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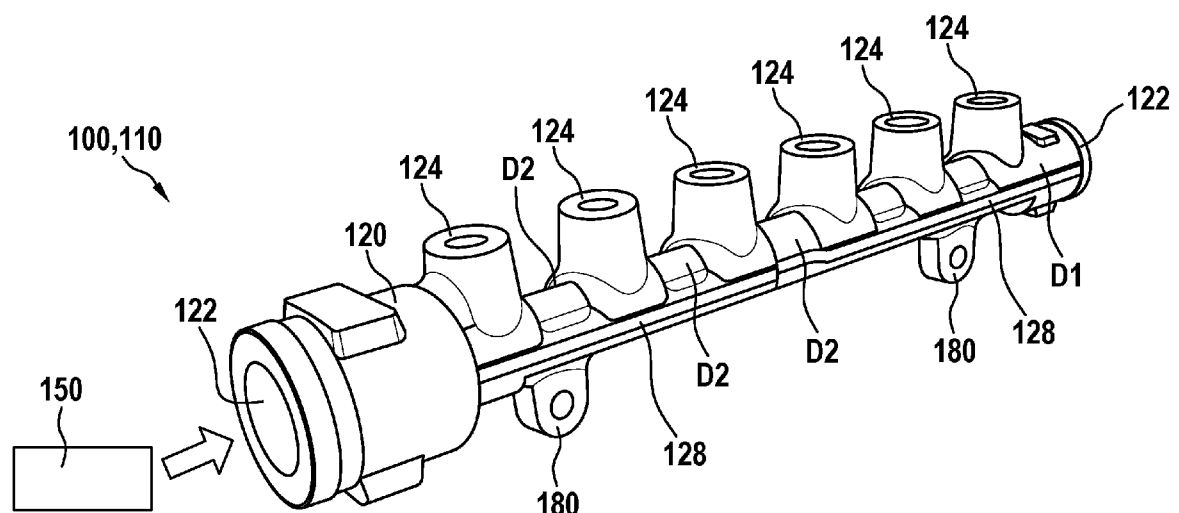
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(54) MANIFOLD AND HIGH-PRESSURE H2-SYSTEM

(57) The present invention relates to a manifold (110) for a high-pressure H₂-system (100), the manifold (110) comprising a main body (120) with a number of radial interfaces (124) to connect the manifold (110) to a refueling infrastructure (150) and the high-pressure H₂-system (100), wherein the number of radial interfaces (124) are fluid communicatingly connected via a main bore (126) along the main body (120), wherein the main body (120) comprises a circumscribed main outer diameter

(D1) at each of the number of radial interfaces (124) and a circumscribed reduced outer diameter (D2) between at least two of the number of radial interfaces (124) and wherein at least one of the number of radial interfaces (124) comprises a flattened backside (125) of the main body (120) opposite to the respective at least one radial interface (124). Furthermore, the invention relates to a high-pressure H₂-system (100) comprising at least one manifold (110).

Fig. 1

Description

[0001] The present invention relates to a manifold for a high-pressure H₂-system. Furthermore, the invention relates to a high-pressure H₂-system with at least one manifold.

Prior art

[0002] Known manifolds for high-pressure systems for hydrogen comprise of various structures with one or more inlets and a number of outlets to distribute the hydrogen. The known manifolds for high-pressure systems for hydrogen are designed up to 700 bar and even higher in the future. The usage of the manifolds with a gas like hydrogen requires a deliberate choice of material for the manifolds.

[0003] Since the inner diameters of a manifold are designed to enable a favourable flow of the fluid through the manifold, strength of known manifolds is typically increased by adding material to the outer shape of the manifold.

[0004] The combination of high material volumes of the manifold and expensive material choices increases the costs for the manifolds and the need for space for the manifold within high pressure H₂ system. High-pressure systems for hydrogen are typically used in different use cases, for example as a fuel providing system for modern drive units in vehicles or for stationary electric power sources.

Disclosure of the invention

[0005] The invention claims a manifold for a high-pressure H₂-system with the features of independent claim 1. Furthermore, the invention discloses a high-pressure H₂-system with at least one manifold with the features of independent claim 13. Further advantages and details of the invention result from the depending on claims, the description and the drawings. In this context, features described in relation to the manifold according to the invention naturally also apply in relation to the high-pressure H₂-system according to the invention and vice versa in each case, so that reference is or can always be made mutually regarding the disclosure concerning the individual aspects of the invention.

[0006] According to a first aspect of the invention, the invention discloses a manifold for a high-pressure H₂-system, the manifold comprising a main body with a number of radial interfaces to connect the manifold to a refuelling infrastructure and the hydrogen high pressure system, wherein the number of radial interfaces are fluid communicatingly connected via a main bore along the main body, wherein the main body comprises a circumscribed main outer diameter at each of the number of radial interfaces and a circumscribed reduced outer diameter between at least two of the number of radial interfaces and wherein at least one of the number of

radial interfaces comprises a flattened backside of the main body opposite to the respective at least one radial interface. The main body can have a circular or oval cross-section. Alternatively, the cross-section can have a rectangular or polygon shape.

[0007] The manifold in general preferably comprises a pipe like shape and/or a cylindrical shape. The main function of the manifold is to distribute the hydrogen between the at least one axial interface and the number of radial interfaces and/or among the interfaces -. The axial and radial interfaces are preferably interchangeable regarding the function as input and/or output interfaces. The number of radial interfaces extend radially from the main body. Preferably, the number of radial interfaces extend parallel to each other and/or in line with each other from the main body.

[0008] The manifold preferably comprises at least one input interface, while the rest of the interfaces are preferably used as output interfaces and/or are closed off by means later described in detail. The interfaces preferably each comprise attachment means for attaching the manifold to the refuelling infrastructure and to the high-pressure H₂-system. The interfaces preferably are understood as connection means for connecting the manifold to the refuelling infrastructure and to the high-pressure H₂-system.

[0009] The fluid is distributed among the interfaces via the main bore along the main body. The main bore is preferably understood as a bored, drilled and/or otherwise machined cavity along the main body. The main bore is preferably designed in such a way that its circumference, in particular its diameter, does not change within at least one region of the main body. Preferably, the main bore has a constant or almost constant inner circumference, in particular diameter, along its whole length or at least 90% of its length inside the main body.

[0010] The high-pressure H₂-system preferably comprises at least one tank for hydrogen and/or at least one consumer-means for hydrogen, for example an engine and/or drive unit of a vehicle. The refuelling infrastructure is preferably understood as some kind of fuel station, a stationary or mobile tank unit and/or some other source of fuel, preferably hydrogen.

[0011] The manifold comprises the main body, which is preferably understood as a single piece of material. The main body comprises a main bore along the main body. The inner circumference, in particular diameter, of the main bore is preferably constant or almost constant in a major portion of the main body. The main body is preferably understood as a linear main body and/or a main body along a virtual axis. The axial interfaces of the manifold are preferably arranged in line with the virtual axis of the main body. The radial interfaces are preferably arranged radially to the virtual axis of the main body.

[0012] The main body of the manifold is especially advantageous, because of the reduced cross section area with circular or near to circular shape between at least two of the number of radial interfaces. The reduced

dimensions of the main body are to be understood in relationship to dimensions of the rest of the main body. The outer circumference, in particular the outer diameter, of the main body is preferably to be understood as the circumscribed diameter of the cross-section of the main body without the protruding regions of the radial interfaces, outside the regions with the reduced cross-section area between the at least two of the number of radial interfaces. For example, the circumscribed diameter of the region of the manifold with the reduced cross section area should be equal to the outer diameter of the main body multiplied by a factor of 0,4 to 0,8, preferably 0,5 to 0,6. The reduced cross section of the main body enables the manifold to be produced with less material and therefore reduced cost, while improving or at least not substantially reducing the load-carrying capacity of the manifold.

[0013] Furthermore, the shape of main body of the manifold is especially advantageous, if the side of the main body opposite to the respective radial interface is flattened. The opposite side is here understood as opposite to the radial interface with respect to the axis of the main bore. The flattened backside is preferably understood as a reduction of material for the main body, opposite to the respective radial interface. The flattened backside enables the manifold to be produced with less material and therefore reduced cost, while improving or at least not substantially reducing the load-carrying capacity of the manifold.

[0014] A manifold designed in this way is particularly advantageous because the manifold enables an advantageous flow of hydrogen, whereby a reduced usage of material and thereby costs is made possible by the manifold in a particularly simple manner. The manifold according to the invention needs little space and provides a sufficiently high load-carrying capacity needed for the distribution of hydrogen for high-pressure H₂-systems. The load-carrying capacity of the manifold is preferably understood as an ability of the manifold to withstand dynamic loading, primarily due to pressure, temperature or vibration loads, while the integrity and function of the manifold is not compromised by a fatigue fracture.

[0015] According to an advantageous design of the invention, a manifold is provided, wherein the main body comprises at least one axial interface, that the main body comprises regions with large cross section area with circular or near to circular shape with the main outer circumference, in particular main outer diameter, and/or that the main body comprises at least one region with a reduced cross section area with circular or near to circular shape with the reduced outer circumference, in particular reduced outer diameter.

[0016] According to an advantageous design of the invention, a manifold is provided, wherein the main body comprises at least partially a reduced cross section area between each two of the number of radial interfaces. The possible features of the reduced dimensions are already described before. It is especially advantageous for the

design of the manifold to have at least partially a reduced cross section area between each two of the number of radial interfaces. Thereby, the reduction of material is advantageously increased, which decreases the costs for the manifold. The reduction of the cross section area is preferably designed similar or identical between each two of the number of radial interfaces. Thereby, the production of the manifold is simplified, and the costs are reduced, while improving or at least not substantially reducing the load-carrying capacity of the manifold. The manifold designed in this way is particularly advantageous because the manifold enables an advantageous flow of hydrogen, whereby a reduced usage of material and thereby costs is made possible by the manifold in a particularly simple manner.

[0017] According to an advantageous design of the invention, a manifold is provided, wherein each of the number of radial interfaces comprises a flattened backside of the main body opposite to each respective radial interface. The possible features of the flattened backside of the main body are already described before. It is especially advantageous for the design of the manifold to a flattened backside of the main body opposite to each respective radial interface. Thereby, the reduction of material is advantageously increased, which decreases the costs for the manifold. The flattened backside of the main body is preferably designed similar or identical for each backside of the main body opposite to each respective radial interface. Thereby, the production of the manifold is simplified, and the costs are reduced, while improving or at least not substantially reducing the load-carrying capacity of the manifold. A manifold designed in this way is particularly advantageous because the manifold enables an advantageous flow of hydrogen, whereby a reduced usage of material and thereby costs is made possible by the manifold in a particularly simple manner.

[0018] According to an advantageous design of the invention, a manifold is provided, wherein the flattened backside of the main body comprises a rounded shape, an arc-like shape, a flat shape or the flattened backside of the main body is shaped as a segment of a circle. The flattened backside of the main body mainly focuses on reducing the material of the manifold, while improving or at least not substantially reducing the load-carrying capacity of the manifold, in order to reduce costs. The flattened backside designed as a rounded shape or an arc-like shape advantageously provides the wanted reduction of material, while improving or at least not substantially reducing the load-carrying capacity of the manifold. Alternatively, the flattened backside of the main body is shaped as a segment of a circle in such a way that reduction of the mass of the main body of the manifold is achieved. The centre of the circle and/or of the segment of the circle is preferably located above the axis of the main bore on the side of the manifold where the radial interface is located, when depicted in a cross-section view in the direction of the virtual axis of the main body. The manifold designed in this way is particularly advantageous.

tageous because the manifold enables an advantageous flow of hydrogen, whereby a reduced usage of material and thereby costs is made possible by the manifold in a particularly simple manner.

[0019] According to an advantageous design of the invention, a manifold is provided, wherein the main body can contain additional mass of material between at least two or more interfaces at least partially along at least one side of the main body. This additional mass of material is preferably understood as a rib-like thickening of the main body which smoothly blends with the rest of the main body. This additional mass is located on at least one side of the main body or preferably on both sides of the main body. The additional mass located on at least one side of the main body can help with easier production, labelling and increase stiffness of the manifold. The additional mass is preferably extending at least partially along a side of the main body, parallel to the axis of the main body. The additional mass is preferably constructed as one piece with the main body and is made from the same material as the main body. The manifold designed in this way is particularly advantageous because the manifold enables an advantageous flow of hydrogen, whereby a reduction of costs is made possible in a particularly simple manner.

[0020] According to an advantageous design of the invention, a manifold is provided, wherein the main body is made of, but not limited to, steel, in particular austenitic stainless steel, and/or that the manifold or at least the main body is made by a forging method, and/or a casting method and/or a machining method and/or a 3D printing method and/or a die casting method. The choice of austenitic stainless steel for the main body is especially advantageous for the usage of the manifold with a high-pressure H₂-system since austenitic stainless steel provides favourable resistance against hydrogen embrittlement. The preferable methods for producing the manifold include a machining method combined with a forging method, a casting method or 3D printing, in order to reduce costs of production, increase quality of the manifold and/or allow for an easy and fast production cycle.

[0021] A manifold designed in this way is particularly advantageous because the manifold enables an advantageous flow of hydrogen, whereby a reduced usage of material and thereby costs is made possible by the manifold in a particularly simple manner.

[0022] According to an advantageous design of the invention, a manifold is provided, wherein to at least one axial interface and/or to at least one of the number of the radial interfaces a sensor unit for measuring at least partially inside the manifold can be attached. As claimed and described before the axial and radial interfaces are mainly used for connecting the manifold to a refuelling infrastructure and to the high-pressure H₂-system. Furthermore, one or more interfaces can be used to integrate a sensor unit into the manifold in order to measure required properties of or within the high-pressure H₂-system. The sensor unit is preferably attached to

the respective interface, for example by screwing, plugging, pressing and/or other ways of attaching. The sensor unit is for example able to measure pressure, temperature, flow velocity or gas compositions. The design of interfaces to which the sensors are attached could be adjusted to the specific need of the corresponding sensor and thus be different from the design of other interfaces. The manifold designed in this way is particularly advantageous because the manifold enables an advantageous flow of hydrogen, whereby a measuring of at least one property of or within the high-pressure H₂-system by the sensor unit in a particularly simple manner.

[0023] According to an advantageous design of the invention, a manifold is provided, wherein the main body comprises at least one attachment means, wherein the at least one attachment means is designed as one piece with the main body. The at least one attachment means is preferably designed as one piece with the main body. The at least one attachment means is preferably extending radially from the main body. Preferably, the manifold comprises at least two attachment means extending in parallel from the main body. The at least one attachment means preferably extends at the angle of 90° or 180° measured with respect to the orientation of the radial interfaces. The at least one attachment means is preferably designed with a hole which could be used for insertion of additional attachment means, such as bolts, pins etc. The manifold designed in this way is particularly advantageous because the manifold with at least one attachment means enables an advantageous flow of hydrogen, whereby a reduced usage of material and thereby costs is made possible by the manifold in a particularly simple manner.

[0024] According to an advantageous design of the invention, a manifold is provided, wherein the manifold can contain at least one screw plug, wherein the at least one screw plug is screwed in one of the at least one axial interface and/or in one of the number of the radial interfaces. The at least one screw plug is able to close of the respective axial interface and/or radial interface. The at least one screw plug is preferably screwed in temporarily or permanently unused interfaces. Thereby, the manifold can be produced with the same amount of interfaces for different use cases even though the use cases might require different numbers of interfaces, which reduces cost for the production of the manifold. The screw plug comprises a sealing feature, such as a conus, a bite edge or an O-ring to seal the connection between the screw plug and the manifold. The manifold designed in this way is particularly advantageous because the manifold with at least one screw plug enables an advantageous flow of hydrogen, whereby a reduced usage of material and thereby costs is made possible by the manifold in a particularly simple manner.

[0025] According to an advantageous design of the invention, a manifold is provided, wherein the manifold comprises at least one plug, other than a screw plug, wherein the at least one plug is attached to one of the at

least one axial interface and/or to one of the number of the radial interfaces. The at least one plug is able to close of the respective axial interface and/or radial interface. The at least one plug is preferably attached by means of additional nut in temporarily or permanently unused interfaces. Alternatively, the plug can be pressed into the manifold. Thereby, the manifold can be produced with the same amount of interfaces for different use cases even though the use cases might require different numbers of interfaces, which reduces cost for the production of the manifold. The plug comprises a sealing feature, such as a conus, a bite edge or an O-ring to seal the connection between the plug and the manifold. The manifold designed in this way is particularly advantageous because the manifold with at least one plug enables an advantageous flow of hydrogen, whereby a reduced usage of material and thereby costs is made possible by the manifold in a particularly simple manner.

[0026] According to an advantageous design of the invention, a manifold is provided, wherein the manifold comprises at least one check valve, wherein the at least one check valve is attached to the at least one axial interface and/or to one of the number of the radial interfaces. The at least one check valve is able to suppress reverse flow of hydrogen at the respective axial interface and/or radial interface. The check valve comprises a sealing feature, such as a conus, a bite edge or an O-ring to seal the connection between the check valve and the manifold. The manifold designed in this way is particularly advantageous because the manifold with at least one check valve enables an advantageous flow of hydrogen, while it requires reduced space to fit in, whereby a reduced usage of material and thereby costs is made possible by the manifold in a particularly simple manner.

[0027] According to the second aspect of the invention, the invention discloses a high-pressure H2-system. The high-pressure H2-system comprises at least one manifold according to the first aspect. The described high-pressure H2-system has all the advantages already described for the manifold according to the first aspect of the invention. The manifold and the high-pressure H2-system are preferably attached to each other, for example by screwing, pressing or clamping.

[0028] A manifold for a high-pressure H2-system and a high-pressure H2-system according to the invention are explained in more detail below with reference to figures. The figures show schematically:

- Figure 1 in a perspective view a manifold of a high-pressure H2-system,
- Figure 2 in a perspective view a different manifold of a high-pressure H2-system,
- Figure 3 in a perspective view a manifold with two axial connections to refuelling infrastructure,
- Figure 4 in a perspective view a manifold with two

radial connections to refuelling infrastructure,

- Figure 5 in a perspective view a manifold with one axial and one radial connection to refuelling infrastructure,
- Figure 6 in a perspective view a manifold with a sensor unit attached to one radial interface of the manifold,
- Figure 7 in a perspective view a manifold with a check valve attached to one axial interface of the manifold, and
- Figure 8 in a cross section view another manifold of a high-pressure H2-system.

[0029] Features with the same function or principle of operation are each provided with the same reference signs in Figs. 1 to 8.

[0030] In Fig. 1, a perspective view of a manifold 110 of a high-pressure H2-system 100 is shown. The manifold 110 comprises a main body 120 with two axial interfaces 122 and six radial interfaces 124 to connect the manifold 110 to a refuelling infrastructure 150 and to the high-pressure H2-system 100. The fluid is distributed among the two axial interfaces 122 and the six radial interfaces 124 via the main bore 126 (not shown) along the main body 120. The main body 120 comprises a main outer circumference D1, in particular main outer diameter D1, at each of the six radial interfaces 124 and a reduced outer circumference D2, in particular reduced outer diameter D2, between each two of the radial interfaces 124. The radial interfaces 124 comprise a flattened backside 125 (not shown) of the main body 120 opposite to each respective radial interface 124. The main body 120 comprises an additional mass of material 128 partially along two opposing sides of the main body 120. The main body 120 is made from austenitic stainless steel and the main body 120 is made by a forging method. The main body 120 comprises two attachment means 180, wherein the two attachment means 180 are designed as one piece with the main body 120.

[0031] In Fig. 2, a perspective view of a different manifold 110 of a high-pressure H2-system 100 is shown. The manifold 110 comprises a main body 120 with two axial interfaces 122 and five radial interfaces 124 to connect the manifold 110 to a refuelling infrastructure 150 and to the high-pressure H2-system 100. The fluid is distributed among the two axial interfaces 122 and the six radial interfaces 124 via the main bore 126 (not shown) along the main body 120.

[0032] The main body 120 comprises a main outer circumference or diameter D1, respectively, at each of the radial interfaces 124 and a reduced outer circumference or diameter D2, respectively, between each two of the radial interfaces 124. The radial interfaces 124 com-

prise a flattened backside 125 (not shown) of the main body 120 opposite to each respective radial interface 124. The main body 120 comprises an additional mass of material 128 partially along two opposing sides of the main body 120. One of the two axial interfaces 122 comprises a sensor unit 140 for measuring inside the manifold 110. The manifold 110 comprises a screw plug 130, wherein the at least one screw plug 130 is screwed in the other of the two axial interfaces 122. The manifold 110 comprises a plug 131, wherein the at least one plug 131 is attached to one of the radial interfaces 124.

[0033] In Fig. 3, a perspective view of a manifold 110 of a high-pressure H₂-system 100 is shown. The manifold 110 comprises a main body 120 with two axial interfaces 122, which are connected to a refuelling infrastructure 150, and six radial interfaces 124 to connect the manifold 110 to the high-pressure H₂-system 100. The fluid is distributed among the two axial interfaces 122 and the six radial interfaces 124 via the main bore 126 (not shown) along the main body 120. The main body 120 comprises a main outer diameter D1 at each of the six radial interfaces 124 and a reduced outer diameter D2 between each two of the radial interfaces 124. The radial interfaces 124 comprise a flattened backside 125 (not shown) of the main body 120 opposite to each respective radial interface 124. The main body 120 comprises an additional mass of material 128 partially along two opposing sides of the main body 120. The main body 120 is made from austenitic stainless steel and the main body 120 is made by a forging method. The main body 120 comprises two attachment means 180, wherein the two attachment means 180 are designed as one piece with the main body 120.

[0034] In Fig. 4, a perspective view of a manifold 110 of a high-pressure H₂-system 100 is shown. The manifold 110 comprises a main body 120 with two axial interfaces 122 and six radial interfaces 124. Two of the radial interfaces 124 are connected to a refuelling infrastructure 150 and the remaining interfaces 122 and 124 are connected to the high-pressure H₂-system 100. The fluid is distributed among the two axial interfaces 122 and the six radial interfaces 124 via the main bore 126 (not shown) along the main body 120. The main body 120 comprises a main outer diameter D1 at each of the six radial interfaces 124 and a reduced outer diameter D2 between each two of the radial interfaces 124. The radial interfaces 124 comprise a flattened backside 125 (not shown) of the main body 120 opposite to each respective radial interface 124. The main body 120 comprises an additional mass of material 128 partially along two opposing sides of the main body 120. The main body 120 is made from austenitic stainless steel and the main body 120 is made by a forging method. The main body 120 comprises two attachment means 180, wherein the two attachment means 180 are designed as one piece with the main body 120.

[0035] In Fig. 5, a perspective view of a manifold 110 of a high-pressure H₂-system 100 is shown. The manifold

110 comprises a main body 120 with two axial interfaces 122 and six radial interfaces 124. One of the axial interfaces 122 and one of the radial interfaces 124 is connected to a refuelling infrastructure 150 and the remaining interfaces 122 and 124 are connected to the high-pressure H₂-system 100. The fluid is distributed among the two axial interfaces 122 and the six radial interfaces 124 via the main bore 126 (not shown) along the main body 120. The main body 120 comprises a main outer diameter D1 at each of the six radial interfaces 124 and a reduced outer diameter D2 between each two of the radial interfaces 124. The radial interfaces 124 comprise a flattened backside 125 (not shown) of the main body 120 opposite to each respective radial interface 124. The main body 120 comprises an additional mass of material 128 partially along two opposing sides of the main body 120. The main body 120 is made from austenitic stainless steel and the main body 120 is made by a forging method. The main body 120 comprises two attachment means 180, wherein the two attachment means 180 are designed as one piece with the main body 120.

[0036] In Fig. 6, a perspective view of a different manifold 110 of a high-pressure H₂-system 100 is shown. The manifold 110 comprises a main body 120 with two axial interfaces 122 and eight radial interfaces 124 to connect the manifold 110 to a refuelling infrastructure 150 and to the high-pressure H₂-system 100. The fluid is distributed among the two axial interfaces 122 and the six radial interfaces 124 via the main bore 126 (not shown) along the main body 120.

[0037] The main body 120 comprises a main outer diameter D1 at each of the radial interfaces 124 and a reduced outer diameter D2 between each two of the radial interfaces 124. The main body 120 comprises an additional mass of material 128 partially along two opposing sides of the main body 120. One of the eight radial interfaces 124 comprises a sensor unit 140 for measuring inside the manifold 110. The manifold 110 comprises a screw plug 130, wherein the at least one screw plug 130 is screwed in the other of the two axial interfaces 122.

[0038] In Fig. 7, a perspective view of a different manifold 110 of a high-pressure H₂-system 100 is shown. The manifold 110 comprises a main body 120 with two axial interfaces 122 and six radial interfaces 124 to connect the manifold 110 to a refuelling infrastructure 150 and to the high-pressure H₂-system 100. The fluid is distributed among the two axial interfaces 122 and the six radial interfaces 124 via the main bore 126 (not shown) along the main body 120.

[0039] The main body 120 comprises a main outer diameter D1 at each of the radial interfaces 124 and a reduced outer diameter D2 between each two of the radial interfaces 124. The main body 120 comprises an additional mass of material 128 partially along two opposing sides of the main body 120. One of the two axial interfaces 122 comprises a check valve 160 for suppress reverse flow of hydrogen through this interface of the manifold 110. The manifold 110 comprises a sensor unit

140 for measuring inside the manifold 110.

[0040] In Fig. 8, a cross section view of another manifold 110 of a high-pressure H₂-system 100 is shown. The manifold 110 comprises a main body 120 with axial interfaces 122 (not shown) and radial interfaces 124. The fluid is distributed among the two axial interfaces 122 (not shown) and the radial interfaces 124 via the main bore 126 along the main body 120. The main body 120 comprises a main outer diameter D1 at each of the radial interfaces 124 and a reduced outer diameter D2 between each two of the radial interfaces 124. The radial interfaces 124 comprise a flattened backside 125 of the main body 120 opposite to each respective radial interface 124. The flat backside 125 of the main body 120 comprises an arc-like shape and the flat backside 125 of the main body 120 is shaped as a circle outline segment.

Claims

1. Manifold (110) for a high-pressure H₂-system (100), the manifold (110) comprising a main body (120) with a number of radial interfaces (124) to connect the manifold (110) to a refuelling infrastructure (150) and the high-pressure H₂-system (100), wherein the number of radial interfaces (124) are fluid communicatingly connected via a main bore (126) along the main body (120), wherein the main body (120) comprises a circumscribed main outer diameter (D1) at each of the number of radial interfaces (124) and a circumscribed reduced outer diameter (D2) between at least two of the number of radial interfaces (124) and wherein at least one of the number of radial interfaces (124) comprises a flattened backside (125) of the main body (120) opposite to the respective at least one radial interface (124).
2. Manifold (110) according to claim 1, **characterized in**
 - that** the main body (120) comprises at least one axial interface (122),
 - that** the main body (120) comprises regions with large cross section area with circular or near to circular shape with the main outer diameter (D1), and/or
 - that** the main body (120) comprises at least one region with a reduced cross section area with circular or near to circular shape with the reduced outer diameter (D2).
3. Manifold (110) according to any of the previous claims, **characterized in**
 - that** the main body (120) comprises at least partially a reduced outer diameter (D2) between each two of the number of radial interfaces (124).

4. Manifold (110) according to any of the previous claims, **characterized in**
 - that** each of the number of radial interfaces (124) comprises a flattened backside (125) of the main body (120) opposite to each respective radial interface (124).
5. Manifold (110) according to any of the previous claims, **characterized in**
 - that** the flattened backside (125) of the main body (120) comprises a rounded shape, an arc-like shape and/or that the flat backside (125) of the main body (120).
6. Manifold (110) according to any of the previous claims, **characterized in**
 - that** the main body (120) comprises additional mass of material and/or a stability rib (128) between at least two or more interfaces (124, 122) at least partially along at least one side of the main body (120), especially at least partially along two opposing sites of the main body (120).
7. Manifold (110) according to any of the previous claims, **characterized in**
 - that** the main body (120) is at least partially made of steel, in particular austenitic stainless steel and/or that the manifold (110) or at least the main body (120) is at least partially made by a forging method, a casting method, a machining method, a 3D printing method and/or a die casting method.
8. Manifold (110) according to any of the previous claims, **characterized in**
 - that** at least one of the at least one axial interface (122) and/or at least one of the number of the radial interfaces (124) comprises a sensor unit (140) for measuring at least partially inside the manifold (110).
9. Manifold (110) according to any of the previous claims, **characterized in**
 - that** the main body (120) comprises at least one attachment means (180), wherein the at least one attachment means (180) is designed as one piece with the main body (120).
10. Manifold (110) according to any of the previous claims, **characterized in**
 - that** the manifold (110) comprises at least one screw plug (130), wherein the at least one screw plug (130) is screwed in one of the at least one axial interface

(122) and/or in at least one of the number of the radial interfaces (124).

11. Manifold (110) according to any of the previous claims, 5
characterized in
that the manifold (110) comprises at least one plug (131), wherein the at least one plug (131) is connected by a nut or pressed into the manifold to the at least one of the axial interfaces (122) and/or to at least one of the radial interfaces (124). 10
12. Manifold (110) according to any of the previous claims, 15
characterized in
that the manifold (110) can contain at least one check valve (160), wherein the at least one check valve (160) is attached to the at least one axial interfaces (122) and/or in at least one of the radial interfaces (124). 20
13. High-pressure H₂-system (100) comprising at least one manifold (110) according to any of the previous claims. 25

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Fig. 1

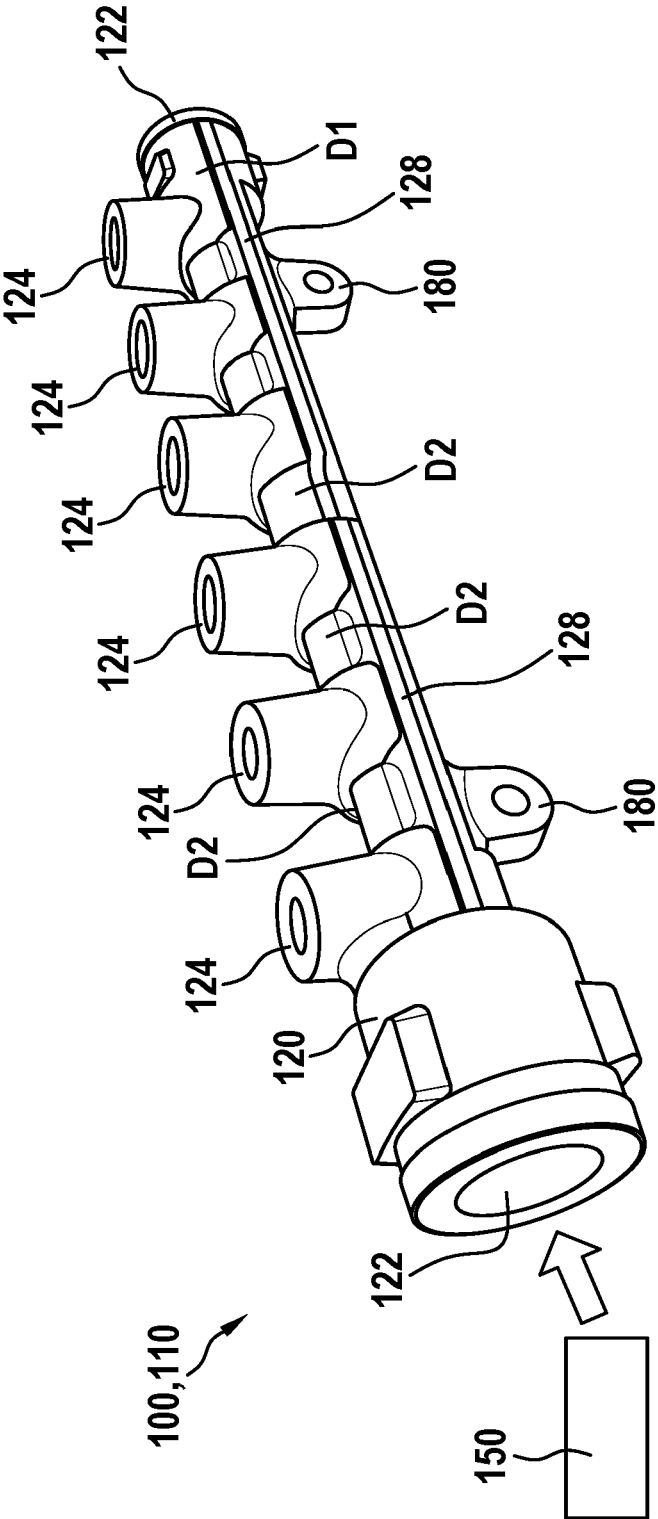


Fig. 2

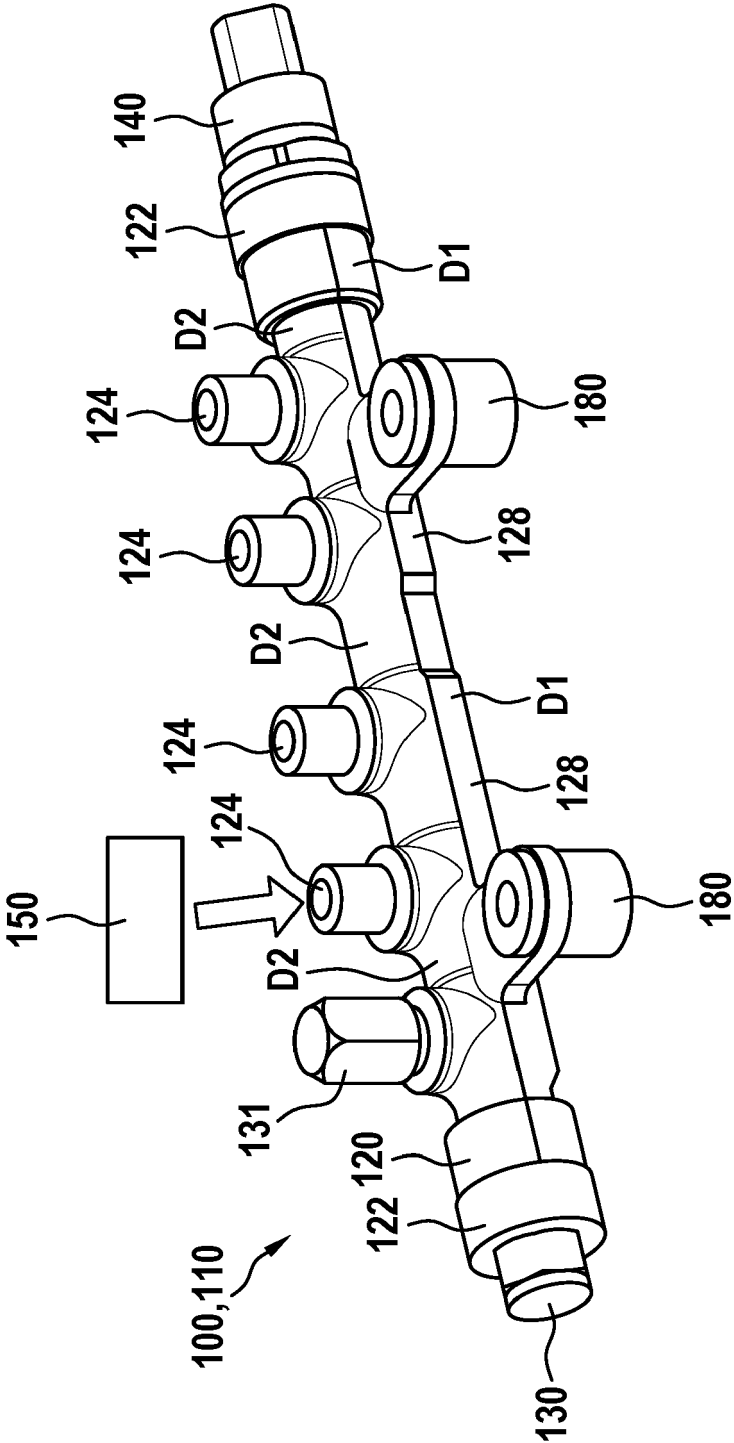
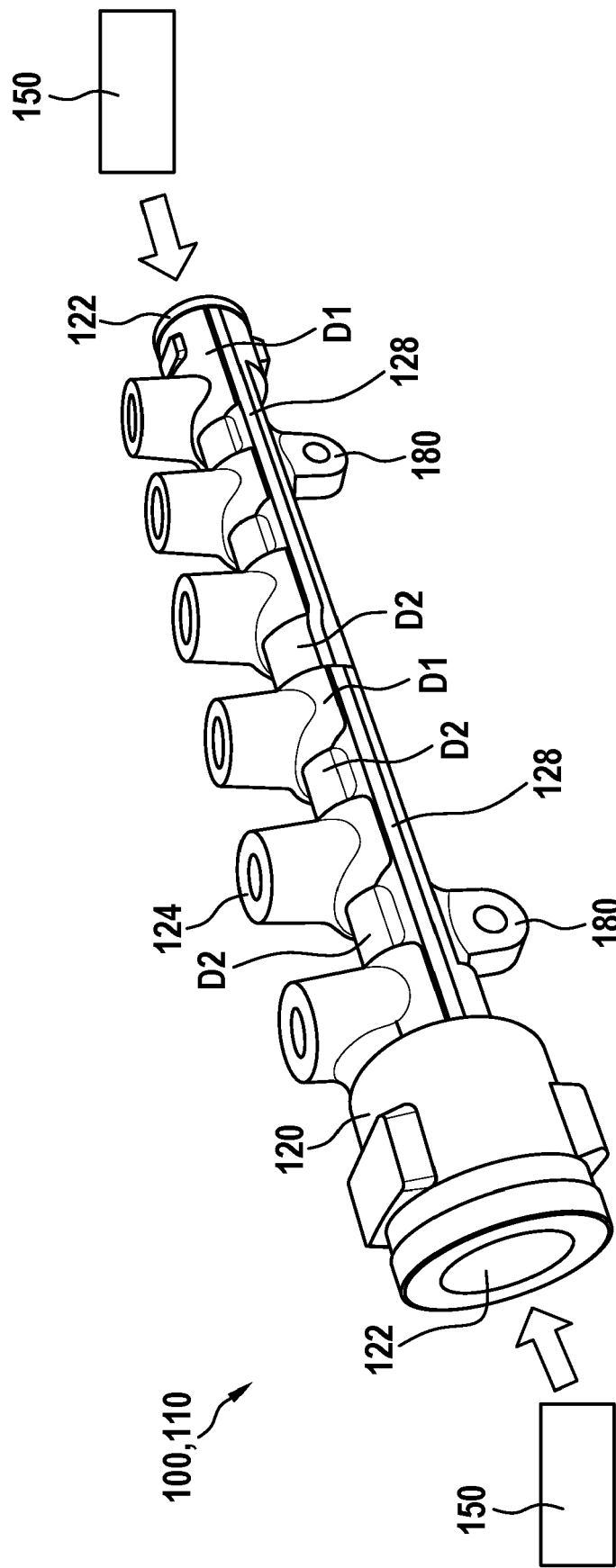


Fig. 3



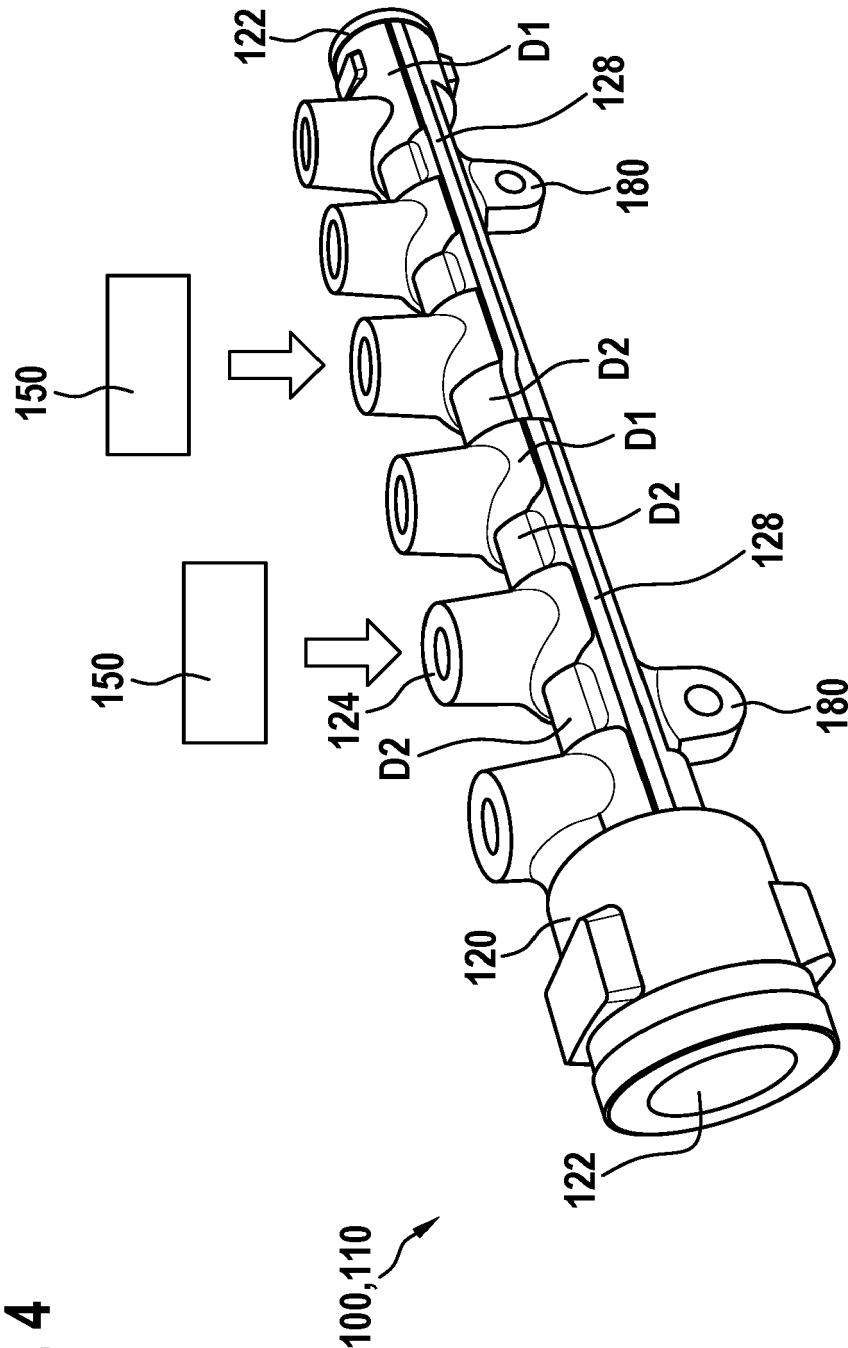


Fig. 4

Fig. 5

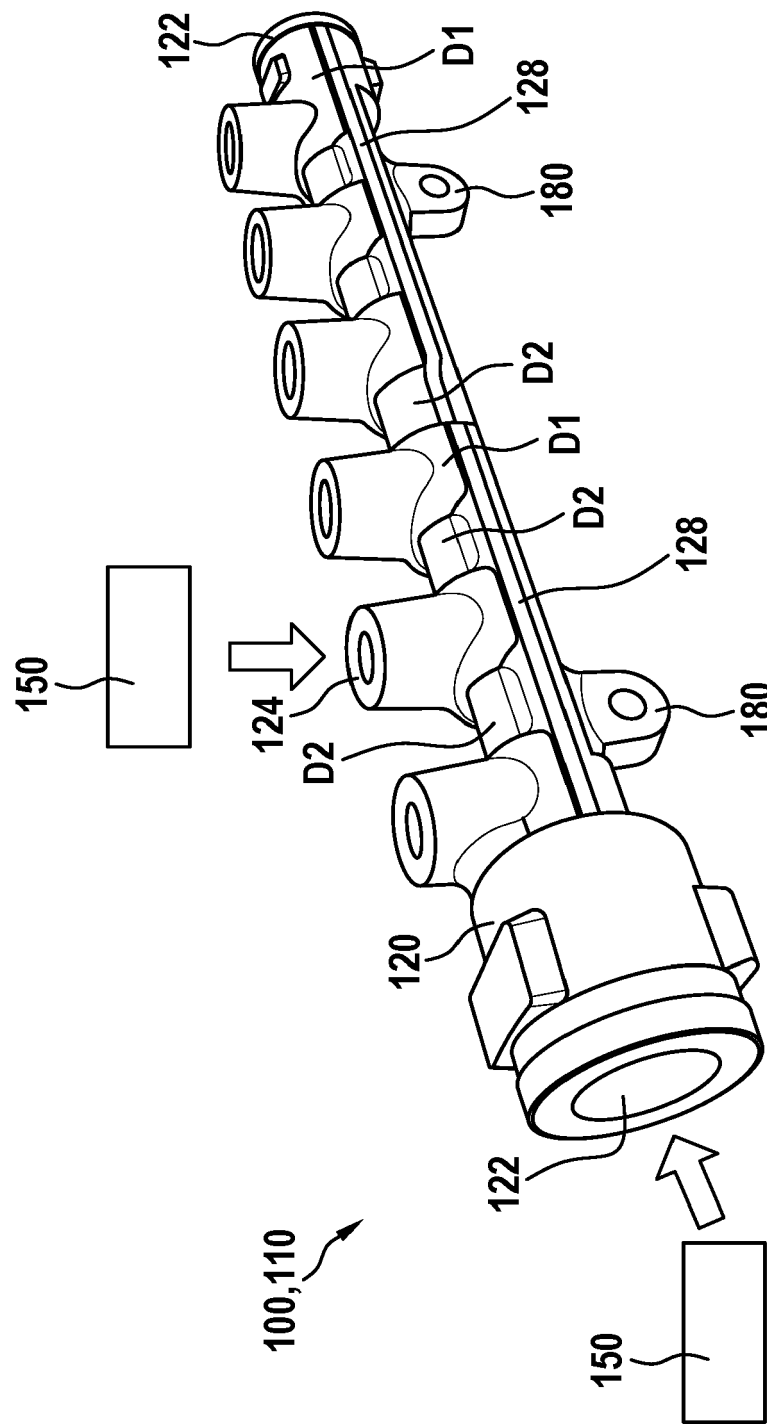


Fig. 6

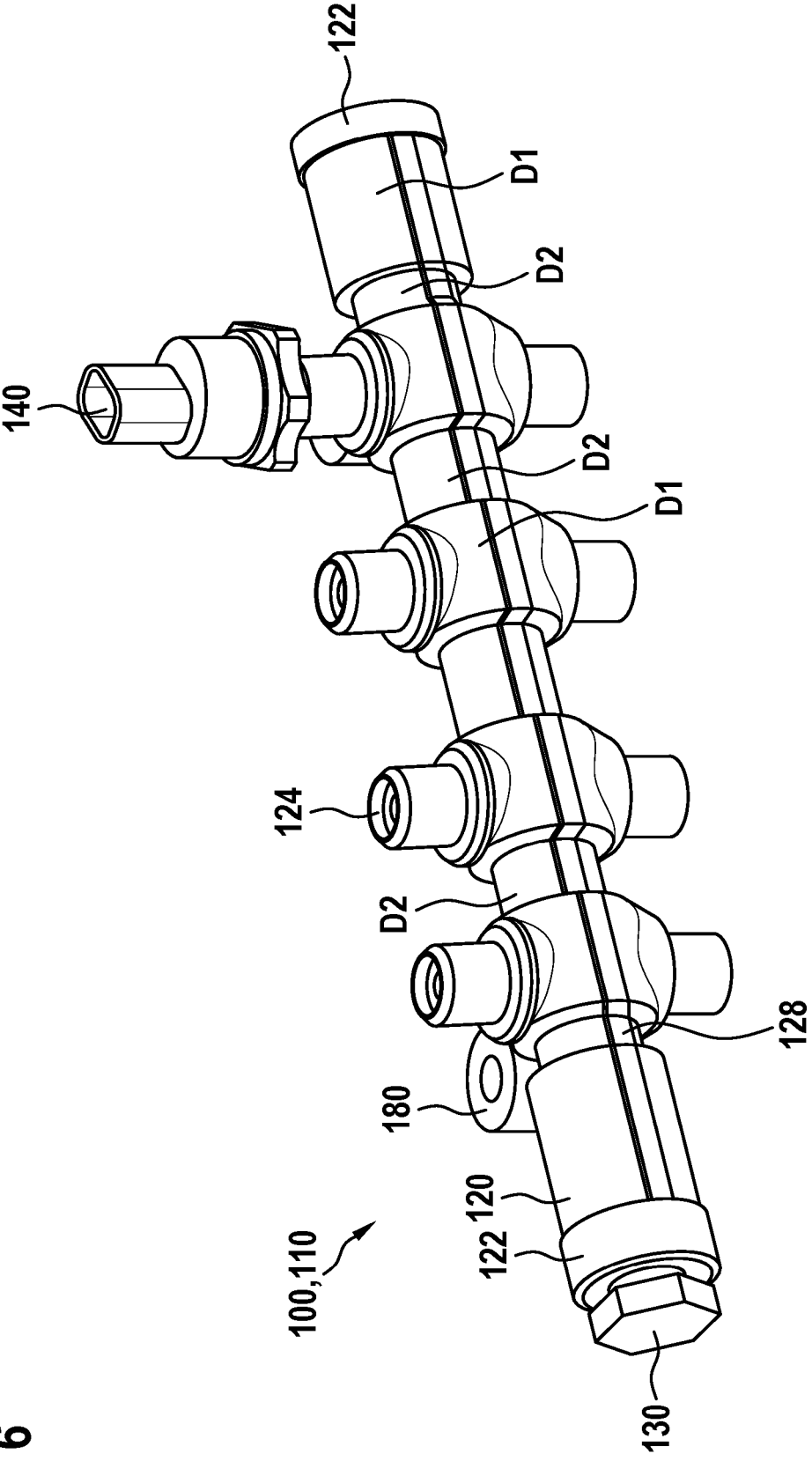


Fig. 7

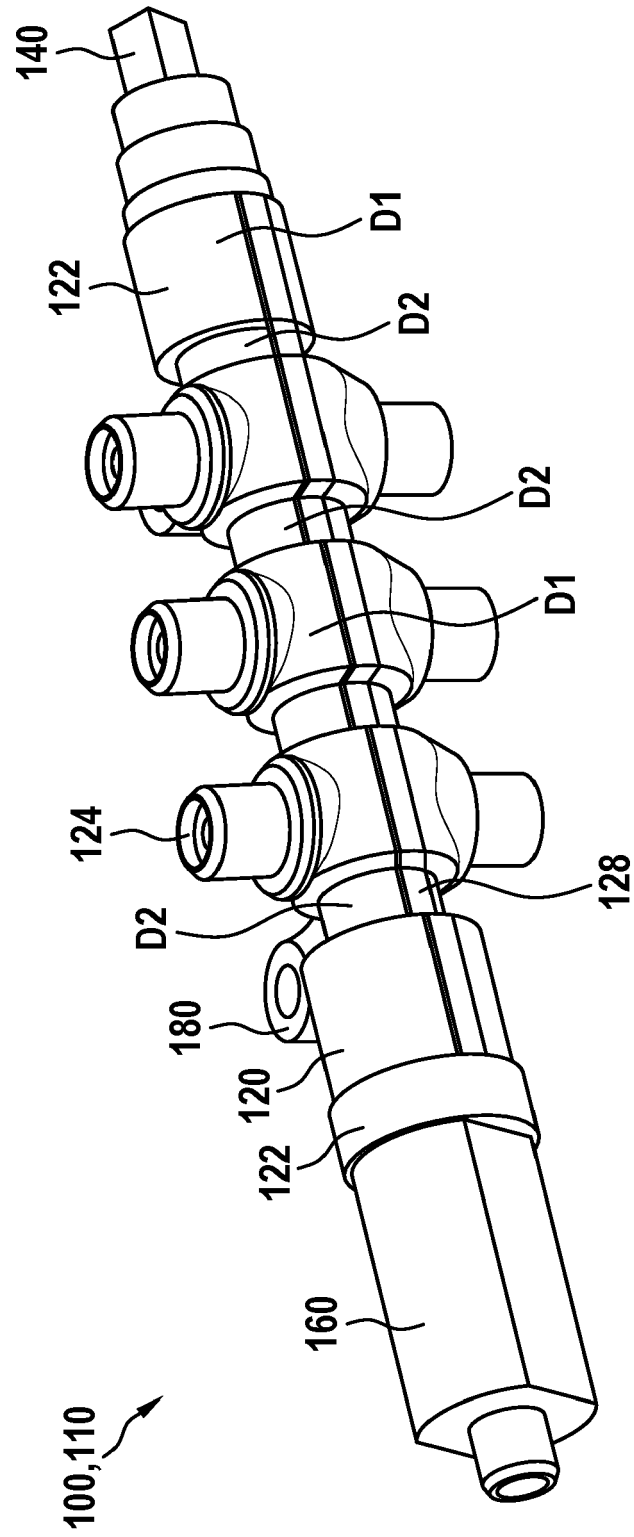
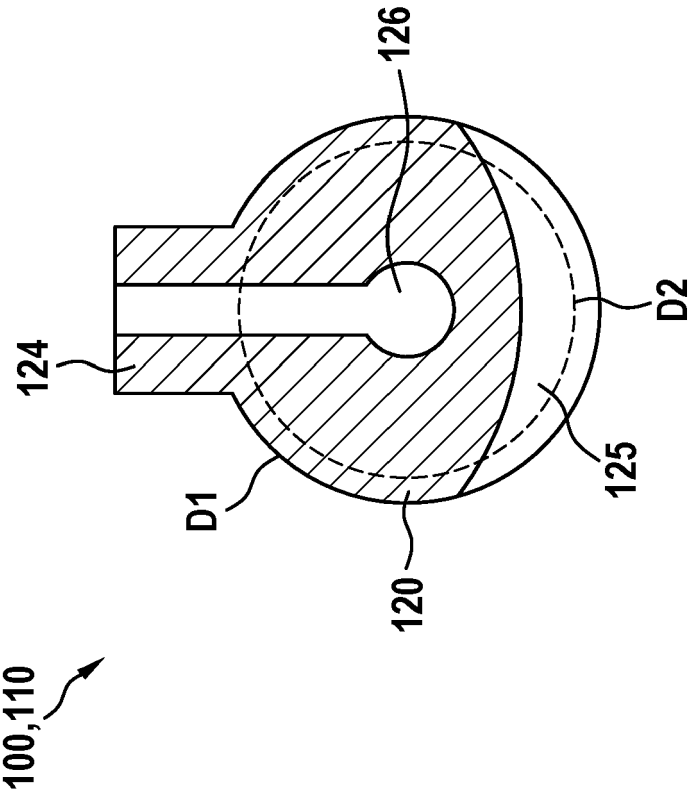


Fig. 8





EUROPEAN SEARCH REPORT

Application Number

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			F17C
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Place of search Munich		Date of completion of the search 14 May 2024	Examiner Forsberg, Peter
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