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(72) Inventor: **Clausen, Anders Østergaard**
6430 Nordborg (DK)

(74) Representative: **Keil & Schaafhausen**
Patentanwälte PartGmbB
Friedrichstraße 2-6
60323 Frankfurt am Main (DE)

(71) Applicant: **Danfoss A/S**
6430 Nordborg (DK)

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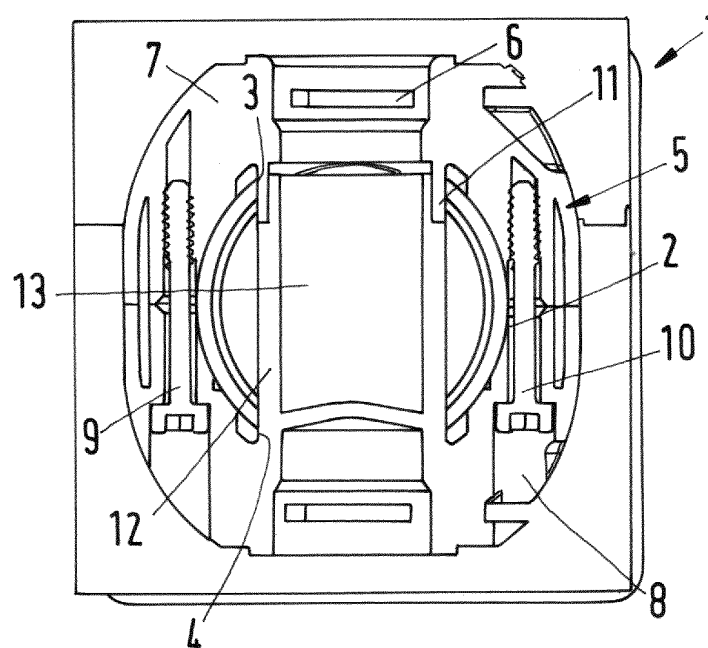
Amended claims in accordance with Rule 137(2)
EPC.

(54) HEATING/COOLING SYSTEM MANIFOLD WITH MOUNTED PRESETTING MEANS

(57) A heating/cooling system manifold (1) is described, the manifold (1) comprising a sleeve (2) having two openings (3, 4) in a wall and fixing means (5) having a connection geometry (6, 29, 30)

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

To this end, presetting means (116) of the system are mounted to the sleeve (2) by means of the fixing means (5), the fixing means comprising at least two parts (7, 8) which are connected, wherein a functional part (17) of the presetting means (116) is mounted movably to the fixing means (5).

**Fig.2****EP 4 242 524 A1**

Description

[0001] The present invention relates to a heating/cooling system manifold comprising a sleeve having two openings in a wall and fixing means having a connection geometry.

[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 presetting means of the system are mounted to the sleeve by means of the fixing means, the fixing means comprising at least two parts which are connected, wherein a functional part of the presetting means is mounted movably to the fixing means.

[0005] The functional part is part of the presetting means and is used to control a flow of fluid from the sleeve to a heating or cooling circuit connected to the sleeve or from the heating or cooling system to the sleeve. This is in particular useful when the manifold is used in a floor heating system, in particular as a forward manifold or a return manifold.

[0006] In an embodiment of the invention the functional part is moveable transverse to a longitudinal extension of the sleeve. 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, in particular the maximum flow through the presetting means.

[0007] 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 form the pre-setting means.

[0008] 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 connec-

tion 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.

[0009] 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.

[0010] 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.

[0011] 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. Thus, the 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.

[0012] 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.

[0013] In an embodiment of the invention the threaded connection is a high pitch thread. The high pitch thread can be a multi turn thread or a thread having a pitch which could give a stroke of, for example, 6 mm for one turn of 360°. A multi turn thread comprises a plurality of intertwined threads thus allowing a rather large stroke per revolution.

[0014] In an embodiment of the invention the high pitch thread comprises at least two intertwined threads, preferably four or six intertwined threads. The larger the number of intertwined threads, the larger the stroke per revolution.

[0015] In an embodiment of the invention the manifold is a forward manifold. In a floor heating system a valve

for controlling the flow of heat carrying fluid is usually mounted in a return manifold. When the presetting means is arranged in the forward manifold, this valve can remain unchanged in the return manifold.

[0016] In an embodiment of the invention the two parts of the fixing means are connected by means of screws outside the sleeve or by a welding seam outside the sleeve. 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 screws which can, for example, be parallel to a tangent to the circumference of the sleeve, or by a welding seam. The 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.

[0017] 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.

[0018] 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.

[0019] In an embodiment of the invention each 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 pre-setting means, so that this functional part is guided in a certain area of movement within the sleeve.

[0020] 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 the sleeve in a controlled manner.

[0021] 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.

[0022] 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.

[0023] 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, |
| 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, |
| Fig. 5 | shows the pre-setting arrangement in a sectional perspective view, |
| Fig. 6 | shows part of the fixing means, |
| Fig. 7 | shows the manifold with pre-setting means from the outside, |
| Fig. 8 to 10 | show the pre-setting means in different pre-setting positions, |
| Fig. 11 | shows a functional part, and |
| Fig. 12 | shows an opening in the functional part. |

[0024] 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.

[0025] 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.

[0026] 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. Alternatively, the two parts 7, 8 of the fixing means 5 can be connected by a welding seam outside the sleeve 2 (not shown).

[0027] 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.

[0028] 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.

[0029] 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.

[0030] 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.

[0031] 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.

[0032] 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.

[0033] 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.

[0034] 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.

[0035] 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.

[0036] 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.

[0037] 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.

[0038] 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.

[0039] 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.

[0040] 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.

[0041] As shown in Fig. 4 only, part 7 of the fixing means 5 is provided with an O-ring 31 surrounding one opening in the manifold 2 and part 8 of the fixing means 5 is provided with an O-ring 32 surrounding the opposite opening in the manifold 2. The O-rings 31, 32 have two functions: they produce a tight seal and they can equalize small tolerances when the two parts 7, 8 of the fixing means 5 are mounted to the manifold 2.

[0042] The threaded connection is a so called multi turn thread, i.e., the male thread 21 and the female thread 22 each have two or more intertwined threads running parallel to one another. Intertwining threads allow the lead distance of a thread to be increased. A double turn thread will have a lead distance double that of a single start thread of the same pitch, a triple turn thread will have a lead distance three times longer than a single turn thread of the same pitch, and so on. In the present manifold the multi turn thread comprises 6 times multi turn thread which is in particular of advantage in connection with the pre-setting means 116.

[0043] It is, for example, possible to have a stroke of the first functional part 17 of nearly 1 cm for a 360° turn of the adjustment knob 25. It is thus possible to have a scale on the adjustment knob 25 or on the housing which indicates an opening degree of the pre-setting means and

makes it easier to adjust the presetting to the right value.

[0044] Furthermore, it is possible to use a part of the rotation of the adjustment knob 25 for a coarse adjustment and another part of the rotation of the adjustment knob 25 for a fine adjustment. To this end, the opening 20 has a width in circumferential direction which varies over the stroke of the first functional part 17. An example for the shape of the opening 20 is shown in Fig. 11 and Fig. 12.

[0045] Fig. 11 shows the second functional part 19 having the opening 20. The opening 20 is shown in Fig. 12 in a larger scale.

[0046] The opening 20 comprises a coarse adjustment section 33 having a large width in circumferential direction, a transitional section 34 in which the width in circumferential direction decreases, and a fine adjustment section 35 having the smallest width in circumferential direction. This means that for the same differential stroke of the first functional part 17 in relation to the second functional part 19 the variation of the size of the opening 20 depends on the position of the first functional part 17 in relation to the second functional part 19. When the upper end the first functional part 17 (related to the view shown in Fig. 8 to 11) is moved in the coarse adjustment section 33 the change in the size of opening 20 for each mm of stroke of the first functional part 17 is much larger than when the upper end of the first functional part 17 is move in the fine adjustment section 35. Since correlation between the rotation of the adjustment knob 25 and the translational movement of the first functional part 17 is linear, a very fine adjustment is possible for small flow volumes.

[0047] Fig. 11 also shows the male thread 21 having the six intertwining threads 36 mentioned above.

Claims

1. Heating/cooling system manifold (1) comprising a sleeve (2) having two openings (3, 4) in a wall and fixing means (5) having a connection geometry (6, 29, 30), **characterized in that** presetting means (116) of the system are mounted to the sleeve (2) by means of the fixing means (5), the fixing means comprising at least two parts (7, 8) which are connected, wherein a functional part (17) of the presetting means (116) is mounted movably to the fixing means (5).
2. Manifold according to claim 1, **characterized in that** the functional part (17) is movable transverse to a longitudinal extension of the sleeve (2).
3. Manifold according to claim 1 or 2, **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).
4. Manifold according to any of claims 1 to 3, **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).
5. Manifold according to claim 4, **characterized in that** the second functional part (19) comprises a tube-like section (24) extending through the first functional part (17).
6. Manifold according to claim 4 or 5, **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).
7. Manifold according to any of claims 3 to 6, **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.
8. Manifold according to claim 7, **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.
9. Manifold according to claim 8, **characterized in that** the threaded connection (21, 22) is a high pitch thread.
10. Manifold according to claim 9, **characterized in that** the high pitch thread comprises at least two intertwined threads.
11. Manifold according to any of claims 1 to 10, **characterized in that** the manifold (2) is a forward manifold.
12. Manifold according to any of claims 1 to 11, **characterized in that** the at least two parts (7, 8) form a closed assembly around the sleeve (2).
13. Manifold according to any of claims 1 to 12, **characterized in that** two parts (7, 8) of the fixing means (5) are mounted on opposite sides of a circumference of the sleeve (2).
14. Manifold according to any of claims 1 to 13, **characterized in that** the two parts (7, 8) of the fixing means (5) each comprises a protrusion (11, 12) extending into the interior of the sleeve (2).

15. Manifold according to claim 14, **characterized in that** the protrusion (11) of the first part (7) contacts the protrusion (12) of the second part (8).

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

1. Heating/cooling system manifold (1) comprising a sleeve (2) having two openings (3, 4) in a wall and fixing means (5) having a connection geometry (6, 29, 30), **characterized in that** presetting means (116) of the system are mounted to the sleeve (2) by means of the fixing means (5), the fixing means comprising at least two parts (7, 8) which form a closed assembly around the sleeve (2), are mounted on opposite sides of a circumference of the sleeve (2), and are connected, wherein a functional part (17) of the presetting means (116) is mounted movably to the fixing means (5). 10
2. Manifold according to claim 1, **characterized in that** the functional part (17) is movable transverse to a longitudinal extension of the sleeve (2). 15
3. Manifold according to claim 1 or 2, **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). 20
4. Manifold according to any of claims 1 to 3, **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). 25
5. Manifold according to claim 4, **characterized in that** the second functional part (19) comprises a tube-like section (24) extending through the first functional part (17). 30
6. Manifold according to claim 4 or 5, **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). 35
7. Manifold according to any of claims 3 to 6, **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. 40

8. Manifold according to claim 7, **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. 45
9. Manifold according to claim 8, **characterized in that** the threaded connection (21, 22) is a high pitch thread. 50
10. Manifold according to claim 9, **characterized in that** the high pitch thread comprises at least two intertwined threads. 55
11. Manifold according to any of claims 1 to 10, **characterized in that** the manifold (2) is a forward manifold.
12. Manifold according to any of claims 1 to 11, **characterized in that** the two parts (7, 8) of the fixing means (5) each comprises a protrusion (11, 12) extending into the interior of the sleeve (2).
13. Manifold according to claim 12, **characterized in that** the protrusion (11) of the first part (7) contacts the protrusion (12) of the second part (8).

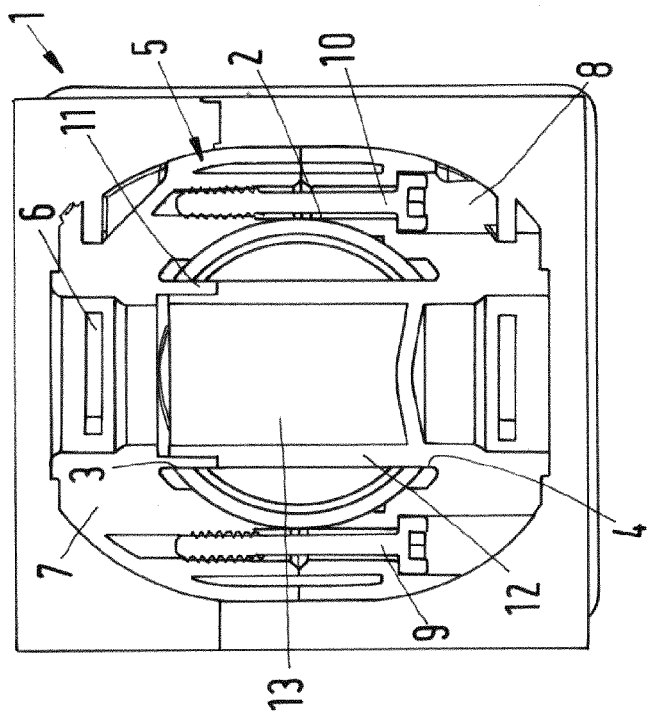


Fig. 2

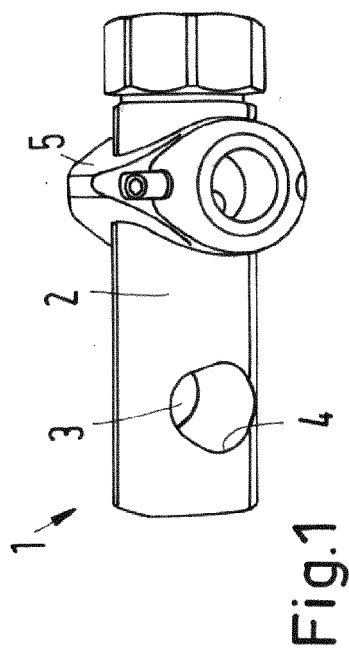


Fig. 1

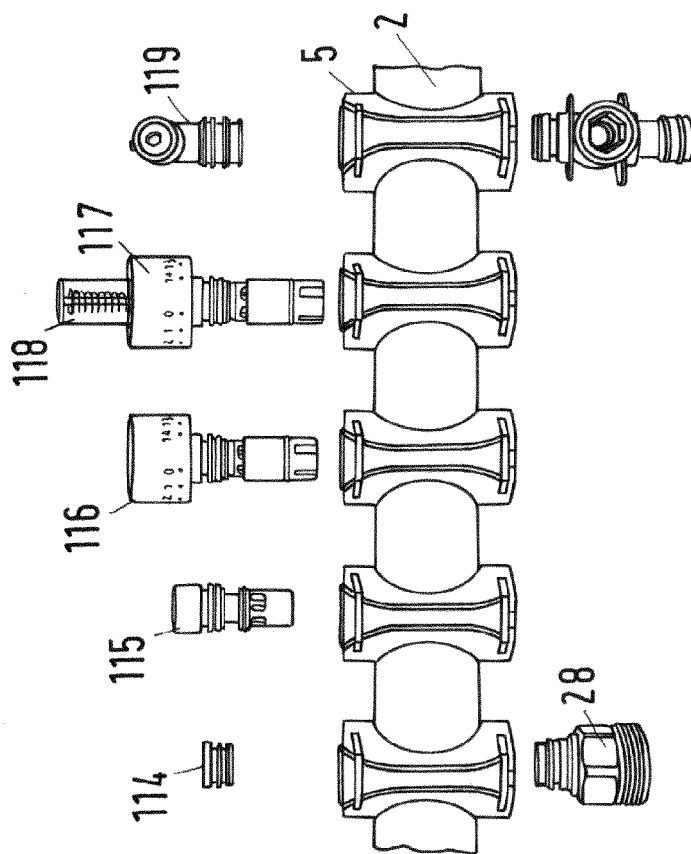


Fig. 3

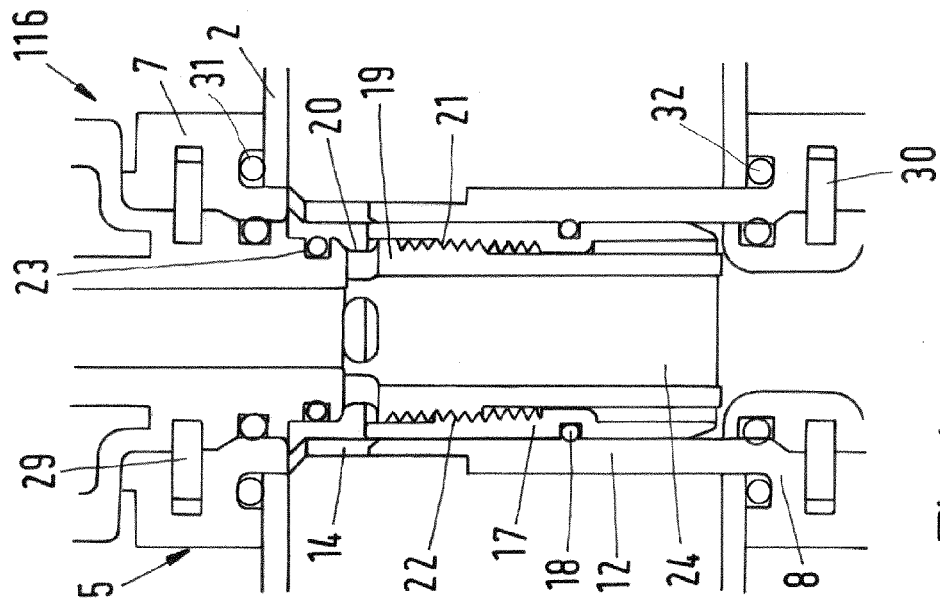


Fig.4

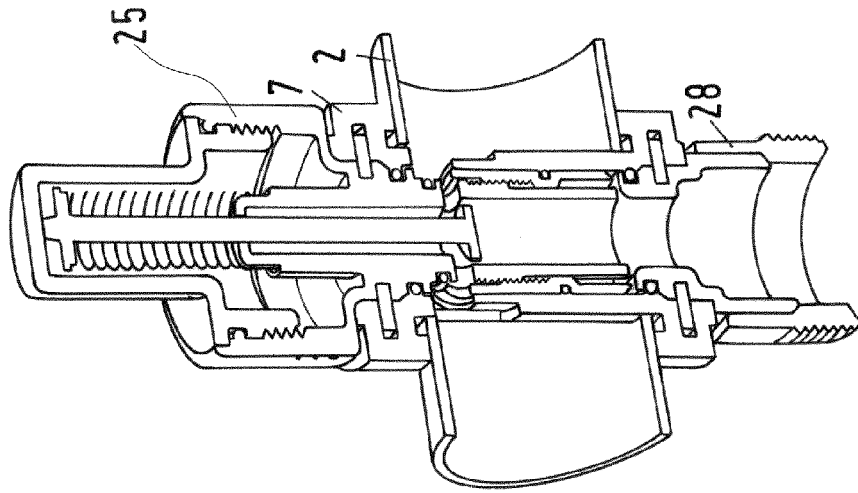


Fig.5

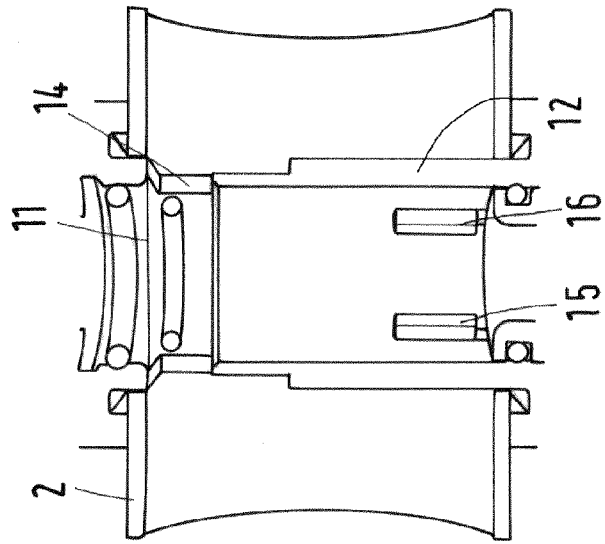
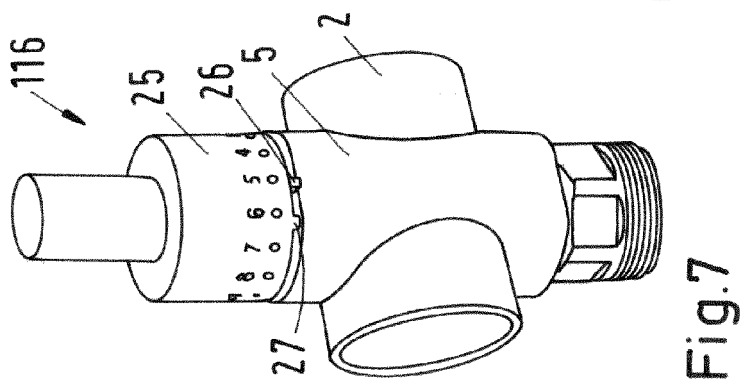
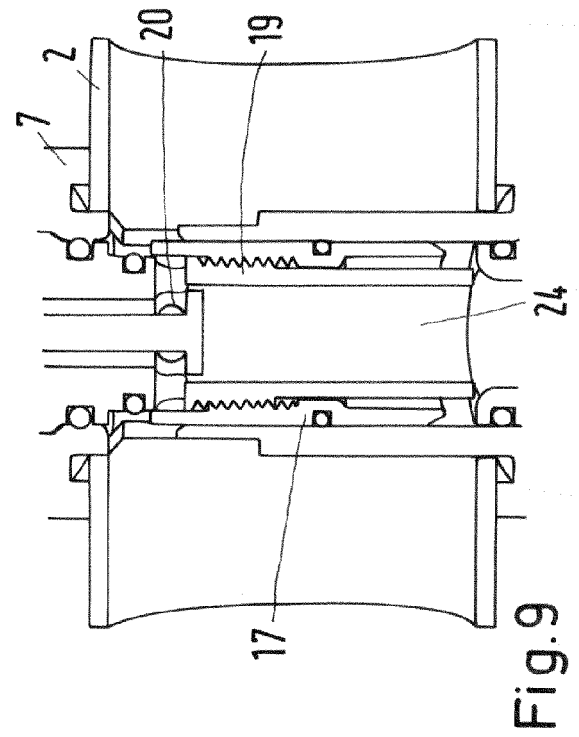
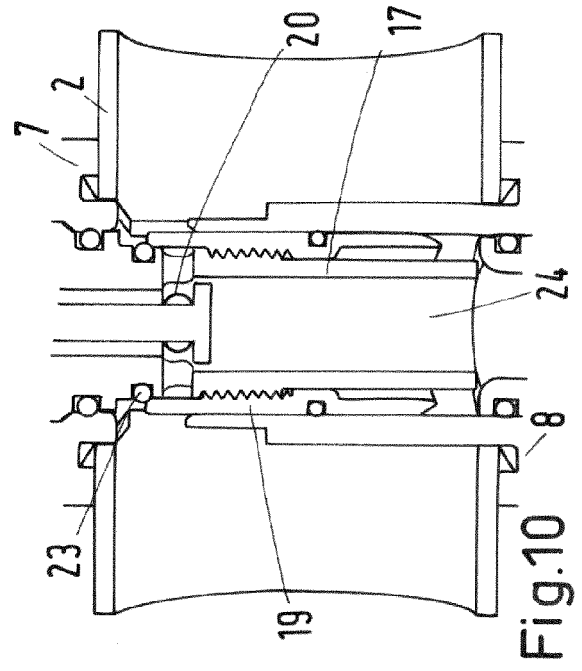
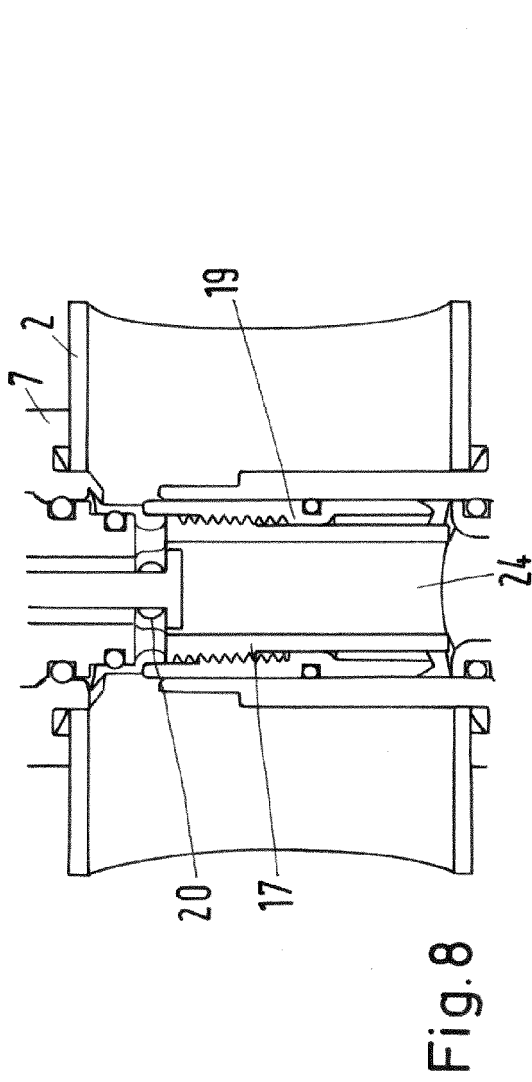


Fig.6



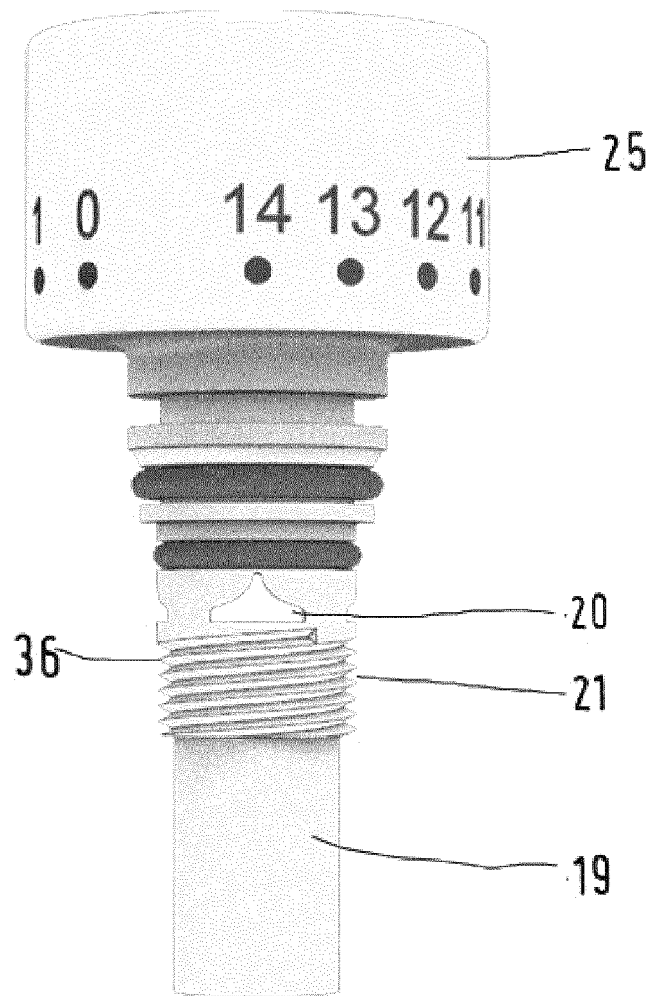


Fig.11

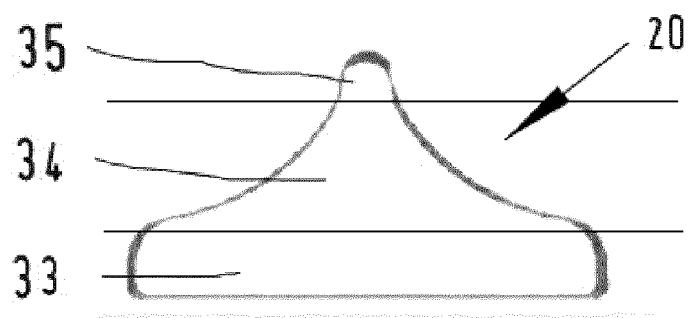


Fig.12



EUROPEAN SEARCH REPORT

Application Number

EP 22 16 0652

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EPO FORM 1503 03.82 (P04C01)

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	DE 35 09 718 A1 (BOEHNISCH SIEGFRIED) 18 September 1986 (1986-09-18)	1-3, 7, 11, 14	INV. F24D3/10
A	* page 7, last paragraph - page 8, paragraph 2; claim 1; figure 1 *	4-6, 8-10, 12, 13, 15	F16K31/00 G05D7/06 F16K37/00 G01F1/05
X	EP 1 688 713 A2 (FRACCHIA STEFANO [IT]) 9 August 2006 (2006-08-09)	1-3, 11	
A	* paragraphs [0032] - [0035]; claim 1; figures 1-4 *	4-10, 12-15	
A	US 6 089 263 A (DUMSER JOSEF [DE]) 18 July 2000 (2000-07-18) * abstract; figures 1, 4, 3 *	1-15	
			TECHNICAL FIELDS SEARCHED (IPC)
			F24D F16K G05D G01F
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 22 August 2022	Examiner Degen, Marcello
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 22 16 0652

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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22-08-2022

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 3509718	A1	18-09-1986	NONE

EP 1688713	A2	09-08-2006	CN 1858468 A 08-11-2006
		EP 1688713 A2 09-08-2006	
		US 2006196551 A1 07-09-2006	

US 6089263	A	18-07-2000	AT 217953 T 15-06-2002
		CA 2247676 A1 18-03-1999	
		DE 29716779 U1 28-01-1999	
		DK 0903543 T3 16-09-2002	
		EP 0903543 A2 24-03-1999	
		ES 2176873 T3 01-12-2002	
		TR 199801854 A2 21-04-1999	
		US 6089263 A 18-07-2000	

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- EP 1426695 A1 [0002]