

CONDENSER

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The invention relates to a condenser. More particularly, the invention relates to a condenser including the condensing structures, like the condensing fins, the inlets, the outlets, the openings, and the notches.

Description of Related Art

[0002] The weather becomes hot, and the air conditioning system is applied to lower the temperature generally. Thus, how to improve the operational efficiency of the air conditioning system to save electricity and have the effects of environmental protection is important.

[0003] A heat sink with a fan, two kinds of cooling devices, and a heat dissipating device such as TW Patent M438927 is disclosed, the heat inside of the heat sink is dissipated by the fan, one cooling device, and a heat dissipating device, and the temperature is lowered to the normal temperature by the other cooling device.

[0004] The inventor wants to reach the purpose of energy saving and carbon reduction, so as to improve the operational efficiency of the air conditioning system to save electricity.

SUMMARY OF THE INVENTION

[0005] The invention is directed to a condenser for upgrading the heat exchange velocity between a cold fluid and a hot fluid, and upgrading the heat transfer efficiency.

[0006] In the invention, a condenser is provided. The condenser comprises at least a first condensing fin, at least a second condensing fin, at least a third condensing fin, and at least a fourth condensing fin. Each first condensing fin has at least a first inlet, at least a first outlet,

and at least a first notch. Each second condensing fin has at least a second inlet, at least a second outlet, and at least a second notch. Each third condensing fin has at least a third inlet, at least a third outlet, and at least a third notch. Each fourth condensing fin has at least a fourth inlet, at least a fourth outlet, and at least a fourth notch. The adjacent first notch, second notch, and third notch constitute a inlet notch groove. The adjacent second notch, the third notch, and the fourth notch constitute a outlet notch groove. The first condensing fin, the second condensing fin, the third condensing fin, and the fourth condensing fin are arranged along a assembling axis. The hot fluid flows into the condenser from the inlet notch groove along a hot fluid flowing-path, and flows out of the condenser from the outlet notch groove. The cold fluid flows into the condenser from the inlet of one of above condensing fins along a cold fluid flowing-path, and flows out of the condenser from the outlet of the condensing fin.

[0007] In one embodiment of the present invention, the condenser further includes a fifth condensing fin and a sixth condensing fin, disposed in two sides of the assembly of the first condensing fin, the second condensing fin, the third condensing fin, and the fourth condensing fin along the assembling axis respectively.

[0008] In one embodiment of the present invention, the first condensing fin, the second condensing fin, the third condensing fin, and the fourth condensing fin are staggered along the assembling axis.

[0009] In one embodiment of the present invention, the second condensing fin is disposed between the first condensing fin and the third condensing fin, the third condensing fin is disposed between the second condensing fin and the fourth condensing fin, the first condensing fin and the fourth condensing fin are disposed between two sides of the second condensing fin and the third condensing fin.

[0010] In one embodiment of the present invention, the first condensing fin further

includes at least a first through hole and at least a second through hole, the second condensing fin further includes at least a third through hole and at least a fourth through hole, the third condensing fin further includes at least a fifth through hole and at least a sixth through hole, the fourth condensing fin further includes at least a seventh through hole and at least a eighth through hole.

[0011] In one embodiment of the present invention, the inlet notch groove is located between the two adjacent fourth condensing fin, and the outlet notch groove is located between the two adjacent first condensing fin.

[0012] In one embodiment of the present invention, the fourth condensing fin is a mirror state of the first condensing fin along the assembling axis.

[0013] In one embodiment of the present invention, the third condensing fin is a mirror state of the second condensing fin along the assembling axis.

[0014] In one embodiment of the present invention, the first condensing fin further includes at least a first opening, the second condensing fin further includes at least a second opening, the third condensing fin further includes at least a third opening, and the fourth condensing fin further includes at least a fourth opening.

[0015] In one embodiment of the present invention, the fifth condensing fin further includes at least a fifth inlet and at least a fifth outlet.

[0016] In one embodiment of the present invention, the fifth inlet is overlapped with the projection area of the first inlet, the second inlet, the third inlet, and the fourth inlet.

[0017] In one embodiment of the present invention, the fifth outlet is overlapped with the projection area of the first outlet, the second outlet, the third outlet, and the fourth outlet.

[0018] In one embodiment of the present invention, the first through hole and the second through hole are overlapped with the projection area of the third through hole and the fourth through hole partly, the third through hole and the fourth through hole are overlapped with

the projection area of the fifth through hole and the sixth through hole partly, the fifth through hole and the sixth through hole are overlapped with the projection area of the seventh through hole and the eighth through hole partly, the seventh through hole and the eighth through hole are overlapped with the projection area of the first through hole and the second through hole partly.

[0019] In one embodiment of the present invention, the first opening is overlapped with the projection area of the second opening partly, the second opening is overlapped with the projection area of the third opening partly, the third opening is overlapped with the projection area of the fourth opening partly, the fourth opening is overlapped with the projection area of the first opening partly.

[0020] In one embodiment of the present invention, the hot fluid flows through the fourth condensing fin, the third condensing fin, the second condensing fin, and the first condensing fin along the hot fluid flowing-path sequentially.

[0021] In one embodiment of the present invention, the cold fluid flows through the first condensing fin, the second condensing fin, the third condensing fin, and the fourth condensing fin along the cold fluid flowing-path sequentially.

[0022] In one embodiment of the present invention, the hot fluid flowing-path and the cold fluid flowing-path are vertical with each other.

[0023] In one embodiment of the present invention, the cold fluid flowing-path and the assembling axis are parallel with each other.

BRIEF DESCRIPTION OF THE DRAWINGS

[0024] The accompanying drawings are included to provide a further understanding of the disclosure, and are incorporated in and constitute a part of this specification. The drawings illustrate embodiments of the disclosure and, together with the description, serve to explain

the principles of the disclosure.

[0025] FIG. 1 is a schematic view illustrating the condenser according to one embodiment of the present invention.

[0026] FIG. 2 is an exploded view illustrating the condensing fins of the condenser according to one embodiment of the present invention.

[0027] FIG. 3 is a plane schematic view illustrating the condensing fins of the condenser depicted in FIG. 3A.

[0028] FIG. 4 is an overlapping schematic view illustrating the projection areas of the inlets, the outlets, the through holes, and the openings disposed in the first condensing fin, the second condensing fin, or the fifth condensing fin according to one embodiment of the present invention.

[0029] FIG. 5 is a flowing schematic view illustrating a hot fluid in the condenser according to one embodiment of the present invention.

[0030] FIG. 6 is a flowing schematic view illustrating the hot fluid in the condenser in section A-C depicted in FIG. 5 according to one embodiment of the present invention.

[0031] FIG. 7 is a flowing schematic view illustrating a cold fluid in the condenser according to one embodiment of the present invention.

[0032] FIG. 8 is a flowing schematic view illustrating the cold fluid in the condenser in section B-D depicted in FIG. 7 according to one embodiment of the present invention.

DESCRIPTION OF EMBODIMENTS

[0033] Other features and advantages of the invention will be further understood from the further technological features disclosed by the embodiments of the invention wherein there are shown and described embodiments of this invention, simply by way of illustration of best modes to carry out the invention.

[0034] FIG. 1 is a schematic view illustrating the condenser according to one embodiment of the present invention. FIG. 2 is an exploded view illustrating the condensing fins of the condenser according to one embodiment of the present invention. FIG. 3 is a plane schematic view illustrating the condensing fins of the condenser depicted in FIG. 3A. FIG. 4 is an overlapping schematic view illustrating the projection areas of the inlets, the outlets, the through holes, and the openings disposed in the first condensing fin, the second condensing fin, or the fifth condensing fin according to one embodiment of the present invention.

[0035] Referring to FIG. 1~FIG. 4, the condenser 1 of the invention includes at least a first condensing fin 2, at least a second condensing fin 3, at least a third condensing fin 4, and at least a fourth condensing fin 5. The first condensing fin 2 has at least a first inlet 21, at least a first outlet 22, and at least a first notch 23. The second condensing fin 3 has at least a second inlet 31, at least a second outlet 32, and at least a second notch 33. The third condensing fin 4 has at least a third inlet 41, at least a third outlet 42, and at least a third notch 43. The fourth condensing fin 5 has at least a fourth inlet 51, at least a fourth outlet 52, and at least a fourth notch 53. The second condensing fin 3 is disposed between the first condensing fin 2 and the third condensing fin 4. The third condensing fin 4 is disposed between the second condensing fin 3 and the fourth condensing fin 5. The first condensing fin 2 and the fourth condensing fin 5 are disposed between two sides of the second condensing fin 3 and the third condensing fin 4. The adjacent first notch 23, second notch 33, and the third notch 43 constitute a inlet notch groove 8, and the adjacent second notch 33, third notch 43, and the fourth notch 53 constitute a outlet notch groove 9. The inlet notch groove 8 is located between the two adjacent fourth condensing fin 5, and the outlet notch groove 9 is located between the two adjacent first condensing fin 2. The first condensing fin 2, the second condensing fin 3, the third condensing fin 4, and the fourth condensing fin 5 are staggered along a assembling axis L1. The fourth condensing fin 5 is a mirror state of the first condensing fin 2 along the

assembling axis L1, and the third condensing fin 4 is a mirror state of the second condensing fin 3 along the assembling axis L1.

[0036] In the embodiment of the invention, the first condensing fin 2 further includes at least a first through hole 24 and at least a second through hole 25, the second condensing fin 3 further includes at least a third through hole 34 and at least a fourth through hole 35, the third condensing fin 4 further includes at least a fifth through hole 44 and at least a sixth through hole 45, and the fourth condensing fin 5 further includes at least a seventh through hole 54 and at least a eighth through hole 55. In the present embodiment, the first condensing fin 2 further includes at least a first opening 26, the second condensing fin 3 further includes at least a second opening 36, the third condensing fin 4 further includes at least a third opening 46, and the fourth condensing fin 5 further includes at least a fourth opening 56.

[0037] In the embodiment of the invention, the condenser 1 further includes a fifth condensing fin 6 and a sixth condensing fin 7. The fifth condensing fin 6 further includes at least a fifth inlet 61 and at least a fifth outlet 62. The fifth condensing fin 6 and the sixth condensing fin 7 are located in two sides of the assembly of the first condensing fin 2, the second condensing fin 3, the third condensing fin 4, and the fourth condensing fin 5 along the assembling axis L1 respectively. The fifth inlet 61 is overlapped with the projection area of the first inlet 21, the second inlet 31, the third inlet 41, and the fourth inlet 51, and the fluid can flow through the overlapping area. The fifth outlet 62 is overlapped with the projection area of the first outlet 22, the second outlet 32, the third outlet 42, and the fourth outlet 52, and the fluid can flow through the overlapping area. The first through hole 24 and the second through hole 25 are overlapped with the projection area of the third through hole 34 and the fourth through hole 35 partly, and the fluid can flow through the overlapping area. The third through hole 34 and the fourth through hole 35 are overlapped with the projection area of the fifth through hole 44 and the sixth through hole 45 partly, and the fluid can flow through the

overlapping area. The fifth through hole 44 and the sixth through hole 45 are overlapped with the projection area of the seventh through hole 54 and the eighth through hole 55 partly, and the fluid can flow through the overlapping area. The seventh through hole 54 and the eighth through hole 55 are overlapped with the projection area of the first through hole 24 and the second through hole 25 partly, and the fluid can flow through the overlapping area. The first opening 26 is overlapped with the projection area of the second opening 36 partly, and the fluid can flow through the overlapping area. The second opening 36 is overlapped with the projection area of the third opening 46 partly, and the fluid can flow through the overlapping area. The third opening 46 is overlapped with the projection area of the fourth opening 56 partly, and the fluid can flow through the overlapping area. The fourth opening 56 is overlapped with the projection area of the first opening 26 partly, and the fluid can flow through the overlapping area.

[0038] FIG. 5 is a flowing schematic view illustrating a hot fluid in the condenser according to one embodiment of the present invention. FIG. 6 is a flowing schematic view illustrating the hot fluid in the condenser in section A-C depicted in FIG. 5 according to one embodiment of the present invention. FIG. 7 is a flowing schematic view illustrating a cold fluid in the condenser according to one embodiment of the present invention. FIG. 8 is a flowing schematic view illustrating the cold fluid in the condenser in section B-D depicted in FIG. 7 according to one embodiment of the present invention.

[0039] Referring to FIG. 5~FIG. 8, the hot fluid F1 flows into the condenser 1 from the inlet notch groove 8 along a hot fluid flowing-path L2, and flows through the overlapping projection area of the fourth opening 56 with the first opening 26, the overlapping projection area of the third opening 46 with the fourth opening 56, the overlapping projection area of the second opening 36 with the third opening 46, the overlapping projection area of the first opening 26 with the second opening 36. The hot fluid F1 flows through the fourth condensing

fin 5, the third condensing fin 4, the second condensing fin 3, and the first condensing fin 2 sequentially, and flows out of the condenser 1 from the outlet notch groove 9. The cold fluid F2 flows into the condenser 1 from the inlet 61 of the fifth condensing fin 6 along a cold fluid flowing-path L3 through the overlapping projection area of the first inlet 21, the second inlet 31, the third inlet 41, the fourth inlet 51, the first through hole 24, and the second through hole 25 with the third through hole 34 and the fourth through hole 35 partly, the overlapping projection area of the third through hole 34 and the fourth through hole 35 with the fifth through hole 44 and the sixth through hole 45 partly, the overlapping projection area of the fifth through hole 44 and the sixth through hole 45 with the seventh through hole 54 and the eighth through hole 55 partly, the overlapping projection area of the seventh through hole 54 and the eighth through hole 55 with the first through hole 24 and the second through hole 25 partly, the first outlet 22, the second outlet 32, the third outlet 42, and the fourth outlet 52, and be stopped by the sixth condensing fin 7. The cold fluid F2 flows through the first condensing fin 2, the second condensing fin 3, the third condensing fin 4, and the fourth condensing fin 5 sequentially, and flows out of the condenser 1 from the outlet 62 of the fifth condensing fin 6. The hot fluid F1 and the cold fluid F2 are executed to heat exchange with the first condensing fin 2, the second condensing fin 3, the third condensing fin 4, and the fourth condensing fin 5, and have a temperature difference of the hot fluid F1 when the hot fluid F1 flows into the inlet notch groove 8 and flows out of the outlet notch groove 9. The hot fluid flowing-path L2 and the cold fluid flowing-path L3 are vertical with each other, and the cold fluid flowing-path L3 and the assembling axis L1 are parallel with each other.

[0040] Although the invention has been described with reference to the above embodiments, it will be apparent to one of the ordinary skill in the art that modifications to the described embodiments may be made without departing from the spirit of the invention. Accordingly, the scope of the invention will be defined by the attached claims rather than by

the above detailed descriptions.

WHAT IS CLAIMED IS:

1. A condenser, comprising:

at least a first condensing fin, having at least a first inlet, at least a first outlet, and at least a first notch;

at least a second condensing fin, having at least a second inlet, at least a second outlet, and at least a second notch;

at least a third condensing fin, having at least a third inlet, at least a third outlet, and at least a third notch; and

at least a fourth condensing fin, having at least a fourth inlet, at least a fourth outlet, and at least a fourth notch,

wherein the adjacent first notch, second notch, and third notch constitute a inlet notch groove, and the adjacent second notch, third notch, and fourth notch constitute a outlet notch groove, the first condensing fin, the second condensing fin, the third condensing fin, and the fourth condensing fin are arranged along a assembling axis, a hot fluid flows into the condenser from the inlet notch groove along a hot fluid flowing-path, and flows out of the condenser from the outlet notch groove, and a cold fluid flows into the condenser from the inlet of one of above condensing fins along a cold fluid flowing-path, and flows out of the condenser from the outlet of the condensing fin.

2. The condenser as recited in claim 1, further includes a fifth condensing fin and a sixth condensing fin, disposed in two sides of the assembly of the first condensing fin, the second condensing fin, the third condensing fin, and the fourth condensing fin along the assembling axis respectively.

3. The condenser as recited in claim 1, wherein the first condensing fin, the second condensing fin, the third condensing fin, and the fourth condensing fin are staggered along the assembling axis.

4. The condenser as recited in claim 1, wherein the second condensing fin is disposed between the first condensing fin and the third condensing fin, the third condensing fin is disposed between the second condensing fin and the fourth condensing fin, the first condensing fin and the fourth condensing fin are disposed between two sides of the second condensing fin and the third condensing fin.

5. The condenser as recited in claim 1, wherein the first condensing fin further includes at least a first through hole and at least a second through hole, the second condensing fin further includes at least a third through hole and at least a fourth through hole, the third condensing fin further includes at least a fifth through hole and at least a sixth through hole, the fourth condensing fin further includes at least a seventh through hole and at least a eighth through hole.

6. The condenser as recited in claim 1, wherein the inlet notch groove is located between the two adjacent fourth condensing fin, and the outlet notch groove is located between the two adjacent first condensing fin.

7. The condenser as recited in claim 1, wherein the fourth condensing fin is a mirror state of the first condensing fin along the assembling axis.

8. The condenser as recited in claim 1, wherein the third condensing fin is a mirror state of the second condensing fin along the assembling axis.

9. The condenser as recited in claim 1, wherein the first condensing fin further includes at least a first opening, the second condensing fin further includes at least a second opening, the third condensing fin further includes at least a third opening, and the fourth condensing fin further includes at least a fourth opening.

10. The condenser as recited in claim 2, wherein the fifth condensing fin further includes at least a fifth inlet and at least a fifth outlet.

11. The condenser as recited in claim 10, wherein the fifth inlet is overlapped with the

projection area of the first inlet, the second inlet, the third inlet, and the fourth inlet.

12. The condenser as recited in claim 10, wherein the fifth outlet is overlapped with the projection area of the first outlet, the second outlet, the third outlet, and the fourth outlet.

13. The condenser as recited in claim 5, wherein the first through hole and the second through hole are overlapped with the projection area of the third through hole and the fourth through hole partly, the third through hole and the fourth through hole are overlapped with the projection area of the fifth through hole and the sixth through hole partly, the fifth through hole and the sixth through hole are overlapped with the projection area of the seventh through hole and the eighth through hole partly, the seventh through hole and the eighth through hole are overlapped with the projection area of the first through hole and the second through hole partly.

14. The condenser as recited in claim 9, wherein the first opening is overlapped with the projection area of the second opening partly, the second opening is overlapped with the projection area of the third opening partly, the third opening is overlapped with the projection area of the fourth opening partly, the fourth opening is overlapped with the projection area of the first opening partly.

15. The condenser as recited in claim 1, wherein the hot fluid flows through the fourth condensing fin, the third condensing fin, the second condensing fin, and the first condensing fin along the hot fluid flowing-path sequentially.

16. The condenser as recited in claim 1, wherein the cold fluid flows through the first condensing fin, the second condensing fin, the third condensing fin, and the fourth condensing fin along the cold fluid flowing-path sequentially.

17. The condenser as recited in claim 1, wherein the hot fluid flowing-path and the cold fluid flowing-path are vertical with each other.

18. The condenser as recited in claim 1, wherein the cold fluid flowing-path and the

assembling axis are parallel with each other.