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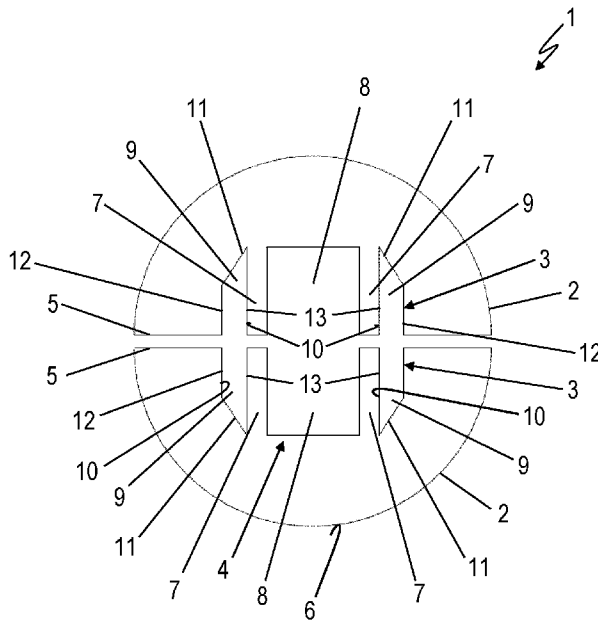
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(54) Title: THERMALLY INSULATED PIPE SYSTEM, THERMALLY INSULATING PIPE SECTION AND METHOD FOR PRODUCING A THERMALLY INSULATING PIPE SECTION



WO 2022/017768 A1

Fig.4



(57) Abstract: The invention relates to a thermally insulated pipe system comprising a pipe having an outer diameter and a thermally insulating pipe section mounted on said pipe, said pipe section comprising two longitudinal parts each having a longitudinal opening, providing an aperture for accommodating the pipe whereby the two longitudinal parts are facing to each other in a symmetry plane, whereby two webs (7) are provided in each longitudinal opening (3) of the parts (2), each web (7) extending substantially to the symmetry plane (5) and being arranged under an angle ( $\alpha$ ) between 45° and 90° relative to the symmetry plane (5), thereby incorporating a first groove (8) between the webs (7) and second grooves (9) between each of the webs (7) and a surface (10) of the longitudinal opening (3).

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Thermally insulated pipe system, thermally insulating pipe section  
and method for producing a thermally insulating pipe section

The invention relates to a thermally insulated pipe system (pipework) comprising a pipe  
5 having an outer diameter and a thermally insulating pipe section mounted on said pipe, said  
pipe section comprising two longitudinal half-parts each having a longitudinal opening,  
providing an aperture for accommodating the pipe, whereby the two longitudinal half-parts  
are facing to each other in a symmetry plane. Furthermore, the present invention relates to  
a thermally insulating pipe section especially for a thermally insulated pipe system  
10 (pipework) as described before and comprising two longitudinal half-parts each having a  
longitudinal opening, providing an aperture for accommodating a pipe, whereby the two  
longitudinal half-parts are facing to each other in a symmetry plane. Finally, the present  
invention relates to a method for producing a thermally insulating pipe section as mentioned  
before comprising two longitudinal half-parts each having a longitudinal opening, providing  
15 an aperture for accommodating a pipe, whereby the two longitudinal half-parts are facing to  
each other in a symmetry plane.

Respective pipe systems and thermally insulating pipe sections are known in the art.  
Principally the pipe sections are preformed sections of e.g. mineral wool insulation,  
20 manufactured of two half-parts or pre-slit for ease of application and having a layer of factory  
applied foil facing and a self-adhesive lap. The self-adhesive lap allows the sections to be  
snapped onto the pipe system, then optionally backing tape is used to completely seal the  
joints.

25 Said thermally insulating pipe sections comprise a central longitudinal opening, providing an  
aperture for accommodating a pipe to be insulated, which dimension of the aperture typically  
equals the outer diameter of the pipe. Thus, for each and every different pipe dimension  
corresponding pipe sections need to be produced and put to stock. Since stockpiling and  
logistics are expensive, attempts have been made to address this problem. However, a need  
30 for improvements remains to date.

WO 96/37728 discloses a thermally insulating pipe section comprising two longitudinal parts  
each having a longitudinal opening, providing an aperture for accommodating a pipe,  
whereby the two longitudinal parts are facing to each other in a horizontal plane. The pipe

section known from this prior art is composed of an assembly of annular insulation discs consisting of mineral fibers. The assembly has on one side a first through going cutting zone and on the other side a second non-through going cutting zone, the later serving to facilitate the opening of the pipe section when it is to be fitted on a pipe. The assembly of insulation  
5 discs is enveloped in a sheet material, for example of aluminum foil, which is glued onto the outer side of the assembly by means of an adhesive. In cross-section the assembly has a tube-like shape with an outer surface and an inner surface being directed to the pipe to be thermally insulated. The inner surface of the assembly has axially extending protrusions, so as to be usable for insulating pipes having different outer diameters. The protrusions are  
10 provided in a wave-like shape.

Furthermore, EP 1 184 614 A2 discloses a thermally insulating pipe section for insulating a pipe whereby the pipe section is made from mineral fibers. The pipe section has an outer cylindrical shape and an aperture having an oval or elliptical cross-section which results in  
15 that an inner surface of this pipe section totally lies against the outer surface of the pipe to be insulated. Air-pockets between the insulating pipe section and the pipe to be insulated can thereby be avoided.

Finally, EP 0 744 574 A1 discloses an insulating element for the insulation of parts of  
20 pipelines like pipe elbows, T-fittings or valve-parts. This pre-known insulating element is made from two longitudinal parts each having a longitudinal opening, providing an aperture for accommodating the before-mentioned parts of pipelines whereby the two longitudinal parts are facing to each other in a horizontal plane. The longitudinal openings of each part is provided with elastically or plastically formable or breakable ribs. These ribs are arranged  
25 parallel to each other and are arranged in equal distances to each other thereby forming recesses between two ribs neighbored to each other. The parts of this pre-known pipe section are made from foam material having a limited adaptability and flexibility to an outer surface of a pipe. Therefore, the insulation of these pipe sections to the parts of pipelines as mentioned before leads to extensive work before fixing to the parts of the pipeline as the  
30 aperture of the pipe section has to be exactly prepared and shaped to give the necessary insulating properties.

It is therefore an object of the invention to provide a thermally insulated pipe system (pipework) and a thermally insulating pipe section which is easily to be mounted with pipes

of different diameters and which provides a tight arrangement of the thermally insulating pipe section on the pipe without any preparatory work to adjust the pipe section to the outer diameter or the outer shape of the pipe.

5 Furthermore, it is an object of the invention to provide a method for producing a thermally insulating pipe section in a continuous way as mass products on low costs.

With respect to the thermally insulated pipe system the before mentioned objects are achieved in that two webs are provided in each longitudinal opening of the pipe section half-  
10 parts, each web extending substantially up to the symmetry plane and being arranged under an angle ( $\alpha$ ) between  $45^\circ$  and  $90^\circ$  relative to the symmetry plane, thereby incorporating a first groove between the webs and second grooves between each of the webs and a surface of the longitudinal opening.

15 Furthermore, the before-mentioned objects are achieved by a thermally insulating pipe section having two webs being provided in each longitudinal opening of the pipe section half-parts, each web extending substantially up to the symmetry plane and being arranged under an angle ( $\alpha$ ) between  $45^\circ$  and  $90^\circ$  relative to the symmetry plane, thereby incorporating a first groove between the webs and second grooves between each of the webs and a surface  
20 of the longitudinal opening.

The thermally insulated pipe system according to the invention comprises a pipe having an outer diameter and a thermally insulating pipe section mounted on said pipe. Said pipe section comprises two longitudinal and substantially identical half-parts, each having a  
25 longitudinal space or opening for accommodating half of the pipe. Both spaces are forming the aperture for the pipe. The longitudinal space or opening of each diameter comprises a central first groove, a first side groove and a second side groove arranged on either side of the central first groove. The grooves defining a first wall between the central first groove and the first side groove and a second wall between the central groove and the second side  
30 groove, whereby the walls forming webs erecting from the part of the pipe section surrounding the pipe into the openings and the aperture, and whereby the webs extent substantially up to a symmetry plane which is a plane in which the two half-parts are connected to each other when the parts are fixed to the pipe. This symmetry plane divides the pipe section preferably into the two parts of identical shape. Nevertheless, it might be

the possibility to divide the pipe section into more than two parts, especially into four parts thereby forming two symmetry planes at right angles to each other.

5 The webs being flexible are deflected by mounting the parts or the pipe section to the outer surface of the pipe so that the webs are used to close possible cavities and air pockets between the inner surface of the pipe section and the outer surface of the pipe. For this purpose, it might be of advantage to arrange the webs of each opening with its free ends slightly to the outer surface of the pipe section so that the groove between the webs has a trapezoidal cross-section. This feature has the effect that the webs are deflected in an intended direction towards the outside of the pipe section. The webs can partly be arranged with a slight deflection to the outer side of the pipe section. Since the webs extend substantially up to the symmetry plane these webs can easily be used for filling air-pockets around the outer circumference of the pipe. Because of the flexibility of the webs these webs are bend by arranging the halves around the pipe, whereby the webs stay in contact with the outer surface of the pipe. The thermally insulating pipe section can easily be mounted with pipes of different diameters in a certain range and the webs provide a tight arrangement of the thermally insulating pipe section on the pipe without any preparatory work to adjust the pipe section to the outer diameter or the outer shape of the pipe. The thermally insulating pipe section can therefore be used for pipes of different diameters without causing areas of insufficient insulation and/or with air-pockets. The webs give and can be used as additional insulation material to close such air-pockets.

25 According to a further embodiment of the invention the first groove has a width being larger than the width of each second groove, whereby the width of the first groove is around the threefold of the width of the second groove. The advantage of this embodiment is that the free ends of the webs, getting into contact with the outer surface of a pipe having a circular cross-section, are deflected to the outer side of the pipe section thereby getting in a nearly full contact with a side surface to the outer side of the pipe and providing improved insulating characteristics between the pipe section and the pipe.

30 Furthermore, it is preferably that each web has a width being smaller than the width of the first groove, whereby the width of the web is preferably between 15% and 50%, such as between 20% and 45%, of the width of the first groove. This embodiment gives the webs a good flexibility with respect to the deflection to the outer surface of the pipe section.

Preferably, the grooves and the webs are arranged symmetrically in the opening so that the parts of the pipe section can be used in either way to be mounted on a pipe. The use of the parts of the pipe section is therefore self-explanatory.

5

Preferably, the opening has a diameter being larger as or at least corresponding substantially to the outer diameter of the largest designated pipe of a range whereby the webs are used to compensate small differences between the outer diameter of the pipe and the diameter of the opening. Such a pipe section can be used for pipes of different diameters whereby the diameters of the pipes should not be varied in a large interval. Furthermore, the pipe section can be easily used for connecting areas of parts of pipes even in case of a recess at one end of a pipe to accommodate a part of a pipe to be connected with or for a certain range of pipes with different diameters.

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According to a further embodiment of the invention the first groove has a depth corresponding at least to half of the outer diameter of the pipe and a width being smaller than the outer diameter of the pipe and in that a total width between an outermost edge of the first of both second grooves to an outermost edge of the second of both second grooves corresponds at least to the outer diameter of the pipe. The width of the first groove is preferably between 30% and 90% of the outer diameter of the pipe, preferably between 35% and 80%, such as between 40% and 70%.

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Furthermore, the first groove having a depth and a width, preferably has a depth being between 80 and 160% of the width, and a total width between an outermost edge of the first side groove to an outermost edge of the second side groove corresponds at least to twice the depth of the first groove. These features give the possibility to use the pipe section in connection with an insulated pipe system for a wide range of pipes to which the insulating pipe section is to be mounted.

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The material of choice for the thermally insulating pipe section according to the present invention is factory made, bound mineral wool (MW), preferably stone wool. Said mineral wool products typically provided in densities of from 50 kg/m<sup>3</sup> to about 150 kg/m<sup>3</sup>, preferably around 90 kg/m<sup>3</sup> to 120 kg/m<sup>3</sup>. Such products are particularly suitable for building equipment and industrial installations and further specified in European Standard EN 14303:2009.

However, it should be noted that in principally the thermally insulating pipe sections might be produced utilizing other materials without departing from the scope of the invention, e.g. factory made flexible elastomeric foam (FEF), factory made polyethylene foam (PEF), or other substantially flexible foams for thermal insulation.

5

Further embodiments and advantages of the thermally insulated pipe system and the thermally insulating pipe section according to this invention are described in the following description of the accompanying drawings in which

10 Fig. 1 is a first embodiment of a thermally insulating pipe section shown in cross-section;

Fig. 2 is a second embodiment of a thermally insulating pipe section shown in cross-section;

15 Fig. 3 is a third embodiment of a thermally insulating pipe section shown in cross-section;

Fig. 4 is a fourth embodiment of a thermally insulating pipe section shown in cross-section;

Fig. 5 shows relative dimensions of the thermally insulating pipe section;

20

Fig. 6 is a fifth embodiment of a thermally insulating pipe section shown in cross-section

Fig. 7 is a tool for producing a thermally insulating pipe section according to Figs. 1 and 2 shown in cut side view;

25

Fig. 8 is a tool for producing a thermally insulating pipe section according to Figs. 3 and 4 shown in cut side view and

Fig. 9 is another view of the fifth embodiment according to Fig. 6.

30

Figs. 1 to 4 show four embodiments of a thermally insulating pipe section 1 especially differing in its size. The pipe section 1 consists of two longitudinal parts 2 being identical in shape and each having a longitudinal opening 3 forming an aperture 4 for accommodating a pipe being not shown in Figs. 1 to 4. The parts 2 are facing to each other in a symmetry

plane 5 dividing the pipe section into two halve shells.

The pipe section 1 has an outer surface 6 and consists of factory made, bound mineral wool, preferably stone wool. Its density measured in accordance with EN13470:2001 is about 110  
5 kg/m<sup>3</sup>.

In each opening 3 two webs 7 are provided extending substantially up to the symmetry plane 5 and being arranged under an angle ( $\alpha$ ) of 90° relative to the symmetry plane 5, thereby incorporating a first groove 8 between the webs 7 and second grooves 9 between the webs  
10 7 and an inner surface 10 of the longitudinal opening 3.

Part 2 and webs 7 are formed as one piece.

The webs 7 are rectangular in cross-section. Furthermore, the first groove 8 and the second  
15 grooves 9 of the embodiments according to Figs. 1 and 2 are rectangular in cross-section, too.

The embodiments according to Figs. 3 and 4 differ in the size of the pipe section 1 and in the shape of the second grooves 9 which have a beveled ground 11 of the groove 9. The  
20 ground 11 is in such a way beveled that a wall 12 of the groove 9 is shorter than a parallel wall 13 of the groove 9 whereby the wall 12 is arranged closer to the outer surface 6 of the pipe section 1. Two grooves 9 of two parts 2 have therefore a trapezoidal cross-section.

As can be seen from the Figs. 1 to 4 the first groove 8 has a width being larger than the  
25 width of each second groove 9, whereby the width of the first groove 8 is around the threefold of the width of the second groove 9, more specifically around 2,4 up to 3,7 times larger. Furthermore, each web 7 has a width being smaller than the width of the first groove 8, whereby the width of the web, depending on the size of the pipe section 1, corresponds to between 15% and 50% of the width of the first groove. The grooves 8, 9 and the webs 7 are  
30 arranged symmetrically in the opening 3.

From the following table 1 the dimensions of the pipe sections 1 in Figs. 1 to 4 can be seen. All dimensions are given in [mm].

	Pipe sizes (range)	Pipe diameter (largest)	Depth first groove	Depth second grooves	Total width	Width first groove	Width webs	Width second grooves
	<b>D</b>		<b>dc</b>	<b>ds</b>	<b>Wt</b>	<b>Wc</b>	<b>Ww</b>	<b>Ws</b>
Fig. 1	<b>12-18</b>	18,0	9,5	9,5	23,0	9,5	4,0	2,75
Fig. 2	<b>22-28</b>	28,0	14,0	14,0	30,0	12,0	4,0	5,0
Fig. 3	<b>32-38</b>	38,0	20,0	20,0	45,0	21,0	5,0	7,0
Fig. 4	<b>42-48</b>	48,0	27,0	27,0	57,0	28,0	7,0	7,5

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From table 1 it can be seen that the depth  $dc$  of the first groove 8 is equal or bigger than halve of the pipe diameter  $D$ , the width  $Wc$  of the central first groove 8 is smaller than the diameter  $D$  of the pipe, the total width  $Wt$  of the opening 3 is equal or bigger than the diameter  $D$  of the pipe, the depth  $dc$  of the first groove 8 is equal to the depth  $ds$  of the side grooves 9, the total width  $Wt$  of the opening 3 is bigger than twice the depth  $dc$  of the first groove 8. Therefore, the depth  $dc$  of the first groove 8 is approximately 95% to 117% of the width  $Wc$  of the first groove 8 whereas the width  $Wc$  of the first groove 8 is about 43 to 58% of the diameter  $D$  of the pipe and the width  $Ww$  of the webs 7 is between 71 and 145% of the width  $Ws$  of the second grooves 9. Furthermore, the width  $Wc$  of the first groove 8 is approximately 40 to 49% of the total width  $Wt$  of the opening 3 and the width  $Ww$  of the webs 7 is approximately 11 to 17% of the total width  $Wt$  of the opening 3 and the width  $Ws$  of the second grooves 9 is approximately 12 to 17% of the total width  $Wt$  of the opening 3.

25

Fig. 5 shows the thermally insulating pipe section 1 according to Fig. 4 with its relative dimensions as given in table 1. These dimensions are valid for all embodiments according to Fig. 1 to 3, 6 and 9, too.

30

Fig. 6 and 9 show a further embodiment of a thermally insulating pipe section 1 according to the invention differing from the embodiments according to Fig. 1 to 4 by diverging webs 7. In respect of the present example according to Fig. 6 the webs 7 are arranged at an angle ( $\alpha$ ) of about  $70^\circ$  relative to the symmetry plane. The first groove 8 is shaped trapezoid, and the second grooves 9 have a larger width in the area of its grounds 11 compared to the width  $Ws$  close to a free end of the web 7.

The shape of the opening 3 with the first groove 8 the second grooves 9 and the webs 7 between the first groove 8 and the second grooves 9 are produced by using a rotatably driven tool 14 which tool 14 is relatively moved to a part 2 thereby forming both webs 7 extending substantially to the symmetry plane 5 and being arranged under an angle of 90° relative to the symmetry plane 5. Forming both webs 7 means that in a part 2 formed as a solid material grooves 8 and 9 are cut from this solid material. For this purpose, the tool 14 is a milling cutter which is discoidal having a central opening 15 and border areas with two recesses 16 flanked by cutting elements 17. The edges of the cutting element 17 are rounded edges.

Fig. 9 shows the embodiment according to Fig. 6 together with a pipe 19 shortly before the two parts 2 of the pipe section 1 are arranged close to an outer surface of the pipe 19, thereby deflecting the webs 7 in directions to the outer surface 6 of the pipe section 1.

Fig. 7 shows the tool with which the opening 3 of the embodiments of the pipe section 1 according to Figs. 1 and 2 is cut whereas Fig. 6 shows the tool 14 with which the opening 3 of the pipe section 1 according to Figs. 3 and 4 is provided in the pipe section 1 and Fig. 8 shows that the outer cutting elements have beveled faces 18 to form the grounds 11 of the second grooves 9.

During the production of thermally insulating pipe sections 1 several blanks made of mineral fibers and a binder having a semi-circular cross-section are moved in line to a machine having at least one tool 14 being driven rotatably, thereby cutting the first groove 8 and the second grooves 9 into the blanks so that the pipe sections 1 can be produced continuously.

**Reference List**

	1	pipe section
	2	part
5	3	opening
	4	aperture
	5	symmetry plane
	6	outer surface
	7	web
10	8	first groove
	9	second groove
	10	surface
	11	ground
	12	wall
15	13	wall
	14	tool
	15	opening
	16	recess
	17	cutting element
20	18	face
	19	pipe
	Ww	width web
	Ws	width second groove
25	dc	depth first groove
	ds	depth second groove
	Wc	width first groove
	Wt	total width opening

## Claims

1. A thermally insulated pipe system comprising a pipe (19) having an outer diameter and a thermally insulating pipe section mounted on said pipe (19), said pipe section  
5 comprising two longitudinal parts each having a longitudinal opening, providing an aperture for accommodating the pipe (19) whereby the two longitudinal parts are facing to each other in a symmetry plane,  
**characterized in that**  
two webs (7) are provided in each longitudinal opening (3) of the parts (2), each web  
10 (7) extending substantially up to the symmetry plane (5) and being arranged under an angle ( $\alpha$ ) between  $45^\circ$  and  $90^\circ$  relative to the symmetry plane (5), thereby incorporating a first groove (8) between the webs (7) and second grooves (9) between each of the webs (7) and a surface (10) of the longitudinal opening (3).
- 15 2. The pipe system according to claim 1,  
**characterized in that**  
the longitudinal parts (2) are identical in shape.
- 20 3. The pipe system according to one of the preceding claims,  
**characterized in that**  
the first groove (8) has a width ( $W_c$ ) being larger than the width ( $W_s$ ) of each second groove (9), whereby the width ( $W_c$ ) of the first groove (8) is around the threefold of the width ( $W_s$ ) of the second groove (9).
- 25 4. The pipe system according to one of the preceding claims,  
**characterized in that**  
each web (7) has a width ( $W_w$ ) being smaller than the width ( $W_c$ ) of the first groove (8), whereby the width ( $W_w$ ) of the web (7) is preferably between 15% and 50%, such as between 20% and 45%, of the width ( $W_c$ ) of the first groove (8).  
30
5. The pipe system according to one of the preceding claims,  
**characterized in that**  
the grooves (8, 9) and the web (7) are arranged symmetrically in the opening (3).

6. The pipe system according to one of the preceding claims,  
**characterized in that**  
the opening (3) has a diameter being larger as or at least corresponding substantially  
to the outer diameter of the pipe (19).

5

7. The pipe system according to one of the preceding claims,  
**characterized in that**  
the first groove (8) has a depth (dc) corresponding at least to half of the outer  
diameter of the pipe (19) and a width (Wc) being smaller than the outer diameter of  
the pipe (19) and in that a total width (Wt) between an outermost edge of the first of  
10 both second grooves (9) to an outermost edge of the second of both second grooves  
(9) is larger than or at least corresponds substantially to the outer diameter of the  
pipe (19).

15

8. The pipe system according to one of the preceding claims,  
**characterized in that**  
the width (Wc) of the first groove (8) is between 30% and 95% of the outer diameter  
of the pipe, preferably between 35% and 80%, such as between 40% and 70%.

20

9. A thermally insulating pipe section comprising two longitudinal parts each having a  
longitudinal opening, providing an aperture for accommodating a pipe (19),  
whereby the two longitudinal parts are facing to each other in a symmetry plane,  
**characterized in that**  
two webs (7) are provided in each longitudinal opening (3) of the parts (2), each web  
25 (7) extending substantially up to the symmetry plane (5) and being arranged under  
an angle ( $\alpha$ ) between 45° and 90° relative to the symmetry plane (5), thereby  
incorporating a first groove (8) between the webs (7) and second grooves (9)  
between each of the webs (7) and a surface (10) of the longitudinal opening (3).

30

10. The thermally insulating pipe section according to claim 9,  
**characterized in that**  
the webs (7) are rectangular in cross section.

11. The thermally insulating pipe section according to claim 9,

**characterized in that**

the second grooves (9) are trapezoidal in cross-section.

12. The thermally insulating pipe section according to any of the claims 9 to 11,

**characterized in that**

the parts (2) are made of mineral wool.

13. The thermally insulating pipe section according to any of the claims 9 to 12,

**characterized in that**

the first groove (8) has a width ( $W_c$ ) being larger than the width of each second groove (9), whereby the width ( $W_c$ ) of the first groove (8) is around the threefold of the width ( $W_s$ ) of the second groove (9).

14. The thermally insulating pipe section according to any of the claims 9 to 13,

**characterized in that**

each web (7) has a width ( $W_w$ ) being smaller than the width ( $W_c$ ) of the first groove (8), whereby the width ( $W_w$ ) of the web (7) is preferably between 15% and 50%, such as between 20% and 45%, of the width ( $W_c$ ) of the first groove (8).

15. The thermally insulating pipe section according to any of the claims 9 to 14,

**characterized in that**

the grooves (8,9) and the webs (7) are arranged symmetrically in the opening (3).

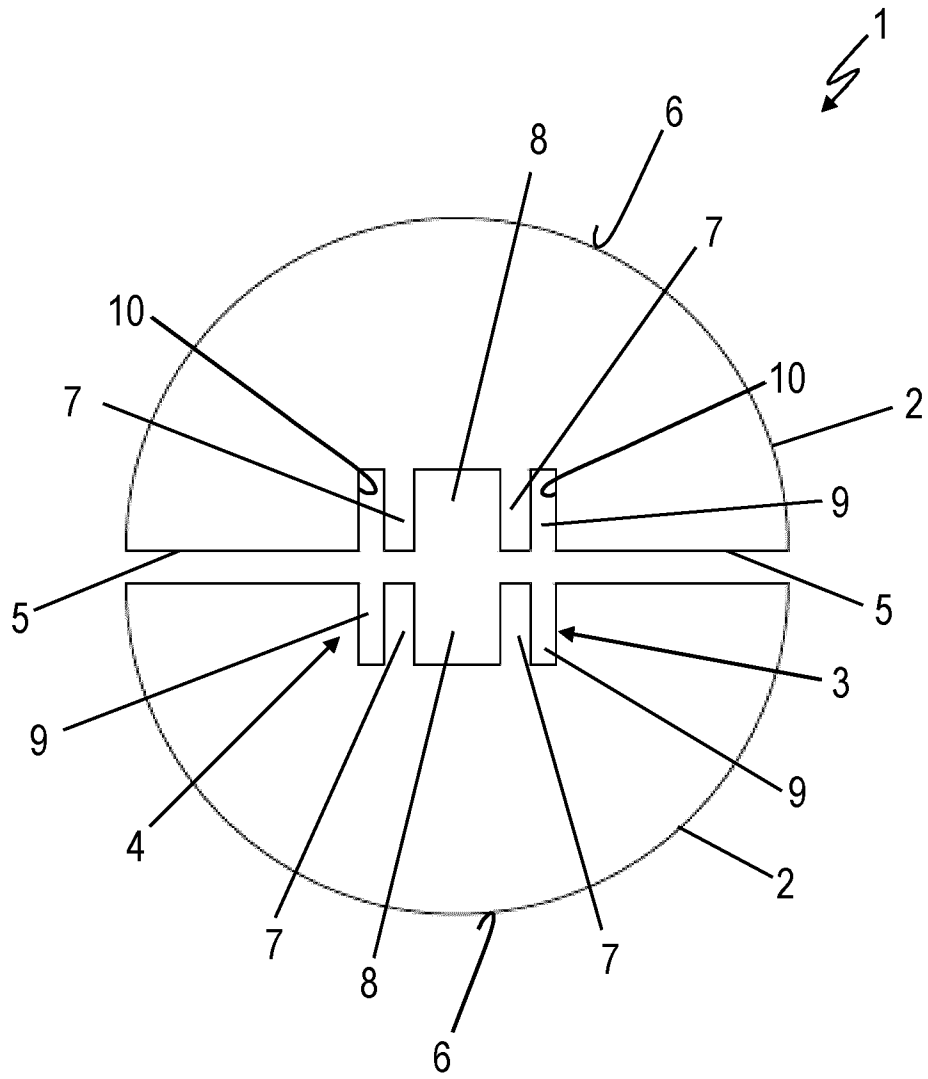
16. Method for producing a thermally insulating pipe section comprising two

longitudinal parts each having a longitudinal opening, providing an aperture for accommodating a pipe (19), whereby the two longitudinal parts are facing to each other in a symmetry plane according to any of the claims 9 to 15,

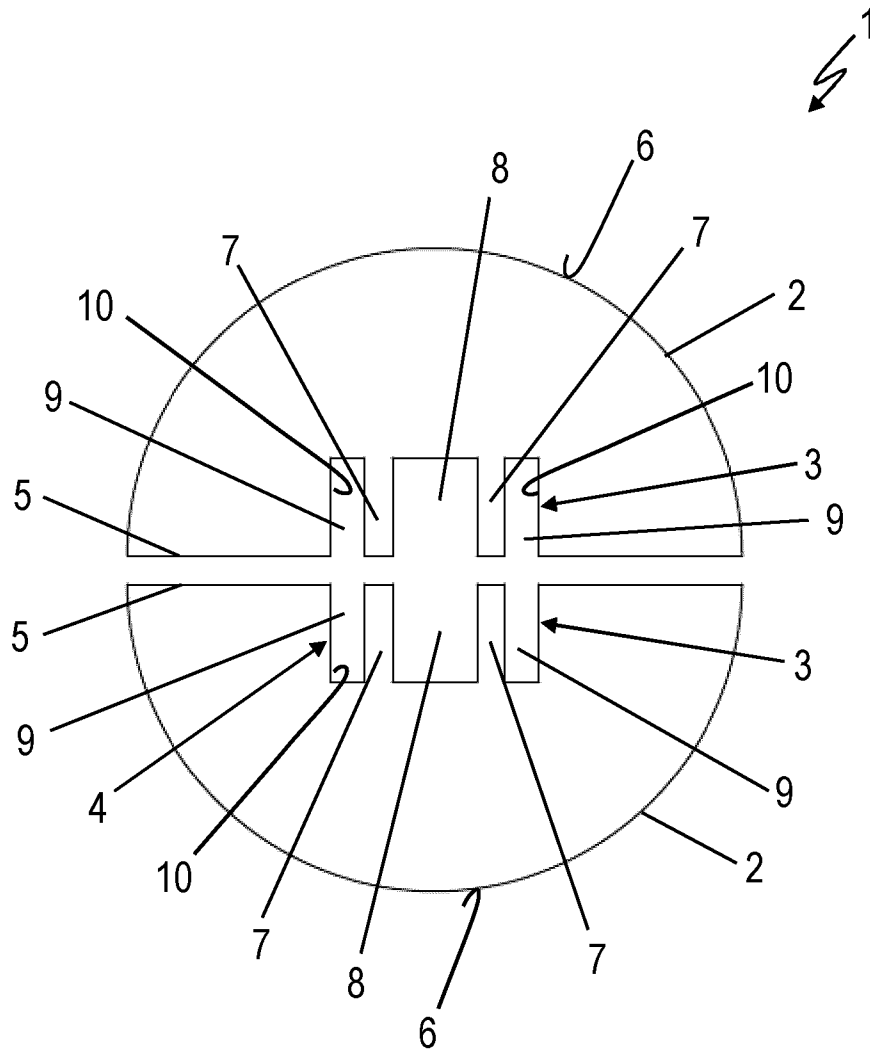
**characterized in that**

a first groove (8) between two webs (7) and second grooves (9) between each of the webs (7) and a surface (10) of the longitudinal opening (3) are cut into each longitudinal opening (3) of each part (2) by using a rotatably driven tool (14) which tool (14) is relatively moved to the part (2) thereby forming both webs (7) extending substantially to the symmetry plane (5) and being arranged under an angle ( $\alpha$ ) between  $45^\circ$  and  $90^\circ$  relative to the symmetry plane (5).

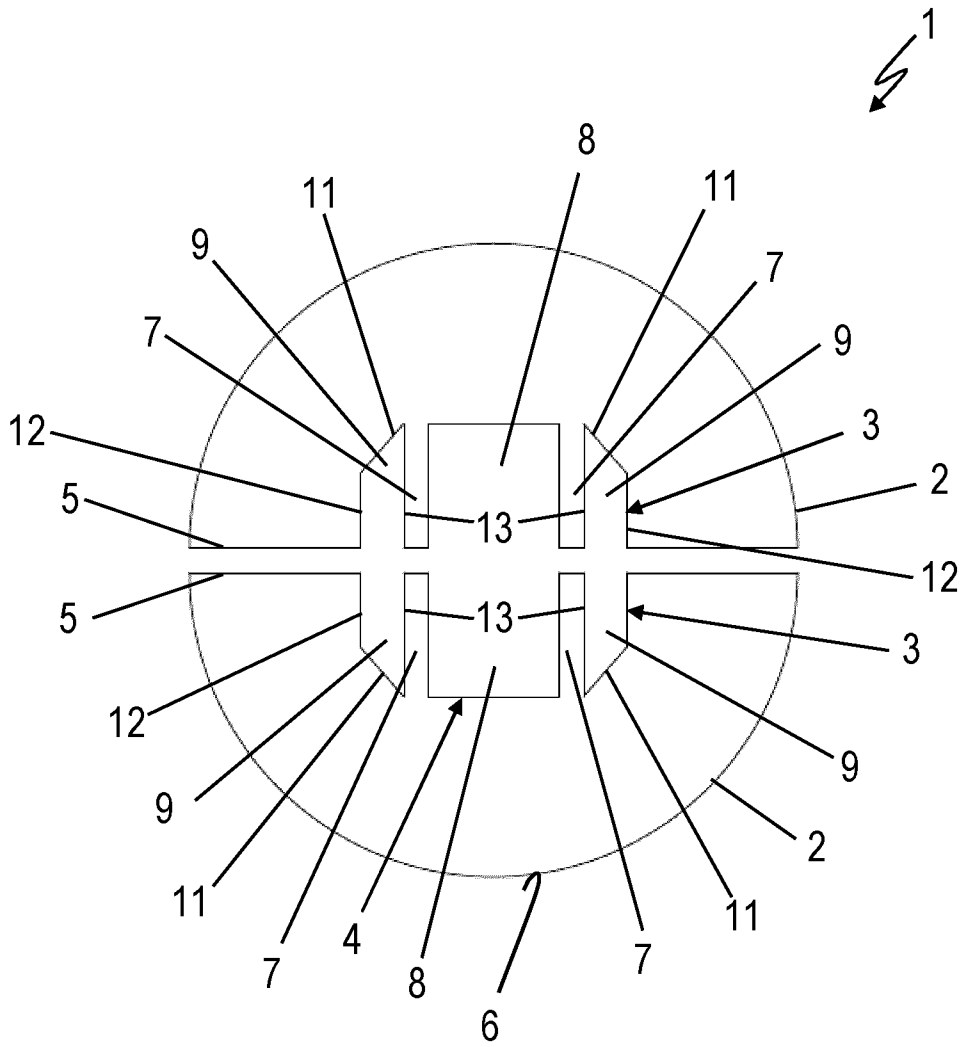
**Fig.1**



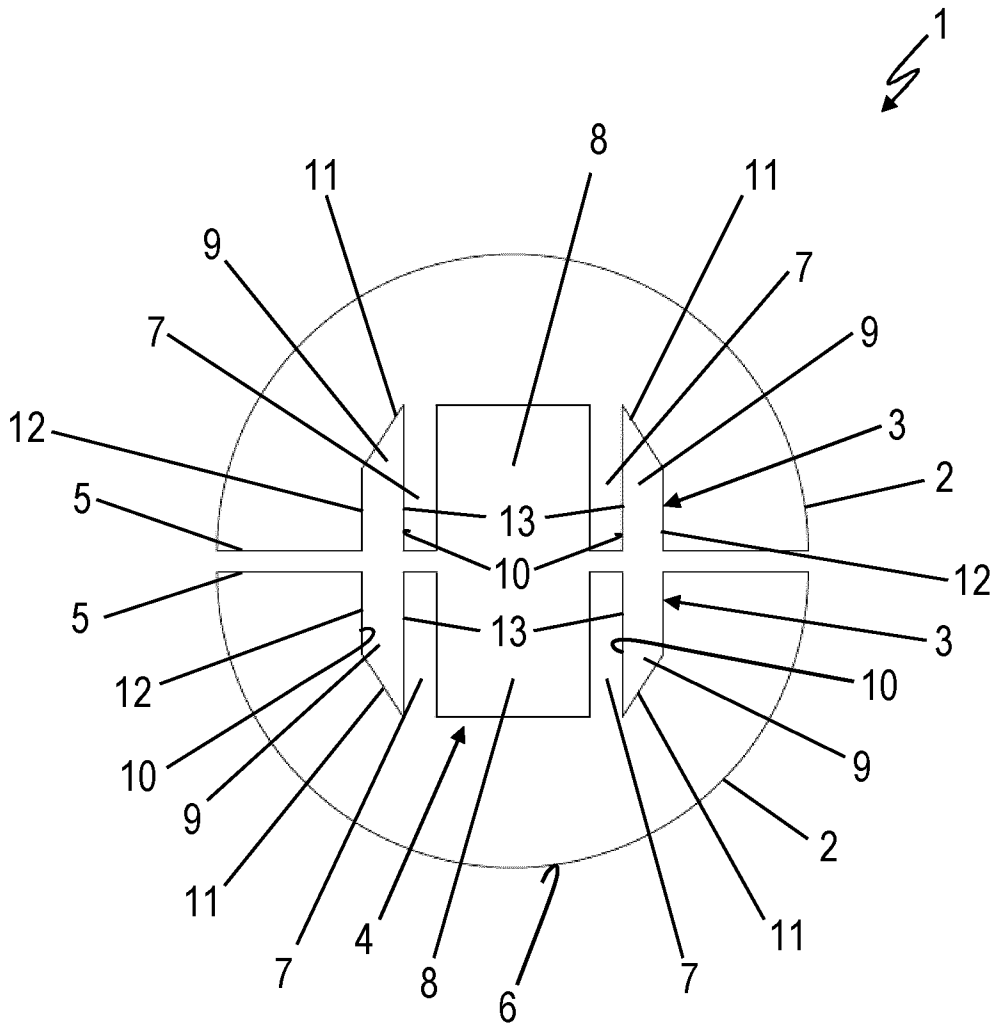
**Fig.2**



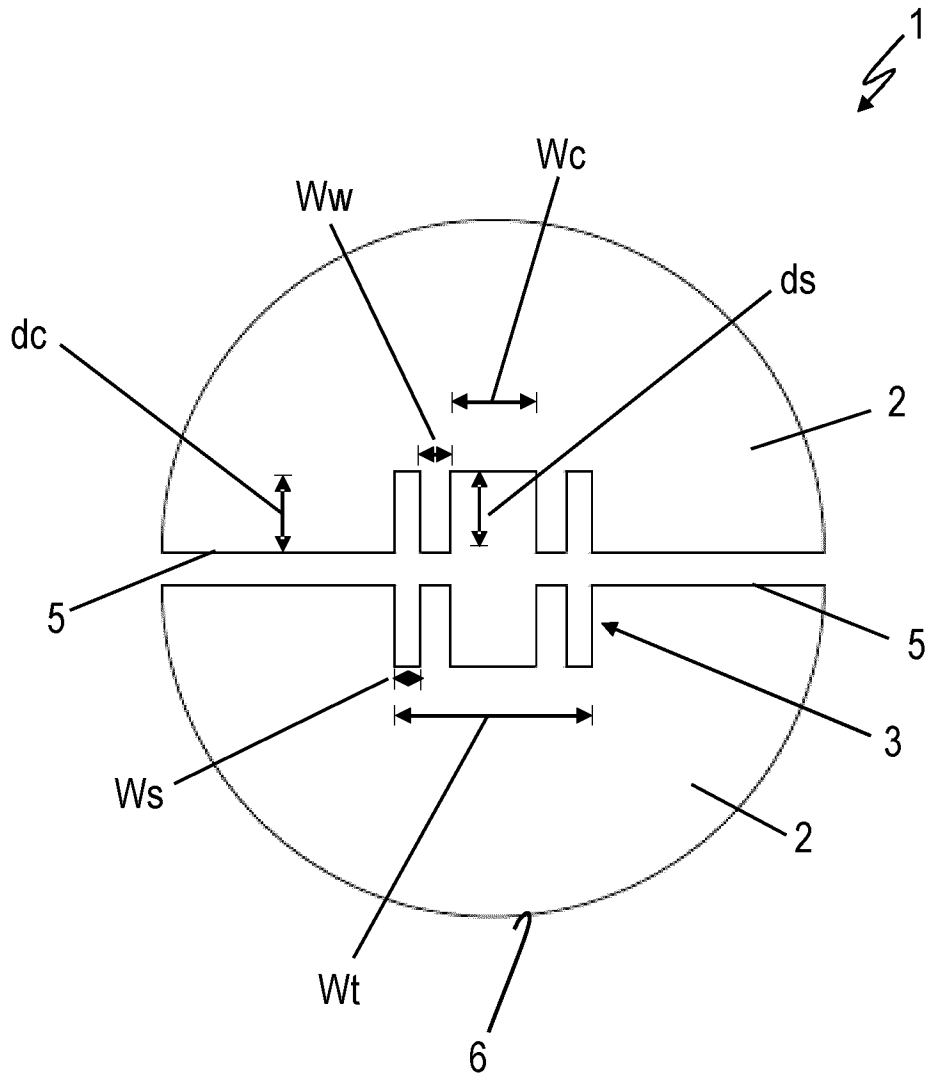
**Fig.3**



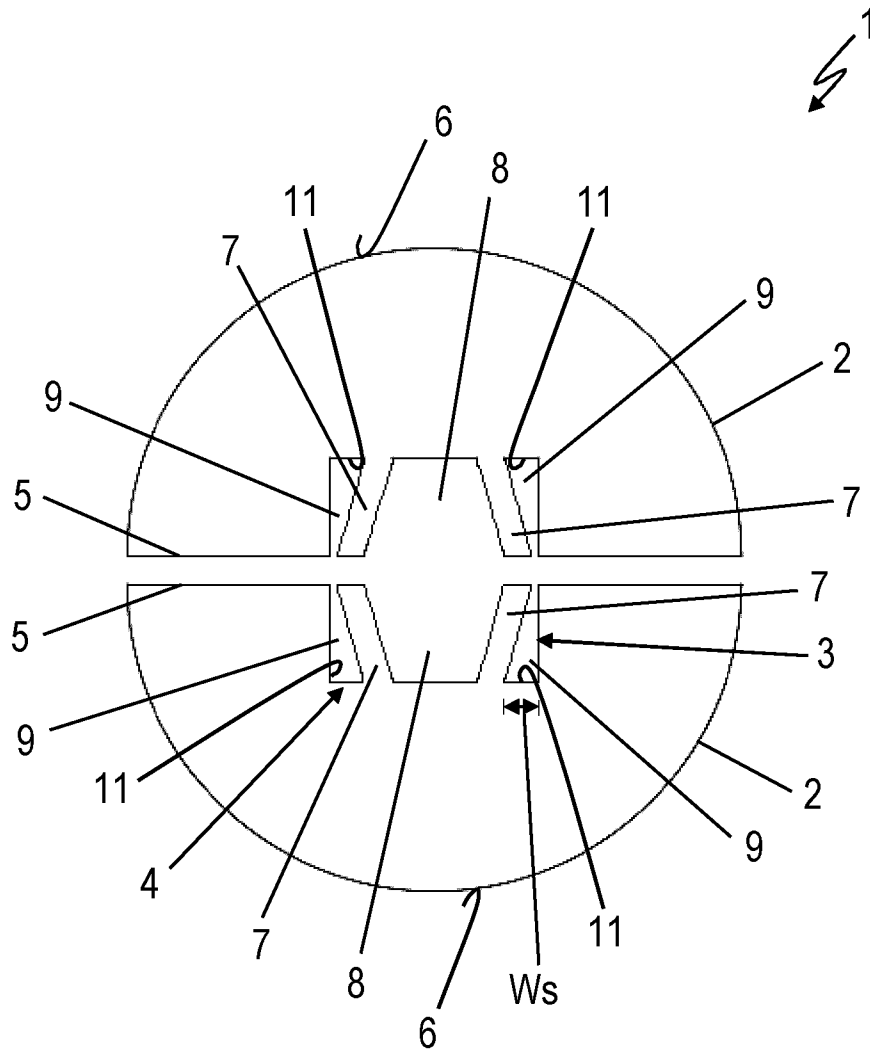
**Fig.4**



**Fig.5**

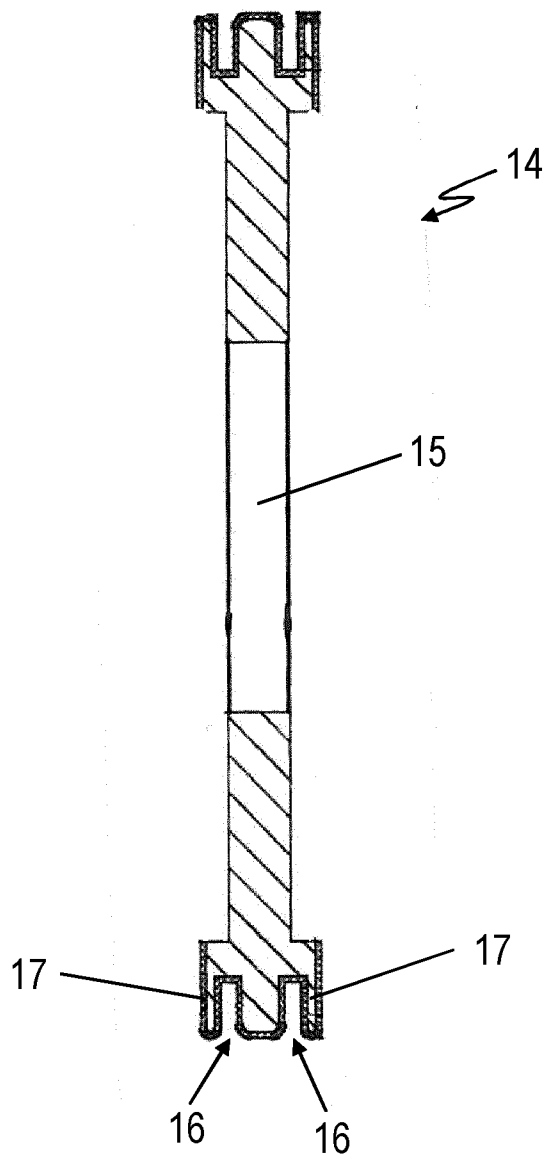


**Fig.6**

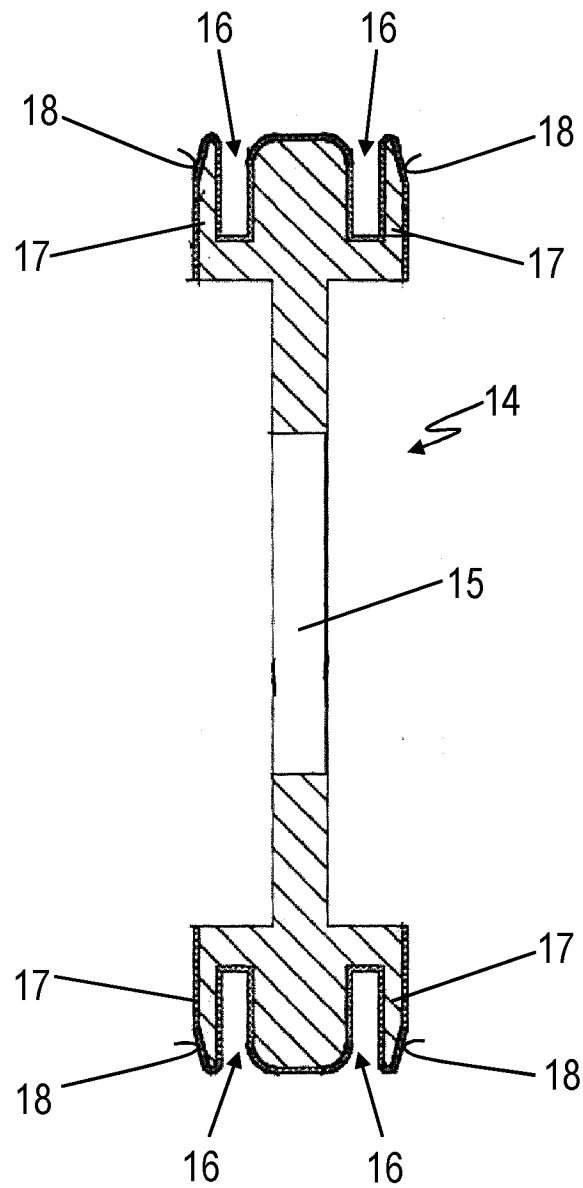


7/9

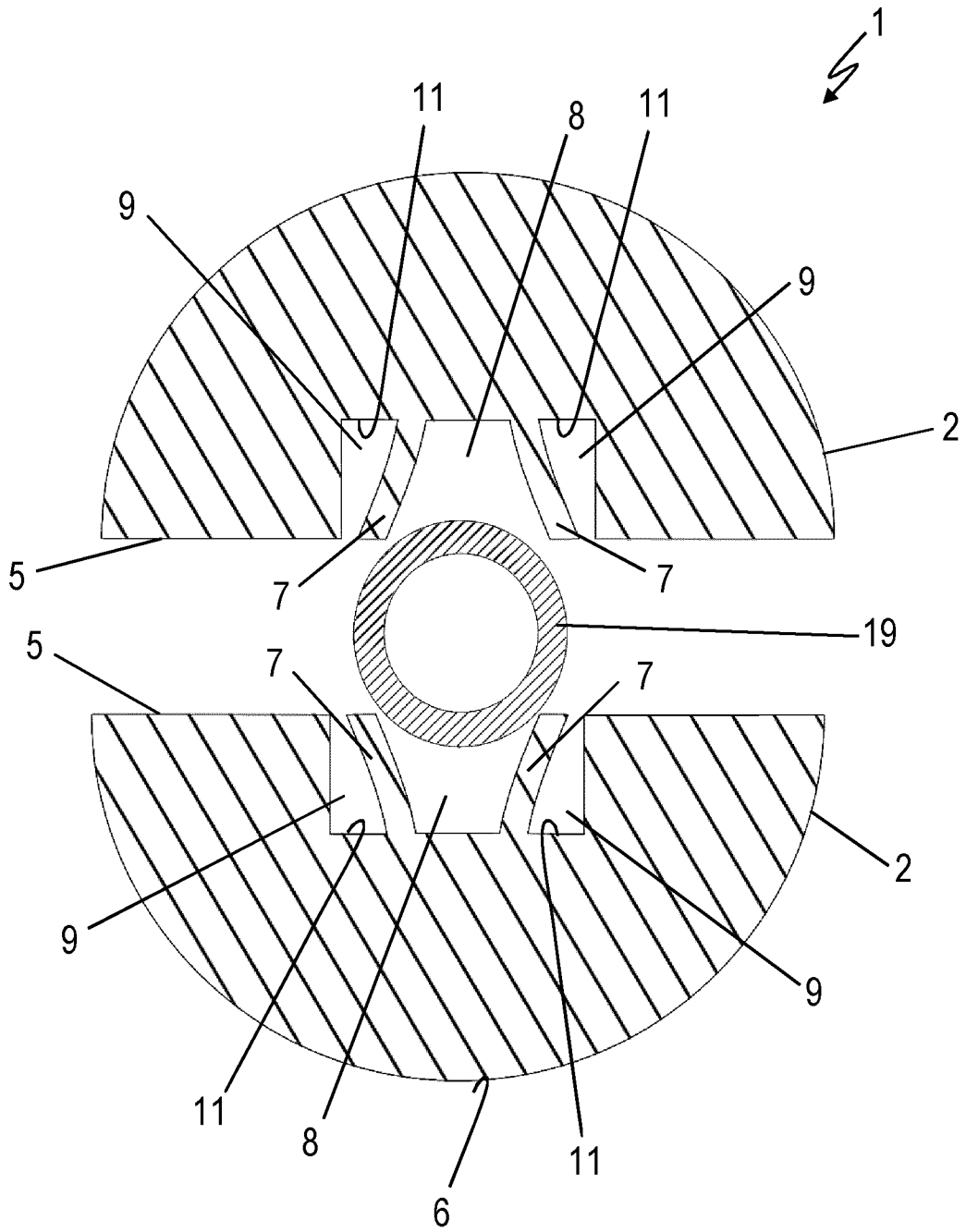
**Fig.7**



**Fig.8**



**Fig.9**



INTERNATIONAL SEARCH REPORT

International application No  
PCT/EP2021/068594

A. CLASSIFICATION OF SUBJECT MATTER  
 INV. F16L59/02 F16L59/14 B23C5/12 B23C5/08  
 ADD.  
 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)  
 F16L B23C B23G

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

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)  
 EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y A	FR 1 432 804 A (APPLIC DE SYNTHESE ET DE BIOSY) 25 March 1966 (1966-03-25) page 2; figures 2a,2b	1,2,5,6, 9,10,15 11,12,16 3,4,7,8, 13,14
X Y A	----- CZ 1 080 U1 (KAISER MILAN [CZ]) 19 November 1993 (1993-11-19) pages 4-6; figures 1,5-7	9,10,16 11,12,16 13,14
X Y	----- WO 2019/043078 A1 (ROCKWOOL INT A/S [DK]) 7 March 2019 (2019-03-07) pages 12-17; figure 3	9,11,12, 15 11,12
X	----- DE 18 68 129 U (BRAEUER HELMUT [DE]) 28 February 1963 (1963-02-28) pages 3-5; figure 4 -----	1,9
	-/--	

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

\* Special categories of cited documents :

<p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier application or patent but published on or after the international filing date</p> <p>"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)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p>	<p>"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</p> <p>"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</p> <p>"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</p> <p>"&amp;" document member of the same patent family</p>
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Date of the actual completion of the international search  2 September 2021	Date of mailing of the international search report  13/09/2021
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Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer  Fromentel, Henri
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# INTERNATIONAL SEARCH REPORT

International application No  
PCT/EP2021/068594

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 175 253 C (WILHELM DUSCHKA) 26 September 1906 (1906-09-26) pages 1,2; figures 1,2,5 -----	1,9

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2021/068594

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
FR 1432804	A	25-03-1966	NONE
-----			
CZ 1080	U1	19-11-1993	NONE
-----			
WO 2019043078	A1	07-03-2019	CA 3073841 A1 07-03-2019
			CN 111247278 A 05-06-2020
			EA 202090538 A1 22-06-2020
			EP 3676434 A1 08-07-2020
			US 2021163783 A1 03-06-2021
			WO 2019043078 A1 07-03-2019
-----			
DE 1868129	U	28-02-1963	NONE
-----			
DE 175253	C	26-09-1906	NONE
-----			