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(54) **HEATING/COOLING SYSTEM MANIFOLD**

(57) A heating/cooling system manifold (1) is described, the manifold (1) comprising a sleeve (2) having at least one opening (3, 4) in a wall and fixing means (5) having a connection geometry (6) for mounting at least a functional part of the system to the sleeve (2) and being arranged around the opening (3, 4).

Mounting of a manifold for a heating/cooling system should be facilitated.

To this end, the fixing means (5) comprise at least two parts (7, 8) which are connected by means of screws (9, 10) outside the sleeve (2)

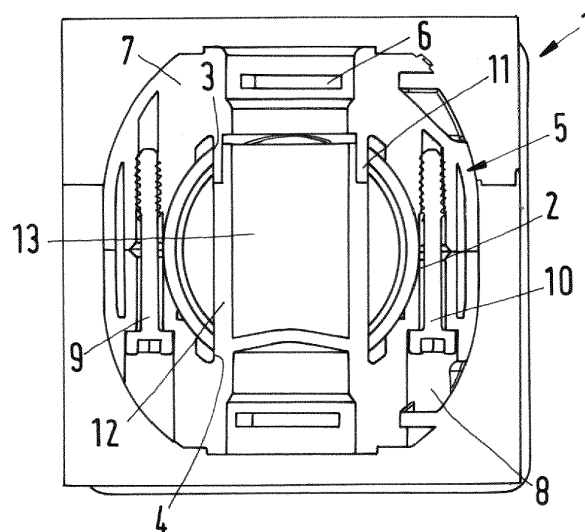


Fig.2

Description

[0001] The present invention relates to a heating/cooling system manifold comprising a sleeve having at least one opening in a wall and fixing means having a connection geometry for mounting at least a functional part of the system to the sleeve and being arranged around the opening.

[0002] Such a manifold is known, for example, from EP 1 426 695 A1. In this reference, the fixing means comprise two parts in form of tubular metal elements which are inserted into opposing openings in the sleeve and are connected to each other by means of a threaded connection, wherein one tubular element comprises a male thread and the other tubular element comprises a female thread. When the parts of the fixing means are connected, they have to be rotated against each other which can be detrimental for O-rings which are used to form a sealing between the parts of the fixing means and the sleeve.

[0003] The object underlying the invention is to facilitate mounting of a manifold for a heating/cooling system.

[0004] This object is solved with a heating/cooling system manifold as described at the outset in that the fixing means comprise at least two parts which are connected by means of at least one joining element outside the sleeve.

[0005] In this way it is possible to just insert one part of the fixing means into the opening in the sleeve, i.e. to mount the part of the fixing means to one side of the sleeve. Another part of the fixing means can then be mounted from another side of the sleeve so that the sleeve is finally held or even clamped between the parts of the fixing means. A connection between the parts of the fixing means is realized by means of at least one joining element which can, for example, be a screw which is arranged parallel to a tangent to the circumference of the sleeve in case the sleeve has circular cross section. Such screws are easily accessible. Mounting is thus simplified. The sleeve can be made of a metal material and the fixing means can be made of a plastic material. Other joining elements can be used, for example a snap connection, straps, rivets or the like

[0006] In an embodiment of the invention the at least two parts form a closed assembly around the sleeve. In other words, the fixing means form a closed ring around the sleeve, which gives a high stability of the fixing means and the connection to the sleeve.

[0007] In an embodiment of the invention two parts of the fixing means are mounted on opposite sides of a circumference of the sleeve. Thus, the sleeve can be loaded in one direction, preferably in the direction in which a centre axis of the opening is directed. Thus, the parts of the fixing means can be pressed with sufficient force against the sleeve to ensure a sufficient tightness. However, in most cases in addition a sealing means will be provided.

[0008] In an embodiment of the invention at least one

of the two parts of the fixing means comprises a protrusion extending into the interior of the sleeve. This protrusion can then accommodate at least a functional part of the system, so that this functional part is guided in a certain area of movement within the sleeve.

[0009] In an embodiment of the invention the sleeve comprises a circumferential wall having two openings opposite to each other, wherein the protrusion is a first protrusion of a first part of the fixing means and a second part of the fixing means comprises a second protrusion extending into the interior of the sleeve. Since the openings in the sleeve are arranged opposite to each other, the protrusions are directed towards each other and form a tube-like section accommodating a channel or parts of a channel, so that the functional part or functional parts can be accommodated in the channel. This channel can be used to guide a fluid out of or into the sleeve in a controlled manner.

[0010] In an embodiment of the invention the first protrusion contacts the second protrusion. In other words, the channel is provided with a throughgoing wall, wherein the wall can have an opening allowing a controlled entry of a fluid from the interior of the sleeve into the channel.

[0011] In an embodiment of the invention a functional part is mounted moveably to the fixing geometry. The functional part can be used, for example, to control a flow of fluid from the sleeve to a heating or cooling circuit connected to the sleeve. This is in particular useful when the manifold is used in a floor heating system, in particular as a forward manifold. The functional part or number of functional parts can form or be part of pre-setting means.

[0012] In an embodiment of the invention the functional part is moveable transverse to a longitudinal extension of the sleeve. When the sleeve has a circular cross section, the functional part can then be positioned in different positions along the diameter of the sleeve to adjust certain characteristics in the flow through the manifold or from the manifold to other parts of the cooling or heating system. When the sleeve has another cross section, these positions are simply arranged in a direction transverse to the longitudinal extension of the sleeve.

[0013] In an embodiment of the invention the functional part is a first functional part and interacts with a control opening in a second functional part. The control opening allows entry of a fluid from the sleeve into the channel formed by the two parts of the fixing means. When the first functional part can be moved, it can open or close the control opening more or less to control the flow of fluid through the opening. Thus, the first functional part in cooperation with the second functional part can be used as pre-setting means.

[0014] In an embodiment of the invention the first functional part is held unrotatably in the fixing means and the second functional part is rotatably mounted to the fixing means, wherein the first functional part and the second functional part are connected by means of a threaded connection. This threaded connection is only a connection between the functional parts, however, not between

the fixing means. When the second functional part is rotated, this rotating movement is translated in a translatory movement of the first part. The first part can then be shifted over the opening to change the flow resistance through the opening.

[0015] In an embodiment of the invention the second functional part comprises a tube-like section extending through the first functional part. Thus, the first functional part is guided over a considerable length on the outside of the second functional part. In addition, the first functional part can be surrounded by the protrusion of a part of the fixing means, so that the first functional part is guided in a gap between two parts which gives a rather high stability, so that the position of the first functional part with respect to the second functional part can be adjusted with a high precision.

[0016] In an embodiment of the invention the fixing means comprise at least one rib or groove parallel to the moving direction of the first functional part, the rib or groove cooperating with a corresponding groove or rib of the first functional part. The cooperation between rib and groove is a simple way to allow a translational movement of the first functional part and to prevent a rotational movement of the first functional part at the same time.

[0017] In an embodiment of the invention the fixing means comprise a sealing ring and the first functional part has a first end position which is in contact with a sealing ring and closes the control opening and a second end position in which the control opening is open to a maximum. When the first functional part is in contact with the sealing ring, there is no flow of fluid from the sleeve through the fixing means. When, for example, the functional part or parts are used to form a pre-setting means, this pre-setting means is closed in this position of the first functional part. When the first functional part is in the second end position, there is basically no additional throttling caused by the control opening.

[0018] In an embodiment of the invention the threaded connection has a pitch translating a rotation of the second functional part over less than 360° to a stroke between the two end positions. Thus, it is possible to use an adjustment knob that is turned back and forth between a single stop which limits the rotation of the adjustment knob in two directions of rotation. Such a thread can also be realized by means of a multi turn thread having a number of intertwined threads, for example two, preferably four or six, intertwined threads.

[0019] In an embodiment of the invention the fixing means are provided with a connection piece. The connection piece allows the connection between the manifold and a forward line or a return line of the heating or cooling system.

[0020] An embodiment of the invention will now be described with reference to the drawing, wherein:

Fig. 1 shows a part of a heating/cooling system manifold

Fig. 2 shows a sectional view through the manifold and fixing means mounted to the manifold,

5 Fig. 3 shows the manifold of Fig. 1 with different functional parts in an exploded view,

Fig. 4 shows a sectional view of a pre-setting arrangement,

10 Fig. 5 shows the pre-setting arrangement in a sectional perspective view,

Fig. 6 shows part of the fixing means,

15 Fig. 7 shows the manifold with pre-setting means from the outside,

20 Fig. 8 to 10 show the pre-setting means in different pre-setting positions.

[0021] Fig. 1 shows a part of a heating/cooling system manifold 1 comprising a sleeve 2 having openings 3, 4 on opposite sides of a circumferential wall of the sleeve 2. Fixing means 5 are mounted to the sleeve 2. The fixing means 5 comprise a connection geometry 6 for mounting at least a functional part of the system to the sleeve 2. The fixing means 5 are arranged around the opening 3, 4.

25 **[0022]** The fixing means 5 are formed in the present example by two parts 7, 8 which are mounted to the sleeve 2 from opposite directions, i.e. basically along a diameter of the sleeve 2. The two parts 7, 8 form a closed assembly around the sleeve 2, i.e. in the region of the openings 3, 4 the sleeve 2 is completely encapsulated by the fixing means 5.

30 **[0023]** The two parts 7, 8 of the fixing means 5 are connected by means of screws 9, 10 which are arranged outside the sleeve and are basically directed in parallel to a tangent to the sleeve 2. Other joining elements can be used, for example snap elements, straps, rivets or the like.

35 **[0024]** The sleeve 2 can be made from a metal material, wherein the two parts 7, 8 of the fixing means 5 can be made, for example, from a plastic material.

40 **[0025]** The first part 7 comprises a first protrusion 11 which is inserted into the opening 3 of the sleeve 2. The second part 8 comprises a second protrusion 12 which is inserted through the second opening 4 into the interior of the sleeve 2. Both protrusions 11, 12 overlap each other and form a channel 13 (or tube) which is closed with the exception of an opening 14 which is shown in Fig. 4 to 6 and 8 to 10 only. This opening 14 is not visible in the sectional view of Fig. 2.

45 **[0026]** Fig. 3 shows that a number of different functional parts can be mounted to the fixing means 5. The functional part can be a plug 114, a simple pre-setting means 115, a more advanced pre-setting means 116 or a pre-setting means 117 having a flow meter 118. Furthermore,

the functional part can be a venting connection 119. All functional parts can be connected to the sleeve 2 by means of the same fixing means 5.

[0027] Fig. 4 to 10 show the manifold 1 in connection with the pre-setting means 116. The same elements are referred to with the same reference numerals as in Fig. 1 to 3.

[0028] Fig. 6 shows part of the fixing means, in particular the first protrusion 11 having the opening 14 and the second protrusion 12. It can be seen that the second protrusion 12 comprises a number of ribs 15, 16 extending parallel to the lengthwise extension of the second protrusion 12 and the function of which will be explained in connection with some of the other Figures.

[0029] A first functional part 17 is arranged in the fixing means 5, in particular in the second part 8 of the fixing means and specifically within the second protrusion 12. The first functional part 17 has on its outside grooves (not visible in Fig. 4) corresponding to the ribs 15, 16 shown in Fig. 6. The cooperation between the grooves and the ribs 15, 16 have the consequence that the first functional part 17 can be moved in a translational manner within the second protrusion 12, while a rotational movement of the first functional part 17 is prevented. An O-ring 18 is arranged between the first functional part 17 and the second protrusion 12 to prevent any leakage flow between the first functional part 17 and the second protrusion 12.

[0030] A second functional part 19 is mounted rotatably to the first part 7 of the fixing means 5. The second functional part 19 comprises a control opening 20. Furthermore, the second functional part 19 comprises a male thread 21 which is in engagement with a female thread 22 of the first functional part 17. A channel is provided inside a tube-like section 24 of the second functional part.

[0031] When the second functional part 19 is rotated and the first functional part 17 is held unrotatably in the second part 8 of the fixing means 5, the rotational movement of the second functional part 19 is translated in a translatory movement of the first functional part 17. In other words, the first functional part 17 is moved along the second functional part 19, so that it can close or open the control opening 20 more or less.

[0032] Furthermore, the second functional part 19 comprises a sealing ring 23 and the first functional part 17 has a first end position which is in contact with the sealing ring 23. This position is shown in Fig. 10. The contact between the first functional part 17 and the sealing ring 23 forms a fluid-tight seal, so that no fluid from the interior of the sleeve 2 can propagate to a channel 24 which is formed in the interior of the second functional part 19. In this position of the first functional part 17 the pre-setting means 116 is completely closed.

[0033] Fig. 8 shows a position of the first functional part 17, in which the control opening 20 is open to a maximum. This position is a second end position. Fig. 9 shows an intermediate position of the first functional part 17, in which the control opening 20 is partly open, so that a

reduced flow of fluid can flow from the interior of the sleeve 2 through the channel 24 in the interior of the second functional part 19.

[0034] As can be seen, in particular in Fig. 4, the first functional part 17 is held between the second protrusion 12 and the second functional part 19, so that the position of the first functional part 17 can be adjusted with a high precision.

[0035] The pre-setting means 116 comprise an adjusting knob 25 which is connected to the second functional part 19 and which can be rotated by a bit less than 360°. To this end, the first part 7 of the fixing means 5 comprise a stop 26 and the adjustment knob 25 comprises another stop 27. The stop 26 of the fixing means 5 can be rotated between two end positions defined by the two end positions of stop 27. When the adjustment knob 25 is rotated between these two end positions, the first functional part 17 is translated between the two end positions (Fig. 8 and Fig. 10) by way of the threaded connection, so that pre-setting of a heating/cooling system is made very simple.

[0036] The fixing means 5 can be provided with a connection piece 28 which simplifies the connection to a forward or return line of the heating/cooling system.

[0037] All functional parts 114-119 and the connection piece can be held in the fixing means 5 by means of a snap ring 29, 30 or another spring-like element. Even an element like a hair pin can be used and it is not necessary that such an element is spring biased.

Claims

1. Heating/cooling system manifold (1) comprising a sleeve (2) having at least one opening (3, 4) in a wall and fixing means (5) having a connection geometry (6, 29, 30) for mounting at least a functional part (114 - 119) of the system to the sleeve (2) and being arranged around the opening (3, 4), **characterized in that** the fixing means (5) comprise at least two parts (7, 8) which are connected by means of at least one joining element (9, 10) outside the sleeve (2).
2. Manifold according to claim 1, **characterized in that** the at least two parts (7, 8) form a closed assembly around the sleeve (2).
3. Manifold according to claim 1 or 2, **characterized in that** two parts (7, 8) of the fixing means (5) are mounted on opposite sides of the wall of the sleeve (2).
4. Manifold according to any of claims 1 to 3, **characterized in that** at least one of the two parts (7, 8) of the fixing means (5) comprises a protrusion (11, 12) extending into the interior of the sleeve (2).
5. Manifold according to claim 4, **characterized in that** the sleeve (2) comprises a circumferential wall hav-

ing two openings (3, 4) opposite to each other, wherein the protrusion (11) is a first protrusion of a first part (7) of the fixing means (5) and a second part (8) of the fixing means (5) comprises a second protrusion (12) extending into the interior of the sleeve (2).

6. Manifold according to claim 5, **characterized in that** the first protrusion (11) contacts the second protrusion (12).

7. Manifold according to any of claims 1 to 6, **characterized in that** a functional part (17) is mounted movably to the fixing means (5).

8. Manifold according to claim 7, **characterized in that** the functional part (17) is movable transverse to a longitudinal extension of the sleeve (2).

9. Manifold according to claim 7 or 8, **characterized in that** the functional part is a first functional part (17) and interacts with a control opening (20) in a second functional part (19).

10. Manifold according to any of claims 7 to 9, **characterized in that** the first functional (17) part is held unrotatably in the fixing means (5) and the second functional part (19) is rotatably mounted to the fixing means (5), wherein the first functional part (17) and the second functional part (19) are connected by means of a threaded connection (21, 22).

11. Manifold according to claim 10, **characterized in that** the second functional part (19) comprises a tube-like section (24) extending through the first functional part (17).

12. Manifold according to claim 10 or 11, **characterized in that** the fixing means (5) comprise at least one rib (15, 16) or groove parallel to a moving direction of the first functional part (17), the rib or groove cooperating with a corresponding groove or rib of the first functional part (17).

13. Manifold according to any of claims 9 to 12, **characterized in that** the fixing means (5) comprises a sealing ring (23) and the first functional part (17) has a first end position in which is in contact with the sealing ring (23) and closes the control opening (20) and a second end position in which the control opening (20) is open to a maximum.

14. Manifold according to claim 13, **characterized in that** the threaded connection (21, 22) has a pitch translating a rotation of the second functional part (19) over less than 360° to a stroke of the first functional part (17) between the two end positions.

15. Manifold according to any of claims 1 to 14, **characterized in that** the fixing means (5) are provided with a connection piece (28).

Amended claims in accordance with Rule 137(2) EPC.

1. Heating/cooling system manifold (1) comprising a sleeve (2) having at least one opening (3, 4) in a wall and fixing means (5) having a connection geometry (6, 29, 30) for mounting at least a functional part (114 - 119) of the system to the sleeve (2) and being arranged around the opening (3, 4), wherein the fixing means (5) comprise at least two parts (7, 8) which are connected by means of at least one joining element (9, 10) outside the sleeve (2), **characterized in that** at least one of the two parts (7, 8) of the fixing means (5) comprises a protrusion (11, 12) extending into the interior of the sleeve (2).

2. Manifold according to claim 1, **characterized in that** the at least two parts (7, 8) form a closed assembly around the sleeve (2).

3. Manifold according to claim 1 or 2, **characterized in that** two parts (7, 8) of the fixing means (5) are mounted on opposite sides of the wall of the sleeve (2).

4. Manifold to any of claims 1 to 3, **characterized in that** the sleeve (2) comprises a circumferential wall having two openings (3, 4) opposite to each other, wherein the protrusion (11) is a first protrusion of a first part (7) of the fixing means (5) and a second part (8) of the fixing means (5) comprises a second protrusion (12) extending into the interior of the sleeve (2).

5. Manifold according to claim 4, **characterized in that** the first protrusion (11) contacts the second protrusion (12).

6. Manifold according to any of claims 1 to 5, **characterized in that** a functional part (17) is mounted movably to the fixing means (5).

7. Manifold according to claim 6, **characterized in that** the functional part (17) is movable transverse to a longitudinal extension of the sleeve (2).

8. Manifold according to claim 6 or 7, **characterized in that** the functional part is a first functional part (17) and interacts with a control opening (20) in a second functional part (19).

9. Manifold according to any of claims 6 to 8, **characterized in that** the first functional (17) part is held unrotatably in the fixing means (5) and the second

functional part (19) is rotatably mounted to the fixing means (5), wherein the first functional part (17) and the second functional part (19) are connected by means of a threaded connection (21, 22).

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10. Manifold according to claim 9, **characterized in that** the second functional part (19) comprises a tube-like section (24) extending through the first functional part (17).

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11. Manifold according to claim 9 or 10, **characterized in that** the fixing means (5) comprise at least one rib (15, 16) or groove parallel to a moving direction of the first functional part (17), the rib or groove cooperating with a corresponding groove or rib of the first functional part (17).

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12. Manifold according to any of claims 8 to 11, **characterized in that** the fixing means (5) comprises a sealing ring (23) and the first functional part (17) has a first end position in which is in contact with the sealing ring (23) and closes the control opening (20) and a second end position in which the control opening (20) is open to a maximum.

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13. Manifold according to claim 12, **characterized in that** the threaded connection (21, 22) has a pitch translating a rotation of the second functional part (19) over less than 360° to a stroke of the first functional part (17) between the two end positions.

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14. Manifold according to any of claims 1 to 13, **characterized in that** the fixing means (5) are provided with a connection piece (28).

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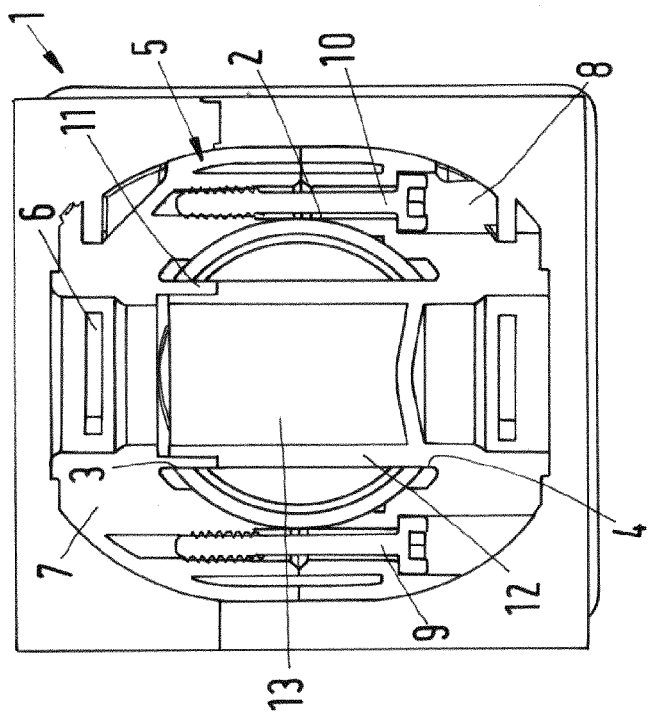


Fig. 2

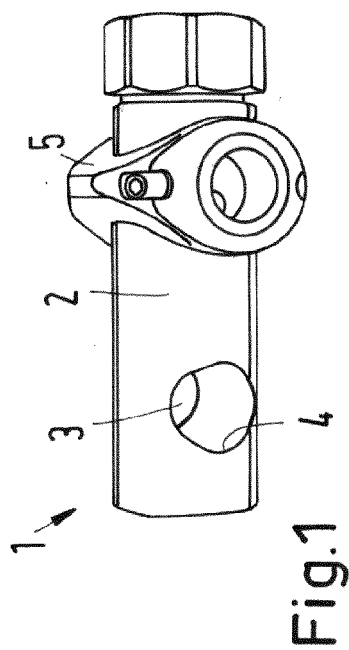


Fig. 1

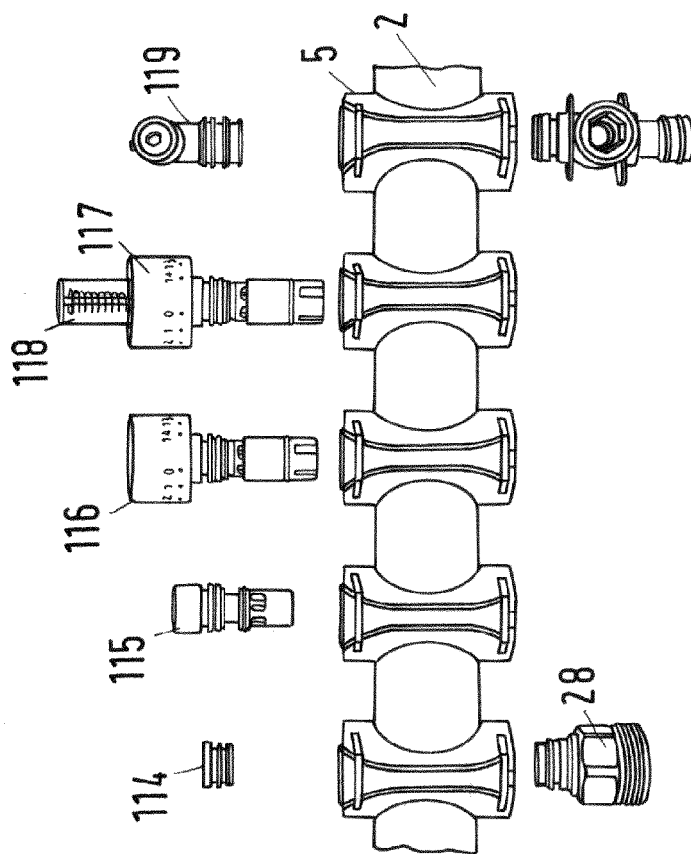


Fig. 3

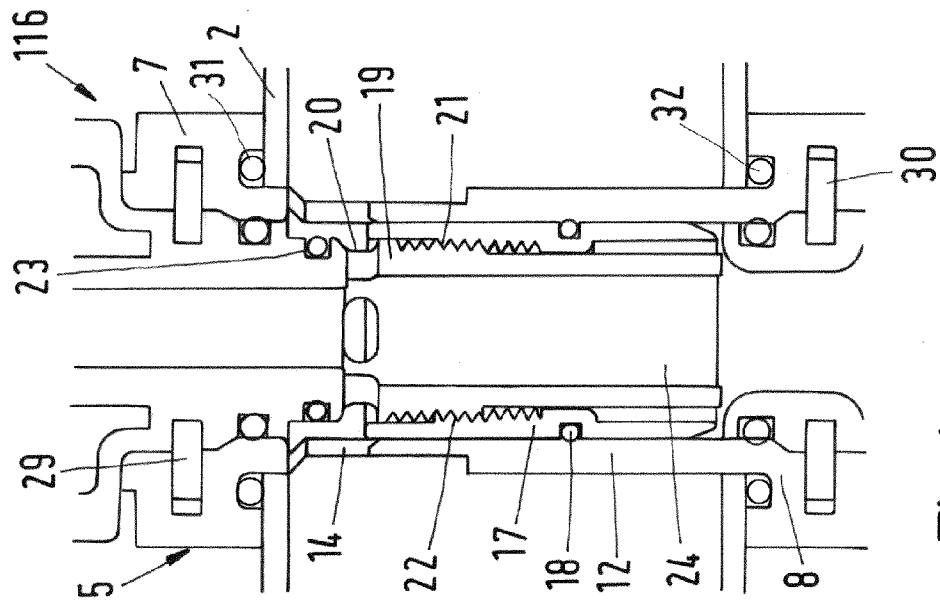


Fig.4

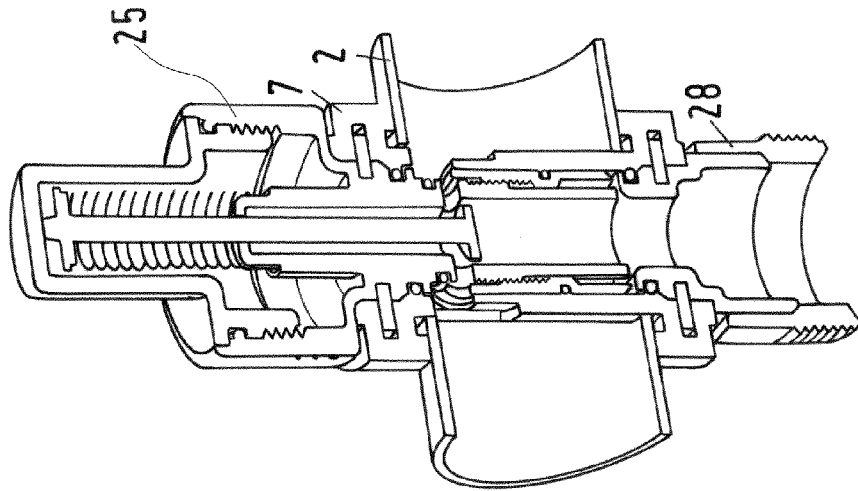


Fig.5

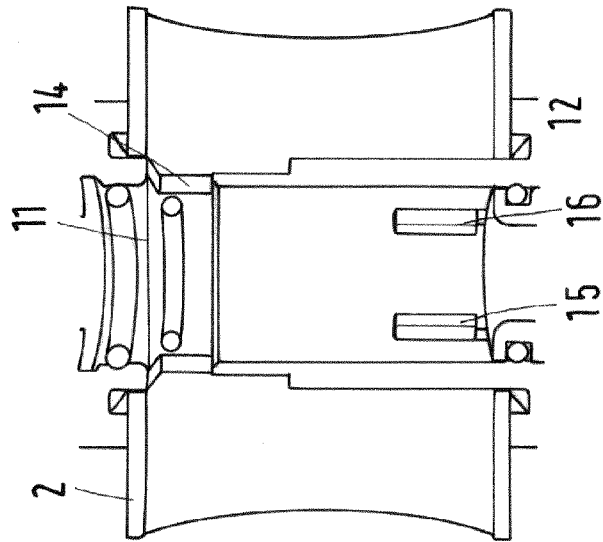


Fig.6

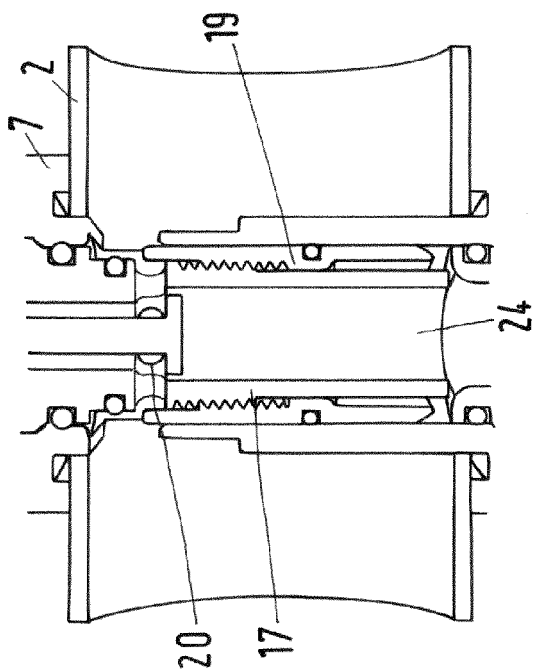


Fig. 8

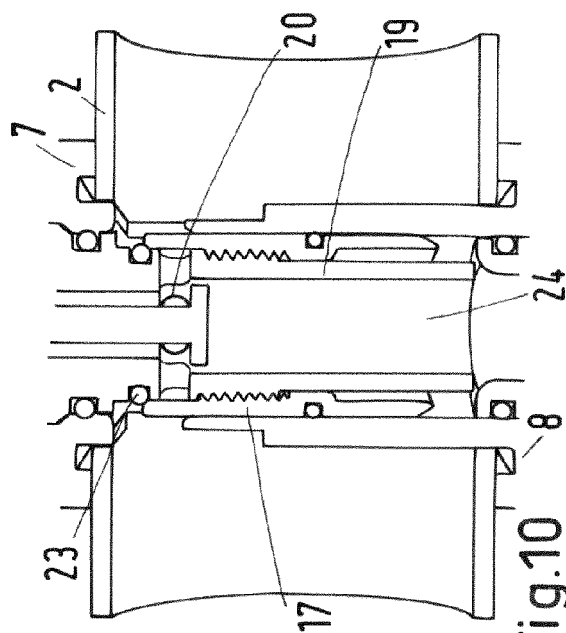


Fig. 10

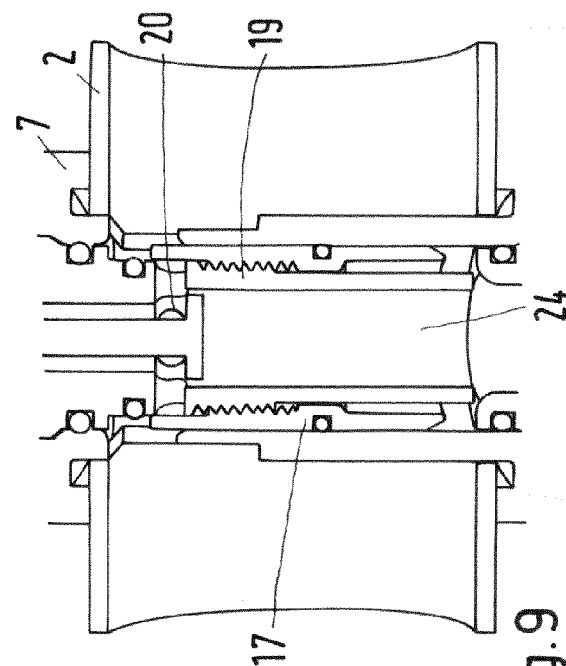


Fig. 9

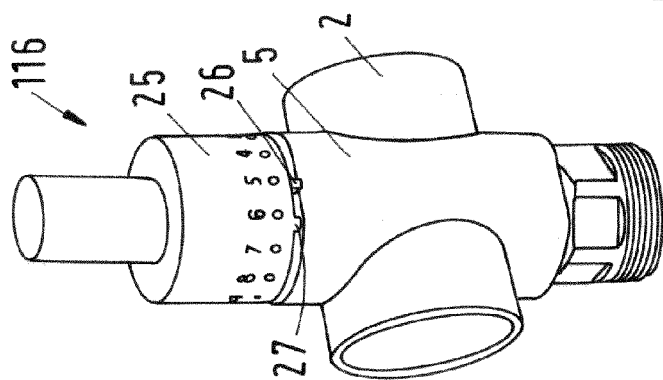


Fig. 7

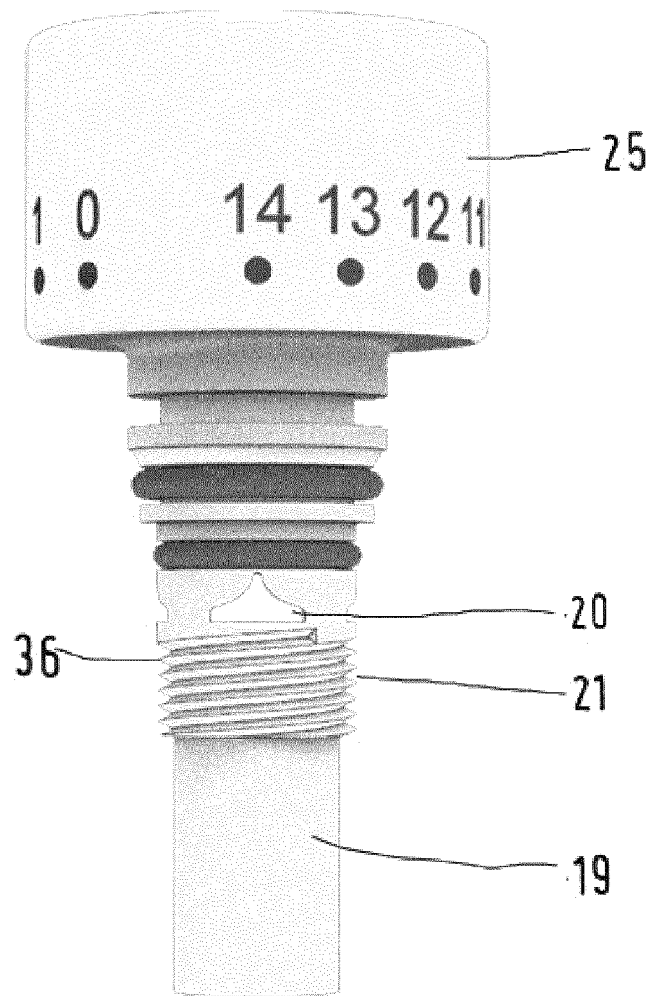


Fig.11

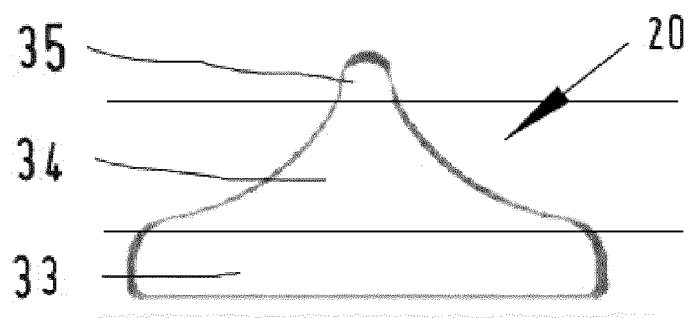


Fig.12



EUROPEAN SEARCH REPORT

Application Number

EP 22 16 0655

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EPO FORM 1503 03.82 (P04C01)

DOCUMENTS CONSIDERED TO BE RELEVANT			
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			TECHNICAL FIELDS SEARCHED (IPC)
			F24D F16K
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
Munich		23 August 2022	Degen, Marcello
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