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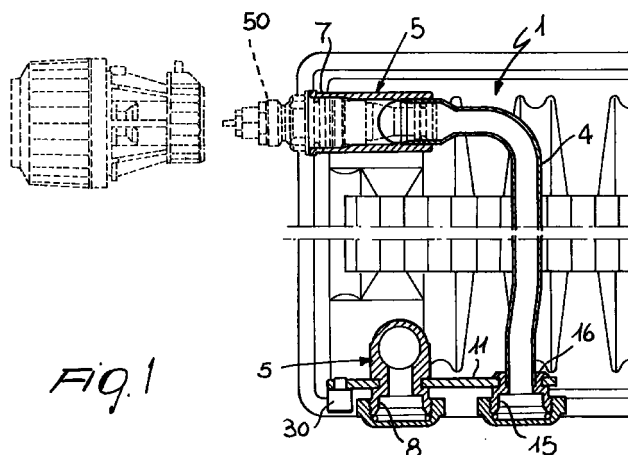
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(54) **Hydraulic connection device particularly for water-tube radiators**

(57) The hydraulic connection device particularly for water-tube radiators includes an upper connection assembly and a lower connection assembly which are hydraulically connected to each other by means of a connecting pipe; the upper connection assembly and/or the lower connection assembly include a manifold which

is formed monolithically with a threaded part which is suitable for engagement with a complementary thread of a different member to which it is connected hermetically.



EP 1 010 953 A1

Description

[0001] The present invention relates to a hydraulic connection device particularly for water-tube radiators.

[0002] It is known that flat-panel water-tube radiators have an upper connection assembly and a lower connection assembly which are hydraulically connected to each other by means of a connecting pipe.

[0003] The upper connection assembly is usually provided with a valve for adjusting the flow of water inside the radiator, whereas the lower connection assembly is hydraulically associated, by means of a distribution assembly, to the main hydraulic system for heating the building.

[0004] In particular, in current flat-panel water-tube radiators, both the upper connection assembly and the lower connection assembly are produced by welding the various parts that compose them to each other or to a base for supporting them, in order to be able to obtain a low-cost product which can be modified at will according to requirements and to the various types of radiator available on the market.

[0005] However, it is easily understandable that the welding of the various parts that predominantly constitute the lower connection assembly can cause a high percentage of liquid leakage in the region affected by it.

[0006] Accordingly, all the welds performed on the lower connection assembly are subjected to strict testing, with consequent rejection of any part that has any seepage or leakage of liquid from one or more of the welds.

[0007] By way of approximation, it can be assumed that weld testing causes the rejection of approximately 2% of manufactured parts.

[0008] All this entails substantially two main problems which arise respectively from the rejects that are produced, causing an increase in production costs, and from the fact that validating the welds by testing them is certainly onerous, both because of the considerable time expenditure and because of the inherent difficulty of the operation in order to ensure the quality of the product that is marketed.

[0009] Another considerable drawback of these devices is that even a part that has passed the weld tightness testing step must then be associated hydraulically with the distribution assembly once it has been fitted to the radiator.

[0010] This subsequent operation, which is indispensable in order to install the radiator, entails that the installer must tighten the hydraulic connection and coupling nuts by means of suitable tools.

[0011] It is evident that the stress applied to the connection nuts is transferred entirely to the welded parts, and accordingly the previously tested welds are subjected to a torque which can damage them, making them leak without the possibility of performing any further check.

[0012] In this case it is actually necessary to

remove the radiator and replace it.

[0013] Moreover, the provision of such a large number of welds causes the formation of many residual welding particles which normally circulate in the ducts of the radiator and of the heating system, causing corrosion in the piping and damage to the vanes of the impeller of the pump of the system.

[0014] It is also known that the presence of many welding regions also causes significant problems during the coating of the radiator and of the upper and lower connection assemblies thereof.

[0015] Finally, it should be noted that during the welding of the various parts and mainly of the lower connection assembly it is necessary to orientate these parts according to requirements and to keep them orientated until welding is complete.

[0016] This fact entails, among other things, a significant complication in the welding operations and requires skill on the part of the operators during its execution.

[0017] The aim of the present invention is to eliminate the above-noted drawbacks of the prior art.

[0018] Within the scope of this aim, an important object of the present invention is to provide a hydraulic connection device particularly for water-tube radiators in which the upper connection assembly and the lower connection assembly have a very small number of welds and in particular have a single weld for the upper connection assembly and for the lower connection assembly.

[0019] Another object of the present invention is to provide a hydraulic connection device particularly for water-tube radiators in which it is substantially possible to eliminate the steps for testing the welds in order to check for any leakage thereof, achieving substantially zero rejects.

[0020] Another object of the present invention is to provide a hydraulic connection device particularly for water-tube radiators in which the parts that compose the upper and lower connection assembly, even if subjected to intense torques, do not discharge these stresses onto any weld, accordingly ensuring absolute tightness of the various connection assembly parts and eliminating any operations for replacing the defective radiator during its installation.

[0021] Another object of the present invention is to provide a hydraulic connection device particularly for water-tube radiators which allows to paint the radiator without any problem, since it has a single welding region for the upper connection assembly and for the lower connection assembly.

[0022] Another object of the present invention is to provide a hydraulic connection device particularly for water-tube radiators which has an extremely low production cost since testing operations are minimized and production rejects are practically eliminated.

[0023] This aim, these objects and others which will become apparent hereinafter are achieved by a hydrau-

lic connection device particularly for water-tube radiators, including an upper connection assembly and a lower connection assembly which are hydraulically connected to each other by means of a connecting pipe, characterized in that the upper connection assembly and/or the lower connection assembly include a manifold which is formed monolithically with a threaded part which is suitable for engagement with a complementary thread of a different member to which it is connected hermetically.

[0024] Further characteristics and advantages of the present invention will become apparent from the following detailed description of a preferred but not exclusive embodiment of the device according to the invention, illustrated by way of non-limitative example in the accompanying drawings, wherein:

Figure 1 is a side elevation view of a flat-panel water-tube radiator according to the invention;
 Figure 2 is a sectional side elevation view of the device according to the invention;
 Figure 3 is a sectional plan view of the device of Figure 2 according to the invention; and
 Figure 4 is a sectional plan view of a different embodiment of the manifold of the upper connection assembly according to the invention.

[0025] With particular reference to the above-described figures, the hydraulic connection device particularly for water-tube radiators, according to the invention, generally designated by the reference numeral 1, includes an upper connection assembly 2 and lower connection assembly 3 which are mutually hydraulically connected by means of a connecting pipe 4.

[0026] The upper connection assembly 2 and/or the lower connection assembly 3 include a manifold 5 which is formed monolithically with a threaded part which is suitable for engagement with a complementary thread of a different member to which it is connected hermetically.

[0027] In particular in the case of the manifold 5 of the upper connection assembly 2, the threaded part is a bush 7 with which a valve 50 is associated which is suitable for opening, closing or adjusting the circulation of water in the water-tube radiator.

[0028] In the case of the lower connection assembly 3, the threaded part that forms a single body with the manifold is formed by a return coupling 8 which is subsequently hydraulically connected to the distribution assembly 51, partially shown in the drawings, and through this assembly to the main hydraulic system for heating the building.

[0029] In particular, the manifold 5 formed monolithically with the return coupling 8 has, in a substantially central portion, at least one first seat 9 which is suitable to engage a first complementary seat 10 formed in a plate-like support 11.

[0030] In particular, the seat 9 has at least two side

walls which are substantially as high as the plate-like support 11 is thick.

[0031] The walls 12 of the seat 9 are furthermore conveniently straight and are parallel to each other and to the axis of the manifold 5, so as to ensure interference during coupling between the seat 9 and the complementary seat 10 provided in the plate-like supporting base 11.

[0032] Conveniently, the base has, at the end of the complementary seat 10, optional protrusions 52 which can be caulked so as to ensure a valid and stable connection of the manifold 5 and of the return coupling 8 to the plate-like supporting base 11.

[0033] In this way, welding operations are eliminated completely and any torque applied to the return coupling 8 when it is connected to the distribution assembly is discharged entirely onto the plate-like support 11 without therefore creating any problem.

[0034] Moreover, the straight side walls 12 allow to insert the manifold in the complementary seat 10 so that the manifold is already orientated according to requirements.

[0035] The device further includes a delivery coupling 15 which is also formed monolithically with an upper enlarged portion 16.

[0036] A second seat 18 is furthermore formed between the delivery coupling 15 and the upper enlarged portion 16 and is suitable to engage a second complementary seat 19 formed in the plate-like support 11.

[0037] The second seat 18 and the corresponding second complementary seat 19 are respectively identical, in terms of both shape and structure, to the first seat 9 and the first complementary seat 10.

[0038] Also in this case, in addition to connecting the delivery coupling 15 to the plate-like support 11 by interference it is possible to perform optional caulking thereof.

[0039] In this manner it is possible to connect the delivery coupling and the return coupling at a preset distance of 50 mm as required by applicable statutory provisions on the subject without any particular positioning, since it is sufficient to insert them in the appropriately provided complementary seats 10 and 19 formed on the plate-like support 11.

[0040] A first end 20 of the connecting pipe 4 is bent and suitable to be welded outside the region affected by the flow of water coaxially and internally with respect to the enlarged portion 16 formed monolithically with the delivery coupling 15.

[0041] It is evident that the only weld in the entire lower connection assembly of the device is the weld of the end 20 of the delivery pipe 4 to the enlarged portion 16.

[0042] From the above description, however, it is easily understandable that this weld will never be subjected to torque or to any other kind of stress, and since it is provided perimetrically at the end 20 of the connect-

ing pipe 4, it ensures perfect hydraulic watertightness even without optional testing thereof.

[0043] The plate-like support 11 further has, in one of its regions, a protrusion 30 which is internally provided with a recess 31 which allows to receive the screw for connecting the side of the radiator directly to the plate-like support, accordingly eliminating any further work or parts for retaining the side on the body of the radiator.

[0044] As shown, the upper connection assembly 2 has a manifold 5 which is formed monolithically with the bush 7, with which the valve for adjusting the flow of water of the radiator is associated.

[0045] Advantageously, the manifold has, on the opposite side with respect to the bush 7, a cavity 34 which accommodates the second end 32 of the connecting pipe 4.

[0046] The seal of the valve 50 is preferably provided in this very region formed by the cavity 34 in two different manners.

[0047] In a first case, the seal of the valve is provided directly inside a flared region 33 formed on the second end of the pipe 32, as shown in Figure 2.

[0048] In a different embodiment, the seal of the valve is provided directly inside the cavity 34, which is machined and shaped specifically for this purpose.

[0049] Also in this case, as is easily understandable, the only weld that is present in the upper connection assembly is the weld provided on the perimeter of the connecting pipe 4, and as mentioned the weld is not subjected to any kind of stress and by way of its very structure it makes testing unnecessary.

[0050] It is also possible to provide, above the manifold 5 of the upper connection assembly 2, a vent valve 35 which is suitable to vent air if any air is present in the piping of the system.

[0051] It should also be noted that the thread 60 of the delivery and return coupling can be provided internally and therefore be of the 1/2-inch size rather than of the 3/4-inch size, as shown in the drawings, in order to ensure protection thereof during handling and storage of the parts.

[0052] In practice it has been observed that the device according to the present invention is particularly advantageous, in that welding of the various parts to the plate-like support has been eliminated and in that the manifolds are provided monolithically with the delivery coupling or the bush for receiving the valve.

[0053] In this manner, all testing operations and the operations for positioning/orientating the parts during their assembly are substantially eliminated.

[0054] The invention thus conceived is susceptible of numerous modifications and variations, all of which are within the scope of the inventive concept; all the details may further be replaced with technically equivalent elements.

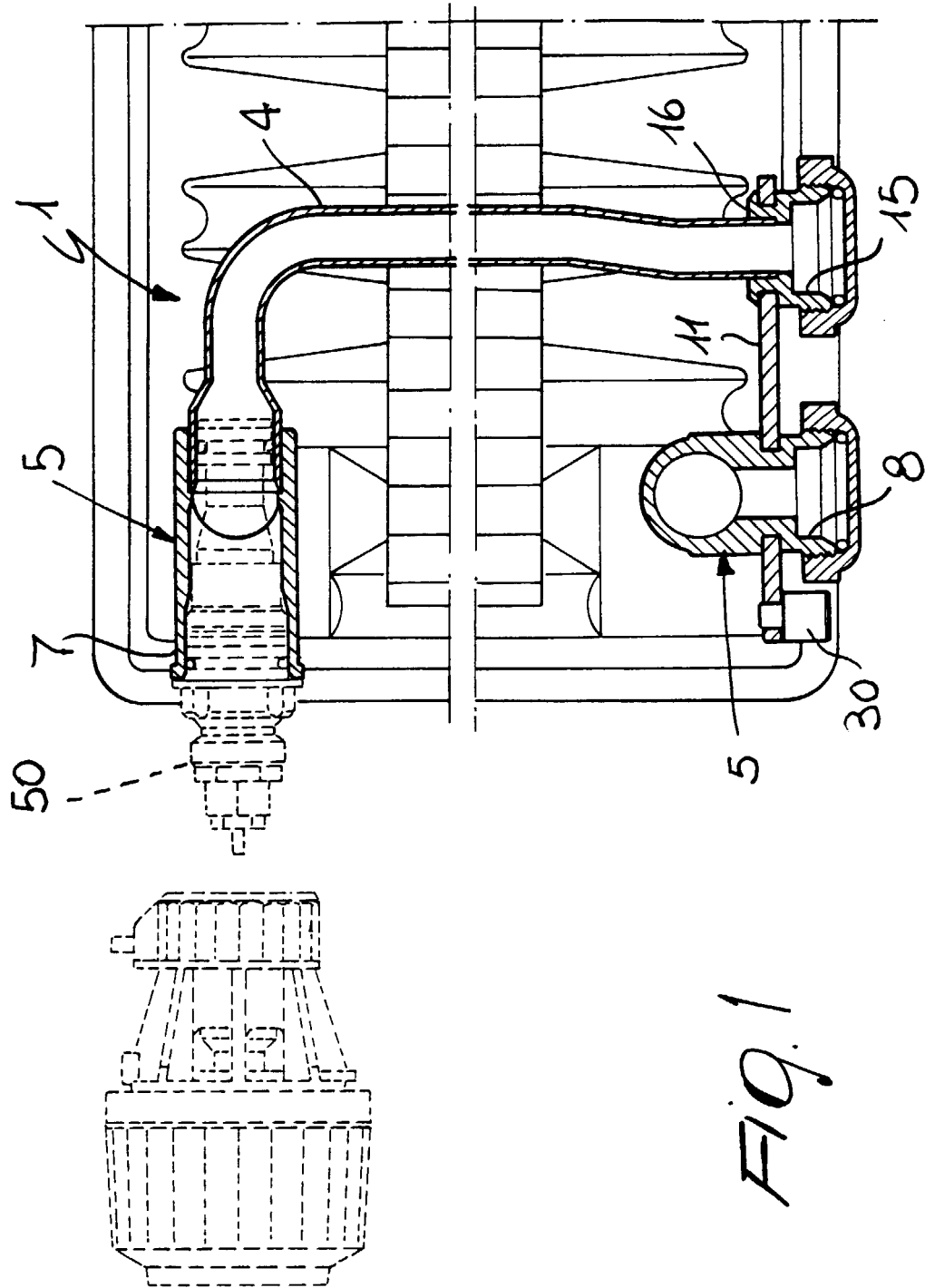
[0055] In practice, the materials employed, as well as the dimensions, may be any according to require-

ments and the state of the art.

Claims

1. A hydraulic connection device particularly for water-tube radiators, comprising an upper connection assembly and a lower connection assembly which are hydraulically connected to each other by means of a connecting pipe, characterized in that said upper connection assembly and/or said lower connection assembly comprise a manifold which is formed monolithically with a threaded part which is suitable for engagement with a complementary thread of a different member to which it is connected hermetically.
2. The device according to claim 1, characterized in that said threaded part is the return coupling of said lower connection assembly.
3. The device according to one or more of the preceding claims, characterized in that said threaded part is a bush with which a valve is associated, said valve being meant to open, close and adjust the water that circulates in the water-tube radiator, said valve being arranged on said upper connection assembly.
4. The device according to one or more of the preceding claims, characterized in that said manifold formed monolithically with said return coupling has, in one of its portions, at least one first seat which is suitable to engage a first complementary seat provided on a plate-like support.
5. The device according to one or more of the preceding claims, characterized in that said seat has at least two side walls which are substantially as high as said plate-like support is thick.
6. The device according to one or more of the preceding claims, characterized in that said walls are straight and parallel with respect to each other and to the axis of said manifold.
7. The device according to one or more of the preceding claims, characterized in that it comprises a delivery coupling which is formed monolithically with an upper enlarged portion, said delivery coupling comprising a second seat which is suitable to engage a second complementary seat provided on said plate-like support.
8. The device according to one or more of the preceding claims, characterized in that said second seat and said second complementary seat are respectively identical to said first seat and to said first complementary seat.

9. The device according to one or more of the preceding claims, characterized in that said connecting pipe has a first end which is bent and suitable to be welded coaxially in said enlarged region of said delivery coupling. 5
10. The device according to one or more of the preceding claims, characterized in that said plate-like support comprises at least one protrusion on which one side of said radiator is connected. 10
11. The device according to one or more of the preceding claims, characterized in that said manifold formed monolithically with said bush with which said valve is associated comprises, on the opposite side with respect to said bush, a cavity for accommodating the second end of said connecting pipe, the seal of said valve being provided in the region formed by said cavity. 15
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12. The device according to one or more of the preceding claims, characterized in that said seal of said valve is provided directly inside a flared region of said second end of said pipe. 25
13. The device according to one or more of the preceding claims, characterized in that said seal of said valve is provided directly inside said cavity.
14. The device according to one or more of the preceding claims, characterized in that said manifold of said upper connection assembly comprises a vent valve. 30
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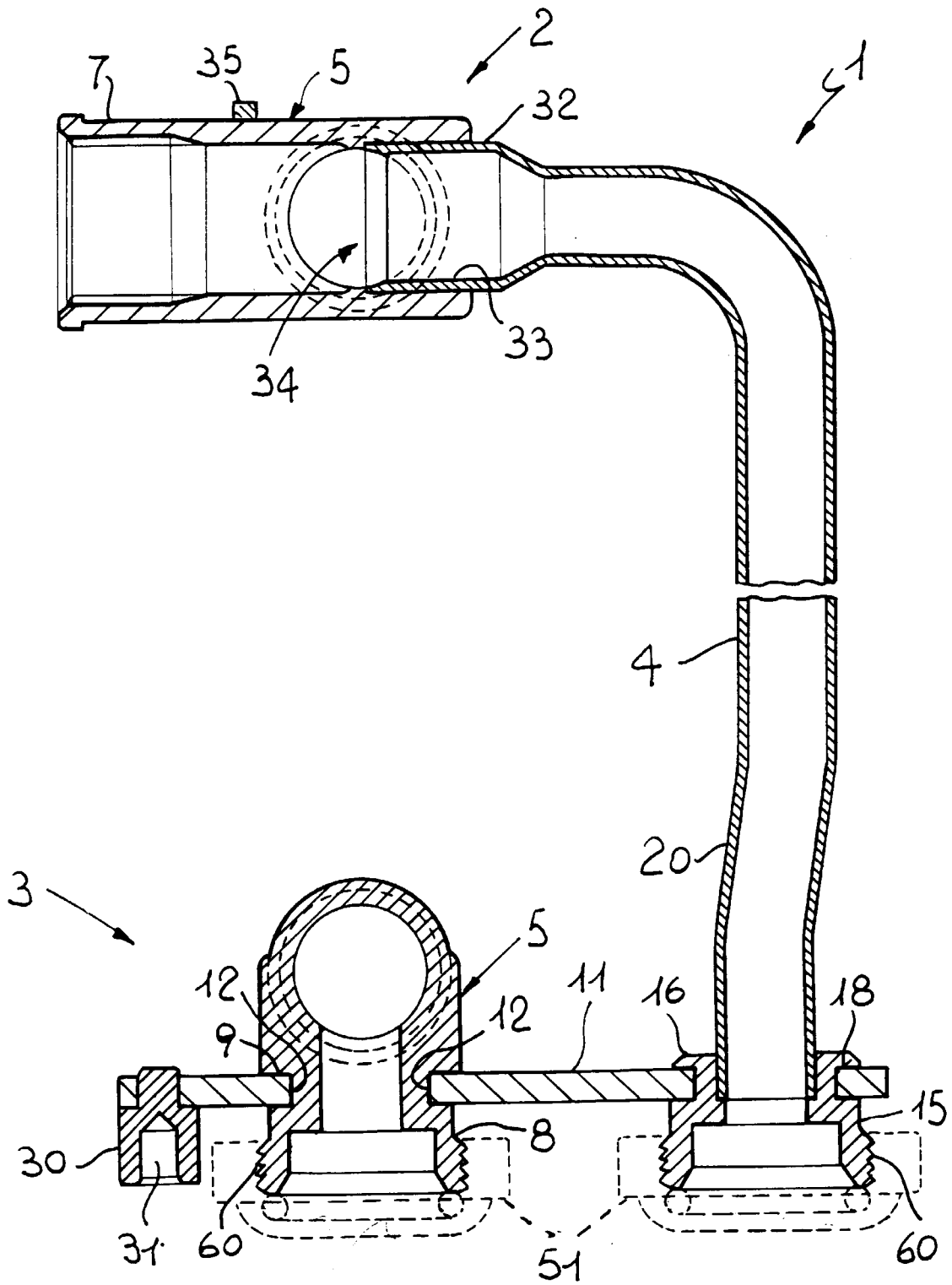


Fig. 2

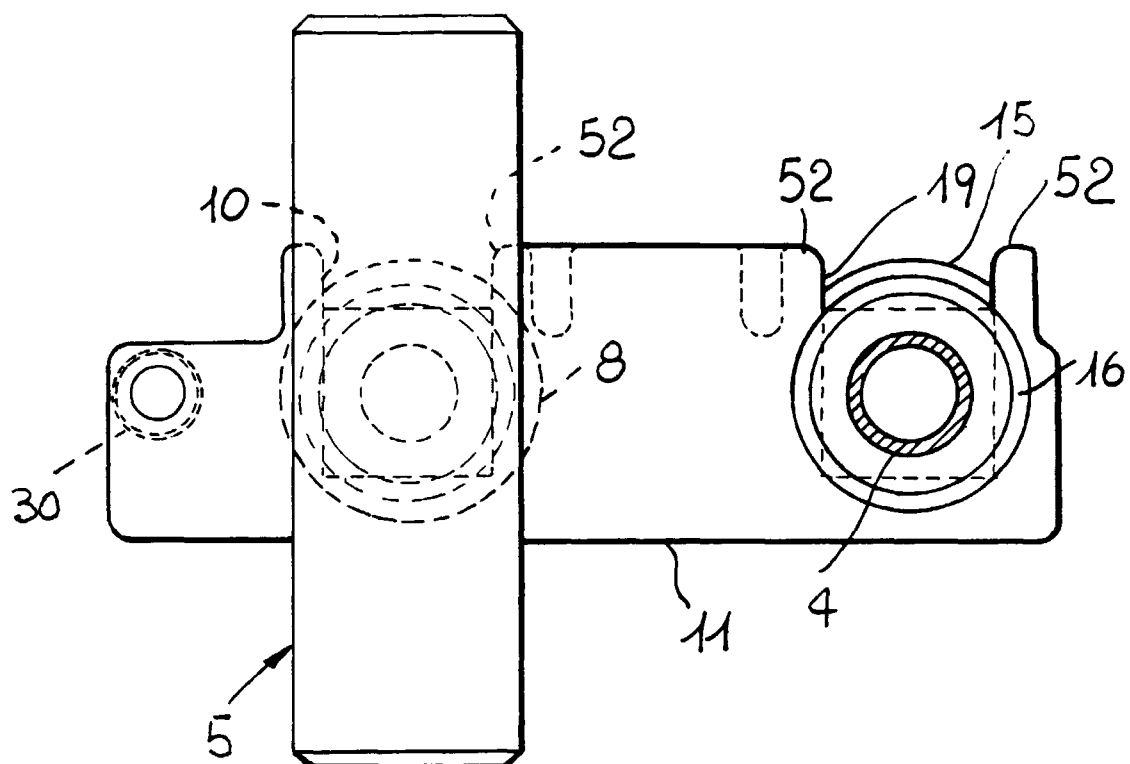


Fig. 3

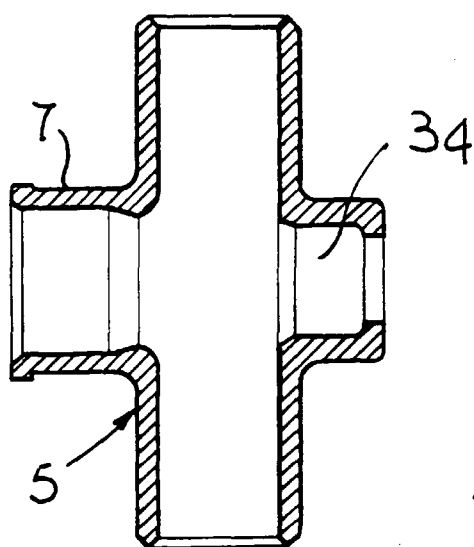


Fig. 4



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EUROPEAN SEARCH REPORT

Application Number
EP 99 12 3789

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
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The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			F24H
Place of search THE HAGUE		Date of completion of the search 13 March 2000	Examiner Van Gestel, H
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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 99 12 3789

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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13-03-2000

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