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(54) **A RECEIVER DRIER**

(57) The receiver drier includes a tubular casing, a plug body, a filter body, a tubular element, an end cap and a disc. The tubular casing includes first and second open ends, first and second apertures. The plug body forms removable engagement with either one of first and second open ends. The filter body is connected to the plug body. The tubular element is connected to the filter body at a proximal end thereof and is eccentrically received within the tubular casing. The end cap closes open end opposite to either of the first and the second open ends closed by plug body. The disc is disposed at a distal end of the tubular element to define a first and a remaining section. The first section receives refrigerant through the tubular element. A portion of the tubular casing upstream of the end cap in the fluid flow direction grips the disc.

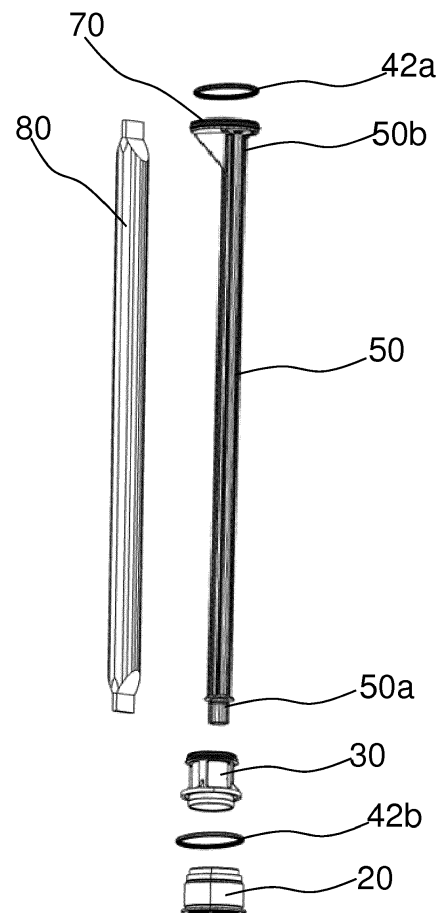


FIG. 4

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Description

[0001] The present invention relates to a receiver drier, more particularly, the present invention relates to a receiver drier configured on a condenser for a vehicle Heating Ventilation and Air-conditioning unit.

[0002] Conventional air conditioning system for example for a vehicle cabin includes condenser, an evaporator, an expansion device, a compressor and a heater. The compressor pumps refrigerant gas up to a high pressure and temperature. Thereafter, refrigerant gas enters the condenser, where refrigerant gas rejects heat energy to external ambient (through ambient air or a specific low temperature coolant circuit), is cooled, and condenses into liquid phase. Thereafter, the expansion valve regulates refrigerant liquid to flow at proper rate, reducing its pressure due its expansion, and finally, the cooled liquid refrigerant flows to the evaporator, where the cooled liquid refrigerant is evaporated, reducing its temperature. As the liquid refrigerant evaporates, the refrigerant extracts or absorbs heat energy from air inside an enclosure to be conditioned, specifically, the vehicle cabin in case of a vehicle air conditioning system and returns to the compressor, and the above cycle repeats. In the process, the heat extracted from inside the vehicle cabin and rejected to outside vehicle cabin, results in cooling of air inside the vehicle cabin.

[0003] Generally, the conventional air conditioning system configured with expansion valve is also configured with a receiver drier that is disposed in the high-pressure section of the air conditioning system, usually located between condenser and expansion valve in the air conditioning loop. Referring to **FIG. 1** of the accompanying drawings, a conventional receiver drier **02** is generally configured on an outlet side of a condenser **04**. In accordance with an embodiment, the conventional receiver drier **02** is mounted along the outlet side of the condenser **04**. Alternatively, the conventional receiver drier **02** is integrally formed along the outlet side of the condenser **04**. The conventional receiver drier **02** includes a tubular casing **01** in form of an airtight container of a tubular configuration with an inlet **02a** and an outlet **02b**. The inlet **02a** is for receiving liquid refrigerant from a condensing section **04a** of the condenser **04** via a first section **08a** of a tank **08**. Whereas, the outlet **02b** is for delivering the liquid refrigerant to a sub-cooling section **04b** of the condenser **04** via a second section **08b** of the tank **08**. The inlet **2a** is so aligned to heat exchange tubes **06** corresponding to the condensing section **04a** of the condenser **04** that refrigerant entering inside, passing through and egressing the heat exchange tubes **06** corresponding to the condensing section **04a** of the condenser **04** enters inside the receiver drier **02** through the inlet **02a** configured on the tubular casing **01** of the conventional receiver drier **02**. The conventional receiver drier **02** acts as a temporary storage for refrigerant (and oil) and receives a desiccant material to absorb moisture (water) that may have entered inside the air conditioning

system. The receiver drier **02** also includes a filter to trap debris that may have entered inside fluid lines of the air conditioner unit. Accordingly, the receiver drier **02** prevents the moisture and/or debris from reaching critical elements of the air conditioner unit, particularly the compressor, thereby preventing any detrimental impact to performance or damage to the critical elements of the air conditioner unit. The conventional receiver drier **02** includes a sealing element **03** received inside the tubular casing **01** to collect the condensed refrigerant. A periphery of the sealing element **03** interacts with an internal rib **02c** configured along inside wall of the tubular casing **01** and the sealing element **03** rests over a plug body **05** engaging with a first extreme end of the tubular casing **01**. The condensed, filtered refrigerant collected above the sealing element **03** is transferred via a tubular element **07** to a section **02d** defined between a bowl **09a** received inside the tubular casing **01** and an end cap **09b** engaging with other extreme end of the tubular casing **01**. The bowl **09a** is in fluid communication with and supplies condensed refrigerant to the sub-cooling section **04b** of the condenser **04** via the outlet **02b** and the second section **08b** of the tank **08**.

[0004] However, there are various drawbacks associated with such configuration of the receiver drier. Particularly, the receiver drier includes a plurality of elements that are required to be assembled inside the tubular casing and such assembly of the elements is inconvenient considering the elements being connected are inside the tubular casing and are not visible from outside the tubular casing. Accordingly, assembly and dis-assembly of the receiver drier of the present invention is inconvenient. Also, such configuration fails to provide ease and flexibility in serviceability of the receiver drier. Particularly, the prior art receiver drier for a condenser with internal inverted flow architecture permits serviceability from bottom only if condenser is of certain specific configuration or condenser is having a certain number of passes. Another drawback of such configuration is that the receiver drier involves more number of components, assembly steps and processes. Although with certain modifications, the elements configuring the receiver drier can first be assembled outside the tubular casing and then inserted inside the tubular casing. However, due to close tolerance between the elements and the internal sidewalls of the tubular casing, the elements of the receiver drier may be subjected to deforming forces and twisting and may be damaged while being inserted inside the tubular casing.

[0005] Accordingly, there is a need for a receiver drier that exhibits ease of assembly and dis-assembly of the elements thereof, particularly, close tolerance elements thereof, by reducing the efforts and eliminating risk of damage during assembly and dis-assembly. Further, there is a need for a receiver drier that provides ease and flexibility in serviceability of the receiver drier, particularly, a receiver drier that permits serviceability from either top or bottom irrespective of configuration and number of

passes of the condenser. Furthermore, there is a need for a receiver drier that involves comparatively fewer components, assembly steps and reduced assembly time as compared to conventionally used receiver drier.

[0006] An object of the present invention is to provide a receiver drier that obviates the drawbacks associated conventional receiver drier that fails to provide flexibility in serviceability of the receiver drier as accessibility to interior of receiver drier is based on configuration and number of passes of the condenser.

[0007] Another object of the present invention is to provide a receiver drier, wherein elements thereof that are connectable to each other and that can be assembled outside a tubular casing of the receiver drier, thereby easing the assembly process.

[0008] Still another object of the present invention is to provide a receiver drier that exhibits ease of assembly and dis-assembly of the elements thereof, particularly, close tolerance elements thereof by reducing the efforts and eliminating risk of damage during assembly and dis-assembly.

[0009] Yet another object of the present invention is to provide a receiver drier that permits ease and flexibility in serviceability, particularly, a receiver drier that permits serviceability from either top or bottom irrespective of configuration and number of passes of the condenser.

[0010] Another object of the present invention is to provide a receiver drier that fewer components, assembly steps and reduced assembly time as compared to conventionally used receiver drier.

[0011] In the present description, some elements or parameters may be indexed, such as a first element and a second element. In this case, unless stated otherwise, this indexation is only meant to differentiate and name elements which are similar but not identical. No idea of priority should be inferred from such indexation, as these terms may be switched without betraying the invention. Additionally, this indexation does not imply any order in mounting or use of the elements of the invention.

[0012] A receiver drier is disclosed in accordance with an embodiment of the present invention. The receiver drier includes a tubular casing, a plug body, a filter body, a tubular element, an end cap and a disc. The tubular casing includes a first open end, a second open end, a first aperture and a second aperture. The plug body is at least partially received in the tubular casing and forms removable engagement with either one of the first open end and the second open end. The filter body is connected to the plug body. The tubular element is connected to the filter body at a proximal end thereof and is eccentrically received within the tubular casing. The end cap closes an open end opposite to either of the first open end and the second open end closed by the plug body. The disc is disposed at a distal end of the tubular element and is spaced away from the end cap. The disc is provided with at least one first sealing element along periphery thereof. The disc defines a first section and a remaining section of the tubular casing. The first section receives

refrigerant through the tubular element. A portion of the tubular casing upstream of the end cap in the fluid flow direction grips the at least one first sealing element received over the disc.

[0013] Generally, the plug body forms threaded engagement with either one of the first open end and the second open end. The plug body and the filter body in spite of being connected, independently move angularly relative to each other.

[0014] In accordance with an embodiment of the present invention, the plug body and the filter body are integrally formed.

[0015] Specifically, the at least one first sealing element is at least one O-ring received in at least one groove formed along periphery of the disc.

[0016] Alternatively, the at least one first sealing element includes a plurality of radially extending flexible wings that interact and form sealing with inside walls of a portion of the tubular casing.

[0017] Generally the at least one of the filter body and the plug body is provided with at least one second sealing element.

[0018] Specifically, the at least one second sealing element is at least one O-ring received in at least one groove formed by at least a portion of the filter body in conjunction with the plug body.

[0019] Alternatively, the at least one second sealing element includes a plurality of radially extending flexible wings that interact and form sealing with inside walls of the tubular casing.

[0020] Particularly, the at least one first sealing element is an O-ring.

[0021] Generally, at least a portion of the filter body in conjunction with the plug body forms at least one second groove that receives at least one second sealing element.

[0022] Similarly, the least one second sealing element is an O-ring.

[0023] Specifically, the proximal end of the tubular element engages with the filter body.

[0024] In accordance with an embodiment of the present invention, the disc is integrally formed at the distal end of the tubular element.

[0025] Further, the receiver drier includes a desiccant material received in an annular space between the tubular element and the tubular casing.

[0026] Specifically, the first aperture configures fluid communication between a condensing section of the core of the condenser and the remaining section of the tubular casing.

[0027] Similarly, the second aperture configures fluid communication between the first section and a sub-cooling section of the core of the condenser.

[0028] In accordance with an embodiment of the present invention, the portion of the tubular casing upstream of the end cap in fluid flow direction is of reduced internal dimension to grip the at least one first sealing element received over the disc.

[0029] In accordance with a preferred embodiment of

the present invention. The plug body forms removable engagement with the first open end at an operative bottom of the tubular casing. The disc at the distal end of the tubular element is gripped by the portion of the tubular casing upstream of the end cap in the fluid flow direction. Such configuration provides serviceability from operative bottom of the receiver drier and enables collection of refrigerant in the first section disposed at the operative top of the receiver drier.

[0030] Alternatively, the plug body forms removable engagement with the second open end at the operative top of the tubular casing. The disc at the distal end of the tubular element is gripped by the portion of the tubular casing upstream of the end cap in the fluid flow direction. Such configuration provides serviceability from operative top of the receiver drier.

[0031] Other characteristics, details and advantages of the invention can be inferred from the description of the invention hereunder. A more complete appreciation of the invention and many of the attendant advantages thereof will be readily obtained as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying figures, wherein:

FIG. 1 illustrates a schematic representation of a receiver drier configured along an outlet side of a condenser in accordance with the prior art;

FIG. 2a illustrates a schematic representation of a receiver drier configured along an outlet side of a condenser in accordance with the present invention;

FIG. 2b illustrates a schematic representation of the receiver drier of **FIG. 2a** without a tubular casing for depicting internal details of the receiver drier;

FIG. 3 illustrates an assembled view depicting connection between various elements such as a plug body, a filter body, a tubular element, a desiccant material, a disc and first and second sealing elements configuring the receiver drier of **FIG.2b**;

FIG. 4 illustrates an exploded view of the receiver drier of **FIG. 3**;

FIG. 5 illustrates a sectional view of the receiver drier of **FIG. 2a** depicting internal details thereof;

FIG. 6a illustrates an isometric view of a tubular casing of the receiver drier of **FIG. 2a**;

FIG. 6b illustrates a sectional of the tubular casing of **FIG. 6a** depicting a first aperture, a second aperture and a portion of reduced dimension for gripping a disc of the receiver drier;

FIG. 6c illustrates an enlarged view depicting the

second aperture and the portion of reduced dimension of the tubular casing of **FIG. 6a**;

FIG. 7 illustrates an exploded view depicting complementary engagement elements formed on the tubular element and the filter body of **FIG. 3** respectively for forming connection there between; and

Fig. 8 illustrates a schematic representation of the filter body of **FIG. 3** provided with at least one second sealing element in accordance with another embodiment of the present invention, wherein the at least one second sealing elements are in the form of a plurality of radially extending wings; and

FIG. 9 illustrates sealing between the tubular casing and a sealing element disposed at a distal end of the tubular element, wherein the sealing element includes a plurality of radially extending flexible wings.

[0032] It must be noted that the figures disclose the invention in a detailed enough way to be implemented, said figures helping to better define the invention if needs be. The invention should however not be limited to the embodiment disclosed in the description.

[0033] The receiver drier of the present invention includes a tubular casing, a plug body closing a first extreme end of the tubular casing, a filter body, a tubular element, a disc, at least one first sealing element, at least one second sealing element, an end cap closing a second extreme end of the tubular casing and a desiccant material. The disc is disposed at a distal end of the tubular element and is spaced away from the end cap to define a first section receiving condensed refrigerant through the tubular element. The disc is configured with groove to receive the at least one first sealing element therein. Particularly, the disc with the at least one first sealing element in conjunction with the end cap and inside walls of the tubular element defines the first section. The at least one first sealing element received in the at least one groove configured on the disc is gripped by a portion of the tubular casing upstream of the end cap in the fluid flow direction and having reduced internal dimension. With such configuration, only the disc at the distal end of the tubular element is gripped and the assembly of the components inside the tubular casing is convenient. Specifically, with such configuration, the components of the receiver drier can be freely inserted inside the tubular casing with ease and without being subjected to any deforming forces, twisting and without being damaged. All the components of the receiver drier of the present invention are connected to each other and with such configuration all the components of the receiver drier can be assembled before being inserted inside the tubular casing of the receiver drier. Although, the present invention is explained with respect to the receiver drier for a condenser used in a vehicle air conditioning unit. However, the present invention is also applicable for any other de-

vice having construction, functional limitations and features similar to the receiver drier. Particularly, present invention is applicable for any other devices that involves a tubular casing for receiving a plurality of elements therein, wherein the elements are required to be assembled outside the tubular casing for convenience of assembly and inserted inside the tubular casing without being subjected to any twisting or deforming forces.

[0034] FIG. 1 illustrates a schematic representation of a conventional receiver drier **02** configured along an outlet side of a condenser **04** in accordance with the prior art. The conventional receiver drier **02** includes a plurality of elements, such as for example, a plug body **05**, a sealing element **03**, a tubular element **07** and a bowl **09** that are required to be assembled inside a tubular casing **01** of the receiver drier **02**. Assembly of the elements inside the tubular casing **01** is inconvenient considering that the elements being connected are inside the tubular casing and are not visible from outside the tubular casing **01**. Also, such configuration fails to provide ease and flexibility in serviceability of the receiver drier **02**. The conventional receiver drier **02** involves more number of components, assembly steps and processes. Although, with some minor modifications, the elements configuring the conventional receiver drier **02** could first be assembled outside the tubular casing **01** and then inserted inside the tubular casing **01**. However, due to close tolerance between the elements and the internal sidewalls of the tubular casing **01**, the elements of the conventional receiver drier **02** are subjected to deforming forces, twisting and may get damaged while being inserted inside the tubular casing **01** of the conventional receiver drier **02**.

[0035] The receiver drier of the present invention overcomes drawbacks of the conventional receiver drier **02**. FIG. 2a illustrates a schematic representation of a receiver drier **100** in accordance with the present invention configured along an outlet side of a condenser **200**. FIG. 2b illustrates a schematic representation of the receiver drier **100** without a tubular casing **10** for depicting internal details of the receiver drier **100**. FIG. 3 illustrates an assembled view depicting connection between various elements such as for example, a plug body **20**, a filter body **30**, at least one first sealing element **40a**, at least one second sealing element **40b**, a tubular element **50**, a disc **70**, a desiccant material **80** configuring the receiver drier **100**. FIG. 3 further depicts an enlarged view of the disc **70** mounted on a distal end **50b** of the tubular element **50**, and an enlarged view depicting connection between the plug body **20** and the filter body **30** configured at a proximal end **50a** of the tubular element **50**. FIG. 4 illustrates an exploded view of the receiver drier **100**. In accordance with an embodiment, the receiver drier **100** is securely mounted along the outlet side of the condenser **200**. Alternatively, the receiver drier **100** is integrally formed along the outlet side of the condenser **200**.

[0036] The tubular casing **10** includes a first open end **10a**, a second open end **10b**, at least one first aperture **10c** and at least one, at least one, second aperture **10d**.

FIG. 6a illustrates an isometric view of the tubular casing **10**. FIG. 6b illustrates a sectional of the tubular casing **10** depicting the first aperture **10c**, the second aperture **10d** and a portion **10e** of reduced dimension, particularly, of reduced diameter for gripping the disc **70**. FIG. 6c illustrates an enlarged view depicting the second aperture **10d** and the portion **10e** of reduced dimension of the tubular casing **10**. The tubular casing **10** is generally of plastic material. However, the present invention is not limited to any particular configuration and any particular material of the tubular casing **10** as far as the tubular casing **10** is capable of receiving refrigerant for temporary storage thereof, a desiccant material to absorb moisture (water) and is able to receive other elements of the receiver drier **100**.

[0037] The plug body **20** is least partially received in the tubular casing **10** and forms removable engagement with either the first open end **10a** or the second open end **10b**. The plug body **20** forms threaded engagement with either one of the first open end **10a** and the second open end **10b**. The plug body **20** includes a gripping portion for gripping and angularly moving the plug body **20** relative to the either one of the first open end **10a** and the second open end **10b**. More specifically, the plug body **20** is angularly moved relative to the tubular casing **10** to achieve engagement or disengagement the plug body **20** with respect to either one of the first and the second open ends **10a**, **10b** of the tubular casing **10**. However, the present invention is not limited to any particular configuration of the plug body **20**, as long as the plug body **20** is capable of configuring removable engagement with either one of the first open end **10a** and the second open end **10b**. In a preferred embodiment, the plug body **20** forms removable engagement with the first open end **10a** at an operative bottom of the tubular casing **10** to provide serviceability from operative bottom of the receiver drier **100**.

[0038] The filter body **30** is connected to the plug body **20**. The configuration of the connection between the plug body **20** and the filter body **30** is such that in spite of being connected, the plug body **20** can independently move angularly relative to the filter body **30**. With such configuration, the filter body **30** connected to the plug body **20** and the other elements subsequently disposed after the filter body **30** and directly or indirectly connected to the filter body **30**, do not angularly move in spite of angular movement of the plug body **20**. Such configuration of connection between the plug body **20** and the filter body **30** prevents twisting of and damage to the other elements of the receiver drier **100**. The filter body **30** is having a netted configuration. However, the present invention is not limited to any particular configuration of the filter body **30** as long as the filter body **30** is able to trap debris. Further, the present invention is not limited to any particular configuration of connection between the filter body **30** and the plug body **20** as long as the connection between the plug body **20** and the filter body **30** permits independent angular movement of the plug body **20** with

respect to the filter body **30**. In accordance with another embodiment of the present invention, the plug body **20** and the filter body **30** are integrally formed to configure a filter-plug body, whereas connection between the filter-plug body and the other elements subsequently disposed there-to is so as to enable independent angular movement of the filter-plug body with respect to the other elements to prevent twisting.

[0039] The tubular element **50** is eccentrically received within the tubular casing **10**, with the proximal end **50a** thereof connected to the filter body **30** and the distal end **50b** thereof configured with the disc **70**. More specifically, the proximal end **50a** of the tubular element **50** engages with the filter body **30** and the distal end **50b** of the tubular element **50** is configured with the disc **70** that is either integrally formed on the distal end **50b** or securely mounted on the distal end **50b**. Generally, the engagement between the proximal end **50a** of the tubular element **50** and the filter body **30** is a snap fit engagement configured by complementary engagement elements or is threaded engagement. **FIG. 7** illustrates an exploded view depicting complementary engagement elements **52a** and **32** such as for examples clips formed on the tubular element **50** and the filter body **30** respectively for forming connection there between. In case the engagement between the proximal end **50a** of the tubular element **50** and the filter body **30** is snap fit engagement, there are complimentary engagement elements configured on the proximal end **50a** of the tubular element **50** and the filter body **30** respectively for configuring the connection. However, the present invention is not limited to any particular configuration of connection between the proximal end **50a** of the tubular element **50** and the filter body **30** or connection between the distal end **50b** of the tubular element **50** and the disc **70**. The tubular element **50** receives condensed filtered refrigerant from the filter body **30** and transfers the condensed filtered refrigerant to a first section **12**. The first section **12** is defined between the disc **70** and an end cap **60** closing a remaining open end that is opposite to either one of the first open end **10a** and the second open end **10b** closed by the plug body **20**. The tubular element **50** is of plastic material. However, the present invention is not limited to any particular configuration of the tubular element **50**, material of the tubular element **50**, as long as the tubular element **50** is capable of receiving and transferring condensed refrigerant filtered by the filter body **30** to the first section **12** defined between the disc **70** and the end cap **60**. The tubular element **50** received inside the tubular casing **10** and the plug body **20** connected to the filter body **30** engaging with either one of the first open end **10a** and the second open end **10b** defines an assembled configuration of the tubular element **50** with respect to the tubular casing **10**.

[0040] The end cap **60** closes the remaining open end that is opposite to either of the first open end **10a** and the second open end **10b** closed by the plug body **20**. The end cap **60** is either integrally formed with the re-

maining open end of the tubular casing **10** or is removably engaging with the remaining open end.

[0041] The disc **70** is disposed at the distal end **50b** of the tubular element **50**. The disc **70** is at a pre-determined space away from the end cap **60** in the assembled configuration of the tubular element **50** inside the tubular casing **10**. The disc **70** is provided with the at least one first sealing element **40a** along a periphery thereof and defines the first section **12** that receives refrigerant through the tubular element **50** and a remaining section **14** of the tubular casing **10**. Specifically, the at least one first sealing element **40a** is at least one O-ring **42a** received in at least one groove **72** formed along periphery of the disc **70**. Alternatively, the at least one first sealing element **40a** includes a plurality of radially extending flexible wings **44a** as illustrated in **FIG. 9** that interact and form sealing with inside walls of a portion of the tubular casing **10**. The at least one first sealing element **40a** forms air tight sealing between the first section **12** and the remaining section **14**. More specifically, the at least one first sealing element **40a** is capable of being gripped by a portion **10e** of the tubular casing **10** having reduced internal dimension, particularly reduced internal diameter, and that is disposed upstream of the end cap **60** in the fluid flow direction "A" through the receiver drier **100** as depicted in **FIG. 2a**. The placement of the portion **10e** of the tubular casing **10** having reduced internal dimension defines the spacing between the disc **70** and the end cap **60** in the assembled configuration of the tubular element **50** with respect to the tubular casing **10**. The at least one first sealing element **40a** is an O-ring. However, the present invention is not limited to any particular configuration, number and placement of the at least one sealing element mounted over the disc **70**, as long as the at least one first sealing element **40a** is capable of configuring sealing between the first section **12** and the remaining section **14**. Although, the disc **70** with the at least one first sealing element **40a** disposed there over is gripped by the portion **10e** of the tubular casing **10** disposed upstream of the end cap **60** in the fluid flow direction "A" and having reduced internal dimension. However, the disc **70** and the tubular casing **10** may have any other configuration to enable gripping or engagement of the at least one first sealing element **40a** received over the disc **70** inside the tubular casing **10** at predetermined spacing with respect to the end cap **60**. In accordance with an embodiment of the present invention, the disc **70** at the distal end **50b** of the tubular element **50** is gripped by the portion **10e** of the tubular casing **10** disposed downstream of the end cap **60** closing the second open end **10b** at the operative top end of the tubular casing **10**. Accordingly, the condensed refrigerant is collected in the first section **12** disposed at the operative top of the receiver drier **100**, specifically above the disc **70**.

[0042] With such configuration, the plug body **20**, the filter body **30**, tubular element **50**, the desiccant material **80** can all be connected to each other to form an assembly before being inserted inside the tubular casing **10**. Also,

with such configuration, only the disc **70** at the distal end **50b** of the tubular element **50** contacts inside walls of the tubular casing **10**, while the assembly is being inserted inside the tubular casing **10**. More specifically, with such configuration, the plug body **20**, the filter body **30**, the tubular element **50**, the desiccant material **80** can be connected or assembled outside the tubular casing **10** and the assembly can be freely inserted inside the tubular casing **10** with ease and without being subjected to any deforming forces, twisting and without being damaged. Particularly, with such configuration, the assembly of the components inside the tubular casing **10** is convenient.

[0043] In accordance with another embodiment of the present invention, the plug body **20** forms removable engagement with the second open end **10b** at the operative top of the tubular casing **10** to provide serviceability from operative top of the receiver drier **100**. Whereas, the disc **70** at the distal end **50b** of the tubular element **50** is gripped by the portion **10e** of the tubular casing **10** upstream from the end cap **60** in the fluid flow direction "A" and closing the first open end **10a**.

[0044] Again referring to the **FIG. 5** and **FIG. 6b**, the first aperture **10c** configures fluid communication between a condensing section **120** of the condenser **200** and the remaining section **14** of the tubular casing **10**. With such configuration of the first aperture **10c**, the refrigerant condensed in the condensing section **120** of the condenser **200** is received in the remaining section **14** of the tubular casing **10** and collected above the at least one, second sealing element **40b**. Similarly, the second aperture **10d** formed on the first section **12** configures fluid communication between the first section **12** and a sub-cooling section **110** of the condenser **200**. With such configuration of the second aperture **10d**, the filtered, condensed refrigerant received inside the first section **12**, through the tubular element **50** is transferred to the sub-cooling section **110** of the condenser **200**.

[0045] The desiccant material **80** is received within the tubular casing **10** in an annular space between the tubular casing **10** and the tubular element **50**. The desiccant material **80** absorbs moisture from any uncondensed and filtered refrigerant that had passed through the filter body **30** of the receiver drier **100**. Generally, the desiccant material **80** is silica gel. However, the present invention is not limited to any particular desiccant material **80** as long as the desiccant material exhibits **80** hygroscopic properties.

[0046] At least one of the filter body **30** and the plug body **20** is provided with at least one second sealing element **40b**. Specifically, the at least one second sealing element **40b** is either one of at least one O-ring **42b** received in at least one groove **22** formed by at least a portion of the filter body **30** in conjunction with the plug body **20** as illustrated in **FIG. 3** and **FIG.4**. Alternatively, the at least one second sealing element **40b** includes a plurality of radially extending wings **44b** as illustrated in **FIG. 8** that interact with and form sealing with inside walls of the tubular casing **10**. However, the present invention

is not limited to any particular configuration, number and placement of the at least one second sealing element **40b**, as long as the at least one second sealing element **40b** prevent incompressible fluid such as moisture/water from escaping from the receiver drier **100** and reaching and harming the critical elements of the air conditioning system such as for example compressor. More specifically, the the at least one second sealing element **40b** is capable of configuring sealing between the tubular casing **10** and the filter-plug assembly formed by assembly between the filter body **30** and the plug body **20**.

[0047] Several modifications and improvement might be applied by the person skilled in the art to the receiver drier as defined above and such modifications and improvements will still be considered within the scope and ambit of the present invention, as long the receiver drier includes

[0048] In any case, the invention cannot and should not be limited to the embodiments specifically described in this document, as other embodiments might exist. The invention shall spread to any equivalent means and any technically operating combination of means.

Claims

1. A receiver drier (100) for a condenser (200), said receiver drier (100) comprising:

- a tubular casing (10) comprising a first open end (10a), a second open end (10b), a first aperture (10c) and a second aperture (10d);
- a plug body (20) adapted to be at least partially received in said tubular casing (10) and form removable engagement with either one of said first open end (10a) and said second open end (10b);
- a filter body (30) connected to said plug body (20);
- a tubular element (50) connected to said filter body (30) at a proximal end (50a) thereof and eccentrically received within said tubular casing (10);
- an end cap (60) adapted to close an open end opposite to either of said first open end (10a) and said second open end (10b) that is closed by said plug body (20),
- a disc (70) disposed at a distal end (50b) of said tubular element (50) and spaced away from said end cap (60) is provided with at least one first sealing element (40a) along periphery thereof and is adapted to define a first section (12) and a remaining section (14) of said tubular casing (10), said first section (12) is adapted to receive refrigerant through said tubular element (50);

characterized in that a portion (10e) of said tubular

- casing (10) upstream of said end cap (60) in fluid flow direction "A" is adapted to grip said at least one first sealing element (40a) received over said disc (70).
2. The receiver drier (100) as claimed in the previous claim, wherein said plug body (20) is adapted to form threaded engagement with either one of said first open end (10a) and said second open end (10b), said plug body (20) and said filter body (30) in spite of being connected are adapted to independently move angularly relative to each other.
 3. The receiver drier (100) as claimed in any of the preceding claims, wherein said the at least one first sealing element (40a) is at least one O-ring (42a) adapted to be received in at least one first groove (72) formed along periphery of said disc (70).
 4. The receiver drier (100) as claimed in any of the preceding claims, wherein said at least one first sealing element (40a) comprises a plurality of radially extending flexible wings adapted to interact and form sealing with inside walls of a portion (10e) of the tubular casing (10).
 5. The receiver drier (100) as claimed in any of the preceding claims, wherein at least one of said filter body (30) and said plug body (20) is provided with at least one second sealing element (40b).
 6. The receiver drier (100) as claimed in the previous claim, wherein the at least one second sealing element (40b) is at least one O-ring (42b) adapted to be received in at least one groove (22) formed by at least a portion of said filter body (30) in conjunction with said plug body (20).
 7. The receiver drier (100) as claimed in the claim 5, wherein the at least one second sealing element (40b) comprises a plurality of radially extending flexible wings (44b) adapted to interact and form sealing with inside walls of the tubular casing (10).
 8. The receiver drier (100) as claimed in any of the preceding claims, wherein said proximal end (50a) of said tubular element (50) is adapted to engage with said filter body (30).
 9. The receiver drier (100) as claimed in any of the preceding claims, wherein said disc (70) is integrally formed at said distal end (50b) of said tubular element (50).
 10. The receiver drier (100) as claimed in any of the preceding claims, wherein said receiver drier (100) further comprising a desiccant material (80) received in an annular space between said tubular element (50) and said tubular casing (10).
 11. The receiver drier (100) as claimed in any of the preceding claims, wherein said first aperture (10c) is adapted to configure fluid communication between a condensing section (120) of said core of said condenser (200) and said remaining section (14) of said tubular casing (10).
 12. The receiver drier (100) as claimed in any of the preceding claims, wherein said first section (12) comprises said second aperture (10d) adapted to configure fluid communication between said first section (12) and a sub-cooling section (110) of said core of said condenser (200).
 13. The receiver drier (100) as claimed in any of the preceding claims, wherein said portion (10e) of said tubular casing (10) upstream of said end cap (60) in fluid flow direction "A" is of reduced internal dimension to grip said at least one first sealing element (40a) received over said disc (70).
 14. The receiver drier (100) as claimed in any of the preceding claims, wherein said plug body (20) is adapted to form removable engagement with said first open end (10a) at an operative bottom of said tubular casing (10) and said disc (70) at said distal end (50b) of said tubular element (50) is adapted to be gripped by said portion (10e) of said tubular casing (10) to provide serviceability from operative bottom of said receiver drier (100) and enables collection of refrigerant in said first section (12) disposed at said operative top of said receiver drier (100).
 15. The receiver drier (100) as claimed in any of the preceding claims, wherein said plug body (20) is adapted to form removable engagement with said second open end (10b) at said operative top of said tubular casing (10) and said disc (70) at said distal end (50b) of said tubular element (50) is adapted to be gripped by said portion of said tubular casing (10) to provide serviceability from operative top of said receiver drier (100).

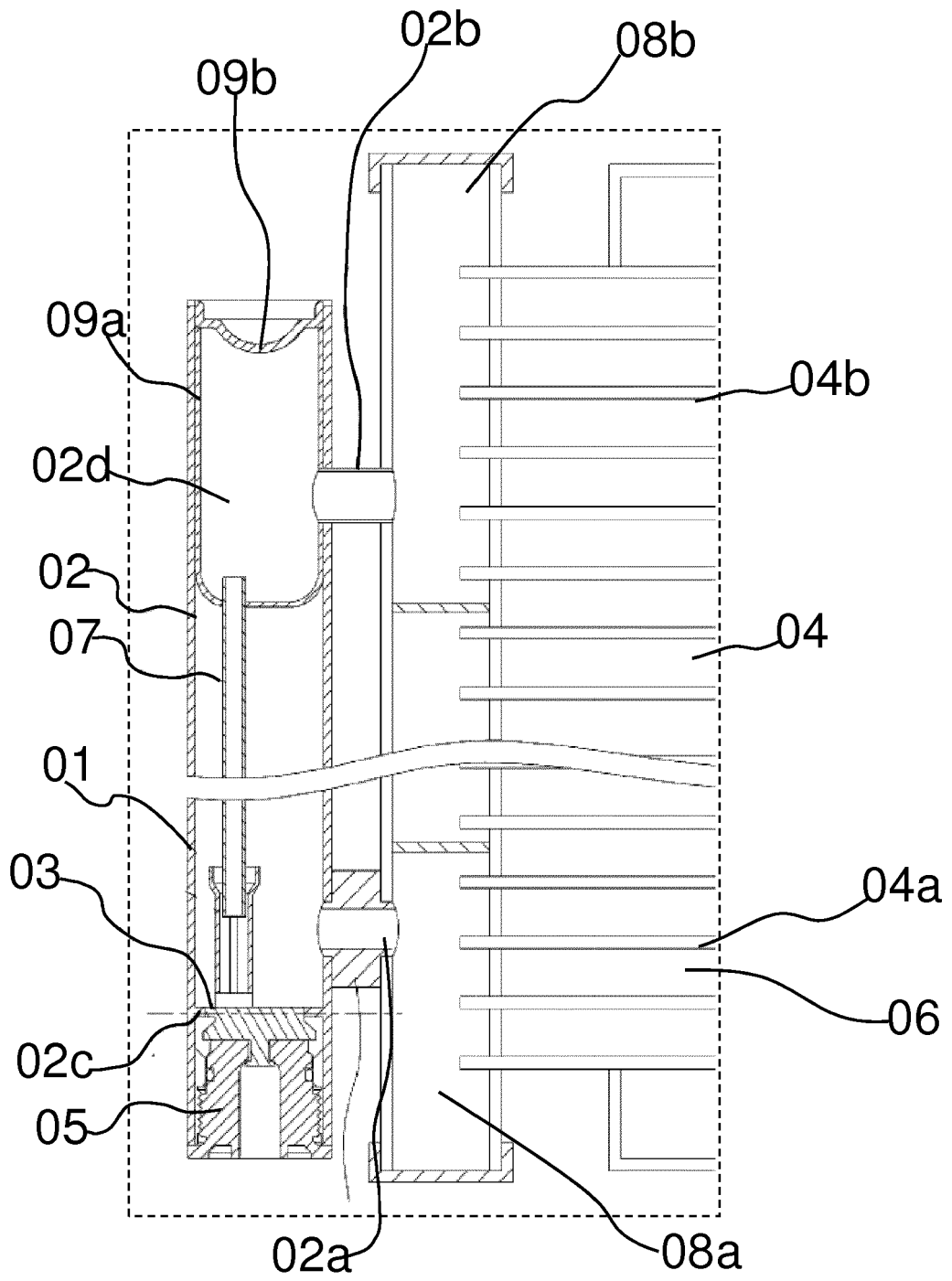


FIG. 1
(PRIOR ART)

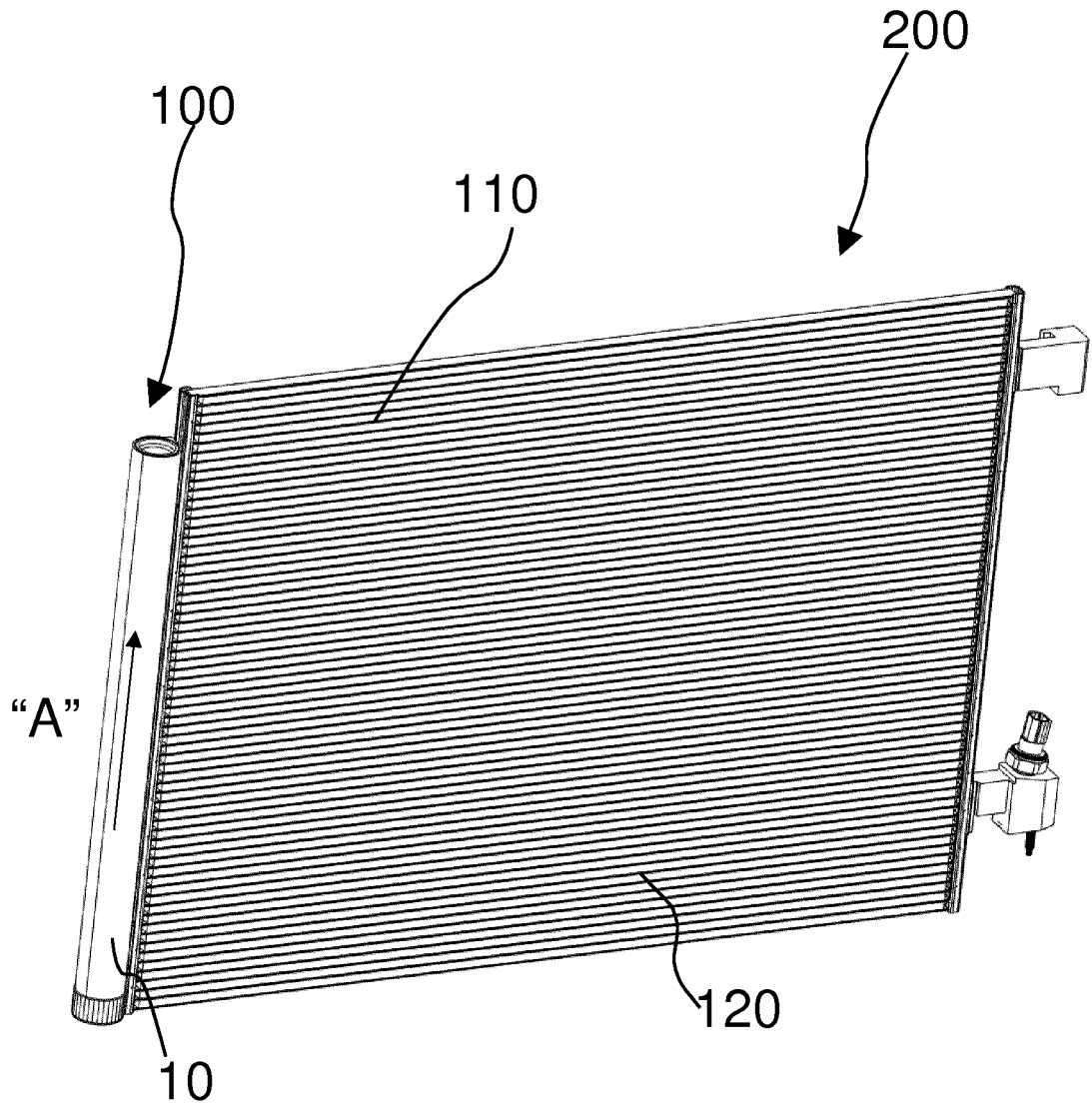


FIG. 2a

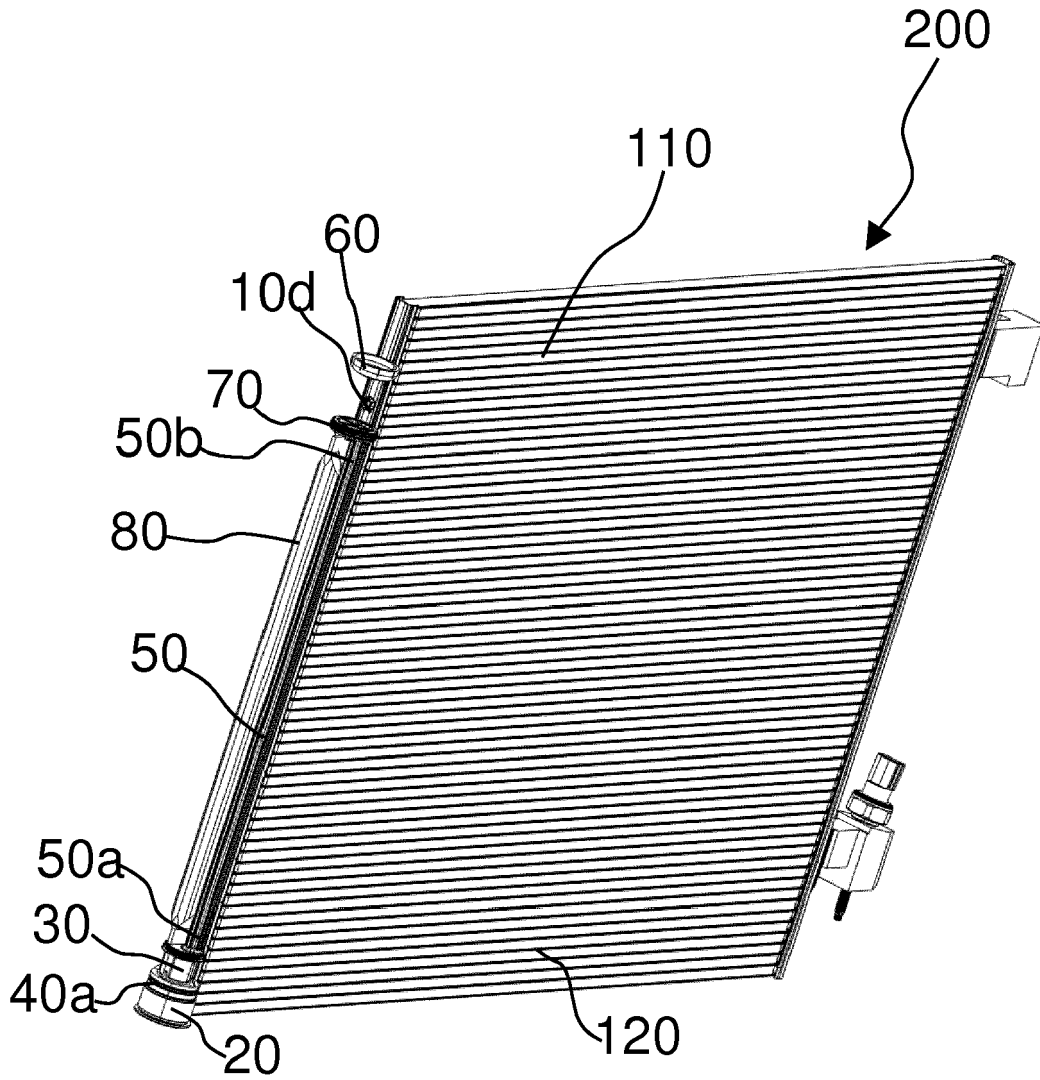


FIG. 2b

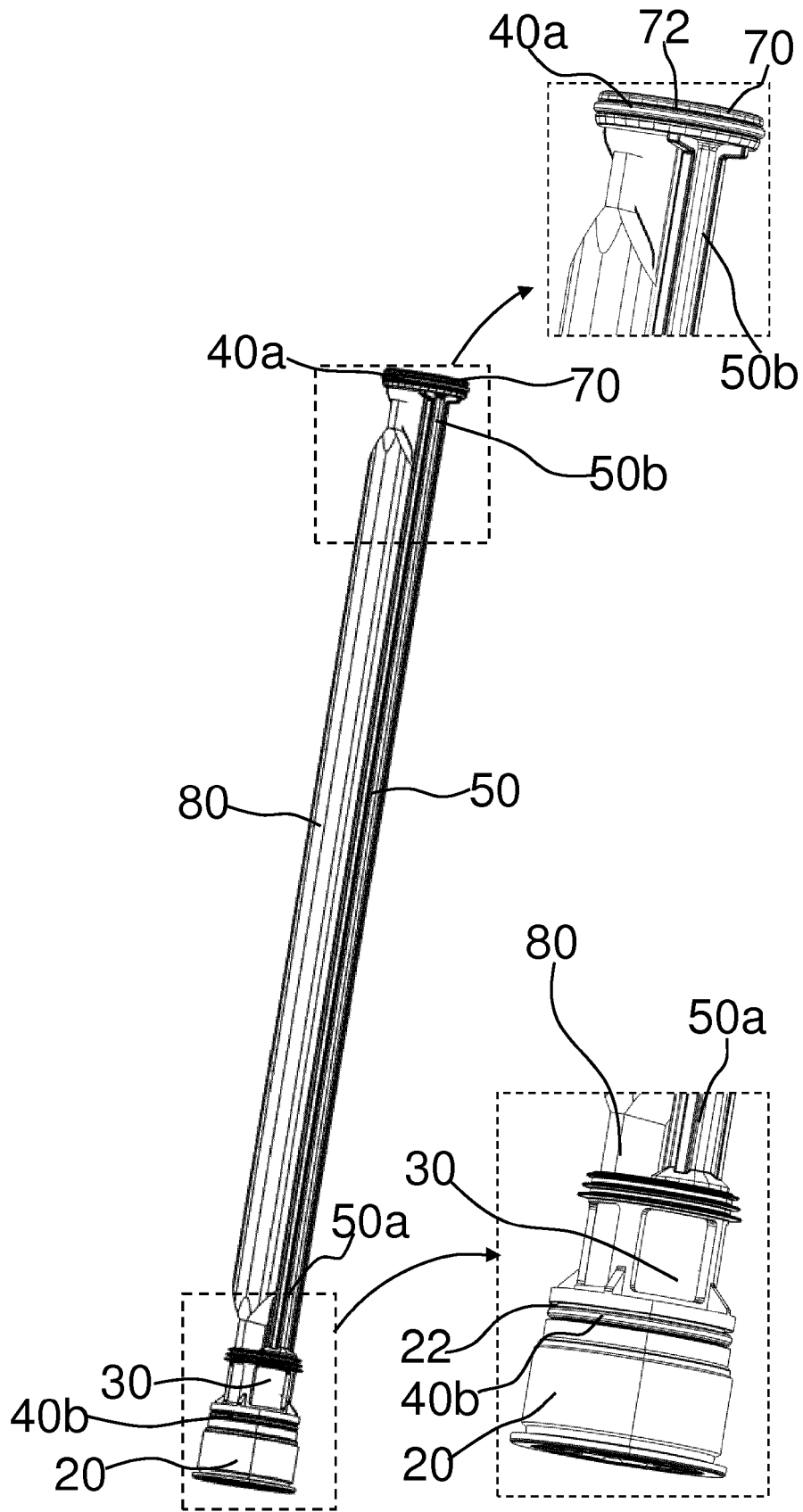


FIG. 3

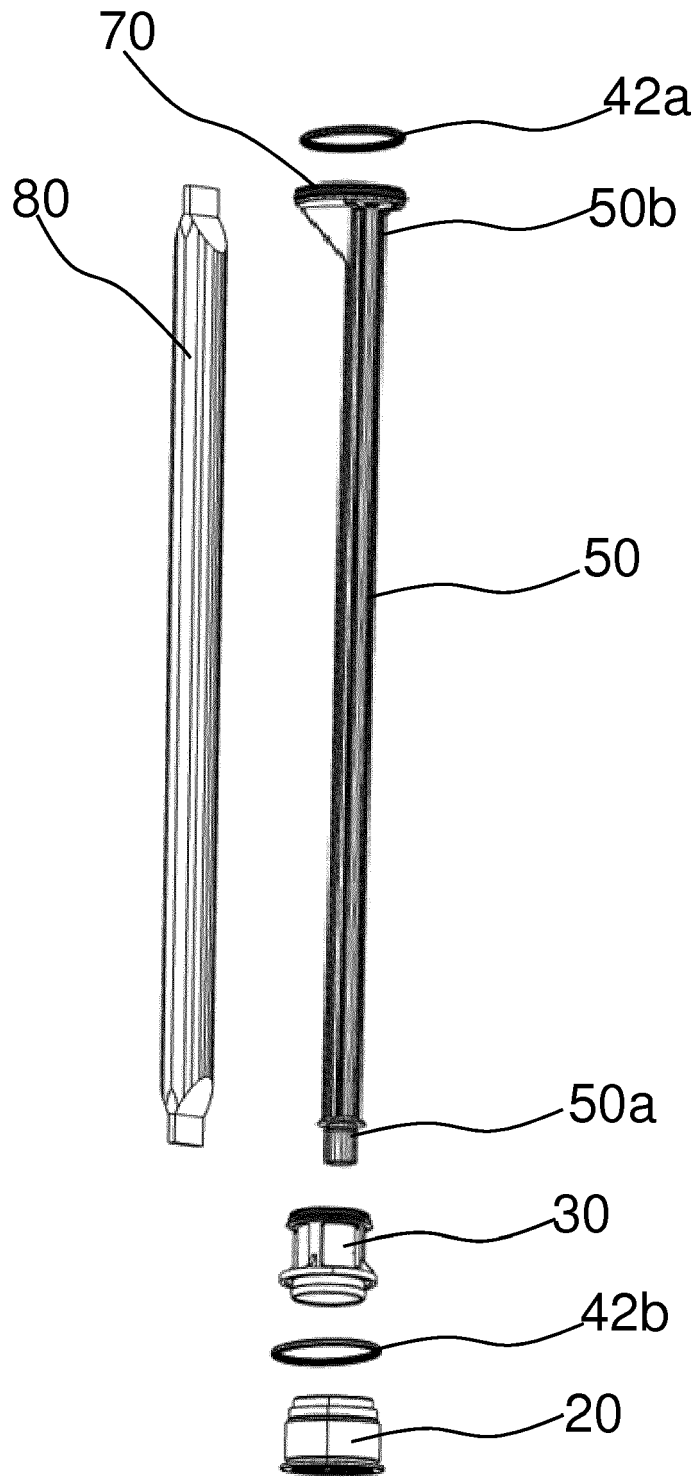


FIG. 4

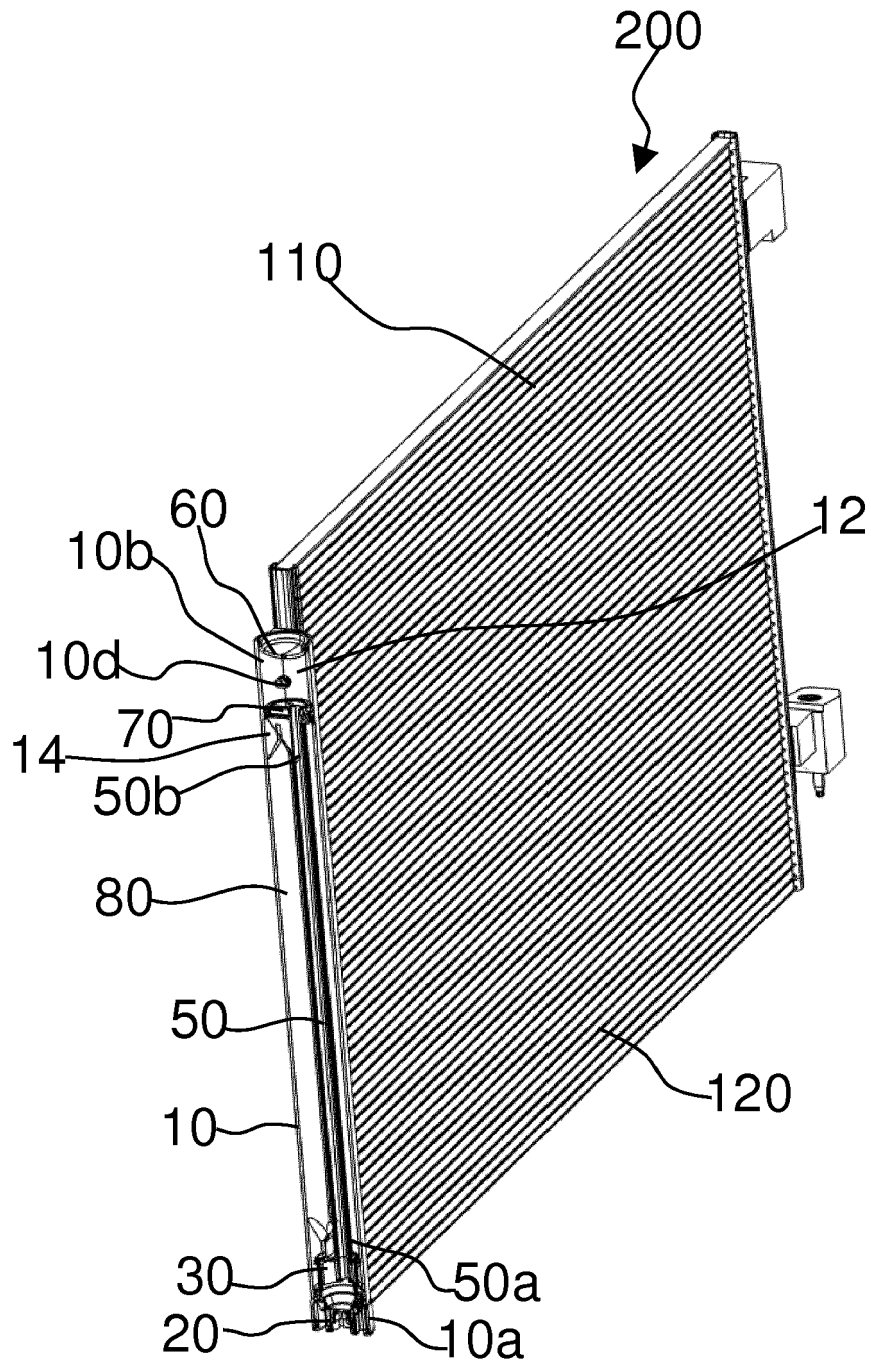


FIG. 5

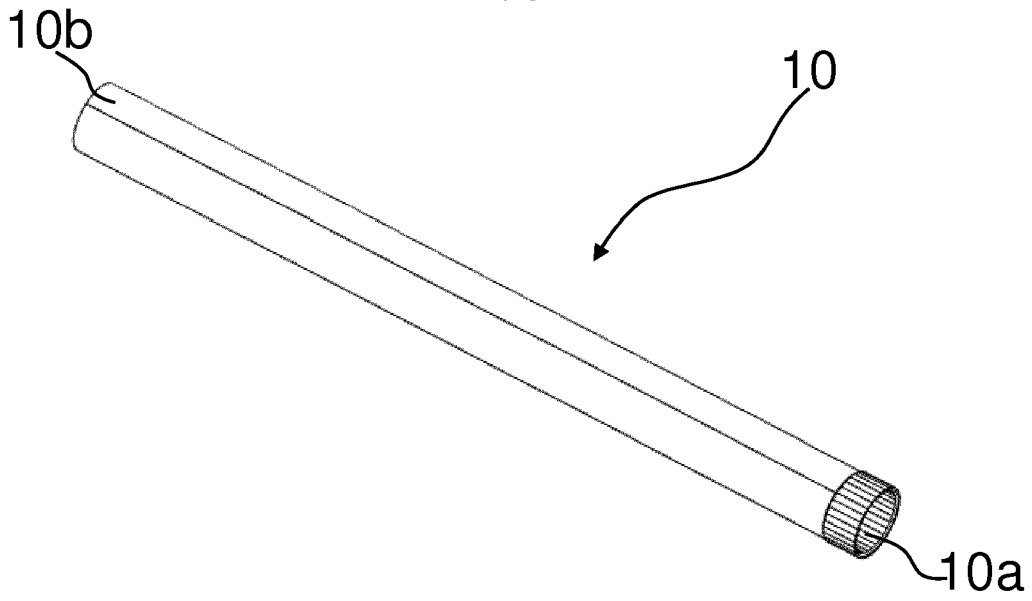


FIG. 6a

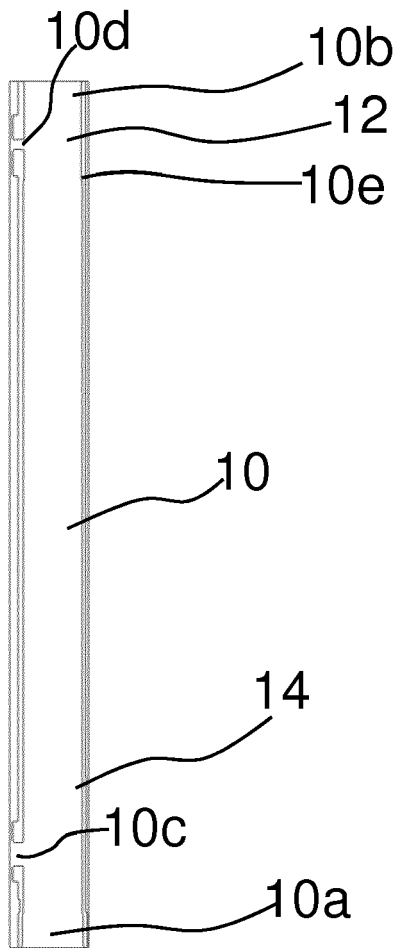


FIG. 6b

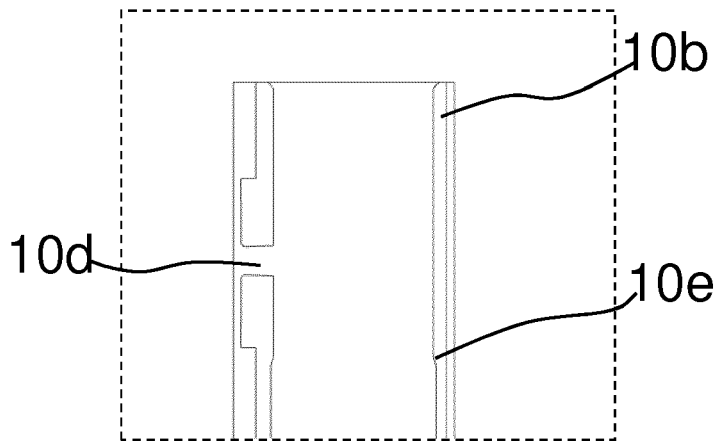


FIG. 6c

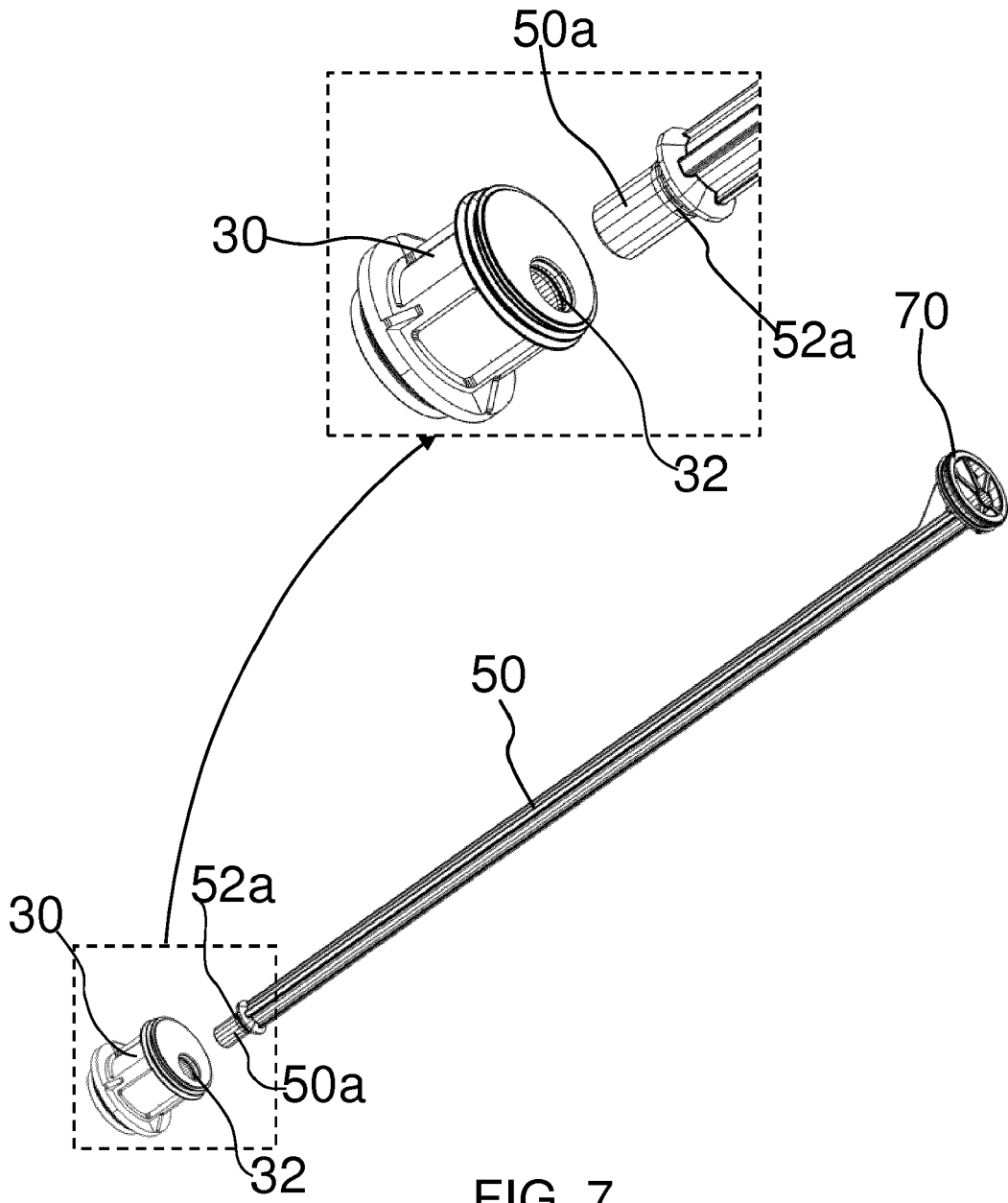


FIG. 7

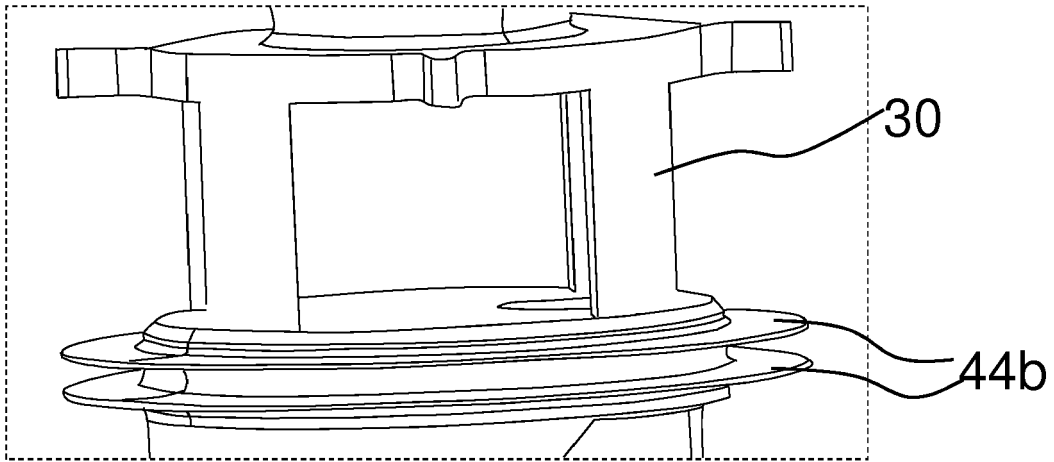


FIG. 8

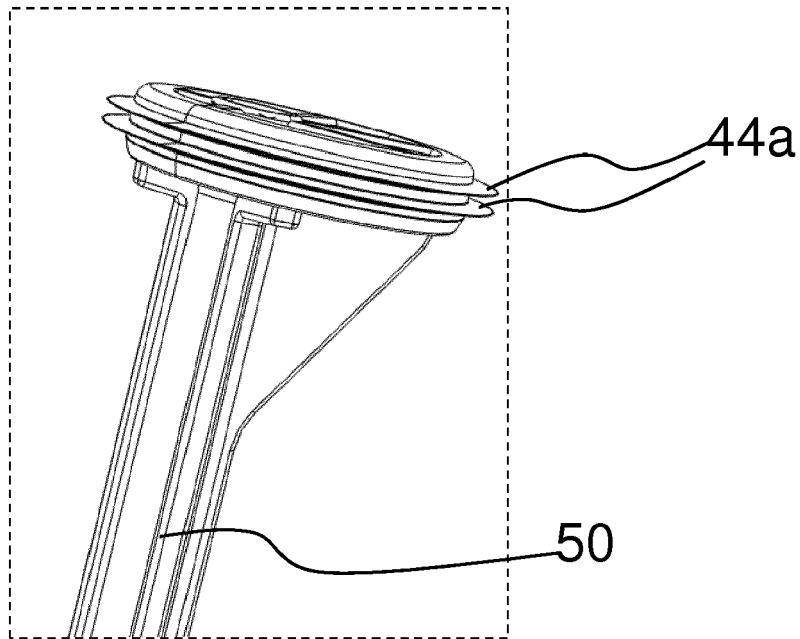


FIG. 9



EUROPEAN SEARCH REPORT

Application Number
EP 19 46 1598

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Place of search Munich		Date of completion of the search 14 April 2020	Examiner Lucic, Anita
<p>CATEGORY OF CITED DOCUMENTS</p> <p>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</p> <p>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</p>			

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