

Description

RADIATOR CORE

Field of the Invention

The present invention relates to radiator core, focusing on the fins with improvements in the heat exchange efficiency by implementing several louvres designs on it. The shape and size of the louvres are not fixed. The louvres can be designed according to the implementation requirements.

Background of the Invention

The traditional radiator core's louvres that are perpendicular to the air inlet direction consist of a plurality of plain fins and a plurality of tubes. The plain fins are arranged parallel to each other with a certain distance. The first fluid will flow between the fins. The tubes are arranged parallel to each other and perpendicular to the fins. The tubes penetrate through every layer of the fins. The second fluid flows into the tubes. With such perpendicular arrangement, the first fluid is able to flow against the front section of the tubes. The first fluid is then deflected and forms several fluid swirls behind the tubes. There is a certain area behind the tubes where the heat exchange efficiency is the lowest. The abovementioned area contains eddies of the hot fluid. The eddies will maintain its position in this area and the heat transfer is not occurring. Traditional radiator core has these eddies located behind each tube. Thus, an assumption that the traditional radiator core design is ineffective can be made certain.

In the prior art, *U. S. patent letter no. 5975199 which is issued in 1999 by Hyun Yeon Park et al.*, there are several louvres implemented on the fins. But, in this prior art, the louvres provide the way for the fluid to flow on them. This prior art is ineffective because most of the fluid cannot be easily guided to pass on the louvres.

To conclude, traditional radiator core with plain fins has low efficiency due to the swirls produced by the fluid behind the tubes and the swirls do not leave the tubes. Such eddies contain hot fluid, thus affecting the heat exchange efficiency.

Summary of the Invention

The radiator core includes a plurality of fins and a plurality of tubes. Unlike traditional radiator core, the present invention of the radiator core has an addition of several louvres. The louvres are located on the fins and arranged around the tubes. The main purpose of having such louvres on the fins is to produce a smooth fluid movement around the tube that guide the fluid movement to the ideal direction in order to effectively utilize the area behind the tube and prevent formation of fluid eddies.

This present invention provides a new structure of the fins that improves the heat exchange efficiency of the radiator core. By implementing such new features, the major disadvantage of traditional radiator core can be overcome. This structure consists of several louvres on the fins which can be easily punched and pressed using simple processes. These louvres are designed to have various shapes such as semi-circular, semi-elliptical, triangular, and rectangular, etc. The size and shape of the louvres are decided according to the implementation requirements. For example, based on the requirements that need to be achieved, the shape of the louvre can be decided, e.g., circular. The top view of the sheet forms a circle with outer diameter, inner diameter and

width. The outer diameter is R_1 mm; the inner diameter is R_2 mm, W mm width and H mm depth.

The fluid flows toward the front part of the tubes. The fluid will be reflected and guided by the louvres to flow smoothly around the tube and on the inner side of the louvres. As a result, the fluid will also flow to the behind part of the tube. This can prevent the formation of fluid swirls. Without the swirls, the heat exchange efficiency will increase. This louvre feature will not increase the pressure drop significantly. It is efficient yet can be easily manufactured.

Brief description of the drawings

Fig. 1 is a perspective view of the radiator core.

Fig. 2 is a plan view of the metal sheet with louvres on it showing the air flow around the tube.

Fig. 3 is a sectional view of optional embodiment of the present invention.

Fig. 3A is a sectional view of semicircular shape louvres.

Fig. 3B is a sectional view of semi elliptical shape louvres.

Fig. 3C is a sectional view of rectangular shape louvres.

Fig. 3D is a sectional view of triangular shape louvres.

Fig. 3E is a sectional view of trapezium shape louvres.

Fig. 3F is a sectional view of one-fourth circle shape louvres.

Fig. 3G is a sectional view of right-angled triangular shape louvres.

Fig. 3H is a sectional view of opposite side right-angled triangular shape louvres.

Fig. 4 is a sectional view of optional embodiment of the present invention

Fig. 4A is a sectional view double semicircular shape louvres.

Fig. 4B is a sectional view double rectangular shape louvres.

Fig. 4C is a sectional view double triangular shape louvres.

Fig. 4D is a sectional view double trapezium shape louvres.

Detailed description on the preferred embodiment

As shown in fig. 1, the present invention is a radiator core (1) including fins (2) and tubes (3). The tubes (3) penetrate through the hole (5) on the fins (2). The tube-side fluid passes through the tubes (3) and is then cooled by the air blowing parallel to the fins (2). The fins (2) are perpendicular to the tubes (3).

As shown in fig. 2, the louvres (4) are designed around the hole (5) on the fins (2). The size and shape of the louvres (4) can vary. The size of the louvres (4) displayed in the figure shows the outer arc has a radius of R_1 and the inner arc has a radius of R_2 . The air flow from the front part of the radiator is then deflected by the louvres (4), flows around the hole (5) and becomes hot due to the heat exchange as it leaves the radiator.

As shown in fig. 3, the louvres have flexible sectional view shape. The tube (3) penetrates through the hole (5). In fig. 3A, the louvres (6) are designed with a semicircular shape. The dimension of this semicircular shape may vary depend on situation. For example: the radius of the semicircular is A. For fig. 3B the louvres' (7) shape are modified to the half-elliptical shape. The ellipse has B mm major axis and C mm semi-minor axis. Fig. 3C shows the rectangular shape of the louvres (8) sectional view. It shows rectangular shape with D mm length and E mm width. The louvres (9) in fig. 3D have a triangular shape. This triangle has F mm height and G mm base length. In fig. 3E, the trapezium shape is applied on the louvres (10) sectional view with I mm height and H mm top-parallel side. Half of the semicircular shape can also be applied on the louvres (11) as shown in fig. 3F. The louvre (11) has a radius of J mm. The louvre (12) shape can also be a right-angled triangle. In fig. 3G, the right-angled triangle has L mm base and M mm height. In fig. 3H, the right-angled triangle louvre (13) can also face the opposite side with N mm base and O mm height. These sectional view shapes are examples of the optional embodiments that can be applied on the invention.

In fig. 4, we provide more design modifications on the optional embodiment. As shown in fig. 4A, the louvres (14) are designed by implementing the shape in fig. 3A, but it is doubled which forms another wavy shape. By taking the same approach, fig. 4B is made based on fig. 3C. The louvre (15) has a double-rectangular shape. The louvre (16) in fig. 4C has a shape of double-triangle which is according to fig. 3D. In fig. 4D, the louvre is designed based on fig. 3E. It is a double-trapezium. In conclusion, the shape of the louvres may vary according to the implementation requirements.

References

U. S. Patent Documents

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Claims

1. Radiator core with louvres on the fins, comprising: a plurality of fins, a plurality of tubes, and louvres around the tubes; wherein the louvres produce a smooth air flow around the tubes.
2. The radiator core according to claim 1, wherein the metal sheet is designed to have several louvres on it.
3. The radiator core according to claim 1, wherein the tubes are arranged to be surrounded by louvres.
4. The radiator core according to claim 1, wherein the louvres have various sizes and shapes. For example: semi-circular, semi-elliptical, triangular, rectangular etc.
5. The louvres on fins according to claim 4, wherein the louvres around the tubes are arranged to guide the fluid to flow smoothly without producing swirls behind the tubes.
6. The louvres on fins according to claim 4, wherein the size of the louvres may vary according to the implementation requirements. For example: the outer arc has a radius of R_1 and the inner arc has a radius of R_2 with a certain louvre width and depth.
7. The louvres on fins according to claim 4, wherein the louvres are arranged to improve the heat exchange efficiency.
8. The louvres' shape according to claim 4, wherein the louvre forms a semicircular sectional shape.
9. The semicircular louvre according to claim 8, wherein the louvre has a radius of A mm.
10. The louvres' shape according to claim 4, wherein the louvre forms a semi elliptical sectional shape.
11. The semi elliptical louvre according to claim 10, wherein the louvre has a B mm semi minor axis and C mm major axis.
12. The louvres shape according to claim 4, wherein the louvre forms a rectangular sectional shape.
13. The rectangular louvre according to claim 12, wherein the louvre has a D mm length and E mm width.
14. The louvres' shape according to claim 4, wherein the louvre forms a triangular sectional shape.
15. The triangular louvre according to claim 14, wherein the louvre has an F mm height and G mm base length.

16. The louvres' shape according to claim 4, wherein the louvre forms a trapezium sectional shape.
17. The trapezium louvre according to claim 16, wherein the louvre has an H mm top parallel side and I mm height.
18. The louvres' shape according to claim 4, wherein the louvre forms a one-fourth circle sectional shape.
19. The one-fourth circle shape louvre according to claim 18, wherein the louvre has a J mm radius.
20. The louvres' shape according to claim 4, wherein the louvre forms a right-angled triangle sectional shape.
21. The right-angled triangle shape louvre according to claim 20, wherein the louvre has an L mm base length and M mm height.
22. The louvres' shape according to claim 4, wherein the louvre can be modified to form double shape of semicircular, semi elliptical, etc.