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(54) **SQUIRREL-CAGE FRAME RADIATOR**

(57) The invention provides a squirrel-cage frame radiator comprises a frame (1), which consists of a water inlet pipe (11), a return pipe and radiating pipes (13); a radiating fin (2), which is fixed with the radiating pipes; and a radiating panel (3), which is fixed with the radiating pipes and shields the radiating fin. The water inlet pipe and return pipe are elliptical annular, the water inlet pipe is located at the upper part of return pipe, and the radi-

ating pipes wind around the elliptical annular water inlet pipe and the elliptical annular return pipe and is connected between the opposite sides of the water inlet pipe and the return pipe at intervals. The upper part of the water inlet pipe is equipped with a radiating cover. The radiating fin is formed with radiating fin cavity, and two sides thereof are formed with a radiating fin strip.

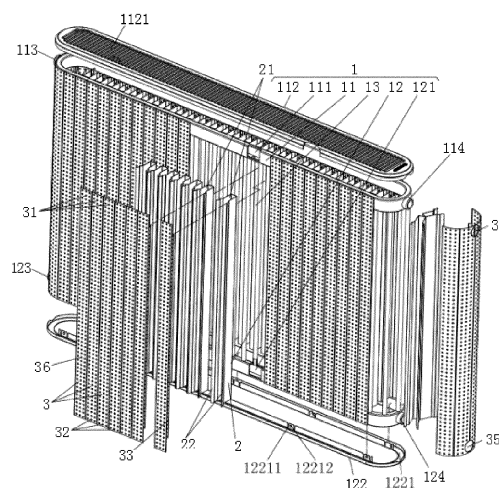


Fig. 1

Description

Field of the Invention

[0001] The invention belongs to the technical field of heating and ventilating facilities, and particularly relates to a cage frame radiator.

Background to the Invention

[0002] Radiator is a widely used heating facility in houses, hotels, offices, cultural and entertainment places, schools, military barracks and so on. As the description of "vertical steel plate radiator with built-in water inlet pipe" recommended by China Patent Publication No. CN106931801A commented: "Because the plate radiator formed by pressing steel plates has the advantages of low cost and good heat dissipation effect, the market demand is increasing". And the so-called steel plate radiator is formed by stamping two steel plates with the thickness of about 1-1.2mm which are matched face to face to form a main channel and a branch channel. And seal and weld the peripheral edge parts, and then firmly spot weld between the two layers of steel plates, and then fix the radiating fins on the steel plate facing outward in the use state, namely, a steel plate on the side facing away from the wall by spot welding. Although the steel plate radiator has the advantage of large heat dissipation, it can only bear the water pressure of about 0.8-1 MPa, so it can only be applied to household heating occasions, which is rare in central heating occasions in northern China.

[0003] There is no lack of technical information related to radiators in the published patent documents of China. The finned radiators include: CN2467998Y (combined multi-column aluminum alloy radiator), CN1841002A (improved radiator), CN2771782Y (steel-aluminum composite column finned radiator), CN2725824Y (radiator), CN1963368A (radiation fin and its manufacturing method), CN201149455Y (aluminum fin of composite finned radiator), CN201680750U (coupled fin radiator) and CN201892445U (stainless steel aluminum composite radiator), and so on. Although the fin radiator has the advantages of high heat transfer coefficient, low material energy consumption and relatively low cost, good mechanical strength and bearing capacity, and is not easy to be corroded, the manufacturing process is very strict and complicated, and it is easy to be blocked and difficult to clean (rinse) in use. As a result, it has gradually been snubbed by people and even in a state of comprehensive withdrawal from the market; The radiators, belonging to the category of steel tubular radiators (also called "plate radiators"), such as: CN204923953U (heating radiator), CN205690921 U (plate radiator) and CN106247823B (steel radiator), are not limited to the above-mentioned steel tubular radiators. Compared with fin radiators, they are much simpler in manufacturing process and can make up for the problem that fin radiators are difficult to

clean, so they are favored by people and occupy a dominant position in the market in recent years. However, due to the need to connect the front and rear radiation fins with a large number of fasteners, such as rivets, the radiating pipe is located between the front and rear radiation fins and the radiating pipe is in good and reliable contact with the opposite sides of the front and rear radiation fins, so the assembly efficiency is affected.

[0004] The above-mentioned steel tubular radiator, including the unnamed CN210118822U (copper pipe plate radiator), mainly has the following disadvantages: First, the heat of the radiating pipe is transferred to the radiation fin by heat transfer, and the radiation fin dissipates the heat, so the heat dissipation is relatively small. If it is applied to a relatively large space, it will be difficult to meet the expected heating requirements unless the volume of the whole radiator is increased or the number of radiators is increased, but these measures are not economical; Secondly, because only a hot water inlet pipe (used to be called "water inlet pipe") at the upper part and a cooling water outlet pipe (used to be called "return pipe") at the lower part are provided with radiating pipes which are respectively communicated with the hot water inlet pipe and the cooling water outlet pipe at intervals, the bearing capacity of water pressure is very limited, so it is critical for heating places; Third, because it is generally necessary to weld or rivet the heat sink, the assembly efficiency is low and welding will produce welding stress and damage the radiation fin; Fourth, due to the relatively complex structure, the number of equipment and molds used in the processing process is large and the cost is high.

Statement of Invention

[0005] It is an objective of the invention to provide a cage frame radiator which optimizes the heat transfer surface, the volume of the whole radiator, the cost, the bearing capacity, the assembly. The task of the present invention is to provide a cage frame radiator, which is helpful for reflecting good heat convection heat dissipation, improving heat dissipation efficiency, optimizing the structures and arrangement modes of water inlet and outlet pipes, radiating pipes and radiating fins, improving the water pressure bearing capacity, obviously expanding the heat dissipation area, and improving the use adaptability to heating places; and it is helpful for abandoning the use of fasteners to fix the radiating fins, improving the assembly efficiency and avoiding damaging the radiating fins in the assembly process. And it is convenient to reduce the number of parts to simplify the structure, reduce the amount of equipment used in the manufacturing process and reduce the corresponding molds to reduce the manufacturing cost and reflect good economic and cheap effects.

[0006] It is an objective of the invention to solve at least one of the drawbacks of the prior art.

[0007] The task of the present invention is accom-

plished in this way, a cage frame radiator comprises a frame, and the frame consists of a water inlet pipe, a return pipe and radiating pipes which are connected between the water inlet pipe and the return pipe at intervals and are communicated with the water inlet pipe cavity of the water inlet pipe and the return pipe cavity of the return pipe; radiating fins are fixed with the radiating pipes; at least one radiating panel is also fixed with the radiating pipes at positions corresponding to the outward side of the radiating fins and shields the radiating fins; remarkable in that the water inlet pipe and the return pipes are all in the shape of annulus with the same size, and the water inlet pipe is located at the upper part of the return pipe in the use state; the radiating pipes are distributed around the water inlet pipe and the return pipe and are connected between the opposite sides of the water inlet pipe and the return pipe at intervals, so that the overall shape of the frame forms a cage frame structure; and an elliptical annular radiating cover is arranged at the upper part of the elliptical annular water inlet pipe, the radiating fins are formed with a radiating fin cavity, and the radiating fin cavity corresponds to between two adjacent radiating pipes, and two sides of the cavity opening of the radiating fin cavity are respectively formed with a radiating fin forced clamping strip; the radiating fin forced clamping strip is embedded and fixed with at least one of the radiating pipes, the upper end of the radiating panel is extended with upper positioning pins of the radiating panel, and a lower end of the radiating panel is extended with lower positioning pins of the radiating panel; the upper positioning pins of the radiating panel match an outer wall of the water inlet pipe and the radiating cover; and the lower positioning pins of the radiating panel match to the outer wall of the return pipe and the lower positioning pin limiting displacement ring of the radiating panel embedded in a lower part of the return pipe in a height direction, and the lower positioning pin limiting displacement ring of the radiating panel is also in the shape of annulus; a central part of the radiating panel in the height direction and the side facing the radiating fin are embedded and fixed with the radiating pipes.

[0008] Preferably, a water inlet pipe left water inlet port communicating with the water inlet pipe cavity is fixed at the center of a circular arc surface at the left end of the water inlet pipe; and a water inlet pipe right water inlet port also communicating with the water inlet pipe cavity is fixed at the center of a circular arc surface at the right end of the water inlet pipe; the cage frame radiator is configured such that when the water inlet pipe left water inlet port is connected with a main hot water inlet pipe through an hot water introduction connecting pipe in the use state, the water inlet pipe right water inlet port is blocked by a screw plug; while when the water inlet pipe right water inlet port is connected with a main hot water inlet pipe through an hot water introduction connecting pipe in the use state, the water inlet pipe left water inlet port is blocked by a screw plug; a return pipe left return water port communicating with the return pipe cavity is

fixed at the center of the circular arc surface at the left end of the return pipe; while a return pipe right return water port also communicating with the return pipe cavity is fixed at the center of the circular arc surface at the right end of the return pipe; when the return pipe left return water port is connected with a main return pipe through a return water lead-out connecting pipe in the use state, the return pipe right return water port is blocked by a screw plug; while when the return pipe right return water port is connected with the main return pipe through the return water lead-out connecting pipe in the use state, the return pipe left return water port is blocked by a screw plug.

[0009] Preferably, a bottom wall of the water inlet cavity of the water inlet pipe is provided with a water inlet pipe outlet hole at a position corresponding to the upper end of the radiating pipes, and a top wall of the return pipe cavity of the return pipe is provided with a return pipe water inlet hole at a position corresponding to a lower end of the radiating pipes; the upper end of the radiating pipes is sealed and fixed with the water inlet pipe at a position corresponding to the water inlet pipe outlet hole, and the lower end of the radiating pipes is sealed and fixed with the return pipe at a position corresponding to the return pipe water inlet hole; and the radiating pipe cavity of the radiating pipes is communicated with both the water inlet pipe cavity and the return pipe cavity.

[0010] Preferably, on both sides of the radiating panel in the height direction and facing the radiating fins, a radiating panel forced clamping strip is respectively formed; and positions of the radiating panel forced clamping strips on two adjacent radiating panels correspond to each other and are clamped with the radiating pipes through the radiating fin forced clamping strip in a mutually matched state; the radiating panels are arranged in a semicircle shape at positions corresponding to a left and right end faces of the water inlet pipe and the return pipe; the thickness of the radiating fins is 0.2-0.4mm; and the radiating pipes are iron pipes or copper pipes with a circular cross section.

[0011] Preferably, a limiting displacement ring groove is formed on the upward side of the lower positioning pin limiting displacement ring of the at least one radiating panel and around the periphery of the lower positioning pin limiting displacement ring of the at least one radiating panel; and the limiting displacement ring groove is embedded with the lower part of the return pipe in the height direction, and the lower positioning pins of the at least one radiating panel is located between a groove wall of the limiting displacement ring groove and the outer wall of the return pipe.

[0012] Preferably, packing lugs are formed on a groove inner wall of the limiting displacement ring groove at intervals, and a packing flange is formed on one side of the packing lugs facing the limiting displacement ring groove; the packing flange clings to an inner wall of the return pipe, and the lower positioning pins of the radiating panel are inserted into the limiting displacement ring

groove and cling to an inner side of a groove outer wall of the limiting displacement ring groove.

[0013] Preferably, on the radiating panel and at a positions corresponding to the water inlet pipe left water inlet port and the water inlet pipe right water inlet port of the water inlet pipe, a water inlet pipe port receding hole of the radiating panel is respectively provided; and at positions corresponding to the return pipe left return water port and the return pipe right return water port of the return pipe are respectively provided with a return pipe port receding hole of the at least one radiating panel.

[0014] Preferably, cross sections of the water inlet pipe and the return pipe are rectangular and the wall thickness is 1.1-1.3 mm.

[0015] Preferably, the upper surface of the radiating cover is provided with radiating grooves distributed in a grid; veneer pits are formed in a dense state on the outward facing side of the radiating panel.

[0016] Preferably, the at least one radiating panel is a steel plate or an aluminum plate with a thickness of 0.2-0.4mm.

[0017] The technical effects of the technical scheme provided by the invention are as follows: Firstly, due to the use of the elliptical annular water inlet pipe, the return pipe and the radiating pipe connected between the opposite side of the water inlet pipe and the return pipe at intervals, the overall structure of the frame is a cage frame structure; Therefore, the heat dissipation mode is dominated by heat convection, which is helpful to reflect good heat dissipation effect and significantly improve heat dissipation efficiency; Secondly, due to the reasonable structure and arrangement mode of the water inlet pipe, the return pipe, the radiating pipe and the radiating fin, the water pressure bearing capacity can be improved, the radiating area can be expanded and the adaptability to the heating place with relatively large space can be improved; Thirdly, because the radiating fin and the radiating panel are embedded and fixed with the radiating pipe, the assembly efficiency can be improved without using fasteners, and the radiating fin and the radiating panel can be prevented from being damaged in the assembly process; Fourthly, because the number of parts of the whole radiator is significantly reduced, the structure can be simplified, the amount of equipment used in the manufacturing process and the corresponding molds can be reduced, and the manufacturing cost can be significantly reduced and the economical and cheap effect can be realized.

Brief description of the drawings

[0018]

Fig. 1 is a structural diagram of an embodiment of the present invention.

Fig. 2 is a schematic view of the frame formed into a cage structure by the water inlet pipe, return pipe and radiating pipe as shown in Fig. 1.

Fig. 3 is a schematic view of the radiating fin and the radiating panel being embedded and fixed with the radiating pipe as shown in Fig. 1.

Fig. 4 is an enlarged view of part A of Fig. 3.

Detailed description

[0019] In order to understand the technical essence and beneficial effects of the present invention more clearly, the applicant will make a detailed explanation in the form of embodiments below, but the description of the embodiments is not a limitation to the scheme of the present invention; and any equivalent transformation made only in form but not in substance according to the concept of the present invention should be regarded as the technical scheme of the present invention.

[0020] In the following description, all the concepts related to up, down, first side, second side, front and back directionality or azimuth are based on the current position state shown in Fig. 1, so it cannot be understood as a special limitation to the technical scheme provided by the present invention. The expression "left" may correspond to the expression "first side", and the expression "right" may correspond to "second side"; which is opposite to the first side. The cage frame radiator comprises a height, a thickness and a length. The height is along the vertical direction; the thickness and the length are measured horizontally; in the use configuration. The thickness is smaller than the height and the length. The left and the right are at the opposite with respect to the length.

[0021] Referring to Figs. 1 and 2, there is shown a frame 1, and the frame 1 consists of a water inlet pipe 11, a return pipe 12 and a, preferably several radiating pipes 13 which are preferably sealed by welding, and is connected between the water inlet pipe 11 and the return pipe 12 at intervals and is communicated with the water inlet pipe cavity 111 of the water inlet pipe 11 and the return pipe cavity 121 of the return pipe 12; And there is shown a radiating fin 2, and the radiating fin 2 is fixed with the radiating pipe 13; And there is shown a radiating panel 3, the radiating panel 3 is also fixed with the radiating pipe 13 at a position corresponding to the outward side of the radiating fin 2 and shields the radiating fin 2.

[0022] As the technical points of the technical scheme provided by the invention: The water inlet pipe 11 and the return pipe 12 are elliptical annular with the same shape and size, and the water inlet pipe 11 is located at the upper part of the return pipe 12 in the use state; The radiating pipe 13 winds around the elliptical annular water inlet pipe 11 and the elliptical annular return pipe 12 and is connected between the opposite sides of the water inlet pipe 11 and the return pipe 12 at intervals, so that the overall shape of the frame 1 forms a squirrel-cage (also called "cage" for short) frame structure as shown in Fig. 2; And an elliptical annular radiating cover 112 is arranged at the upper part of the elliptical annular water inlet pipe 11; The radiating fins 2 are formed with a radiating fin cavity 21, and the radiating fin cavity 21 corre-

sponds to between two adjacent radiating pipes 13, and two sides of the cavity opening of the radiating fin cavity 21 are respectively formed with a radiating fin forced clamping strip 22; The radiating fin forced clamping strip 22 is embedded and fixed with the radiating pipe 13, the upper end of the radiating panel 3 is extended with upper positioning pins 31 of the radiating panel, and the lower end of the radiating panel 3 is extended with lower positioning pins 32 of the radiating panel; The height of the upper positioning pins 31 of the radiating panel is adapted to the height of the water inlet pipe 11 and corresponds to the outer wall of the water inlet pipe 11; And the upper positioning pins 31 of the radiating panel is defined by the radiating cover 112, that is, it is defined by the radiating cover 112 within the radiating cover cavity of the radiating cover 112; The height of the lower positioning pins 32 of the radiating panel is adapted to the height of return pipe 12 and corresponds to the outer wall of return pipe 12; And the lower positioning pins 32 of the radiating panel is defined by the lower positioning pin limiting displacement ring 122 of the radiating panel embedded in the lower part of the return pipe 12 in the height direction, and the lower positioning pin limiting displacement ring 122 of the radiating panel is also elliptical annular; The central part of the radiating panel 3 in the height direction and the side facing the radiating fins 2 are embedded and fixed with the area of the radiating pipe 13 in the height direction (that is, embedded and fixed with the radiating pipe 13).

[0023] The aforementioned radiating fins 2 are preferably roll-formed by roll-forming equipment.

[0024] With continued reference to Figs. 1 and 2, according to professional knowledge, as the aforementioned water inlet pipe 11 and return pipe 12 are in the shape of elliptical annular, the left and right ends of the water inlet pipe 11 and return pipe 12 are both in the shape of circular arcs, and the outward-facing side surface and the inward-facing side surface are both in the shape of circular arcs. According to the present invention, a water inlet pipe left water inlet port 113 communicating with the water inlet pipe cavity 111 is fixed at the center of the circular arc surface at the left end of the water inlet pipe 11; And a water inlet pipe right water inlet port 114 also communicating with the water inlet pipe cavity 111 is fixed at the center of the circular arc surface at the right end of the water inlet pipe 11; In the use state, when the water inlet pipe left water inlet port 113 is connected with the main hot water inlet pipe through the hot water introduction connecting pipe, the water inlet pipe right water inlet port 114 is blocked by a screw plug or similar plug; On the contrary, in the use state, when the water inlet pipe right water inlet port 114 is connected with the main hot water inlet pipe through the hot water introduction connecting pipe, the water inlet pipe left water inlet port 113 is blocked by a screw plug or similar plug. With this design, it is possible to flexibly cope with, that is, flexibly adapt to, the position of the main inlet pipe port on the main hot water inlet pipe. For example, when the position

of the main inlet pipe port basically corresponds to the water inlet pipe left water inlet port 113, the water inlet pipe left water inlet port is enabled; While when the position of the main inlet pipe port basically corresponds to the water inlet pipe right water inlet port 114, the water inlet pipe right water inlet port is enabled. For the same reason, a return pipe left return water port 123 communicating with the return pipe cavity 121 is fixed at the center of the circular arc surface at the left end of the return pipe 12; While a return pipe right return water port 124 also communicating with the return pipe cavity 121 is fixed at the center of the circular arc surface at the right end of the return pipe 12; In the use state, when the return pipe left return water port 123 is connected with the port of the main return pipe through the return water lead-out connecting pipe, the return pipe right return water port 124 is blocked by a screw plug or similar plug; On the contrary, in the use state, when the return pipe right return water port 124 is connected with the port of the main return pipe through the return water lead-out connecting pipe, the return pipe left return water port 123 is blocked by a screw plug or similar plug. The reason for adopting this design is as described above for the main hot water inlet pipe, which can play a role in adaptable selection. The aforementioned main hot water inlet pipe and main return pipe are usually public pipelines laid by central heating units.

[0025] Refer to Fig. 2, the bottom wall of the water inlet cavity 111 of the water inlet pipe 11 is provided with a water inlet pipe outlet hole 1111 at the position corresponding to the upper end of the radiating pipe 13, and the top wall of the return pipe cavity 121 of the return pipe 12 is provided with a return pipe water inlet hole 1211 at the position corresponding to the lower end of the radiating pipe 13; The upper end of the radiating pipe 13 is sealed and fixed with the water inlet pipe 11 by welding preferably at the position corresponding to the water inlet pipe outlet hole 1111, and the lower end of the radiating pipe 13 is sealed and fixed with the return pipe 12 by welding preferably at the position corresponding to the return pipe water inlet hole 1211. And the radiating pipe cavity 131 of the radiating pipe 13 is simultaneously communicated with the water inlet pipe cavity 111 and the return pipe cavity 121. According to professional knowledge, each radiating pipe 13 has the aforementioned water inlet pipe outlet hole 1111 and return pipe water inlet hole 1211.

[0026] Hot water is introduced into the water inlet pipe cavity 111 from the water inlet pipe left water inlet port 113 or the water inlet pipe right water inlet port 114 by the main hot water inlet pipe through the hot water introduction connecting pipe; The hot water is introduced into the radiating pipe cavity 131 of the radiating pipe 13 through the water inlet pipe outlet hole 1111, then into the return pipe cavity 121 through the return pipe water inlet hole 1211, and then introduced into the main return pipe through the return water lead-out connecting pipe from the return pipe left return water port 123 or the return

pipe right return water port 124, thus forming a cycle.

[0027] In the above process, indoor air enters from the bottom of the frame cavity of the frame 1 until it is led out from the radiating cover 112, which plays a good role in heat convection.

[0028] Referring to Figs. 3 and 4 in conjunction with Fig. 1, on both sides of the radiating panel 3 in the height direction and facing the radiating fin 2, a radiating panel forced clamping strip 33 is respectively formed; And the positions of the radiating panel forced clamping strips 33 on two adjacent radiating panels 3 correspond to each other and are clamped with the radiating pipe 13 through the radiating fin forced clamping strip 22 in a mutually matched state. That is to say, the radiating panel forced clamping strip 33 is clamped with the radiating pipe 13 in such a way that it is overlapped and clamped with the outer side of the radiating fin forced clamping strip 22. Here, the height direction of the radiating panel 3 is the area corresponding to the height direction of the radiating pipe 13, excluding the areas of the upper and lower limiting displacement pins 31 and 32 of the radiating panel. Specifically, the areas of the upper and lower limiting displacement pins 31 and 32 of the radiating panel are free of the radiating panel forced clamping strip 33. The radiating panels 3 are arranged in a semicircle shape at positions corresponding to the left and right end faces of the water inlet pipe 11 and the return pipe 12. The same is true for the aforementioned radiating fin 2 with the same height as the radiating pipe 13, and the thickness of the radiating fin 2 is preferably 0.2-0.4mm, preferably 0.25-0.35mm, and most preferably 0.3mm (0.3mm is selected in this embodiment), which can not only ensure the strength, but also reduce the weight. In this embodiment, the radiating pipe 13 is a copper pipe, but it can also be an iron pipe or other similar pipe, and its cross-sectional shape is circular.

[0029] As can be seen from the above description, the radiating fin 2 and the radiating panel 3 are assembled one by one.

[0030] Focus on Fig. 1, a limiting displacement ring groove 1221 is formed on the upward side of the lower positioning pin limiting displacement ring 122 of the radiating panel and around the periphery of the lower positioning pin limiting displacement ring 122 of the radiating panel; And the limiting displacement ring groove 1221 is embedded with the lower part of the return pipe 12 in the height direction, and the lower positioning pins 32 of the radiating panel is located between the groove wall of the limiting displacement ring groove 1221 and the outer wall of the return pipe 12.

[0031] And packing lugs 12211 are formed on the groove inner wall of the limiting displacement ring groove 1221 at intervals, and a packing flange 12212 is formed on one side of the packing lugs 12211 facing the limiting displacement ring groove 1221; The packing flange 12212 clings to the inner wall of the return pipe 12, and the lower positioning pins 32 of the radiating panel is inserted into the limiting displacement ring groove 1221

and clings to the inner side of the groove outer wall of the limiting displacement ring groove 1221.

[0032] As shown in Fig. 1, on the radiating panel 3 and at the positions corresponding to the water inlet pipe left water inlet port 113 and the water inlet pipe right water inlet port 114 of the water inlet pipe 11, a water inlet pipe port receding hole 34 of the radiating panel is respectively provided; And at the positions corresponding to the return pipe left return water port 123 and the return pipe right return water port 124 of the return pipe 12 are respectively provided with a return pipe port receding hole 35 of the radiating panel.

[0033] And the cross sections of the water inlet pipe 11 and the return pipe 12 are rectangular (Rectangular shape is selected in this embodiment) and the wall thickness is preferably 1.1-1.3mm, most preferably 1.2mm (1.2mm is selected in this embodiment).

[0034] As shown in Fig. 1, the upper surface of the radiating cover 112 is provided with radiating grooves (1121) distributed in a grid for leading out hot air; Veneer pits 36 are formed in a dense state on the outward facing side of the radiating panel 3.

[0035] The thickness of the radiating panel 3 is preferably 0.2-0.4mm and preferably 0.3mm, but an aluminum plate can also be used (an aluminum plate with a thickness of 0.3mm is selected in this embodiment).

[0036] To sum up, the technical scheme provided by the invention makes up for the shortcomings in the prior art, successfully completes the invention task, and faithfully fulfills the technical effects described by the applicant in the technical effect column above.

Claims

1. A cage frame radiator comprises a frame (1), and the frame (1) consists of a water inlet pipe (11), a return pipe (12) and radiating pipes (13) which are connected between the water inlet pipe (11) and the return pipe (12) at intervals and are communicated with the water inlet pipe cavity (111) of the water inlet pipe (11) and the return pipe cavity (121) of the return pipe (12); radiating fins (2) are fixed with the radiating pipes (13); at least one radiating panel (3) is also fixed with the radiating pipes (13) at positions corresponding to the outward side of the radiating fins (2) and shields the radiating fins (2); **characterized in that** the water inlet pipe (11) and the return pipes (12) are all in the shape of annulus with the same size, and the water inlet pipe (11) is located at the upper part of the return pipe (12) in the use state; the radiating pipes (13) are distributed around the water inlet pipe (11) and the return pipe (12) and are connected between the opposite sides of the water inlet pipe (11) and the return pipe (12) at intervals, so that the overall shape of the frame (1) forms a cage frame structure; and an elliptical annular radiating cover (112) is arranged at the upper part of the

elliptical annular water inlet pipe (11), the radiating fins (2) are formed with a radiating fin cavity (21), and the radiating fin cavity (21) corresponds to between two adjacent radiating pipes (13), and two sides of the cavity opening of the radiating fin cavity (21) are respectively formed with a radiating fin forced clamping strip (22); the radiating fin forced clamping strip (22) is embedded and fixed with at least one of the radiating pipes (13), the upper end of the radiating panel (3) is extended with upper positioning pins (31) of the radiating panel, and a lower end of the radiating panel (3) is extended with lower positioning pins (32) of the radiating panel; the upper positioning pins (31) of the radiating panel match an outer wall of the water inlet pipe (11) and the radiating cover (112); and the lower positioning pins (32) of the radiating panel match to the outer wall of the return pipe (12) and the lower positioning pin limiting displacement ring (122) of the radiating panel embedded in a lower part of the return pipe (12) in a height direction, and the lower positioning pin limiting displacement ring (122) of the radiating panel is also in the shape of annulus; a central part of the radiating panel (3) in the height direction and the side facing the radiating fin (2) are embedded and fixed with the radiating pipes (13).

2. The cage frame radiator, as claimed in claim 1, **characterized in that** a water inlet pipe left water inlet port (113) communicating with the water inlet pipe cavity (111) is fixed at the center of a circular arc surface at the left end of the water inlet pipe (11); and a water inlet pipe right water inlet port (114) also communicating with the water inlet pipe cavity (111) is fixed at the center of a circular arc surface at the right end of the water inlet pipe (11); the cage frame radiator is configured such that when the water inlet pipe left water inlet port (113) is connected with a main hot water inlet pipe through an hot water introduction connecting pipe in the use state, the water inlet pipe right water inlet port (114) is blocked by a screw plug; while when the water inlet pipe right water inlet port (114) is connected with a main hot water inlet pipe through an hot water introduction connecting pipe in the use state, the water inlet pipe left water inlet port (113) is blocked by a screw plug; a return pipe left return water port (123) communicating with the return pipe cavity (121) is fixed at the center of the circular arc surface at the left end of the return pipe (12); while a return pipe right return water port (124) also communicating with the return pipe cavity (121) is fixed at the center of the circular arc surface at the right end of the return pipe (12); when the return pipe left return water port (123) is connected with a main return pipe through a return water lead-out connecting pipe in the use state, the return pipe right return water port (124) is blocked by a screw plug; while when the return pipe right return water

port (124) is connected with the main return pipe through the return water lead-out connecting pipe in the use state, the return pipe left return water port (123) is blocked by a screw plug.

3. The cage frame radiator, as claimed in claim 1, **characterized in that** a bottom wall of the water inlet cavity (111) of the water inlet pipe (11) is provided with a water inlet pipe outlet hole (1111) at a position corresponding to the upper end of the radiating pipes (13), and a top wall of the return pipe cavity (121) of the return pipe (12) is provided with a return pipe water inlet hole (1211) at a position corresponding to a lower end of the radiating pipes (13); the upper end of the radiating pipes (13) is sealed and fixed with the water inlet pipe (11) at a position corresponding to the water inlet pipe outlet hole (1111), and the lower end of the radiating pipes (13) is sealed and fixed with the return pipe (12) at a position corresponding to the return pipe water inlet hole (1211); and the radiating pipe cavity (131) of the radiating pipes (13) is communicated with both the water inlet pipe cavity (111) and the return pipe cavity (121).
4. The cage frame radiator, as claimed in claim 1, **characterized in that** on both sides of the radiating panel (3) in the height direction and facing the radiating fins (2), a radiating panel forced clamping strip (33) is respectively formed; and positions of the radiating panel forced clamping strips (33) on two adjacent radiating panels (3) correspond to each other and are clamped with the radiating pipes (13) through the radiating fin forced clamping strip (22) in a mutually matched state; the radiating panels (3) are arranged in a semicircle shape at positions corresponding to a left and right end faces of the water inlet pipe (11) and the return pipe (12); the thickness of the radiating fins (2) is 0.2-0.4mm; and the radiating pipes (13) are iron pipes or copper pipes with a circular cross section.
5. The cage frame radiator, as claimed in claim 1, **characterized in that** a limiting displacement ring groove (1221) is formed on the upward side of the lower positioning pin limiting displacement ring (122) of the at least one radiating panel and around the periphery of the lower positioning pin limiting displacement ring (122) of the at least one radiating panel; and the limiting displacement ring groove (1221) is embedded with the lower part of the return pipe (12) in the height direction, and the lower positioning pins (32) of the at least one radiating panel is located between a groove wall of the limiting displacement ring groove (1221) and the outer wall of the return pipe (12).
6. The cage frame radiator, as claimed in claim 5, **characterized in that** packing lugs (12211) are formed on a groove inner wall of the limiting displacement

ring groove (1221) at intervals, and a packing flange (12212) is formed on one side of the packing lugs (12211) facing the limiting displacement ring groove (1221); the packing flange (12212) clings to an inner wall of the return pipe (12), and the lower positioning pins (32) of the radiating panel are inserted into the limiting displacement ring groove (1221) and cling to an inner side of a groove outer wall of the limiting displacement ring groove (1221).

7. The cage frame radiator, as claimed in claim 2, **characterized in that** on the radiating panel (3) and at positions corresponding to the water inlet pipe left water inlet port (113) and the water inlet pipe right water inlet port (114) of the water inlet pipe (11), a water inlet pipe port receding hole (34) of the radiating panel is respectively provided; and at positions corresponding to the return pipe left return water port (123) and the return pipe right return water port (124) of the return pipe (12) are respectively provided with a return pipe port receding hole (35) of the at least one radiating panel.
8. The cage frame radiator, as claimed in any one of claims 1-7, **characterized in that** cross sections of the water inlet pipe (11) and the return pipe (12) are rectangular and the wall thickness is 1.1-1.3 mm.
9. The cage frame radiator, as claimed in claim 1, 4 or 7, **characterized in that** the upper surface of the radiating cover (112) is provided with radiating grooves (1121) distributed in a grid; veneer pits (36) are formed in a dense state on the outward facing side of the radiating panel (3).
10. The cage frame radiator, as claimed in claim 9, **characterized in that** the at least one radiating panel (3) is a steel plate or an aluminum plate with a thickness of 0.2-0.4mm.

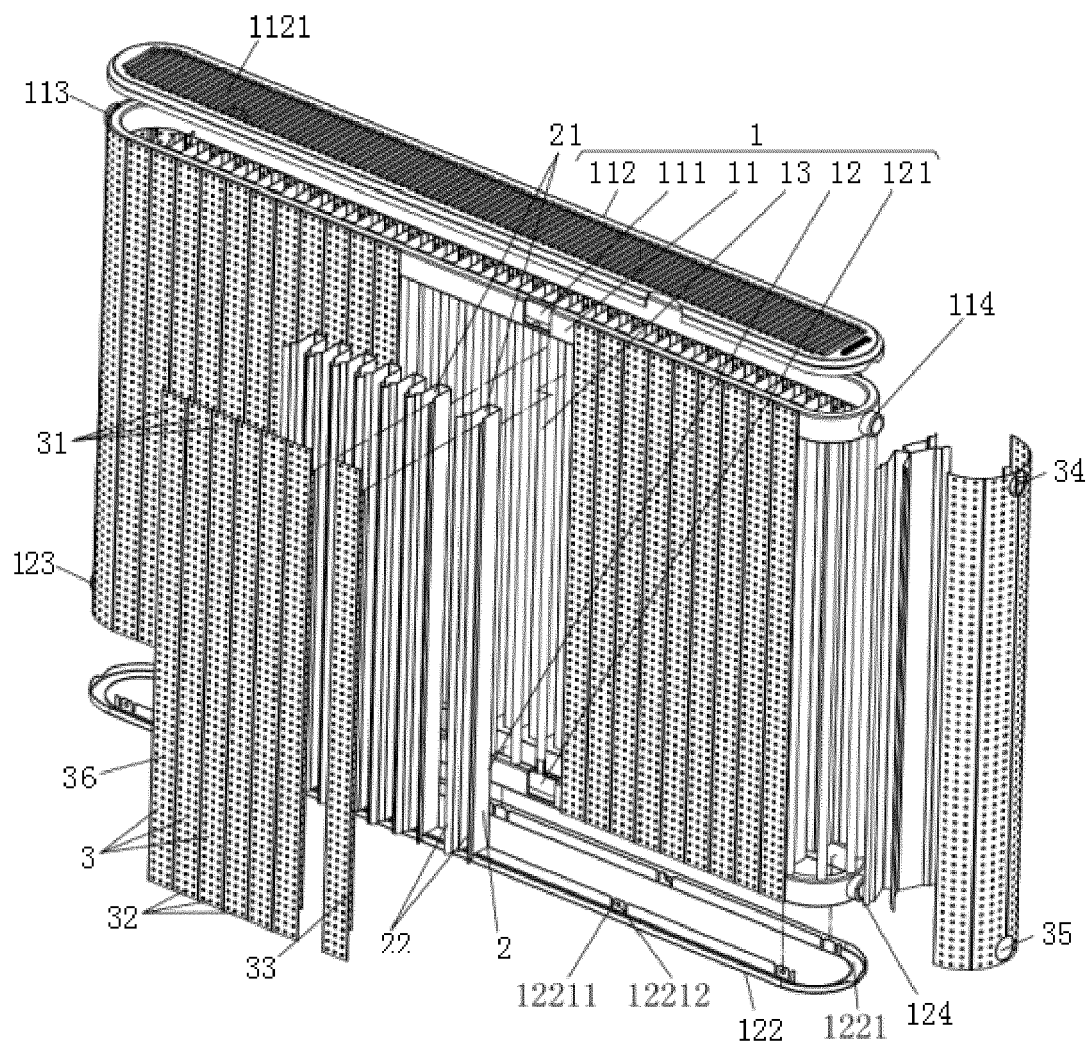


Fig. 1

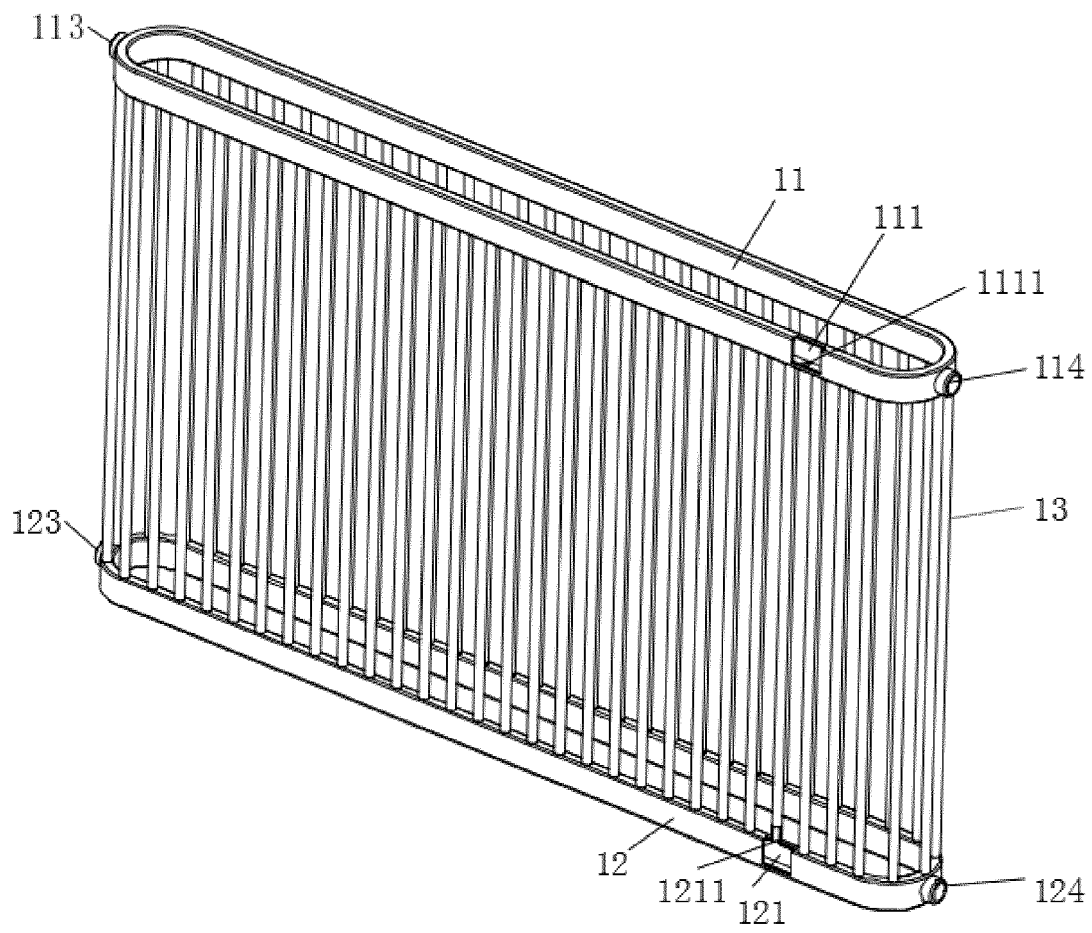


Fig. 2

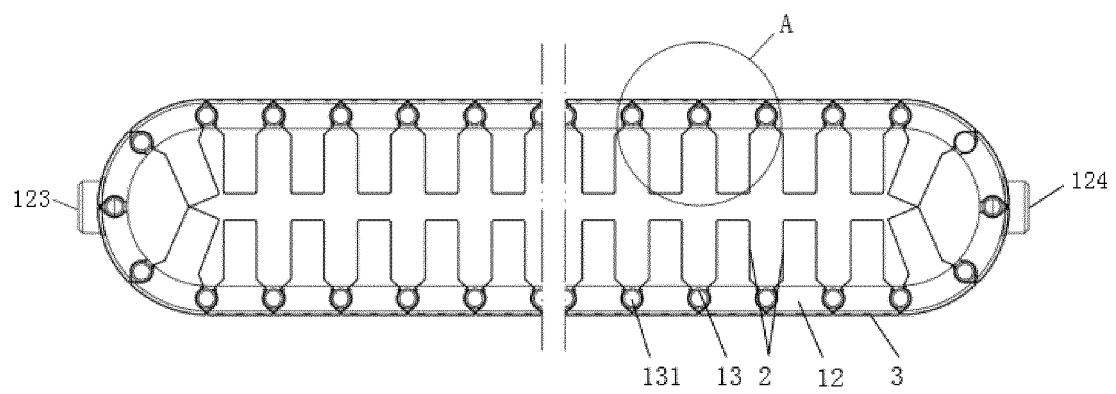


Fig. 3

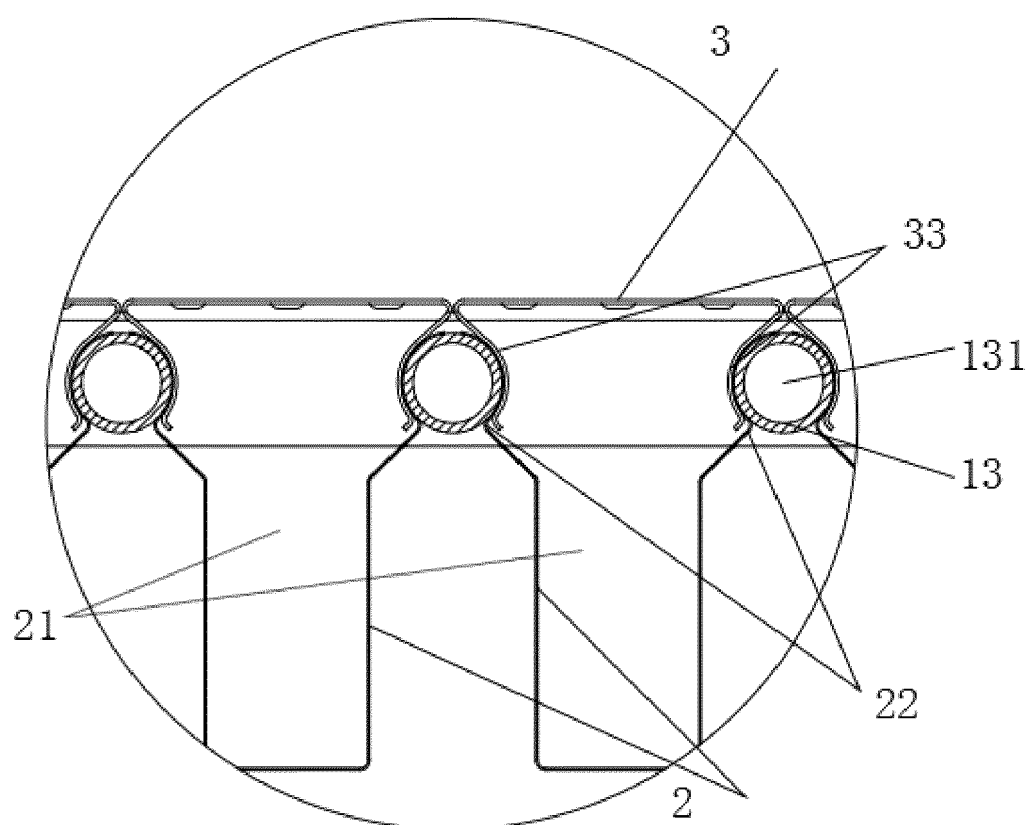


Fig. 4



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