (5) and a metal outer shell (6) disposed at a distance from the inner shell (5), the intermediate space (7) formed between the inner shell (5) and the outer shell (6) being filled with a filler. The inner shell (5) and the outer shell (6) are interconnected by substantially radially disposed heat-dissipating metal elements (8). The production and function of the metal elements (8) are particularly favourable if the metal elements (8) are formed by the webs of at least one open meander ring (12), the connecting shoulders (13) of which bear with prestressing alternately against the inner shell (5) and the outer shell (6). To make a container of this kind, the meander rings (12) are each clamped by an outer clamp ring to the inner shell (5) and consecutively released during the fitting of the outer shell (6).

To be published with Fig. 2

Description

The invention relates to a transport and/or storage container for radioactive, heat-evolving elements, comprising a container shell defining a container interior, a container base and at least one container lid, the container shell consisting of a metal inner shell and a metal outer shell disposed at a distance from the inner shell, the intermediate space formed between the inner shell and the outer shell being filled with a filler, and the inner shell and the outer shell being interconnected by substantially radially disposed heat-dissipating metal elements. The invention also relates to a method of producing this container.

Radioactive heat-evolving elements according to the invention denotes in particular spent fuel elements which are received in the container. The heat evolved by the elements must be dissipated to the exterior. For this purpose, the inner shell and the outer shell usually consist of sheet steel and the metal elements therebetween consist of copper; of course other materials are possible. Concrete is the preferred filler.

In a known container of the above kind (DE-A-28 17 193) there is no mention of how the metal elements are connected to the inner shell and outer shell.

The object of the invention is to indicate how the metal elements are to be devised in a transport and/or storage container of the kind according to the preamble, to ensure adequate heat dissipation despite being simple to manufacture.

According to the invention, to solve this problem, the metal elements are formed by the webs of at least one open meander ring, the connecting shoulders of which bear with prestressing alternately against the inner shell and the outer shell.

The advantages of the invention are that the metal elements are initially relatively simple to manufacture. A metal strip is formed into an open meander ring and disposed between the inner shell and the outer shell, something which is possible without any appreciable difficulty, because the meander ring is deformable. Particularly good results are obtained in respect of heat dissipation if the connecting shoulders bearing against the inner and outer shells have their curvature.

A number of possibilities are applicable for the further configuration according to the invention. For example, according to a preferred embodiment, the bent edges situated adjacently between the webs and the connecting shoulders along the inner shell are brought into contact and, in particular, interconnected, e.g. welded or soldered. A preferred embodiment which is also particularly important is characterised by a plurality of superposed meander rings which are disposed consecutively in offset relationship by a pitch. This embodiment results in fact in a particularly intimate interlocking of the metal elements or webs and filler.

According to another feature of the invention, the container base consists of a metal inner base and a metal outer base and heat-dissipating metal radial

webs are disposed between the inner base and the outer base and are connected to the inner base and to the outer shell via end-face bends. It is also advisable in this case for the bends associated with the outer shell to be adapted to the curvature of the latter.

The invention also relates to a method of making the container described, said method being characterised in that that the open meander rings are fitted on to the inner shell and clamped to the inner shell by means, in each case, of an external clamp ring, the outside diameter of the respective meander ring being reduced, and in that the clamp rings are consecutively released during the fitting of the outer shell.

The invention is explained in detail hereinafter with reference to a drawing which illustrates one exemplified embodiment and wherein:

Fig. 1 is a longitudinal section through a transport and/or storage container.

Fig. 2 is an enlarged view of part of a section A-A through the article shown in Fig. 1 and

Fig. 3 is a perspective view looking in the direction of the arrow B of the metal elements in the bottom zone.

The transport and/or storage container shown in the drawings is intended for radioactive heat-evolving elements, more particularly spent nuclear fuel elements. In its basic construction, it consists of a container shell 2 defining a container interior 1,

a container base 3 and at least one container lid 4. The container shell 2 is constructed from an inner shell 5 of sheet steel and an outer shell 6 of sheet steel disposed at a distance from the inner shell 5. An intermediate space 7 is formed between the inner shell 5 and the outer shell 6 and is filled with concrete as the filler. The inner shell 5 and the outer shell 6 are interconnected by substantially radially disposed heat-dissipating metal elements 8.

At the top of the container the inner shell 5 and the outer shell 6 are interconnected by a.steel ring 9, to which the inner shell 5 and the outer shell 6 are welded. The container base 3 consists of an inner base 10 and an outer base 11 each made from sheet steel. The inner base 10 is welded to the inner shell 5 and the outer base 11 is welded to the outer shell 6.

As will be immediately apparent from a comparison of Figs. 1 and 2, the metal elements 8 disposed between the inner shell 5 and the outer shell 6 are formed by the webs of a plurality of open meander rings 12, the connecting shoulders 13 of which bear alternately with prestressing against the inner shell 5 and the outer shell 6. The connecting shoulders 13 are adapted to the curvature of the inner and outer shells (5 and 6). The bent edges 14, 15 situated adjacently between the webs 8 and the connecting shoulders 13 along the inner shell 5 are brought into contact and interconnected by welding or soldering. It will be apparent also from the said Figures that a plurality of said meander rings 12 are disposed one above the other. These meander rings are consecutively offset from one another by a pitch T in each case. The thickness of

the meander rings 12 and webs 8 and connecting shoulders 13 respectively is shown on an exaggerated scale in Fig. 2 for reasons of clarity.

Fig. 3 shows that heat-dissipating metal radial webs 16 are disposed between the inner base 10 and the outer base 11 and are connected to the inner base 10 of the outer shell 6 via end-face bends 17. They are connected to the outer shell 6 because the container stands on the outer base 11 and hence practically no heat can be dissipated via the outer base 11. If the bends 17 consist of a material which is not weldable to the material of the inner base 10 or outer shell 6, the bends 17 can be connected by auxiliary elements which are welded on the inner base 10 or outer shell 6 and which press against the bends 7.

To manufacture the transport and/or storage container described, the inner shell 5 is welded to the steel ring 9 adjacent the lid and to the inner base 10 and is deposited with the steel ring 9 on the ground. The open meander rings 12 are then successively fitted on to the inner shell 5 and clamped to the inner shell 5 by means, in each case, of an external clamp ring (not shown), the outside diameter of the respective meander ring 12 being reduced. It is possible to reduce the outside diameter of the respective meander ring 12 because the webs 8 of the meander rings 12 can be elastically twisted. Consecutive meander rings 12 are arranged in offset relationship by a pitch T. The outer shell 6 is then fitted initially over part of the top meander ring 12 as far as the associated clamp ring and then the latter is released. The procedure is the same for the next meander rings 12

until the outer shell 6 bears against the steel ring 9 and can also be welded to the latter. The filler is then introduced and the container is closed by welding the outer shell 11 on.

1. A transport and/or storage container for radioactive, heat-evolving elements, comprising a container shell defining a container interior, a container base and at least one container lid, the container shell consisting of a metal inner shell and a metal outer shell disposed at a distance from the inner shell, the intermediate space formed between the inner shell and the outer shell being filled with a filler, and the inner shell and the outer shell being interconnected by substantially radially disposed heat-dissipating metal elements, wherein the metal elements are formed by the webs of at least one open meander ring, the connecting shoulders of which bear with prestressing alternately against the inner shell and the outer shell.

2. A container according to claim 1, wherein the bent edges situated adjacently between the webs and the connecting shoulders along the inner shell are brought into contact.

3. A container according to claim 2, wherein the bent edges brought into contact are interconnected.

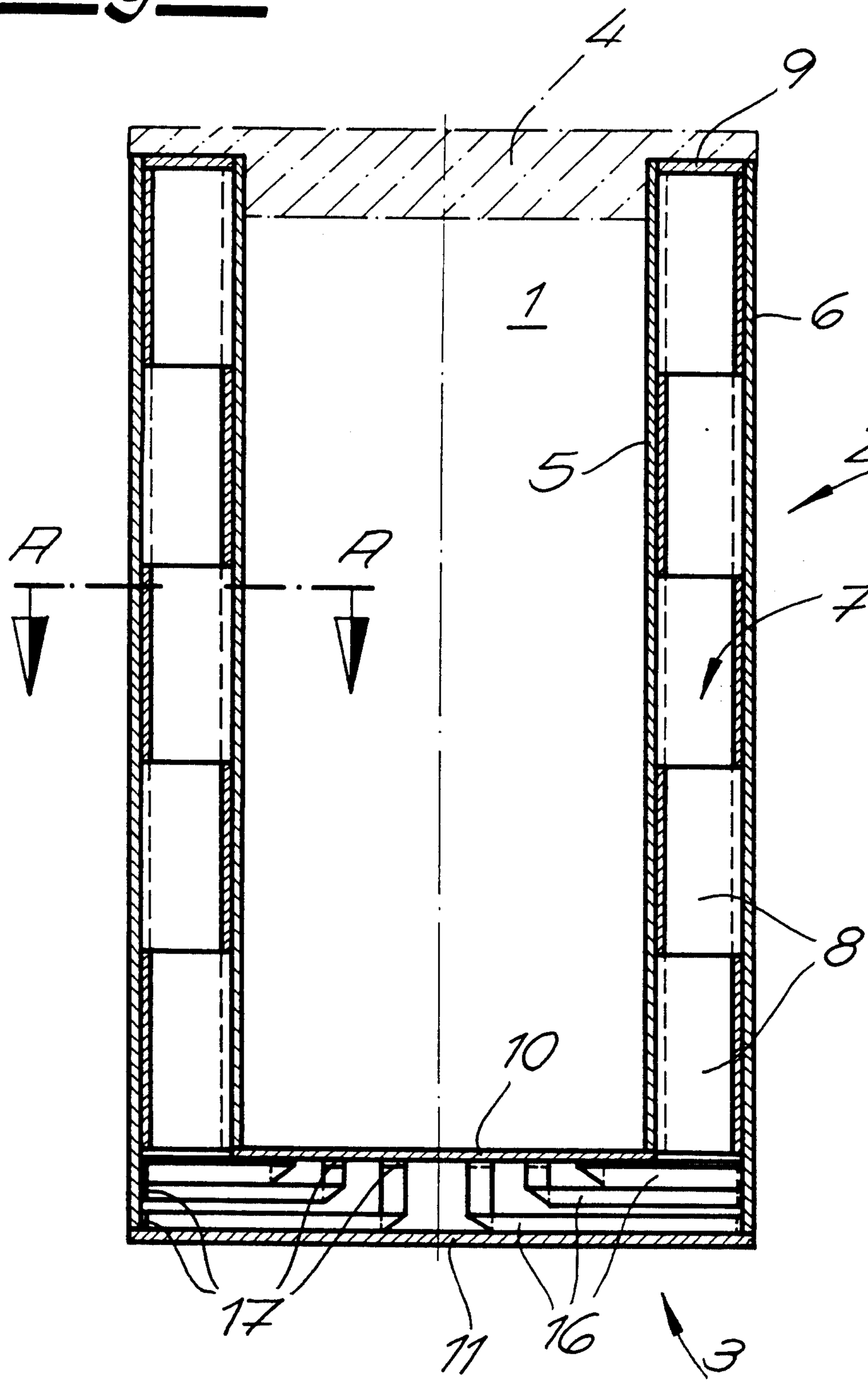
4. A container according to any one of claims 1 to 3, wherein a plurality of superposed meander rings which are disposed consecutively in offset relationship by a pitch (T).

5. A container according to any one of claims 1 to 4, wherein the container base consists of a metal inner base and a metal outer base and heat-dissipating metal radial webs are disposed between the inner base and the outer base and are connected to the inner base and to the outer shell via end-face bends.

6. A method of producing a container according to any one of claims 1 to 5, wherein the open meander rings are fitted on to the inner shell and clamped to the inner shell

by means, in each case, of an external clamp ring, the outside diameter of the respective meander ring being reduced, and the clamp rings being consecutively released during the fitting of the outer shell.

Fig. 1



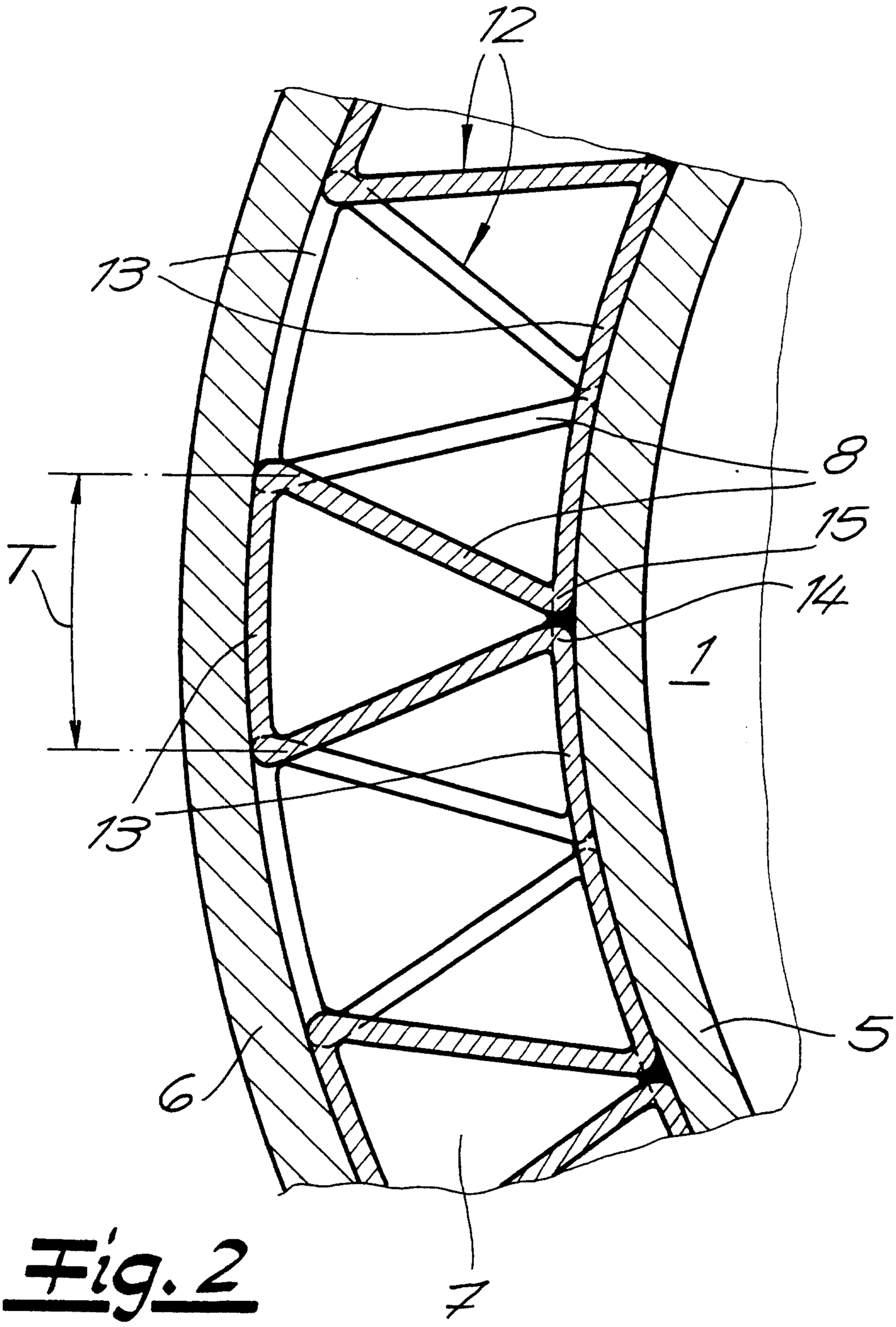
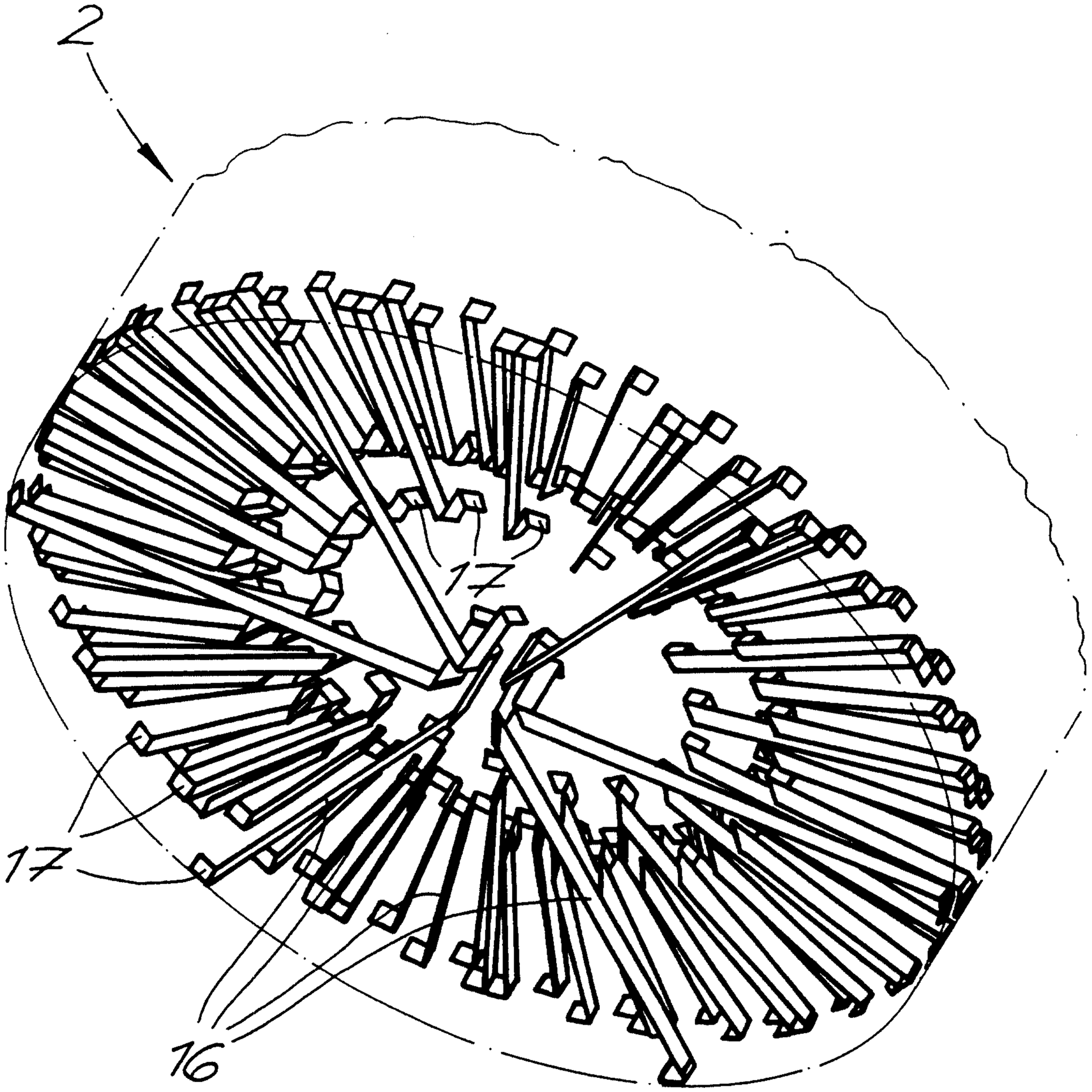
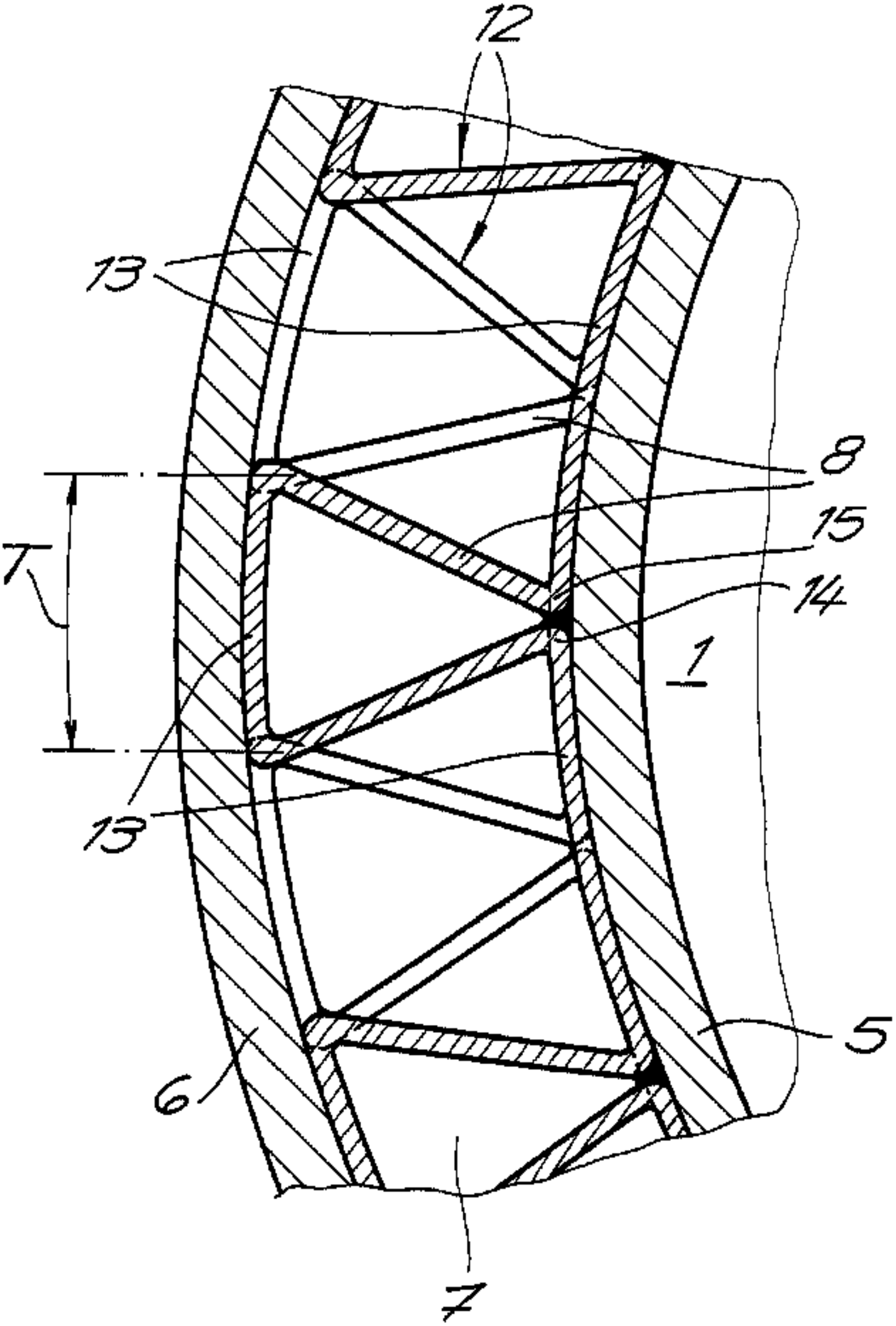


Fig. 2

Fig. 3

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