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(54) HEAT EXCHANGER WITH FILTER, FOR REFRRIGERANT FLUID LOOP

(57) The Invention relates to a heat exchanger for a refrigerant fluid loop, the heat exchanger comprising at least one inlet configured to allow a refrigerant fluid to enter in the heat exchanger, and at least one outlet configured to allow the refrigerant fluid to exit the heat exchanger, the heat exchanger comprising at least one block (200) in which a filter (300) is arranged, characterized in that the at least one block (200) is arranged downstream the at least one outlet of the heat exchanger, in that the block (200) comprises at least one first part (201) and at least one second part (202) secured to the first part (201), and in that the filter (300) is arranged between said first part (201) and said second part (202).

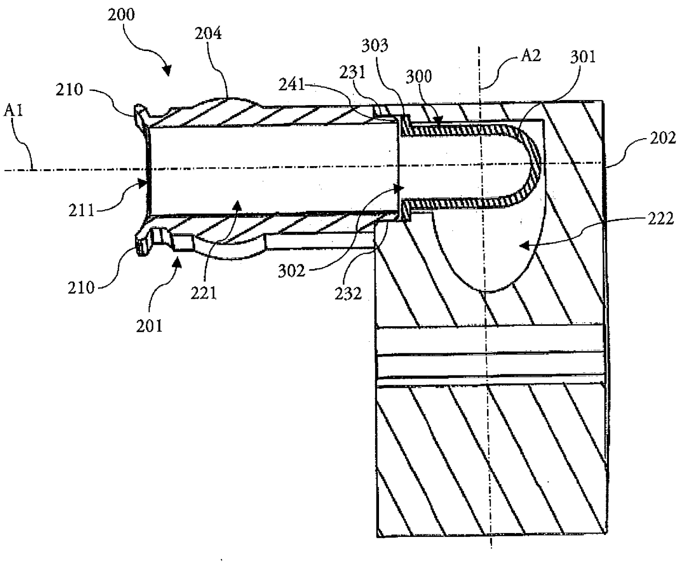

Fig. 5

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Description

[0001] The present invention relates to the domain of heat exchangers designed for refrigerant fluid loops. More specifically, the present invention concerns devices for filtering the refrigerant fluid that flows through such heat exchangers.

[0002] A refrigerant fluid loop generally comprises at least two heat exchangers, at least one compressor and at least one expansion device. The compressor and the expansion device are both fragile and comprise movable elements that can easily break. It is therefore important that only the refrigerant fluid enters this compressor or the expansion device. In order to achieve that goal, it is already known to filter the refrigerant fluid before it reaches one of these components.

[0003] However, some particles may be inside heat exchangers, for instance due to manufacturing processes or default in the cleaning system of such heat exchanger. The cleaning of such particles appears to be really expensive and complex. And even with all the care that can be given to this cleaning, some of those particles, especially particles that have a diameter smaller than 60μm can remain in those heat exchangers and can then be dragged by the refrigerant fluid to finally damage the compressor, the expansion device or any other element in which this refrigerant fluid could flow.

[0004] As a result, automotive suppliers are more and more concerned with this filtration, and they aim to filter even smaller particles than what is already filtered.

[0005] The present invention solves at least this issue, by providing a heat exchanger for a refrigerant fluid loop, the heat exchanger comprising at least one inlet configured to allow a refrigerant fluid to enter in the heat exchanger, and at least one outlet configured to allow the refrigerant fluid to exit the heat exchanger, the heat exchanger comprising at least one block in which a filter is arranged. According to the invention, the at least one block is arranged downstream the at least one outlet of the heat exchanger, the block comprises at least one first part and at least one second part secured to the first part, and the filter is arranged between said first part and said second part. According to the invention, the filter therefore comprises at least one portion which is in contact with both the first part and the second part of the block. The word "downstream" is to be understood with respect to a direction of the refrigerant fluid flow.

[0006] According to a first embodiment of the present invention, the block comprises at least one first orifice through which the refrigerant fluid enters the block and at least one second orifice through which the refrigerant fluid exits the block, the first orifice being arranged in the first part of the block and the second orifice being arranged in the second part of the block. According to a feature of this first embodiment, the first part comprises a first path through which the refrigerant fluid is able to flow, the second part comprises a second path through which the refrigerant fluid is able to flow, the first path being connected to the second path and the first path extending mainly along a first axis, this first axis intersecting a second axis along which the second path mainly extends. The word "connected" must, here, be understood as a fluidic connection, that is to say that the refrigerant fluid that flows through the first path reaches the second path as soon as it leaves the first path.

[0007] According to a second embodiment of the invention, the block comprises at least a third part secured, at least, to the second part of said block, the block comprising at least one first orifice through which the refrigerant fluid enters the block and at least one second orifice through which the refrigerant fluid exits the block, the first orifice being arranged in the first part of the block and the second orifice being arranged in the third part of the block. According to a feature of this second embodiment, the first part, the second part and the third part of the block comprise, respectively, a first path, a second path and a third path, the refrigerant fluid being able to flow through each of these paths and at least the second path being connected to both the first path and the third path. According to this feature, the first path, the second path and the third path extend along a unique axis. In other words, the first path, the second path and the third path extend parallel to each other, and are arranged one after the other, therefore forming a unique path extending from the first orifice to the second orifice. Obviously other arrangements of said paths is conceivable within the scope of the invention.

[0008] According to an aspect of the invention, the refrigerant fluid enters the block along a first direction and exits the block along a second direction, the first direction and the second direction intersecting each other. In other words, the first orifice and the second orifice of the block, which respectively allow the entrance and the exit of the refrigerant fluid in the block, are non-linear, that is to say that the second orifice through which the refrigerant fluid exits the block is arranged obliquely with respect to the first orifice through which the refrigerant fluid enters the block.

[0009] According to the invention, the heat exchanger comprises at least one manifold in which the outlet is arranged. For instance, the first part of the block can be secured to the manifold of the heat exchanger in such a way that said outlet is directly continued by the first orifice of the block. It is understood that the first part of the block is, according to this example, directly secured to the manifold, in the vicinity of the outlet.

[0010] Alternately, a conduit can be interposed between the outlet of the heat exchanger and the first orifice of the block. In other words, according to this alternative, the block can be placed away from the heat exchanger. Obviously, said conduit is able to carry the refrigerant fluid, in order for this refrigerant fluid to reach the first orifice of the block once out of the heat exchanger.

[0011] According to a feature of the invention, the first path arranged in the first part of the block comprises a chamber which houses the filter, this chamber presenting a diameter bigger than a diameter of the rest of the first path. Advantageously, the diameter of the chamber which houses the filter is bigger than a diameter of the second path arranged in the second part of the block. Even more advantageously, a diameter of the third path arranged in the third part of the block is smaller than the diameter of the chamber which houses the filter. Optionally, the diameter of the second path arranged in the second part can be bigger than the diameter of the third path arranged in the third part of the block. Those diameters are all measured along a straight line extending perpendicularly to at least one face defining the concerned path, the diameter being the longest dimension of said path measurable along said straight line.

[0012] For example, the block can be made of a single piece. That is to say that, at least, the first part and the second part form, together, a single piece which cannot be separated without damaging at least the first part and/or the second part. According to the second embodiment of the invention, the first part, the second part and the third part can therefore form, together, a single piece which cannot be separated without damaging at least the first part and/or the second part and/or the third part.

[0013] Alternately, the first part and the second part of the block are two distinct parts. For instance, the first part can be screwed to the second part. Alternately, the first part and the second part of the block can be brazed together. It is understood that, according to this alternative, the filter is made of a material that resists high temperatures, and in particular, that resists at least the temperature at which the brazing is operated, that is to say for example up to 660°C, depending on the material used for the brazing operation.

[0014] According to one example of application of the present invention, the heat exchanger is used as condenser. In other words, the heat exchanger according to this example of application is configured to liquefy the refrigerant fluid that flows through it, that is to say that the refrigerant fluid enters the heat exchanger in a gaseous state and exits it in a liquid state.

[0015] Other features, details and advantages of the invention can be inferred from the specification of the invention given hereunder. Various embodiments are represented in the figures, wherein:

- figure 1 is a schematic representation of a refrigerant fluid loop comprising at least one heat exchanger according to the invention, this heat exchanger comprising at least one block in which a filter is arranged;

- figures 2 and 3 are two different perspective views of the block schematically illustrated on figure 1 according to a first embodiment of the invention;

- figure 4 is a perspective view of the block schematically illustrated on figure 1 according to a second embodiment of the invention;

- figures 5 and 6 are, respectively, cross-section views of the block according to the first embodiment and of the block according to the second embodiment.

[0016] In the following specification, the words "upstream" and "downstream" both refer to a direction of circulation of a refrigerant fluid in the concerned object.

[0017] Figure 1 is a schematic view of a refrigerant fluid loop 100 intended to be accommodated in a motor vehicle. This refrigerant fluid loop 100 comprises at least a compressor 110 configured to increase the pressure of a refrigerant fluid R circulating through the loop 100, a first heat exchanger 120 configured to undertake a heat exchange between the refrigerant fluid R and a first airflow AF1, an expansion device 130 configured to decrease the pressure of the refrigerant fluid R and a second heat exchanger 140 configured to undertake a heat exchange between the refrigerant fluid R and a second airflow AF2. For instance, the first airflow AF1 is taken outside the motor vehicle in which the refrigerant fluid loop 100 is accommodated, and the second airflow AF2 is reserved to be sent in a passenger compartment of said motor vehicle.

[0018] According to the illustrated embodiment, the first heat exchanger 120 is realized according to the invention and comprises a block 200 in which, as explained in more details below, a filter 300 is arranged. According to the invention, this filter 300 is located at an outlet 122 of the heat exchanger, that is to say that the block 200 which houses said filter 300 is arranged downstream the first heat exchanger 120 along a flowing direction of the refrigerant fluid R, this flowing direction being illustrated by the arrow R.

[0019] First, the refrigerant fluid R exits the compressor 110 in a gaseous state and reaches the first heat exchanger 120, and more precisely it reaches an inlet 121 of the first heat exchanger 120. Once the refrigerant fluid R has entered the first heat exchanger 120, a transfer of calories is undertaken between said refrigerant fluid R circulating in this first heat exchanger 120 and the first airflow AF1 that flows through it. More precisely, the refrigerant fluid R gives calories to the first airflow AF1 and liquefies. In other words, the first heat exchanger 120 acts, in this particular example, as a condenser. As a result, the refrigerant fluid R exits the first heat exchanger 120 in a liquefied state and reaches the block 200 wherein it is filtered by the filter 300. In other words, it is to be understood that the block 200 is connected on one hand to an outlet 122 of the first heat exchanger 120 configured to allow the refrigerant fluid R to exit said first heat exchanger 120 and on the other hand to a pipe 101 of the refrigerant fluid loop 100. Then the refrigerant fluid R goes through the expansion device 130 in which its pressure is reduced before it reaches the second heat exchanger 140. In this second heat exchanger 140, the refrigerant fluid R takes calories from the second airflow AF2 and evaporates. The second airflow AF2 can then be sent to the passenger compartment to drop the temperature of this compartment and the refrigerant fluid R, which is again in a gaseous state, can again reach the compressor 110 to start a new cycle.

[0020] Generally speaking, the first heat exchanger 120 and the second heat exchanger 140 are similar and both comprise at least two manifolds or header tanks arranged at an extremity of a heat exchange area wherein the heat exchange between the refrigerant fluid and the first or the second airflow AFi, AF2 takes place. According to the invention, the outlet 122 of the first heat exchanger 120 is arranged in one of its head tanks, and the inlet 121 of this first heat exchanger 120 is arranged in the other one.

[0021] We are now going to describe with more details the block 200 connected to the first heat exchanger 120. For the rest of the specification, the words "first heat exchanger" and "heat exchanger" will be used with no distinction. Anyway, it is understood that the block 200 arranged near the outlet 122 of the first heat exchanger 120 could be placed at an outlet of the second heat exchanger without departing from the scope of the invention.

[0022] Figures 2 and 4 illustrate, in perspective views, the block 200 according, respectively, to a first embodiment and to a second embodiment of the invention. Figure 3 illustrates another perspective view of the block 200 according to the first embodiment.

[0023] The block 200 according to the first embodiment of the invention comprises a first part 201 and a second part 202 secured to the first part 201. A first orifice 211 is arranged in the first part 201 of this block 200, such first orifice 211 being configured to allow the refrigerant fluid to enter the block 200. A second orifice 212 is arranged in the second part 202 of the block 200, such second orifice 212 being configured to allow the refrigerant fluid to exit the block 200. In other words, the first part 201, and more specifically the first orifice 211 arranged in this first part 201, is intended to be connected, directly or indirectly, to the outlet of the heat exchanger and the second part 202, and especially the second orifice 212 arranged in this second part 202, is intended to be connected to the pipe of the refrigerant fluid loop described above.

[0024] According to an example of the first embodiment shown on figure 2, the first part 201 and the second part 202 can, for instance, be brazed together. Obviously this feature does not restrict the invention and the first part 201 could be secured to the second part 202 thanks to any other existing means within the scope of the invention. Still according to this example of the first embodiment, the first part 201 of the block 200 comprises two ribs 210 configured to allow the crimping of said first part 201 to one of the head tanks of the heat exchanger the block 200 is designed for. As illustrated on figure 2, such ribs 210 extend parallel to each other and are distributed on both sides of the first orifice 211. As mentioned above, the first orifice 211 arranged in the first part 201 of the block 200 is intended to be connected to the outlet of the heat exchanger. As a result, according to the example illustrated on figure 1, the ribs 210 of the first part 201 of the block 200 is configured to allow the crimping of said first part 201 to the header tank of the heat exchanger in which said outlet is arranged.

[0025] We also note that the first part 201 of the block 200 presents a bulge 204 created near the ribs 210, such bulge 204 resulting of the arrangement of a baffle near the first orifice 211 of the first part 201.

[0026] According to the first embodiment shown on figure 2, the first part 201 and the second part 202 of the block 200 present different shapes. More precisely, the second part 202 has the general shape of an L, therefore comprising at least two branches 205, 206 arranged perpendicularly to one another, a first branch 205 being longer than a second branch 206 of this general L-shape. According to the example illustrated on figure 2, the first part 201 extends mainly along a straight line that is perpendicular to a plane which comprises both the first branch 205 and the second branch 206. In other words, an angle of approximately 90° is formed between the first part 201 and the second part 202 of the block 200.

[0027] As detailed below, the first part 201 can take different position thanks to a cooperation between a finger 207 realized on the first part 201 of the block 200 and a groove 208 realized in the second part 202 of said block 200. This cooperation is for instance illustrated on figure 3 which displays a different perspective view of the block 200 according to the first embodiment of the invention.

[0028] As illustrated on this figure 3, the finger 207 presents a rounded end 217 and the groove 208 presents a complementary shape, that is to say that a bottom of this groove 208 is curved. As a result, the rounded end 217 of the finger 207 can be moved with respect to the groove 208, along the illustrated arrow A, thus modifying the position of the first part 201, and more precisely, modifying the orientation of the ribs 210 distributed on either side of the first orifice. Advantageously, this movement enables the block 200 of the invention to be attached to different heat exchangers, and more particularly to different head tanks of such heat exchangers. It is understood, that this position has to be chosen before the brazing operation. Indeed, once the two parts are brazed the first part 201 and the second part 202 cannot be moved anymore.

[0029] Obviously the shape and the orientation of the first part 201 and of the second part 202 of the block can be modified without departing from the scope of the invention.

[0030] The block 200 according to the second embodiment illustrated on figure 4, differs from the first embodiment in that the block 200 comprises a third part 203 and in that the second orifice 212 is arranged in this third part 203. As a result, according to such second embodiment of the invention, the first part 201, and more precisely the first orifice 211 arranged in this first part 201, is connected, directly or indirectly to the outlet of the heat exchanger, the third part 203, and more specifically the second orifice 212 arranged in such third part 203, is connected to the pipe of the refrigerant loop and the second part 202 is interposed between the first part 201 and the third part 203. According to the second embodiment illustrated on figure 4, the first part 201, the second part 202 and the third part 203 are screwed together. Again, it is understood that this is only an example and that any other means for fixing pieces together can be used within the scope of the invention. Another difference between the example of the first embodiment illustrated on figure 2 and the example of the second embodiment represented on figure 4 stands in that the block 200 according to the second embodiment lacks the ribs 210. In other words, said block 200 cannot be crimped to the head tank of the heat exchanger. Instead, the first orifice 211 is connected to the outlet of the heat exchanger thanks to a conduit - not shown on the figures. Advantageously, using this conduit allows to place the block away from the heat exchanger, reducing the bulk of such heat exchanger.

[0031] As illustrated on both figures 2 and 4, the first orifice 211 and the second orifice 212 of the block 200 are not linear. To put it another way, the refrigerant fluid enters the block 200, via the first orifice 211 along a first direction R1 and the refrigerant fluid exits said block 200, via the second orifice 212 along a second direction R2, the second direction R2 intersecting the first direction R1.

[0032] As mentioned above, a filter 300 is disposed in the block 200, and especially, said filter 300 is interposed between the first part 201 and the second part 202 of the block 200. We are now going to describe this filter and its function referring to figures 5 and 6. Figure 5 represents a cross-section view of the block 200 according to the first embodiment and figure 6 illustrates a cross-section view of the block 200 according to the second embodiment.

[0033] In the illustrated embodiments, a first path 221 is arranged in the first part 201 and a second path 222 is arranged in the second part 202, both this paths 221, 222 being adapted to the circulation of the refrigerant fluid. It is understood that the first path 221 is connected, directly or indirectly, to the first orifice 211 through which the refrigerant fluid enters the block 200 on one end and to the second path 222 on another end. The word "connected" must, here, be understood as a "fluidic connection", that is to say a connection that allows the circulation of the refrigerant fluid.

[0034] According to the first embodiment illustrated on figure 5, the first path 221 extends mainly along a first axis A1 and the second path 222 - which is only partially represented on figure 5 - extends along a second axis A2, the first axis A1 intersecting the second axis A2. According to one example of the invention, the second axis A2 can extend perpendicular to the first axis A1. As shown on figure 5, the filter 300 extends mainly along a direction parallel to the first axis A1. The filter 300 according to the invention has a cylindrical shape adapted to fit at least in the first path 221 and/or in the second path 222 arranged in the first part 201 and/or in the second part 202 of the block 200. More precisely, a wall 301 defining the filter 300 has a cylindrical shape that fits an internal shape of said paths 221, 222. In other words, the first path 221 and the second path 222 are both formed as rounded tubes. As a result, the filter 300, viewed in the cross-sections illustrated on figures 5 and 6, has a U-shaped profile, an opening 302 of the U-shape facing the first orifice 211 through which the refrigerant fluid enters the block 200. In other words, the refrigerant fluid enters the filter 300 along the first axis A1 and exits this filter 300 along the second axis A2. We also note that an edge 303 defining the opening 302 of the U-shape extends perpendicular to the first axis A1, beyond the wall 301 defining the filter 300.

[0035] As previously mentioned, the filter 300 is interposed between the first part 201 and the second part 202 of the block 200. For this purpose, a first groove 232 is arranged in the second part 202, such groove 232 being configured to receive, at least, the edge 303 defining the opening 302 of the filter 300. Additionally, the first part 201 comprises a second groove 231 which presents a shape which complement the shape of the first groove 232 arranged in the second part 202. As illustrated, the first groove 232 arranged in the second part 202 extends from an internal face if the second part 202, that is to say a face of this second part 202 that defines the second path 222 and the second groove 231 arranged in the first part 201 extends from an external face of the first part 201, that is to says a face of this first part 201 that faces an external environment of the block 200. As shown on figure 5, the first groove 232 arranged in the second part 202 receives the edge 303 of the filter 300 as described above and a rim 241 defining the second groove 231 is also received in said first groove 232, this rim 241 forming an abutment to the edge 303 of the filter 300. As mentioned earlier, the first part 201 and the second part 202 of the block 200 are, according to the first embodiment described in this document, brazed together. It is understood that the filter 300 is, according to said first embodiment, disposed between the first part 201 and the second part 202 before the brazing of those pieces. As a consequence, once the first part 201 and the second part 202 of the block 200 are brazed together, the filter 300 is firmly maintained between them. According to the example of the first embodiment given here, the filter 300 is therefore made of a material that resists high temperatures, and especially a material that resists temperatures at which the brazing operation is realized.

[0036] Referring now to figure 6, we are going to describe the block 200 according to the second embodiment of the invention. According to this second embodiment, the block 200 comprises three parts 201, 202, 203 in which are realized, respectively, the first path 221, the second path 222 and a third path 223. In a similar manner to what have been described referring to the first embodiment, the first path 221 is connected to the first orifice 211 on one end and to the second path 222 on another end. The second path 222 is therefore connected to the first path 221 on one side and to the third path 223 on another side and this third path 223 is connected both to the second path 222 and to the second orifice 212 through which the refrigerant fluid exits the block 200. According to the illustrated example of the second embodiment, the third path 223 partially extends in the second path 222.

[0037] As illustrated, the second embodiment of the present invention differs from the first embodiment in that it comprises three parts 201, 202, 203 instead of two and in that the first path 221, the second path 222 and the third path 223 extend mainly along a unique axis A3. In other words, the first path 221, the second path 222 and the third path 223 extend parallel to one another, thus forming a unique path starting from the first orifice 211 and ending at the second orifice 212. As described above, the first part 201, the second part 202 and the third part 203 of the block 200 according to the second embodiment illustrated on figure 6 are screwed together. More precisely, the first part 201 is screwed to the second part 202 which is, in turn, screwed to the third part 203. For that purpose, at least two holes 242, 243 are pierced in the second part 202, a first hole 242 extending through the first part 201 and receiving a first screw 401 which fixes the first part 201 to the second part 202 and a second hole 243 extending through the third part 203 and receiving a second screw 402 for fixing the third part 203 to the second part 202. We also note that the third part 203 presents an L-shaped profile, viewed in the cross-section illustrated on figure 6. As illustrated, this specific profile is designed to allow the screwing of each part to one another. More precisely, the second hole 243 is arranged through one branch 213 of this L-shaped profile and the other branch 214 extends in a way that a free space is created, this free space being able to receive a head 411 of the first screw 401. According to the second embodiment illustrated on figure 6, the first part 201 and the second part 202 both presents rectangular cross-sections.

[0038] The block 200 according to the second embodiment illustrated here also comprises the filter 300, which is, as mentioned above, disposed between the first part 201 and the secondpart 202 of the block 200. The filter 300 presents, according to this second embodiment, a similar shape to the shape of the filter 300 according to the first embodiment, that is to say a U-shaped profile viewed in the cross-section illustrated here, this U-shaped profile comprising the opening 302 defined by the edge 303 that extends beyond the wall 301 defining the filter 300. Focusing on the differences between first and second embodiments, the opening 302 of the filter 300 faces away from the first orifice 211 through which the refrigerant fluid enters the block 200. In other word, a base of the U-shaped profile faces this first orifice 211. The filter 300 according to this example of the second embodiment of the invention, also comprises at least one aperture 304, advantageously several apertures 304, closed by a meshed element 305 configured to filter the refrigerant fluid. For instance, the meshed element 305 can be configured to retain particles presenting a diameter bigger than 50μm. In other configurations, the meshed element 305 can be configured to retain particles presenting a diameter bigger than 30μm.

[0039] As shown, the first path 221 comprises a chamber 251 in which the filter 300 is housed. This chamber 251 advantageously presents a diameter Dc bigger than a diameter D1 of the rest of the first path 201, bigger than a diameter D2 of the second path 222 and also bigger than a diameter D3 of the third path 223. We also note that the third path 223 partially protrudes in the second path 222, resulting in that the diameter D3 of this third path 223 is smaller than the diameter D2 of the second path 222.

[0040] The second part 202 also comprises at least a first annular cut 262 and a second annular cut 272, which respectively receive a first sealing device 261 and a second sealing device 263, the first sealing device 261 being adapted to seal a junction between the first part 201 and the second part 202 and the second sealing device 263 being designed to seal a junction between the second part 202 and the third part 203.

[0041] Obviously, the features that have just been described referring to one or the other embodiment illustrated in this document can be combined between them. For instance, the block according to the second embodiment of the invention can be provided with ribs allowing it to be crimped to the head tank of the heat exchanger within the scope of the invention. Any other combination of the features described above is also possible within the scope of the invention.

[0042] It will be understood from the foregoing that the present invention provides a simple, easily adaptable and easily replaceable means to filter the refrigerant fluid that exit a heat exchanger accommodated on a refrigerant fluid loop so as to prevent any damage on other components of such a refrigerant fluid loop. Advantageously, said means can be mounted directly or indirectly to the heat exchanger, allowing its use in a various number of refrigerant loops.

[0043] However, the invention cannot be limited to the means and configurations described and illustrated herein, and it also extends to any equivalent means or configurations and to any technically operative combination of such means. In particular, the shape and arrangement of the parts of the block and/or the filter can be modified insofar as they fulfil the functionalities described in the present document.

Claims

1. Heat exchanger (120) for a refrigerant fluid loop (100), the heat exchanger (120) comprising at least one inlet (121) configured to allow a refrigerant fluid (R) to enter in the heat exchanger (120) and at least

one outlet (122) configured to allow the refrigerant fluid (R) to exit the heat exchanger (120), the heat exchanger (120) comprising at least one block (200) in which a filter (300) is arranged, **characterized in that** the at least one block (200) is arranged downstream the at least one outlet (122) of the heat exchanger (120), **in that** the block (200) comprises at least one first part (201) and at least one second part (202) secured to the first part (201), and **in that** the filter (300) is arranged between said first part (201) and said second part (202).

2. Heat exchanger (120) according to the preceding claim, wherein the block (200) comprises at least one first orifice (211) through which the refrigerant fluid (R) enters the block (200) and at least one second orifice (212) through which the refrigerant fluid (R) exits the block (200), the first orifice (211) being arranged in the first part (201) of the block (200) and the second orifice (212) being arranged in the second part (202) of the block (200).

3. Heat exchanger (120) according to the any of the preceding claims, wherein the first part (201) comprises a first path (221) through which the refrigerant fluid (R) is able to flow, wherein the second part (202) comprises a second path (222) through which the refrigerant fluid (R) is able to flow, the first path (221) being connected to the second path (222), and wherein the first path (221) extends mainly along a first axis (A1), this first axis (A1) intersecting a second axis (A2) along which the second path (222) mainly extends.

4. Heat exchanger (120) according to claim 1, wherein the block (200) comprises at least a third part (203) secured, at least, to the second part (202) of said block (200), the block (200) comprising at least one first orifice (211) through which the refrigerant fluid (R) enters the block (200) and at least one second orifice (212) through which the refrigerant fluid (R) exits the block (200), the first orifice (211) being arranged in the first part (201) of the block (200) and the second orifice (212) being arranged in the third part (203) of the block (200).

5. Heat exchanger (120) according to the preceding claim, wherein the first part (201), the second part (202) and the third part (203) of the block (200) comprise, respectively, a first path (221), a second path (222) and a third path (223), the refrigerant fluid being able to flow through each of these paths (221, 222, 223), at least the second path (222) being connected to both the first path (221) and the third path (223), and wherein the first path (221), the second path (222) and the third path (223) extend along a unique axis (A3).

6. Heat exchanger (120) according to any of the preceding claims, wherein the refrigerant fluid (R) enters the block (200) along a first direction (R1) and exits the block (200) along a second direction (R2), the first direction (R1) and the second direction (R2) intersecting each other.

7. Heat exchanger (120) according to any of the preceding claims, comprising at least one manifold in which the outlet (122) is arranged, wherein the first part (201) of the block (200) is secured to the manifold of the heat exchanger (120), in such a way that said outlet (122) is directly continued by the first orifice (211) of the block (200).

8. Heat exchanger (120) according to any of claims 1 to 6, wherein a conduit is interposed between the outlet (122) of the heat exchanger (120) and the first orifice (211) of the block (200).

9. Heat exchanger (120) according to any of the preceding claims in combination with claim 3 or 5, wherein the first path (221) arranged in the first part (201) of the block (200) comprises a chamber (251) which houses the filter (300), this chamber (251) presenting a diameter (Dc) bigger than a diameter (D1) of the rest of the first path (201).

10. Heat exchanger (120) according to claim 9, wherein the diameter (Dc) of the chamber (251) which houses the filter (300) is bigger than a diameter (D2) of the second path (222) arranged in the second part (202) of the block (200).

11. Heat exchanger (120) according to claims 5 and 9, wherein a diameter (D3) of the third path (223) arranged in the third part (203) of the block (200) is smaller than the diameter (Dc) of the chamber (251) which houses the filter (300).

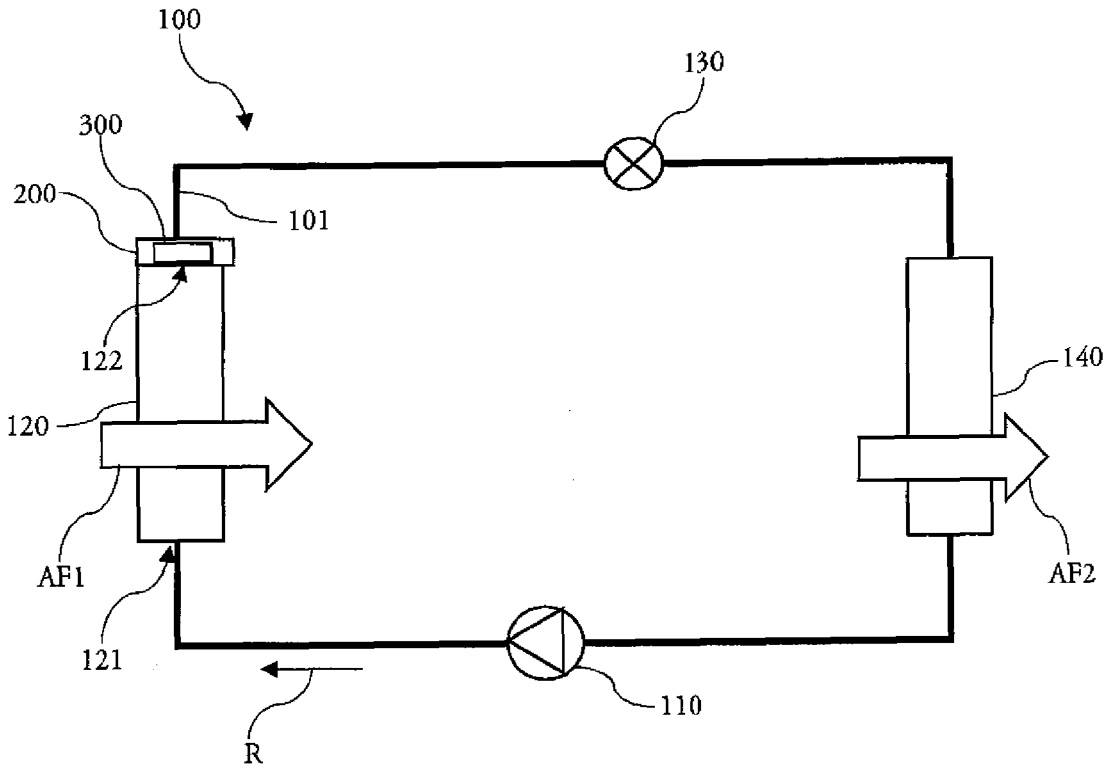
12. Heat exchanger (120) according to any of the preceding claims, wherein the block (200) is made of a single piece.

13. Heat exchanger (120) according to any of claims 1 to 11, wherein at least the first part (201) and the second part (202) of the block (200) are two distinct parts.

14. Heat exchanger (120) according to the preceding claim, wherein the first part (201) is screwed to the second part (202).

15. Heat exchanger (120) according to claim 13, wherein the first part (201) and the second part (202) of the block (200) are brazed together.

16. Heat exchanger (120) according to any of the preceding claims, wherein the heat exchanger (120) is used as condenser.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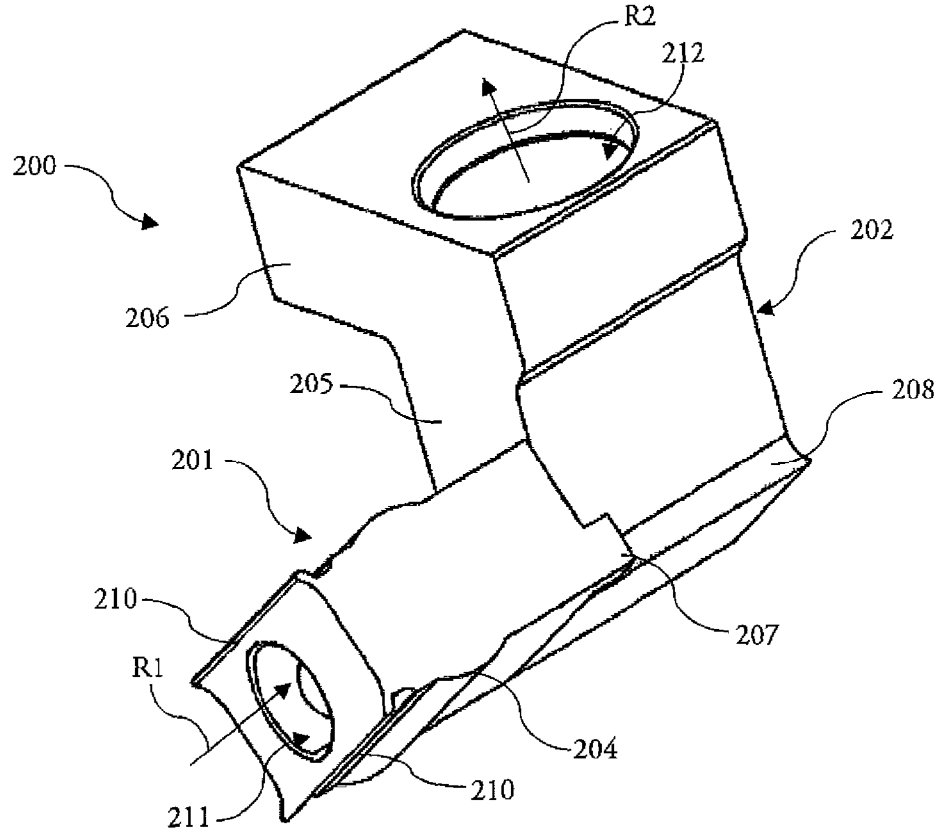
130
300
200
101
122
140
120
AF1
AF2
121
110
R

Fig. 1


R2
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R1
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211

Fig. 2

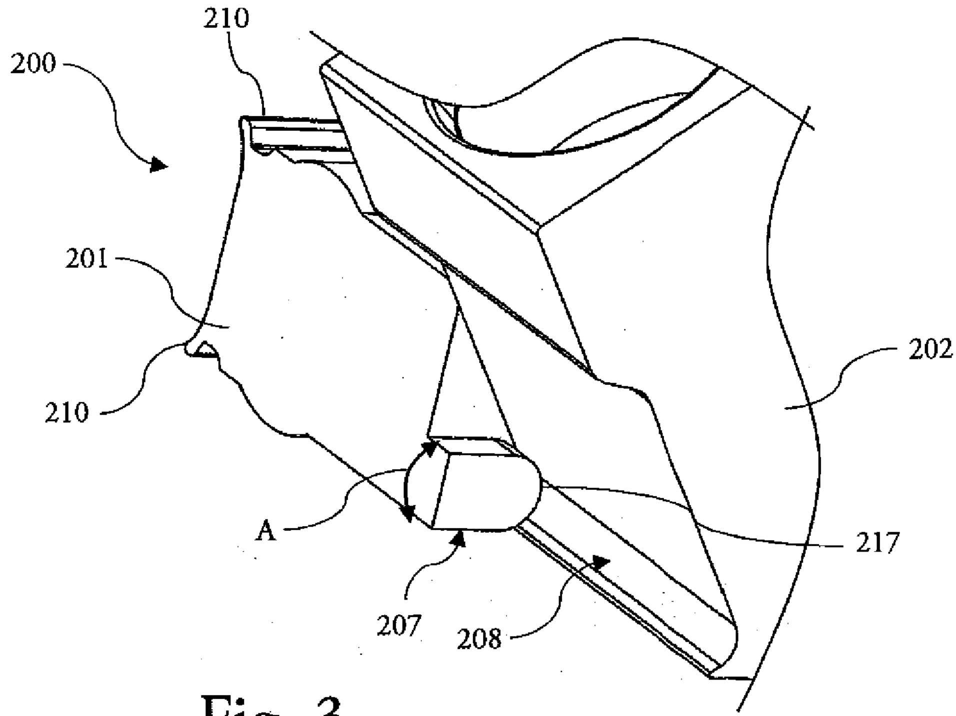


Fig. 3

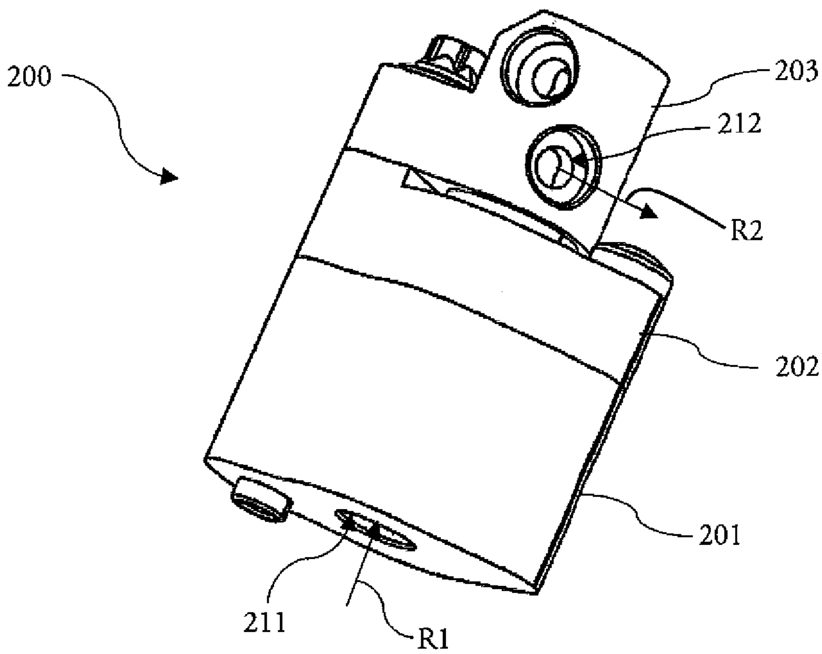
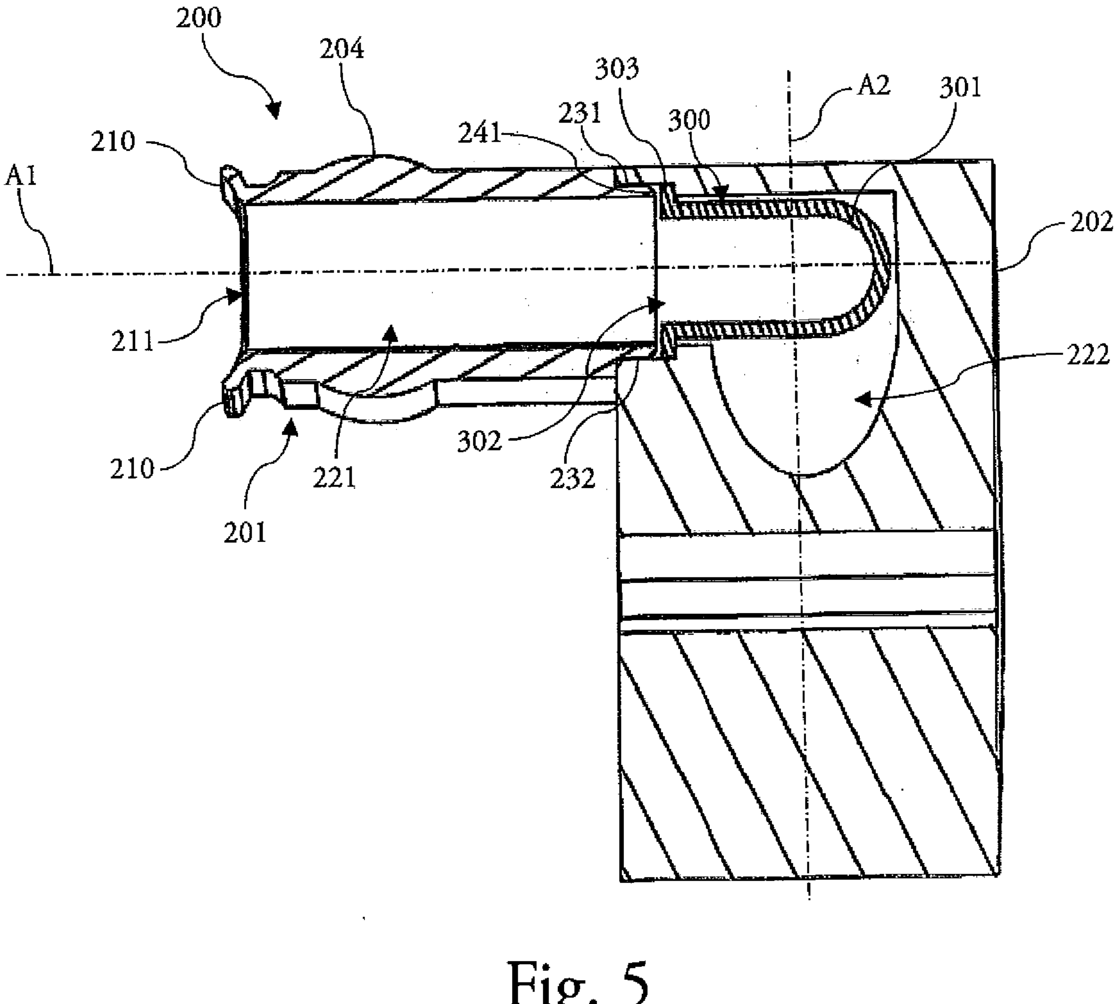


Fig. 4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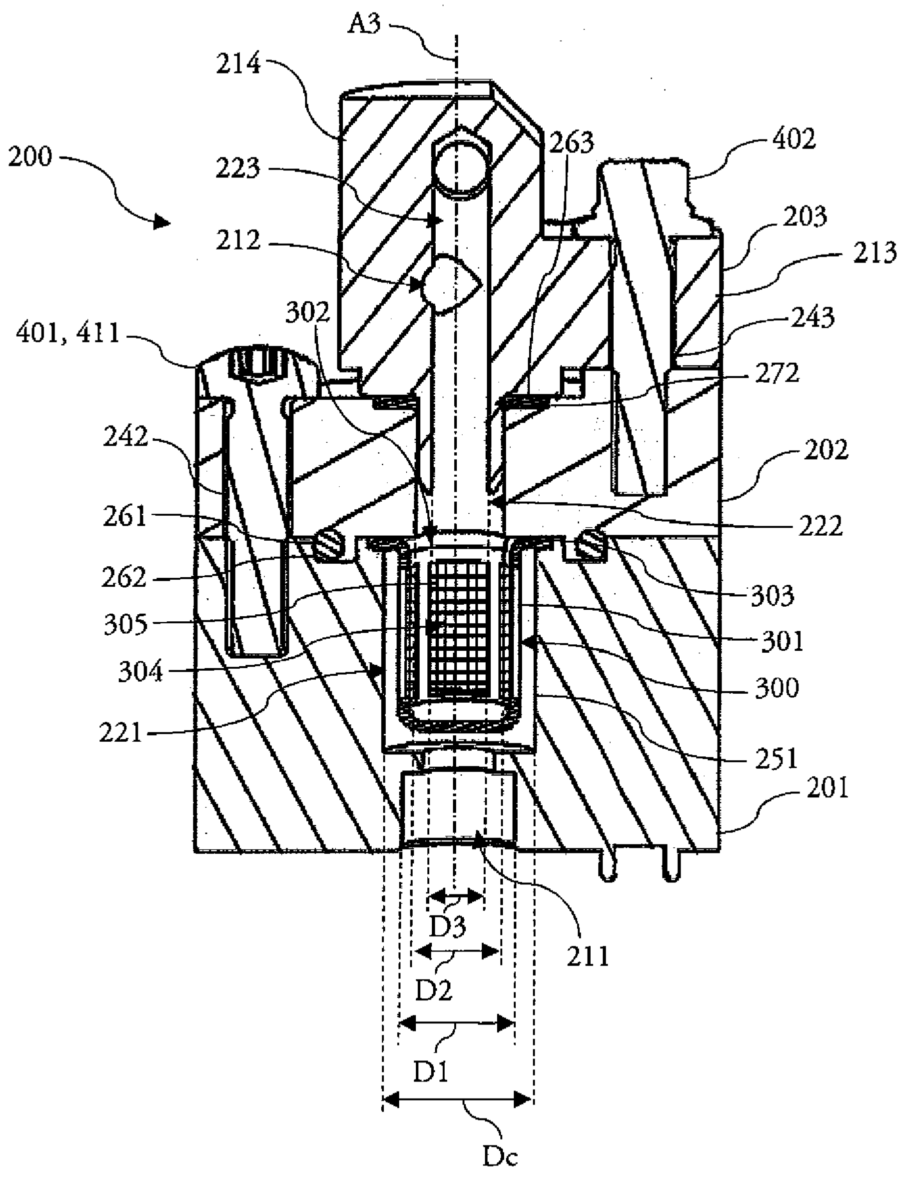
221
232
201

Fig. 5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401, 411
272
242
202
261
222
262
303
305
301
304
300
221
251
201
211
D3
D2
D1
Dc

Fig. 6

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EUROPEAN SEARCH REPORT

Application Number
EP 18 46 1649

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F25B
F28F
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	25 June 2019	Lepers, Joachim

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CATEGORY OF CITED DOCUMENTS

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