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Remarks:

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

(54) **CIRCULATION BYPASS ARRANGEMENT FOR BEING CONNECTED TO A HYDRAULIC SYSTEM, AND METHOD FOR REMOVING AND/OR EXCHANGING A WEAR PART AND/OR FOR REMOVING AND/OR EXCHANGING AT LEAST PART OF A CIRCULATION BYPASS ARRANGEMENT**

(57) The invention relates to a circulation bypass arrangement for being connected to a hydraulic system, wherein the circulation bypass arrangement comprises a connecting part and a circulation pump unit, and wherein the circulation bypass arrangement is connected to the hydraulic system using a first and a second connection arrangement wherein the circulation bypass arrange-

ment is configured to be connected to the first and second connection arrangements using a plurality of screw connections, wherein the connecting part and the circulation pump unit are connected with each other by means of a union nut, and that the connecting part and the first connection arrangement are connected with each other by means of a lock nut.

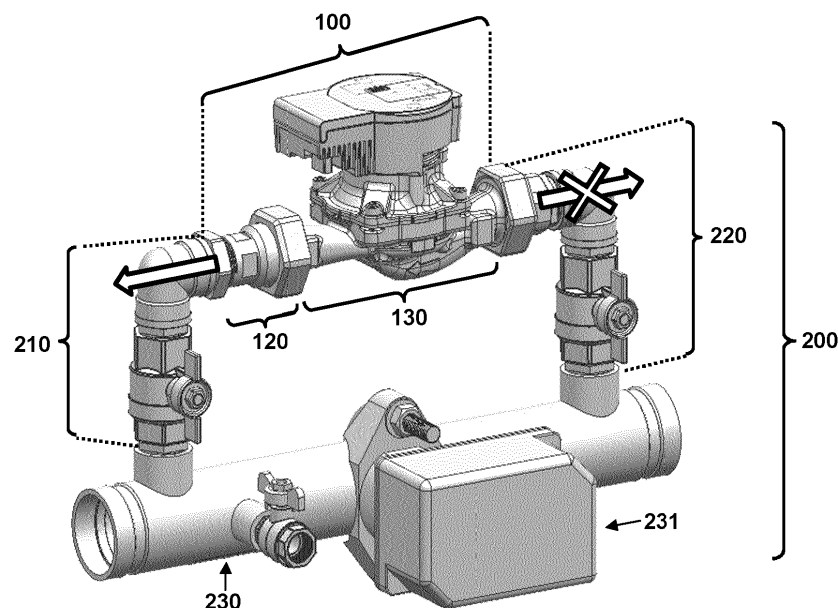


Fig. 1

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Description

[0001] The present invention relates a circulation bypass arrangement for being connected to a hydraulic system, wherein the circulation bypass arrangement comprises a connecting part and a circulation pump unit, and wherein the circulation bypass arrangement is connected to the hydraulic system using a first and a second connection arrangement, wherein the circulation bypass arrangement is configured to be connected to the first and second connection arrangements using a plurality of screw connections.

[0002] Furthermore, the present invention relates to a corresponding method for removing and/or exchanging a wear part and/or for removing and/or exchanging at least part of a circulation bypass arrangement, wherein the circulation bypass arrangement is connected to a hydraulic system and comprises a circulation pump unit and a connecting part housing the wear part, and wherein the circulation bypass arrangement is connected to the hydraulic system using a first and a second connection arrangement and using a plurality of screw connections.

BACKGROUND OF THE INVENTION

[0003] Circulation bypass arrangements for being connected to a hydraulic system are generally known. Furthermore, automatic fire sprinkler systems are generally known that comprise flow detectors and one-way valves that may be required to be tested, and, in order to conduct such tests, such sprinkler systems are known to be arranged such as to comprise closed loop (or circulation bypass) arrangements - at locations of such flow detectors or of such one-way valves - in order to be able to locally cause a flow of a liquid which flow is able to be detected by the respective flow detector.

[0004] Such circulation bypass arrangement or closed loop arrangements are known to comprise at least a circulation pump unit, and are furthermore known to be connected to a portion - typically comprising a flow detector - of such an automatic fire sprinkler system or such a hydraulic system, typically by means of a plurality of screw connections.

[0005] However, conventionally known circulation bypass arrangements or closed loop arrangements are arranged such as to require considerable effort to disassemble, especially in order to check and/or exchange an element of the circulation bypass arrangement or closed loop arrangement.

SUMMARY OF THE INVENTION

[0006] An object of the present invention is to provide a technically simple, effective and cost-effective solution for arranging a circulation bypass arrangement (or a closed loop arrangement) that is to be connected, by means of using a first and second connection arrangement, to a hydraulic system - especially an automatic fire

sprinkler system, and especially a portion thereof comprising a flow detector- in a manner such as to be able to comparatively easily and comparatively effortlessly disassemble the circulation bypass arrangement or closed loop arrangement, especially without the need to also remove or separate the first and/or second connection arrangement from the hydraulic system and/or to disassemble the first and/or second connection arrangement. Especially, it should be able to check and/or to remove and/or to replace a wear part (being part of the circulation bypass arrangement) comparatively easily and comparatively effortlessly. Furthermore, such checking and/or removing and/or replacing of the wear part shall be possible without increased tightness problems and/or leakages (e.g. due to misalignment of components). A further object of the present invention is to provide a corresponding method for removing and/or exchanging a wear part and/or for removing and/or exchanging at least part of a circulation bypass arrangement.

[0007] The object of the present invention is achieved by a circulation bypass arrangement for being connected to a hydraulic system, wherein the circulation bypass arrangement comprises a connecting part and a circulation pump unit, and wherein the circulation bypass arrangement is connected to the hydraulic system using a first and a second connection arrangement,

wherein the circulation bypass arrangement is configured to be connected to the first and second connection arrangements using a plurality of screw connections,

characterized in that the connecting part and the circulation pump unit are connected with each other by means of a union nut, and that the connecting part and the first connection arrangement are connected with each other by means of a lock nut.

[0008] It is thereby advantageously possible according to the present invention to provide the possibility to create an axial distance or space for facilitating the disassembly of the circulation bypass arrangement, or of at least part thereof. Especially in case that the circulation bypass arrangement comprises a wear part, it is advantageously possible, according to the present invention, to facilitate the removal and/or the exchange of the wear part and/or at least a part of a circulation bypass arrangement.

[0009] According to the present invention, the connecting part and the circulation pump unit are connected with each other by means of a union nut; especially the connecting part and the circulation pump unit are connected with each other by means of the union nut in a manner such that the connection part has, or comprises, the union nut. Furthermore according to the present invention, the connecting part and the first connection arrangement (without restriction of generality) are connected with each other by means of a lock nut. Hence, the connecting part has, or comprises, both the union nut and the lock nut; this provides - especially by means of an interaction

(of a thread portion) of the connecting part with a corresponding thread portion of the first connection arrangement, the corresponding thread portion having, or being, an internal thread - the possibility to easily disassemble the circulation bypass (or closed loop) arrangement, and, if applicable, to replace and/or remove and/or exchange the wear part.

[0010] Once the axial distance or space is realized, by means of loosening both the union nut and the lock nut, and by means of rotating the connecting part further into the internal thread (corresponding thread portion) of the first connection arrangement, it is advantageously possible to comparatively easily and quickly remove and/or exchange at least a part of the circulation bypass arrangement, and/or, if applicable, to remove and/or exchange the wear part; especially, it is advantageously possible according to the present invention that - during such a removal and/or an exchange of at least a part of the circulation bypass arrangement - the connections of both the first and of the second connection arrangements towards the hydraulic system remain untouched, thereby reducing any risks of generating leakages at such connections and by means of such a procedure.

[0011] Hence, according to the present invention, the circulation bypass arrangement advantageously provides the possibility to avoid drawbacks associated with such removal and/or exchange of at least a part of the circulation bypass arrangement and, especially with such removal and/or exchange of a wear part in relation to hydraulic systems conventionally known. Such drawbacks include, e.g., quality problems related to leakage due to the difficulty to center the wear part, especially in case the wear part corresponds to a non-return valve.

[0012] According to the present invention, it is advantageously possible and preferred that a further union nut is used for connecting the second connection arrangement with the circulation pump unit - especially the other side of the circulation pump unit (compared to the side of the circulation pump unit that is connected to the connecting part).

[0013] It is thereby advantageously possible to realize and implement the inventive method in a comparatively simple and efficient manner.

[0014] According to the present invention, it is advantageously furthermore possible and preferred that the lock nut is used - at the connection of the connecting part to the first connection arrangement - together with a sealing means, wherein the sealing means is especially a sealing ring, especially an O-ring.

[0015] It is thereby advantageously possible to realize and implement the inventive method in a comparatively simple and efficient manner.

[0016] According to the present invention, it is furthermore advantageously possible and preferred that the connecting part comprises a first thread portion and a second thread portion, wherein the first thread portion is used to screw the connecting part into an internal thread of the first connection arrangement and wherein the

second thread portion is used as connection between the connecting part and the lock nut.

[0017] It is thereby advantageously possible to realize and implement the inventive method in a comparatively simple and efficient manner. Especially, it is advantageously possible to realize the internal thread as part of the first connection arrangement.

[0018] According to the present invention, it is furthermore advantageously possible and preferred that the connecting part comprises a groove portion between the first thread portion and the second thread portion, wherein the groove portion is especially used to receive or to contain the sealing means between the connecting part and the first connection arrangement.

[0019] It is thereby advantageously possible to realize and implement the inventive method in a comparatively simple and efficient manner.

[0020] Furthermore, it is advantageously possible and preferred according to the present invention that the connecting part houses a wear part, wherein the wear part especially corresponds to a check valve or to a non-return valve or to a filter element.

[0021] It is thereby advantageously possible to realize and implement the inventive method in a comparatively simple and efficient manner; especially, it is advantageously possible to realize the wear part such that only the wear part and/or the connecting part need to be specifically configured in order to implement the present invention.

[0022] Furthermore, it is advantageously possible and preferred according to the present invention that the hydraulic system comprises a tube or tube part, wherein the tube or tube part is especially located parallel (or substantially parallel) to the circulation bypass arrangement (especially parallel to the pumping direction of the circulation pump unit), wherein the tube or tube part especially comprises a flow detector entity.

[0023] It is thereby advantageously possible to realize and implement the inventive method in a comparatively simple and efficient manner.

[0024] Furthermore, it is advantageously possible and preferred according to the present invention that the first and second connection arrangement comprises,

respectively, a valve, wherein the valve of the first connection arrangement and/or the valve of the second connection arrangement are or correspond to ball valve or ball valves,

wherein especially the first and second connection arrangement comprise, respectively, a 90 degree pipe angle, especially having internal threads.

[0025] It is thereby advantageously possible to realize and implement the inventive method in a comparatively simple and efficient manner.

[0026] Furthermore, the present invention relates to a method for removing and/or exchanging a wear part and/or for removing and/or exchanging at least part of

a circulation bypass arrangement, wherein the circulation bypass arrangement is connected to a hydraulic system and comprises a circulation pump unit and a connecting part housing the wear part, and wherein the circulation bypass arrangement is connected to the hydraulic system using a first and a second connection arrangement and using a plurality of screw connections, characterized in that the connecting part and the circulation pump unit are connected with each other by means of a union nut, and that the connecting part and the first connection arrangement are connected with each other by means of a lock nut, wherein the method comprises the following steps:

- in a first step, the union nut, connecting the connecting part with the circulation pump unit, is loosened or opened as well as the lock nut, at the connection of the connecting part with the first connection arrangement, is loosened,
- in a second step, the connecting part is further screwed onto and in the direction of an internal thread of the first connection arrangement,
- in a third step, the circulation pump unit is removed by means of loosening or opening a further union nut used for connecting the second connection arrangement with the circulation pump unit,
- in a fourth step, the connecting part is loosened and removed from the first connection arrangement.

[0027] These and other characteristics, features and advantages of the present invention will become apparent from the following detailed description, taken in conjunction with the accompanying drawings, which illustrate, by way of example, the principles of the invention. The description is given for the sake of example only, without limiting the scope of the invention. The reference figures quoted below refer to the attached drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0028]

Figure 1 schematically illustrates an exemplary embodiment of the present invention, according to a perspective view: A circulation bypass arrangement is shown comprising a circulation pump unit, wherein the circulation bypass arrangement is connected to a hydraulic system by means of a first and a second connection arrangement, and wherein the circulation bypass arrangement comprises, in addition to the circulation pump unit, a connecting part.

Figure 2 schematically illustrates an exploded view of the circulation bypass arrangement according to the present invention, as well as a representation of the first and second connection arrangement.

Figure 3 schematically illustrates an exploded view

of the connecting part, as well as a perspective view of the connecting part according to the present invention.

Figure 4 a) to f) schematically illustrates - by means of showing different operational steps - the inventive method for removing and/or exchanging the wear part and/or for removing and/or exchanging at least part of a circulation bypass arrangement.

Figure 5 schematically illustrates, in a side view, the connecting part.

Figure 6 schematically illustrates two representations of a sectional view of the connecting part, the first connection arrangement, the lock nut and the sealing means, illustrating the interaction between these elements or components.

DETAILED DESCRIPTION

[0029] The present invention will be described with respect to particular embodiments and with reference to certain drawings, but the invention is not limited thereto but only by the claims. The drawings described are only schematic and are nonlimiting. In the drawings, the size of some of the elements may be exaggerated and not drawn on scale for illustrative purposes.

[0030] Where an indefinite or definite article is used when referring to a singular noun, e.g. "a", "an", "the", this includes a plural of that noun unless something else is specifically stated.

[0031] Furthermore, the terms first, second, third and the like in the description and in the claims are used for distinguishing between similar elements and not necessarily for describing a sequential or chronological order. It is to be understood that the terms so used are interchangeable under appropriate circumstances and that the embodiments of the invention described herein are capable of operation in other sequences than described or illustrated herein.

[0032] In Figure 1, a perspective view of an exemplary embodiment of a circulation bypass arrangement 100 according to the present invention is schematically shown: The circulation bypass arrangement 100 is shown comprising a circulation pump unit 130, wherein the circulation bypass arrangement 100 is connected to a hydraulic system 200 by means of a first connection arrangement 210 and a second connection arrangement 220, and wherein the circulation bypass arrangement 100 comprises, in addition to the circulation pump unit 130, a connecting part 120.

[0033] At both sides of the circulation bypass arrangement 100, Figure 1 shows an arrow, wherein the arrow on the right hand side is crossed out, and wherein the arrow on the left hand side (towards the first connection arrangement 210) is not crossed out. The arrow on the left hand side indicates that it is possible, according to the

present invention, to create an axial distance or space for facilitating the disassembly of the circulation bypass arrangement, or of at least part thereof.

[0034] Figure 1 furthermore shows the hydraulic system 200 to also comprise - besides the first connection arrangement 210 and the second connection arrangement 220 - a tube or tube part 230, wherein the tube or tube part 230 comprises a flow detector entity 231. As can be seen from Figure 1, the tube or tube part 230 is located (or mainly extended) parallel to the (main extension direction of the) circulation bypass arrangement 100.

[0035] In Figure 2, an exploded view of the circulation bypass arrangement 100 according to the present invention is schematically shown. Figure 2 also shows a representation of the first and second connection arrangements 210, 220 - the first connection arrangement 210 in non-exploded form and the second connection arrangement 220 in rather exploded form. From Figure 2, it can be seen that both the first and the second connection arrangements 210, 220 comprise, respectively, a valve - wherein especially the valve 211 of the first connection arrangement 210 and/or the valve 221 of the second connection arrangement 220 are or correspond to a ball valve or ball valves.

[0036] In themselves, the first and second connection arrangements 210, 220 are predominantly oriented orthogonal to the main extension direction of the circulation bypass arrangement 100 (and of the tube or tube part 230). Furthermore, the first and second connection arrangements 210, 220, respectively, comprise a 90° pipe angle 212, 222, especially having internal threads (not shown/visible in Figure 2).

[0037] On both of its sides (or ends), the circulation bypass arrangement 100 is connected to the respective one of the first and second connection arrangements 210, 220 - according to the present invention using a plurality of screw connections; in Figure 2, these screw connections (of the circulation bypass arrangement 100) are shown to be realized with the 90° pipe angles 212, 222 of the first and second connection arrangements 210, 220.

[0038] As already said, the circulation bypass arrangement 100 comprises (and Figure 2 shows) the circulation pump unit 130 as well as the connecting part 120, wherein the connecting part 120 and the circulation pump unit 130 are connected with each other by means of a union nut 125 (in a generally known manner, typically using a sealing ring 125', especially an O-ring), and that the connecting part 120 and the first connection arrangement 210 (especially via its 90° pipe angle 212) are connected with each other by means of a lock nut 126. Figure 2 also shows a further union nut 135 that is used for connecting the second connection arrangement 220 with the circulation pump unit 130 (in a generally known manner, typically using a sealing ring 135', especially an O-ring).

[0039] Especially according to the present invention, the connecting part 120 houses a wear part 110, especially a check valve or a non-return valve or a filter

element.

[0040] In Figure 3 an exploded view as well as a perspective view of the connecting part 120, the union nut 125 and the lock nut 126 according to the present invention is schematically shown together with a sealing means 126' (related to (or interacting with) the lock nut 126) and the wear part 110. The sealing means 126' is especially realized as a sealing ring, especially an O-ring. The connecting part 120 comprises a first thread portion 127 as well as a second thread portion 128; in between the first and second thread portions 127, 128, the connecting part 120 comprises a groove portion 126" where the sealing means 126' is located. The first thread portion 127 is used to screw the connecting part 120 into an internal thread (of the 90° pipe angle 212 - not shown in Figure 3) of the first connection arrangement 210. The second thread portion 128 is used as connection between the connecting part 120 and the lock nut 126.

[0041] The first and second thread portions 127, 128 as well as the groove portion 126" in between both are also visible from the schematical side view of the connecting part 120 that is provided by Figure 5.

[0042] This interaction between the 90° pipe angle 212 of the first connection arrangement 210, the connecting part 120 and the lock nut 126 (as well as the sealing means 126') is schematically shown in Figure 6, by means of two sectional views: On a left hand sectional view, the assembled relative positions of the elements or components is represented, i.e. in a situation when the circulation bypass arrangement 100 is in its fixed, or mounted, (and tight) state; in such a situation, the connecting part 120 - by means of its first (external) thread portion 127 is screwed into the internal thread of the 90° pipe angle 212 (i.e., more generally, into an internal thread of the first connection arrangement 210). The area of the internal thread of the first connection arrangement 210 is indicated, in Figure 6 (left hand side) by means of reference sign 212'. The lock nut 126 (that interacts with - i.e. is screwed on - the second (external) thread portion 128 of the connecting part 120) is - in the situation shown on the left hand side of Figure 6 - pulled tight against the first connection arrangement 210, i.e. especially the 90° pipe angle 212. This connection is sealed by means of the sealing means 126' that is located in the groove portion 126" between the first and second thread portions 127, 128 of the connecting part 120.

[0043] It can be seen, on the left hand side representation of Figure 6, that the first thread portion 127 of the connecting part 120 is - in the assembled or fixed state of the circulation bypass arrangement 100 - not completely screwed into the internal thread of the first connection arrangement 210 (i.e. of the 90° pipe angle 212), i.e. in case that the lock nut 126 is loosened, the connecting part 120 would be able to be screwed further into this internal thread. This situation is shown in the right hand side sectional view of Figure 6: The lock nut 126 is loosened, i.e. screwed (on the second thread portion 128) away from the first thread portion 127 (and, thus,

also away from the first connection arrangement 210, i.e. especially the 90° pipe angle 212). Hence, the sealing means 126' (shown on the right hand side of Figure 6) is no longer compressed between the first connection arrangement 210 / 90° pipe angle 212. In case that the connecting part 120 is able to be rotated, it is possible to screw it further into the internal thread of the first connection arrangement 210, i.e. especially the 90° pipe angle 212 - and, thus, provide the possibility to create an axial distance or space for facilitating the disassembly of the circulation bypass arrangement 100.

[0044] In Figure 4 a) to f), different operational steps are schematically shown that illustrate the inventive method for removing and/or exchanging the wear part 110 and/or for removing and/or exchanging at least part of a circulation bypass arrangement 100: Figure 4a) schematically shows that the two valves 211, 221 (shown in Figure 2) of the first and second connection arrangement 210, 220, respectively, are closed such that the circulation bypass arrangement 100 is (hydraulically) separated from the residual part of the hydraulic system 200.

[0045] Figure 4b) schematically shows that the union nut 125 (connecting, or fastening, the circulation pump unit 130 with the connecting part 120) is loosened, and, likewise, that the lock nut 126 (fixing the (other side of the) connecting part 120 with the first connection arrangement 210 / 90° pipe angle 212) is loosened. This loosening of the union nut 125 provides the possibility - shown in Figure 4c) - that the connecting part 120 is rotated or screwed (in case that the lock nut 126 has previously been loosened) further (along the arrow shown) into the internal thread of the first connection arrangement 210 / 90° pipe angle 212, hence creating the axial distance which is shown, in Figure 4c), by means of an indication of this axial distance of (exemplarily) roughly 2 millimeters.

[0046] Figure 4d) shows that, due to this axial distance, the union nut 135 on the other side of the circulation pump unit 130 (opposite of the connecting part 120) can be opened or loosened such as to be able to remove the circulation pump unit 130; this is represented in Figure 4e).

[0047] Figure 4f) finally shows the removal of the connection part 120 and the possibility to remove, or to exchange, the wear part 110 housed or located in the connection part 120 of the circulation bypass arrangement 100.

[0048] In view of an assembly of the circulation bypass arrangement 100, the steps shown in Figures 4a) to 4f) are performed in inverted order.

[0049] Hence, according to all embodiments of the present invention, once the axial distance or space is realized, by means of loosening the union nut 125 as well as the lock nut 126, it is advantageously possible to comparatively easily and quickly remove and/or exchange the wear part 110 and/or remove and/or exchange at least part of the circulation bypass arrangement 100.

[0050] Hence, the inventive method for removing and/or exchanging the wear part 110 and/or for removing and/or exchanging at least part of the circulation bypass arrangement 100 is able to be applied: the connecting part 120 comprises, or interacts with, the union nut 125 as well as the lock nut 126 and the method comprises loosening or opening both in order to create the axial distance or space.

Claims

1. Circulation bypass arrangement (100) for being connected to a hydraulic system (200), wherein the circulation bypass arrangement (100) comprises a connecting part (120) and a circulation pump unit (130), and wherein the circulation bypass arrangement (100) is connected to the hydraulic system (200) using a first and a second connection arrangement (210, 220),

wherein the circulation bypass arrangement (100) is configured to be connected to the first and second connection arrangements (210, 220) using a plurality of screw connections, **characterized in that** the connecting part (120) and the circulation pump unit (130) are connected with each other by means of a union nut (125), and that the connecting part (120) and the first connection arrangement (210) are connected with each other by means of a lock nut (126).

2. Circulation bypass arrangement (100) according to claim 1, wherein a further union nut (135) is used for connecting the second connection arrangement (220) with the circulation pump unit (130).
3. Circulation bypass arrangement (100) according to one of the preceding claims, wherein the lock nut (126) is used - at the connection of the connecting part (120) to the first connection arrangement (210) - together with a sealing means (126'), wherein the sealing means (126') is especially a sealing ring, especially an O-ring.
4. Circulation bypass arrangement (100) according to one of the preceding claims, wherein the connecting part (120) comprises a first thread portion (127) and a second thread portion (128), wherein the first thread portion (127) is used to screw the connecting part (120) into an internal thread of the first connection arrangement (210) and wherein the second thread portion (128) is used as connection between the connecting part (120) and the lock nut (126).
5. Circulation bypass arrangement (100) according to one of the preceding claims, wherein the connecting

part (120) comprises a groove portion (126") between the first thread portion (127) and the second thread portion (128), wherein the groove portion (126") is especially used to receive or to contain the sealing means (126') between the connecting part (120) and the first connection arrangement (210).

6. Circulation bypass arrangement (100) according to one of the preceding claims, wherein the connecting part (120) houses a wear part (110), wherein the wear part (110) especially corresponds to a check valve or to a non-return valve or to a filter element.
7. Circulation bypass arrangement (100) according to one of the preceding claims, wherein the hydraulic system (200) comprises a tube or tube part (230), wherein the tube or tube part (230) is especially located parallel to the circulation bypass arrangement (100), wherein the tube or tube part (230) especially comprises a flow detector entity (231).
8. Circulation bypass arrangement (100) according to one of the preceding claims, wherein the first and second connection arrangement (210, 220) comprises, respectively, a valve (211, 221), wherein the valve (211) of the first connection arrangement (210) and/or the valve (221) of the second connection arrangement (220) are or correspond to ball valve or ball valves, wherein especially the first and second connection arrangement (210, 220) comprise, respectively, a 90 degree pipe angle (212, 222), especially having internal threads.
9. Method for removing and/or exchanging a wear part (110) and/or for removing and/or exchanging at least part of a circulation bypass arrangement (100), wherein the circulation bypass arrangement (100) is connected to a hydraulic system (200) and comprises a circulation pump unit (130) and a connecting part (120) housing the wear part (110), and wherein the circulation bypass arrangement (100) is connected to the hydraulic system (200) using a first and a second connection arrangement (210, 220) and using a plurality of screw connections, **characterized in that** the connecting part (120) and the circulation pump unit (130) are connected with each other by means of a union nut (125), and that the connecting part (120) and the first connection arrangement (210) are connected with each other by means of a lock nut (126), wherein the method comprises the following steps:

-- in a first step, the union nut (125), connecting the connecting part (120) with the circulation pump unit (130), is loosened or opened as well

as the lock nut (126), at the connection of the connecting part (120) with the first connection arrangement, is loosened,

-- in a second step, the connecting part (120) is further screwed onto and in the direction of an internal thread of the first connection arrangement (210),

-- in a third step, the circulation pump unit (130) is removed by means of loosening or opening a further union nut (135) used for connecting the second connection arrangement (220) with the circulation pump unit (130),

-- in a fourth step, the connecting part (120) is loosened and removed from the first connection arrangement (210).

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

1. Circulation bypass arrangement (100) for being connected to a hydraulic system (200), wherein the circulation bypass arrangement (100) comprises a connecting part (120) and a circulation pump unit (130), and wherein the circulation bypass arrangement (100) is connected to a hydraulic system (200) using a first and a second connection arrangement (210, 220),

wherein the circulation bypass arrangement (100) is configured to be connected to the first and second connection arrangements (210, 220) using a plurality of screw connections,

characterized in that the connecting part (120) and the circulation pump unit (130) are connected with each other by means of a union nut (125), and that the connecting part (120) and the first connection arrangement (210) are connected with each other by means of a lock nut (126).

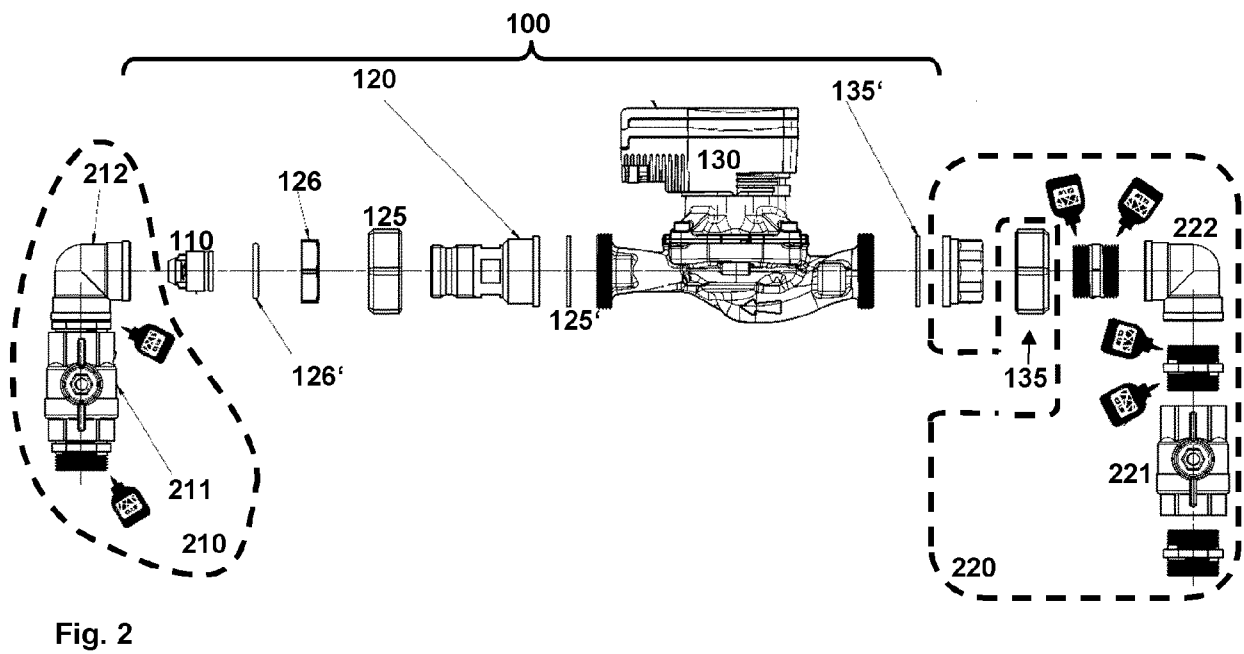
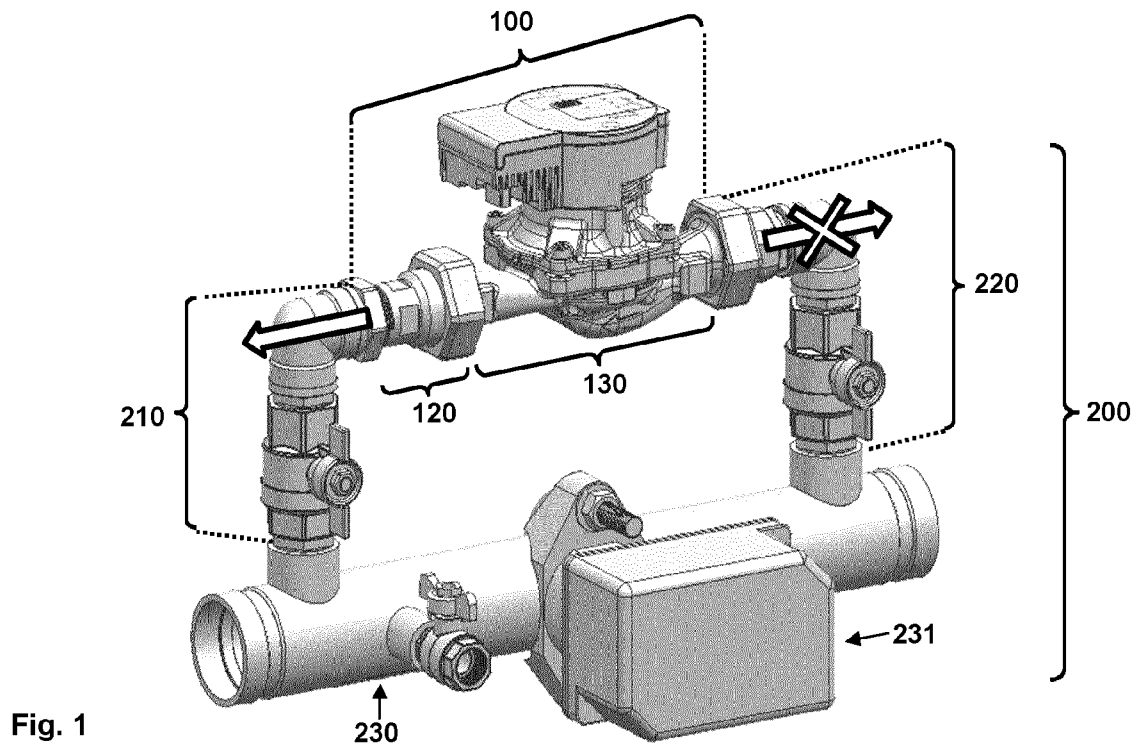
2. Circulation bypass arrangement (100) according to claim 1, wherein a further union nut (135) is used for connecting the second connection arrangement (220) with the circulation pump unit (130).
3. Circulation bypass arrangement (100) according to one of the preceding claims, wherein the lock nut (126) is used - at the connection of the connecting part (120) to the first connection arrangement (210) - together with a sealing means (126'), wherein the sealing means (126') is especially a sealing ring, especially an O-ring.
4. Circulation bypass arrangement (100) according to one of the preceding claims, wherein the connecting part (120) comprises a first thread portion (127) and a second thread portion (128), wherein the first thread portion (127) is used to screw the connecting part

(120) into an internal thread of the first connection arrangement (210) and wherein the second thread portion (128) is used as connection between the connecting part (120) and the lock nut (126).

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5. Circulation bypass arrangement (100) according to one of the preceding claims, wherein the connecting part (120) comprises a groove portion (126") between the first thread portion (127) and the second thread portion (128), wherein the groove portion (126") is especially used to receive or to contain the sealing means (126') between the connecting part (120) and the first connection arrangement (210).
6. Circulation bypass arrangement (100) according to one of the preceding claims, wherein the connecting part (120) houses a wear part (110), wherein the wear part (110) especially corresponds to a check valve or to a non-return valve or to a filter element.
7. Circulation bypass arrangement (100) according to one of the preceding claims, wherein the hydraulic system (200) comprises a tube or tube part (230), wherein the tube or tube part (230) is especially located parallel to the circulation bypass arrangement (100), wherein the tube or tube part (230) especially comprises a flow detector entity (231).
8. Circulation bypass arrangement (100) according to one of the preceding claims, wherein the first and second connection arrangement (210, 220) comprises, respectively, a valve (211, 221), wherein the valve (211) of the first connection arrangement (210) and/or the valve (221) of the second connection arrangement (220) are or correspond to ball valve or ball valves, wherein especially the first and second connection arrangement (210, 220) comprise, respectively, a 90 degree pipe angle (212, 222), especially having internal threads.
9. Method for removing and/or exchanging a wear part (110) and/or for removing and/or exchanging at least part of a circulation bypass arrangement (100), wherein the circulation bypass arrangement (100) is connected to a hydraulic system (200) and comprises a circulation pump unit (130) and a connecting part (120) housing the wear part (110), and wherein the circulation bypass arrangement (100) is connected to the hydraulic system (200) using a first and a second connection arrangement (210, 220) and using a plurality of screw connections, **characterized in that** the connecting part (120) and the circulation pump unit (130) are connected with each other by means of a union nut (125), and that the connecting part (120) and the first connection

arrangement (210) are connected with each other by means of a lock nut (126), wherein the method comprises the following steps:

- in a first step, the union nut (125), connecting the connecting part (120) with the circulation pump unit (130), is loosened or opened as well as the lock nut (126), at the connection of the connecting part (120) with the first connection arrangement, is loosened,
- in a second step, the connecting part (120) is further screwed onto and in the direction of an internal thread of the first connection arrangement (210),
- in a third step, the circulation pump unit (130) is removed by means of loosening or opening a further union nut (135) used for connecting the second connection arrangement (220) with the circulation pump unit (130),
- in a fourth step, the connecting part (120) is loosened and removed from the first connection arrangement (210).



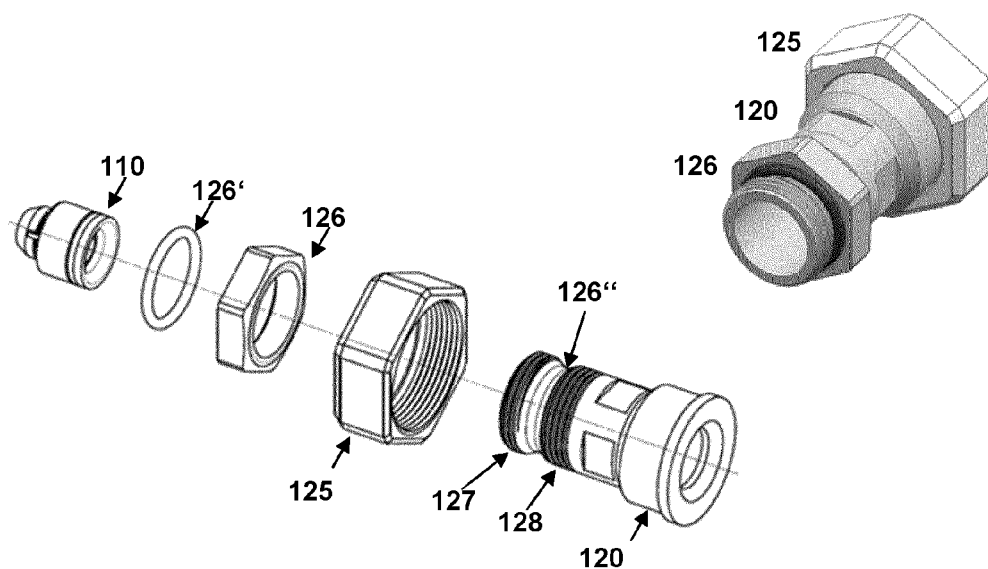


Fig. 3

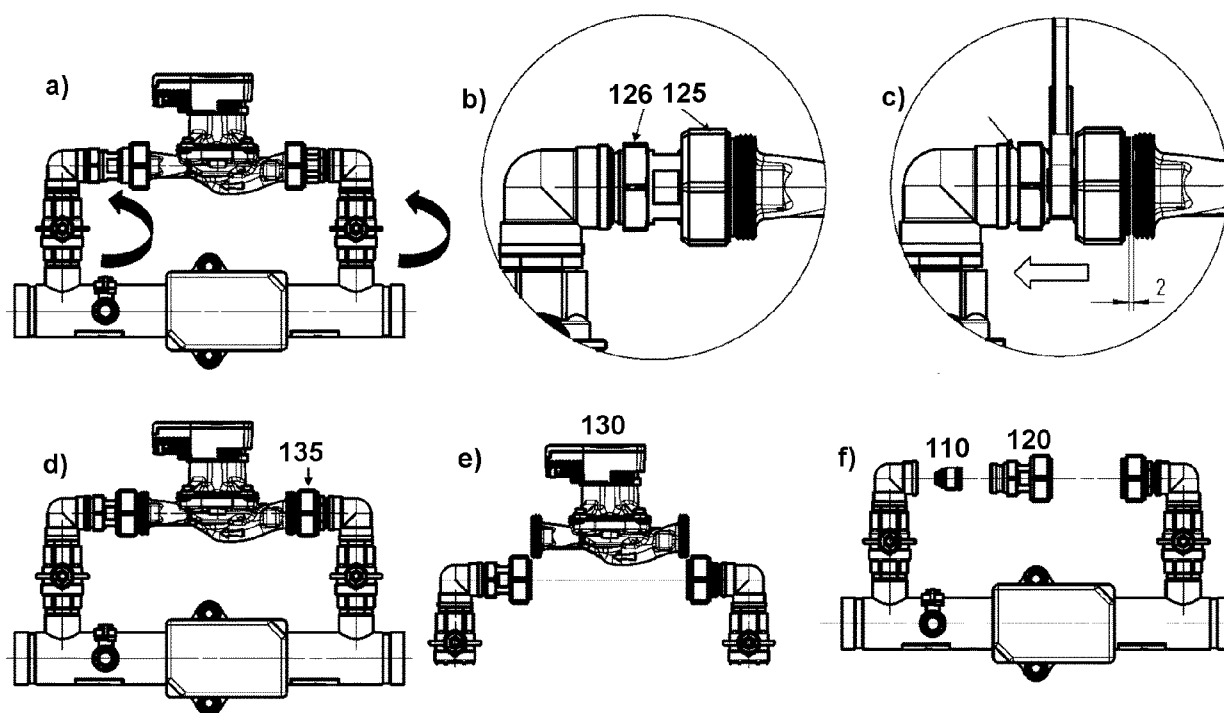


Fig. 4

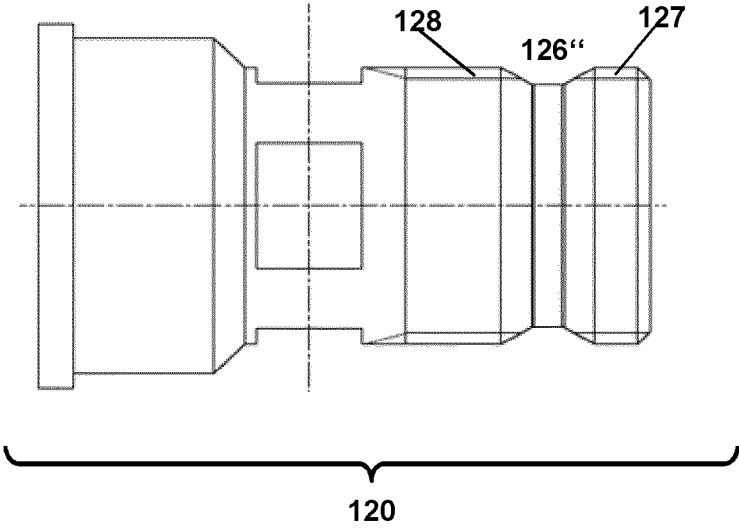


Fig. 5

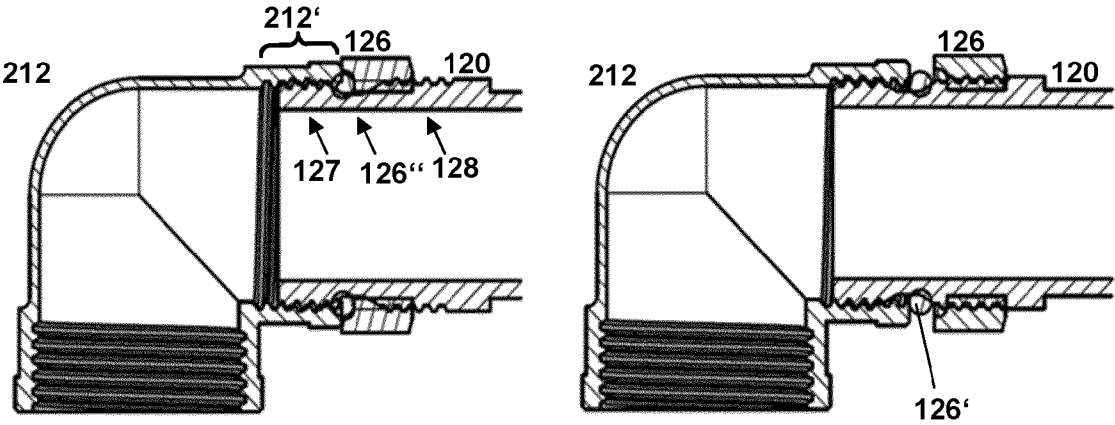


Fig. 6



EUROPEAN SEARCH REPORT

Application Number

EP 23 30 6850

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y	CN 211 231 033 U (SHAOXING KEQIAO WATER SUPPLY CO LTD) 11 August 2020 (2020-08-11) * figures 1-3 * * paragraph [0014] - paragraph [0019] * -----	1-9	INV. F04B49/24 F04B53/10 F04B53/20 F04B53/22
Y	CN 203 571 834 U (FOSHAN RIFENG ENTPR CO LTD; FOSHAN RIFENG NEW TUBING CO LTD) 30 April 2014 (2014-04-30) * figures 1-6 * * paragraph [0023] - paragraph [0028] * -----	1-9	ADD. A62C35/68
A	CN 206 112 360 U (CUI GUOSHAN) 19 April 2017 (2017-04-19) * figures 1-2 * * paragraph [0020] - paragraph [0026] * -----	1-9	
A	JP 6 242046 B2 (KITZ CORP) 6 December 2017 (2017-12-06) * figure 2 * * paragraph [0035] - paragraph [0039] * -----	1-9	
A	CN 206 577 470 U (YANTAI HUMON INFORMATION TECH CO LTD) 24 October 2017 (2017-10-24) * figure 1 * * paragraph [0015] - paragraph [0021] * -----	1-9	TECHNICAL FIELDS SEARCHED (IPC) F04B A62C
A	GB 2 546 778 A (STUART TURNER LTD [GB]) 2 August 2017 (2017-08-02) * figures 1-4 * * page 8, line 3 - page 11, line 11 * -----	1-9	
A	US 2013/161941 A1 (ZULAUF KEITH E [US] ET AL) 27 June 2013 (2013-06-27) * figures 1-7 * * paragraph [0020] - paragraph [0040] * ----- -/--	1-9	
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 15 December 2023	Examiner Ricci, Saverio
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			



EUROPEAN SEARCH REPORT

Application Number

EP 23 30 6850

DOCUMENTS CONSIDERED TO BE RELEVANT

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	US 2017/074524 A1 (ADEY CHRISTOPHER [GB] ET AL) 16 March 2017 (2017-03-16) * figures 1-7 * * paragraph [0047] - paragraph [0063] * -----	1-9	
			TECHNICAL FIELDS SEARCHED (IPC)
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
Munich		15 December 2023	Ricci, Saverio
CATEGORY OF CITED DOCUMENTS		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	
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EPO FORM 1503 03.82 (P04C01)

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

EP 23 30 6850

15-12-2023

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
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
CN 211231033	U	11-08-2020	NONE	
CN 203571834	U	30-04-2014	NONE	
CN 206112360	U	19-04-2017	NONE	
JP 6242046	B2	06-12-2017	JP 6242046 B2 JP 2013164157 A	06-12-2017 22-08-2013
CN 206577470	U	24-10-2017	NONE	
GB 2546778	A	02-08-2017	NONE	
US 2013161941	A1	27-06-2013	AU 352243 S AU 352424 S AU 352425 S AU 352426 S AU 2012362800 A1 CA 2859196 A1 CN 103339432 A EP 2800920 A1 PL 2800920 T3 RU 2014131049 A RU 2016102325 A UA 111402 C2 UA 116568 C2 US D738470 S US D777299 S US D787647 S US 2013161941 A1 US 2015000096 A1 US 2018180204 A1 WO 2013101534 A1 ZA 201403856 B ZA 201508455 B	21-11-2013 25-11-2013 25-11-2013 25-11-2013 19-06-2014 04-07-2013 02-10-2013 12-11-2014 31-07-2019 20-02-2016 01-08-2017 25-04-2016 10-04-2018 08-09-2015 24-01-2017 23-05-2017 27-06-2013 01-01-2015 28-06-2018 04-07-2013 26-08-2015 30-01-2019
US 2017074524	A1	16-03-2017	AU 2015228586 A1 CA 2942468 A1 CA 3113903 A1 CN 106461237 A CN 111503716 A DK 3117154 T3 EP 3117154 A1 EP 3236163 A1 GB 2524056 A GB 2540023 A	27-10-2016 17-09-2015 17-09-2015 22-02-2017 07-08-2020 02-01-2019 18-01-2017 25-10-2017 16-09-2015 04-01-2017

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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

EP 23 30 6850

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
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

15-12-2023

10	Patent document cited in search report	Publication date	Patent family member(s)	Publication date
			KR 20160132451 A	18-11-2016
			NZ 724956 A	26-03-2021
15			RU 2016140054 A	13-04-2018
			US D793523 S	01-08-2017
			US 2017043354 A1	16-02-2017
			US 2017074524 A1	16-03-2017
			US 2018340697 A1	29-11-2018
20			WO 2015136249 A1	17-09-2015

25				
30				
35				
40				
45				
50				
55				

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82