CONDENSER FOR VEHICLE

A condenser for a vehicle may include a main heat dissipating portion having a first passage and a second passage, a sub-heat-dissipating portion having a third passage and a fourth passage, a receiver drier unit that receives refrigerant from the main heat dissipating portion through the sub-heat-dissipating portion, separates gaseous refrigerant from the condensed refrigerant, and filters moisture and foreign materials, an upper cover in which a refrigerant inlet may be formed at one side of an opposite side of the receiver drier unit corresponding to the main heat dissipating portion and a coolant outlet may be formed at the other end portion thereof, and a lower cover in which a refrigerant outlet may be formed at one side corresponding to the refrigerant inlet to be connected to the sub-heat-dissipating portion.
CONDENSER FOR VEHICLE

CROSS-REFERENCE TO RELATED APPLICATION

[0001] The present application claims priority to Korean Patent Application No. 10-2012-0116818 filed on Oct. 19, 2012, the entire contents of which is incorporated herein for all purposes by this reference.

BACKGROUND OF THE INVENTION

[0002] 1. Field of the Invention
[0003] The present invention relates to a condenser for a vehicle. More particularly, the present invention relates to a condenser for a vehicle that condenses a refrigerant through heat exchange with a coolant.

[0004] 2. Description of Related Art
[0005] An air conditioning system includes a compressor compressing a refrigerant, a condenser condensing and liquefying the refrigerant compressed by the compressor, an expansion valve quickly expanding the refrigerant condensed and liquefied by the condenser, and an evaporator evaporating the refrigerant expanded by the expansion valve and cooling air which is supplied to the cabin in which the air conditioning is installed by using evaporation latent heat.

[0006] Herein, the condenser cools compressed gas refrigerant of high temperature/pressure by using outside air flowing into the vehicle when running and condenses it into low temperature liquid refrigerant.

[0007] The condenser is connected to a receiver drier through a pipe.

[0008] The condenser for a vehicle is a pin-tube type that is air cooled, and the overall size has to be increased so as to improve cooling performance thereof.

[0009] Recently, a water cooled condenser that uses a coolant as a cooling fluid has been applied so as to resolve the above problem.

[0010] However, the condensing temperature of the above-described water cooled condenser is about 5-15°C lower than that of the air cooled condenser, and therefore the condensing and cooling efficiency is deteriorated.

[0011] Also, a size of a radiator is to be increased so as to increase the cooling efficiency or the condensing efficiency in the water cooled condenser for a vehicle, and it is necessary for a connection pipe to be connected to a receiver drier that is separately disposed therein.

[0012] The information disclosed in this Background of the Invention section is only for enhancement of understanding of the general background of the invention and should not be taken as an acknowledgement or any form of suggestion that this information forms the prior art already known to a person skilled in the art.

BRIEF SUMMARY

[0013] Various aspects of the present invention are directed to providing a condenser for a vehicle having advantages of making the layout of constituent elements and a connection pipe simple by integrally configuring a receiver drier unit, and improving cooling efficiency of an air-conditioning system by increasing a heat radiating area.

[0014] In an aspect of the present invention, a condenser for a vehicle may include a main heat dissipating portion including a first passage in which a coolant passes the first passage, and a second passage in which a refrigerant passes the second passage such that the coolant and the refrigerant exchange heat with each other, a sub-heat-dissipating portion that is disposed at a lower side of the main heat dissipating portion and including a third passage in which a coolant passes, and a fourth passage in which a refrigerant passes such that the coolant and the refrigerant exchange heat with each other, a receiver drier unit that is disposed at a lateral side of an upper side of the sub-heat-dissipating portion, receives the refrigerant from the main heat dissipating portion through the sub-heat-dissipating portion so as to separate gaseous refrigerant from condensed refrigerant and to filter moisture and foreign materials therefrom, an upper cover in which a refrigerant inlet is formed at one side of an opposite side of the receiver drier unit corresponding to the main heat dissipating portion and a coolant outlet is formed at the other end portion thereof, and a lower cover in which a refrigerant outlet is formed at one side corresponding to the refrigerant inlet to be connected to the sub-heat-dissipating portion, a coolant inlet is formed to be connected to the main heat dissipating portion and the sub-heat-dissipating portion, and a mounting hole is formed to correspond to the receiver drier unit.

[0015] The receiver drier unit may include a refrigerant storage portion that is formed by laminating a plurality of plates and in which a coolant storage space is formed therein, an insert element that is inserted into the coolant storage space through the sub-heat-dissipating portion at a lower portion of the lower cover, and a drier that is disposed in the insert element at an upper portion of a fixation cap configured to be disposed in the insert element.

[0016] The sub-heat-dissipating portion may include a connection space at one side inner portion corresponding to the receiver drier unit to be connected to the coolant storage space.

[0017] The insert element may have an exhaust hole that is formed at a side upper portion corresponding to a filter portion of fixation cap and the sub-heat-dissipating portion to exhaust a liquid state refrigerant passing the filter portion of fixation cap to the sub-heat-dissipating portion.

[0018] The insert element may have a cylindrical shape of which both end portions are opened.

[0019] A sealant is interposed between an interior circumference of the insert element and an exterior circumference of a lower end portion of the fixation cap to seal the insert element and the fixation cap.

[0020] A barrier wall is formed at an upper portion of the sub-heat-dissipating portion near the main heat dissipating portion respectively corresponding to the refrigerant outlet and the coolant inlet, wherein a first connection passage is formed at an upper portion of the barrier wall to be connected to the receiver drier unit.

[0021] The main heat dissipating portion condenses refrigerant through the heat exchange with the coolant and exhausts condensed refrigerant to the receiver drier unit through the first connection passage.

[0022] A second connection passage is formed at a lower portion of the barrier wall in the sub-heat-dissipating portion, and the liquid refrigerant passing the receiver drier unit flows into the sub-heat-dissipating portion through the second connection passage.

[0023] The sub-heat-dissipating portion further condenses the refrigerant that passes the main heat dissipating portion, and the second connection passage, wherein the receiver drier unit separates gaseous refrigerant from the condensed refrigerant and eliminates moisture.
The sub-heat-dissipating portion is connected to the main heat dissipating portion and the receiver driver unit through a connection plate that is disposed at an upper portion thereof.

A fixation protrusion is formed on the connection plate, the fixation protrusion is formed between the main heat dissipating portion and the receiver driver unit in a width direction thereof, and the fixation protrusion separates the main heat dissipating portion from the receiver driver unit and fixes them together.

The refrigerant and the coolant flow in opposite directions from each other.

A condenser for a vehicle according to an exemplary embodiment of the present invention is a plate layered type in which a receiver driver unit is integrally configured, and therefore a layout of constituent elements and a connection pipe becomes simple and the cost and weight are reduced.

Also, the receiver driver unit is separated from a main heat dissipating portion and therefore mixing of the coolant and the refrigerant is prevented.

Further, dead volume of the condenser is reduced, a heating radiating area is increased, and therefore the condensing efficiency and the cooling efficiency are improved.

In addition, the coolant that flows in through a coolant inlet in a low temperature condition cools the refrigerant that passes a receiver driver unit in a liquid state, and therefore the refrigerant is sub-cooled to improve the cooling performance of the air-conditioning system.

Also, a main heat dissipating portion, a sub-heat-dissipating portion, and a receiver driver unit are formed as a plate layered type and are integrally formed through an upper cover, a lower cover, and a connection plate, and therefore leakage and mixing that are caused by welding or assembling faults are prevented.

The methods and apparatuses of the present invention have other features and advantages which will be apparent from or are set forth in more detail in the accompanying drawings, which are incorporated herein, and the following Detailed Description, which together serve to explain certain principles of the present invention.

FIG. 1 is a schematic diagram of a vehicle air-conditioning system in which a condenser for a vehicle is applied according to an exemplary embodiment of the present invention.

FIG. 2 is a perspective view of a condenser for a vehicle according to an exemplary embodiment of the present invention.

FIG. 3 is a top plan view of a condenser for a vehicle according to an exemplary embodiment of the present invention.

FIG. 4 is a cross-sectional view of a condenser for a vehicle according to an exemplary embodiment of the present invention.

FIG. 5 is a cross-sectional view along A-A line of FIG. 3 showing a coolant flowing.

FIG. 6 is a cross-sectional view along B-B line of FIG. 3 showing a coolant flowing.

It should be understood that the appended drawings are not necessarily to scale, presenting a somewhat simplified representation of various features illustrative of the basic principles of the invention. The specific design features of the present invention as disclosed herein, including, for example, specific dimensions, orientations, locations, and shapes will be determined in part by the particular intended application and use environment.

In the figures, reference numbers refer to the same or equivalent parts of the present invention throughout the several figures of the drawing.

DETAILED DESCRIPTION

Reference will now be made in detail to various embodiments of the present invention(s), examples of which are illustrated in the accompanying drawings and described below. While the invention(s) will be described in conjunction with exemplary embodiments, it will be understood that the present description is not intended to limit the invention(s) to those exemplary embodiments. On the contrary, the invention(s) is/are intended to cover not only the exemplary embodiments, but also various alternatives, modifications, equivalents and other embodiments, which may be included within the spirit and scope of the invention as defined by the appended claims.

An exemplary embodiment of the present invention will hereinafter be described in detail with reference to the accompanying drawings.

While the invention will be described in conjunction with exemplary embodiments, it will be understood that the present description is not intended to limit the invention to those exemplary embodiments. On the contrary, the invention is intended to cover not only the exemplary embodiments, but also various alternatives, modifications, equivalents, and other embodiments, which may be included within the spirit and scope of the invention as defined by the appended claims.

FIG. 1 is a schematic diagram of a vehicle air-conditioning system in which a condenser for a vehicle is applied according to an exemplary embodiment of the present invention.

FIG. 2 is a perspective view of a condenser for a vehicle according to an exemplary embodiment of the present invention.

FIG. 3 is a top plan view of a condenser for a vehicle according to an exemplary embodiment of the present invention, and FIG. 4 is a cross-sectional view of a condenser for a vehicle according to an exemplary embodiment of the present invention.

A condenser 100 for a vehicle according to an exemplary embodiment of the present invention, as shown in FIG. 1, is applied to an air-conditioning system that includes an expansion valve 101 that expands a liquid refrigerant, an evaporator 103 that evaporates refrigerant that is expanded by the expansion valve 101 through heat exchange with air, and a compressor 105 that receives gasified refrigerant from the evaporator 103 and compresses it.

That is, the condenser 100 is disposed between the compressor 105 and the expansion valve 101, and uses coolant that is supplied from a radiator 107 to cool the refrigerant that is supplied from the compressor 105 to condense the refrigerant.

The radiator 107 is a low temperature type to be connected to a reservoir tank 108, and a cooling fan 109 is disposed at a rear side thereof.

Here, the condenser 100 for a vehicle according to an exemplary embodiment of the present invention includes a receiver drier unit 130 that is integrally formed thereon and is a water cooled type in which a coolant cools the refrigerant through heat exchange, and therefore layout of constituent elements and a connection pipe becomes simple to reduce cost and weight, a heating radiating area is increased by
reducing dead volume of a receiver driver, and overall cooling efficiency of the air-conditioning system is improved.

[0049] For this, a condenser 100 for a vehicle according to an exemplary embodiment of the present invention, as shown in FIG. 2 to FIG. 4, includes a main heat dissipating portion 110, a sub-heat-dissipating portion 120, the receiver driver unit 130, an upper cover 140, and a lower cover 150.

[0050] Firstly, the main heat dissipating portion 110 includes a plurality of plates 111 that are layered, and first passages 113 and second passages 115 are formed therein.

[0051] The main heat dissipating portion 110 includes the second passages 115 that are connected to the radiator 107 and in which the coolant flows, and the first passages 113 that are connected to the compressor 105 and in which the refrigerant flows, and the coolant cools the refrigerant through heat exchange.

[0052] In the present exemplary embodiment, the sub-heat-dissipating portion 120 is disposed at a lower side of the main heat dissipating portion 110 to be connected to the main heat dissipating portion 110, and the coolant and refrigerant flow therein.

[0053] The sub-heat-dissipating portion 120 includes a plurality of plates 121 that are layered and fourth passages 123 and 125 are formed therein. Coolant flows through the third passage 123 and refrigerant flows through the fourth 125 passage, and the coolant exchanges heat with the refrigerant.

[0054] That is, the refrigerant is cooled by the main heat dissipating portion 110 to be supplied to the sub-heat-dissipating portion 120, and the main heat dissipation portion 120 sub-cools the refrigerant again.

[0055] Here, the coolant flows in the sub-heat-dissipating portion 120 in an opposite direction of a direction that the refrigerant flows therein.

[0056] That is, the sub-heat-dissipating portion 120 is formed by laminating the plates 121, the third passages 123 and the fourth passages 125 are formed between the plates 121, the coolant and the refrigerant respectively counter-flow through the passages 123 and 125 without mixing with each other, and the refrigerant is effectively cooled by the coolant.

[0057] Meanwhile, it is described that the coolant that flows in the sub-heat-dissipating portion 120 and the refrigerant that passes the receiver drier unit 130 counter-flow in the sub-heat-dissipating portion 120 in the present exemplary embodiment, but it is not limited thereto, and they can flow in the same direction to exchange heat thereof.

[0058] In the present exemplary embodiment, the sub-heat-dissipating portion 120 can be connected to the main heat dissipating portion 110 and the receiver driver unit 130 through a connection plate 160 that is disposed at an upper portion thereof.

[0059] The connection plate 160 fixes the main heat dissipating portion 110 on the receiver driver unit 130 with a gap through a fixation protrusion 161 that is formed in a width direction of the connection plate 160 between the main heat dissipating portion 110 and the receiver driver unit 130.

[0060] In the present exemplary embodiment, the receiver driver unit 130 is separated from the main heat dissipating portion 110 with a gap to be mounted on an upper side of the sub-heat-dissipating portion 120 through the connection plate 160.

[0061] The receiver driver unit 130 filters and separates gas of the refrigerant that is supplied from the main heat dissipating portion 110 through the sub-heat-dissipating portion 120 and supplies the sub-heat-dissipating portion 120 with only liquid refrigerant.

[0062] In the present exemplary embodiment, the upper cover 140 is disposed to connect the main heat dissipating portion 110 with the receiver driver unit 130, and a coolant inlet 141 is formed at one end portion of an opposite side of the receiver driver unit 130 corresponding to the main heat dissipating portion 110 and a coolant outlet 143 is formed at the other end portion.

[0063] Here, the coolant inlet 141 is connected to the first passage 113 in the main heat dissipating portion 110 to receive the refrigerant from the compressor 105.

[0064] Further, the lower cover 150 is disposed at a lower side of the sub-heat-dissipating portion 120, a coolant outlet 151 is formed at one side corresponding to the coolant inlet 141 to be connected to the sub-heat-dissipating portion 120, and the coolant outlet 151 is connected to the expansion valve 101.

[0065] Also, a coolant inlet 153 is formed at one side of the lower cover 150 that is distanced from the coolant outlet 151 to be connected to the main heat dissipating portion 110 and the sub-heat-dissipating portion 120, and the coolant inlet 153 is connected to the radiator 107 and a mounting hole 155 is formed to correspond to the receiver driver unit 130.

[0066] The lower cover 150 is a plate type like the sub-heat-dissipating portion 120 to be mounted on a lower portion of the sub-heat-dissipating portion 120.

[0067] That is, the coolant that is supplied from the radiator 107 passes the coolant inlet 153 that is formed on the lower cover 150 to pass the sub-heat-dissipating portion 120 at a lower position.

[0068] Accordingly, the refrigerant is cooled to be condensed in the main heat dissipating portion 110, and gaseous refrigerant, moisture, and foreign materials are eliminated in the receiver driver unit 130.

[0069] Afterward, the refrigerant is supplied to the sub-heat-dissipating portion 120, the refrigerant is further cooled by the low temperature coolant, and therefore overall cooling efficiency is improved and the condensation rate is increased.

[0070] Meanwhile, in the present exemplary embodiment, a barrier wall 127 is formed at an upper side of the sub-heat-dissipating portion 120 near the main heat dissipating portion 110, and a first connection passage 128 is formed at an upper side of the barrier wall 127 to be connected to the receiver driver unit 130.

[0071] Accordingly, the main heat dissipating portion 110 condenses the refrigerant through heat exchange with the coolant and supplies the receiver driver unit 130 with the condensed refrigerant.

[0072] Also, the sub-heat-dissipating portion 120 is formed at a lower side of the barrier wall 127 and a second connection passage 129 is formed at the sub-heat-dissipating portion 120, and the refrigerant of the receiver driver unit 130 is supplied to the sub-heat-dissipating portion 120 through the second connection passage 129.

[0073] That is, the refrigerant that is exhausted from the main heat dissipating portion 110 passes the receiver driver unit 130, the receiver driver unit 130 separates gas and liquid of the refrigerant and eliminates moisture from the refrigerant, the refrigerant that is processed thereby is supplied to the sub-heat-dissipating portion 120 through the second connection passage 129, and the refrigerant is further cooled by the coolant therein.
Here, the barrier wall 127 divides the first connection passage 128 and the second connection passage 129 and prevents mixing of the coolant passing the main heat dissipating portion 110 and the coolant that flows into the sub-heat-dissipating portion 120.

Hereinafter, the receiver driver unit 130 that is described above will be described according to the present exemplary embodiment.

In the present exemplary embodiment, the receiver driver unit 130 includes a refrigerant storage portion 131, an insert element 133, a fixation cap 135, and a drier 137.

Firstly, the refrigerant storage portion 131 is formed by laminating a plurality of plates 131a and a refrigerant storage space 131b is formed therein.

The insert element 133 is inserted into the coolant storage space 131b through the mounting hole 155 at a lower portion of the lower cover 150.

Meanwhile, a connection space 126 that is connected to the mounting hole 155 is formed at one side inner portion of the sub-heat-dissipating portion 120 corresponding to the receiver driver unit 130, and the space 126 can be connected to the coolant storage space 131b.

The insert element 133 has a cylindrical pipe shape of which both ends thereof are opened and is inserted into the mounting hole, wherein a lower portion corresponding to the connection space 126 is forcibly inserted such that the coolant does not leak out of the sub-heat-dissipating portion 120 and an upper end portion is disposed toward the coolant storage space 131b.

In the present exemplary embodiment, the fixation cap 135 is upwardly inserted into the insert element 133, a filter portion 135a is integrally formed at an upper side of the cap 135 to filter the liquid state refrigerant, and a lower portion of the cap 135 is screw-engaged on an interior circumference of the insert element 133.

Here, an exhaust hole 133a is formed at one side upper portion of the insert element 133 corresponding to the filter portion 135a of the fixation cap 135 and the sub-heat-dissipating portion 120, and the liquid refrigerant that passes the filter portion 135a of the fixation cap 135 is exhausted to the sub-heat-dissipating portion 120 through the exhaust hole 133a.

The liquid state refrigerant that is filtered through the filter portion 135a is supplied to the third passage 125 of the sub-heat-dissipating portion 120 through the second connection passage 129 and connects the second connection passage 129 with the filter portion 135a.

Meanwhile, a sealant 139 is interposed between the interior circumference of the insert element 133 and the exterior circumference of the fixation cap 135 of a lower side of the filter portion 135a.

In the present exemplary embodiment, the sealant 139 can be a pair to prevent the liquid state coolant passing the filter portion 135a inside the insert element 133 from leaking from the sub-heat-dissipating portion 120.

Also, the drier 137 is disposed in the coolant storage space 131b at an upper portion of the fixation cap 135 and separates gaseous refrigerant from the condensed refrigerant of the main heat dissipating portion 110 such that the liquid state refrigerant passes the filter portion 135a to be supplied to the sub-heat-dissipating portion 120.

That is, the gaseous refrigerant that remains in the condensed coolant of the main heat dissipating portion 110 is separated by the drier 137, and then the foreign materials are filtered by the filter portion 135a.

Afterwards, the refrigerant passes the sub-heat-dissipating portion 120 through the second connection passage 129 to be condensed again, and is exhausted from the sub-heat-dissipating portion 120 through the refrigerant outlet 151 to be supplied to the expansion valve 101.

Accordingly, the filter portion 135a and the drier 137 prevents the gaseous refrigerant and the foreign materials from remaining in the liquid refrigerant, and therefore the expansion valve 101 is not clogged by the foreign materials or the performance thereof is not deteriorated by the gaseous refrigerant.

Further, when the drier 137 reaches the end of its life span, the drier 137 can be easily disassembled from the insert element 133 by detaching the fixation cap 135 from the insert element 133 such that the maintenance time can be shortened.

The condenser 100 that is configured according to an exemplary embodiment of the present invention can be a plate-type heat exchanger, wherein the main heat dissipating portion 110, the sub-heat-dissipating portion 120, and the receiver driver unit 130 are formed by laminating a plurality of plates 111, 121, and 131a to be integrally combined with each other through the upper and lower covers 140 and 150 and the connection plate 160.

Hereinafter, the operation and function of the condenser for a vehicle 100 according to an exemplary embodiment of the present invention will be described with reference to FIG. 5 and FIG. 6.

FIG. 5 is a cross-sectional view along the A-A line of FIG. 3 showing a coolant flow, and FIG. 6 is a cross-sectional view along the B-B line of FIG. 3 showing a coolant flow.

In the meantime, as shown in FIG. 5, the high temperature/high pressure state gas refrigerant that is supplied from the compressor 105 is supplied to the main heat dissipating portion 110 through the coolant inlet 141 of the upper cover 140, and the refrigerant passing the portion 110 is supplied to the receiver driver unit 130 along the first passages 113 that is formed between the second passages 115.

In this process, the low temperature coolant that is cooled by the radiator 107, as shown in FIG. 6, flows into the sub-heat-dissipating portion 120 through the coolant inlet 153 of the lower cover 150.

The inflow refrigerant sequentially passes the forth passage 125 of the sub-heat-dissipating portion 120 and the first passage 113 of the main heat dissipating portion 110, is exhausted through the coolant outlet 143 of the upper cover 140, and is supplied to the radiator 107 to be cooled by outside air.

Here, the main heat dissipating portion 110 condenses the refrigerant flowing through the first passage 113 through the heat exchange with the coolant flowing through the second passage 115, and the condensed refrigerant is supplied to the receiver drier unit 130 through the first connection passage 128 that is formed at an upper portion of the sub-heat-dissipating portion 120.

The refrigerant of the receiver driver unit 130 passes the drier 137 and the filter portion 135a of the coolant storage space 131b, and the gas refrigerant is separated from the condensed refrigerant, the moisture is eliminated, and the foreign materials are filtered out.

In this condition, the coolant passes the second connection passage 129 that is connected to the exhaust hole
of the insert element 133 to be supplied to the third passage 123 of the sub-heat-dissipating portion 120.

100. The refrigerant of the third passage 123 is supplied to the sub-heat-dissipating portion 120 and is further condensed by the coolant flowing through the fourth passage 125 such that the condensation rate of the refrigerant is increased, wherein the refrigerant flows in an opposite direction of the coolant.

101. Thereafter, the refrigerant of the sub-heat-dissipating portion 120 is exhausted through the coolant outlet 151 to be supplied to the expansion valve 101.

102. Here, the receiver driver unit 130 is disposed at one side of the main heat dissipating portion 110, the refrigerant storage portion 131 is spaced apart from the main heat dissipating portion 110 by the connection plate 160, the main heat dissipating portion 110 and the receiver drier unit 130 are integrally formed through the upper cover 140, and the receiver drier unit 130 is connected to the main and sub-heat-dissipating portion 110 and 120 through the first and second connection passages 128 and 129 that are formed in the sub-heat-dissipating portion 120.

103. Further, the receiver drier unit is formed by laminating plates (111, 121, 131α) that are also used to form the heat dissipating portions 110 and 120 and therefore the dead volume of the receiver drier unit is reduced to increase the capacity of the heat dissipating portions 110 and 120, and because sub-cooling is further performed by the sub-heat-dissipating portion 120, the cooling performance and efficiency are improved.

104. Also, the operational fluid leaks and mixing with each other can be prevented, compared with a conventional plate type in which passages are separated by a rib, and therefore the condensation efficiency and the salability are improved.

105. Accordingly, when the condenser 100 for a vehicle that is a laminated plate type is applied to an exemplary embodiment of the present invention, in which the receiver driver unit 130 is integrally formed therein, the liquid coolant condenses the refrigerant, the layout of the connection pipe with constituent elements becomes simple, and the cost and weight can be reduced.

106. Also, the receiver driver unit 130 is separated from the main heat dissipating portion 110 to prevent the mixing of the coolant and the refrigerant.

107. Further, the radiating area is increased by reducing the dead volume of the condenser 100, and the condensation and cooling efficiency are improved without size enlargement.

108. In addition, the coolant that is supplied through the coolant inlet 153 in a low temperature state and the liquid state refrigerant that passes the receiver driver unit 130 exchanges heat with each other and the refrigerant is cooled in two stages such that the overall cooling performance of the air-conditioning system is improved.

109. Also, the main heat dissipating portion 110, the sub-heat-dissipating portion 120, and the receiver driver unit 130 are formed as a laminated plate type, they are integrally formed through the upper/lower covers 140 and 150 and the connection plate 160, and therefore it prevents the leakage and the mixing of the operational fluids that can be caused by a welding fault and assembling deviation, compared with a conventional type in which passages are divided by a rib.

110. For convenience in explanation and accurate definition in the appended claims, the terms “upper”, “lower”, “inner” and “outer” are used to describe features of the exemplary embodiments with reference to the positions of such features as displayed in the figures.

111. The foregoing descriptions of specific exemplary embodiments of the present invention have been presented for purposes of illustration and description. They are not intended to be exhaustive or to limit the invention to the precise forms disclosed, and obviously many modifications and variations are possible in light of the above teachings. The exemplary embodiments were chosen and described in order to explain certain principles of the invention and their practical application, to thereby enable others skilled in the art to make and utilize various exemplary embodiments of the present invention, as well as various alternatives and modifications thereof. It is intended that the scope of the invention be defined by the Claims appended hereto and their equivalents.

What is claimed is:

1. A condenser for a vehicle, comprising:
   a main heat dissipating portion including:
   a first passage in which a coolant passes the first passage;
   and
   a second passage in which a refrigerant passes the second passage such that the coolant and the refrigerant exchange heat with each other;
   a sub-heat-dissipating portion that is disposed at a lower side of the main heat dissipating portion and including:
   a third passage in which a coolant passes; and
   a fourth passage in which a refrigerant passes such that the coolant and the refrigerant exchange heat with each other;
   a receiver drier unit that is disposed at a lateral side of an upper side of the sub-heat-dissipating portion, receives the refrigerant from the main heat dissipating portion through the sub-heat-dissipating portion so as to separate gaseous refrigerant from condensed refrigerant and to filter moisture and foreign materials therefrom;
   an upper cover in which a refrigerant inlet is formed at one side of an opposite side of the receiver drier unit corresponding to the main heat dissipating portion and a coolant outlet is formed at the other end portion thereof; and
   a lower cover in which a refrigerant outlet is formed at one side corresponding to the refrigerant inlet to be connected to the sub-heat-dissipating portion, a coolant inlet is formed to be connected to the main heat dissipating portion and the sub-heat-dissipating portion, and a mounting hole is formed to correspond to the receiver driver unit.

2. The condenser for the vehicle of claim 1, wherein the receiver driver unit includes:
   a refrigerant storage portion that is formed by laminating a plurality of plates and in which a coolant storage space is formed therein;
   an insert element that is inserted into the coolant storage space through the sub-heat-dissipating portion at a lower portion of the lower cover; and
   a drier that is disposed in the insert element at an upper portion of a fixation cap configured to be disposed in the insert element.

3. The condenser for the vehicle of claim 2, wherein the sub-heat-dissipating portion includes a connection space at one side inner portion corresponding to the receiver driver unit to be connected to the coolant storage space.
4. The condenser for the vehicle of claim 2, wherein the insert element has an exhaust hole that is formed at one side upper portion corresponding to a filter portion of the fixation cap and the sub-heat-dissipating portion to exhaust a liquid state refrigerant passing the filter portion of the fixation cap to the sub-heat-dissipating portion.

5. The condenser for the vehicle of claim 2, wherein the insert element has a cylindrical shape of which both end portions are opened.

6. The condenser for the vehicle of claim 2, wherein a sealant is interposed between an interior circumference of the insert element and an exterior circumference of a lower end portion of the fixation cap to seal the insert element and the fixation cap.

7. The condenser for the vehicle of claim 1, wherein a barrier wall is formed at an upper portion of the sub-heat-dissipating portion near the main heat dissipating portion respectively corresponding to the refrigerant outlet and the coolant inlet, and wherein a first connection passage is formed at an upper portion of the barrier wall to be connected to the receiver drier unit.

8. The condenser for the vehicle of claim 7, wherein the main heat dissipating portion condenses refrigerant through the heat exchange with the coolant and exhausts condensed refrigerant to the receiver drier unit through the first connection passage.

9. The condenser for the vehicle of claim 7, wherein a second connection passage is formed at a lower portion of the barrier wall in the sub-heat-dissipating portion, and wherein the liquid refrigerant passing the receiver drier unit flows into the sub-heat-dissipating portion through the second connection passage.

10. The condenser for the vehicle of claim 9, wherein the sub-heat-dissipating portion further condenses the refrigerant that passes the main heat dissipating portion, and the second connection passage, wherein the receiver drier unit separates gaseous refrigerant from the condensed refrigerant and eliminates moisture.

11. The condenser for the vehicle of claim 1, wherein the sub-heat-dissipating portion is connected to the main heat dissipating portion and the receiver drier unit through a connection plate that is disposed at an upper portion thereof.

12. The condenser for the vehicle of claim 11, wherein a fixation protrusion is formed on the connection plate, the fixation protrusion is formed between the main heat dissipating portion and the receiver drier unit in a width direction thereof, and the fixation protrusion separates the main heat dissipating portion from the receiver drier unit and fixes them together.

13. The condenser for the vehicle of claim 1, wherein the refrigerant and the coolant flow in opposite directions from each other.

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