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(54) **Evaporation type condensation radiator piping for refrigeration and air-conditioning facilities**

(57) Condensation radiator piping having a special structure, particularly condensation radiator piping that is applicable to an air-cooling and water-membrane

evaporation type of refrigeration or air-conditioning facility, characterized in a structure that has cooling agent condensation piping (1) designed to have a section in the shape of a streamlined water drop.

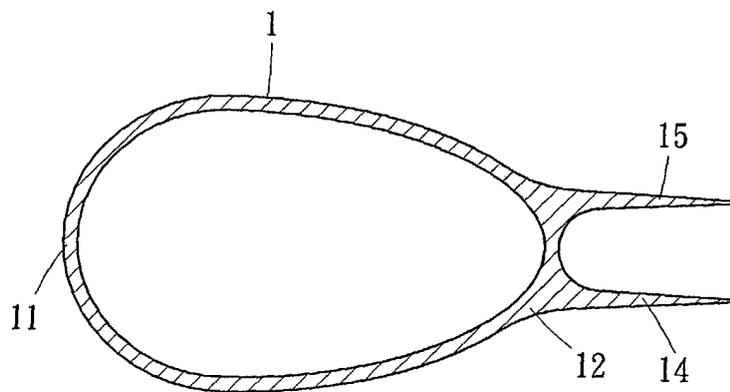


Fig. 3

Description**BACKGROUND OF THE INVENTION**

[0001] All conventional air-conditioning or refrigerating facilities using a refrigerant to cool down temperature inevitably involve a heat exchange process in their condensation refrigerant piping system; an air-conditioner or refrigerating facility usually conducts heat exchange radiation in an air-cooling, water-cooling or evaporation process, to save energy or enhance the EER value of the air-conditioner or the refrigerator.

[0002] The condensation radiation piping used in conventional refrigerating facility or air-conditioning facility is a copper pipe with a round diameter; the copper material is adopted mainly for its high cold or heat conduction efficiency, the round pipe is also fitted with aluminum radiating fins to achieve anticipated radiating or heat exchange objectives. But due to the high speed of refrigerant passing through the round diameter of conventional cold or heat exchange pipe, whether it is applied to an air-cooling, evaporating or water-immersed type of heat exchange refrigerant tube, a turbulence may occur on the outside of the tube, resulting in such weaknesses as escaping evaporation membrane, lacking of radiating area and failure of enhanced heat exchange radiation efficiency.

[0003] In view of the aforementioned weaknesses of conventional round-shaped cold/heat exchange media, the inventor has been devoted to the research of cold/heat exchange devices, based on more than ten years experience in refrigeration and air-conditioner fields, and has come up with this invention.

[0004] The condensation radiating piping with a section shaped like a streamlined water drop is suitable for applications to air-cooling and water-membrane evaporation type refrigerating and air-conditioning facility, so air force can pass through the entire surface of the pipe wall along the streamline, to increase air flow speed, furthermore, in the additional process of atomization or water drop applying to water membrane, the speed of refrigerant passing through the pipe can be reduced, thereby increasing the time of water membrane sticking on the outside of pipe, increasing heat cycle evaporation and radiation, absorbing large amounts of potential heat from evaporation, significantly reducing refrigerant temperature, sufficiently developing evaporation type cooling effects, and enhancing EER.

SUMMARY OF THE INVENTION

[0005] The present invention relates to a condensation radiator piping specially designed for application to evaporation type refrigeration or air-conditioning facilities, having its refrigerant condensation piping designed to have a section in the shape of a streamlined water drop shape, optionally having an extension of radiation conduction flow fins on one end to upgrade its heat ex-

change efficiency.

BRIEF DESCRIPTION OF DRAWINGS

[0006]

FIG. 1 is a section view of the present invention of condensation radiation pipe for evaporation type refrigerating or air-conditioning facility.

FIG. 2 is a section view of the present invention of condensation radiation pipe with an extension of conduction fin, for application to evaporation type refrigerating or air-conditioning facility.

FIG. 3 is a section view of the present invention of condensation radiation pipe with more than one conduction fin, for application to evaporation type refrigerating or air-conditioning facility.

FIG. 4 is a section view of the present invention of condensation radiation pipe with an extension of an arched conduction fin, for application to evaporation type refrigerating or air-conditioning facility.

FIG. 5 is a section view of air flowing through the condensation radiation pipe of FIG. 1.

FIG. 6 is a section view of air flowing through the condensation radiation pipe of FIG. 2.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0007] As shown in FIG. 1 which illustrates the present invention of condensation radiation pipe 1 for evaporation type refrigerating and air-conditioning facilities, the condensation radiating pipe 1 is designed to have a section in the shape of a streamlined water drop, having a large arch 11 at one end and a small arch 12 at the other end, to be installed in a evaporation type refrigerating or air-conditioning facility. When the condensation radiation pipe 1 is installed, the large arch 11 is fixed to face an outlet of the fan blower.

[0008] The present invention of condensation radiating pipe 1 in the shape of a streamlined water drop is specially applicable to heat exchange radiation in an "evaporation condensation radiation system" adopted by a refrigerating or air-conditioning facility.

[0009] As shown in FIG. 5, the condensation radiating pipe 1 has a stylishly streamlined and elongated surface, so air can flow along the entire surface of a pipe wall, thereby increasing the speed of air flow, furthermore, during an additional atomizing process or water drop applied in water membrane by evaporation type condensation, it will increase heat circulation evaporation and radiation, and sufficiently develop EER efficiency of evaporation type cooling system.

[0010] As shown in FIGS. 2 and 6, when in application, the condensation radiating pipe 1 can have an extension of a radiating conduction fin 13 to the small arch 12; obviously it will increase the area for radiation, enable smooth passage of air flow to the tail end, prevent

turbulence, promote the time of water membrane sticking to the surface, and obtain better radiating efficiency.

[0011] As shown in FIG. 3, the radiating conduction fin 13 extending from the small arch 12 of the condensation radiation pipe 1 is optionally made in the shape of a plurality of radiating conduction fins 14, 15. 5

[0012] As shown in FIG. 4, the radiating conduction fin 13 extending from the small arch 12 of the condensation radiation pipe 1 is optionally made in the shape of an arched radiating conduction fin 16, to promote the conduction direction of air flow, to increase the time of water membrane sticking on the surface, so as to obtain more conspicuous condensation radiation efficiency for the evaporation of liquid. 10

[0013] To conclude, the invention has a condensation radiation pipe 1 in the shape of a streamlined water drop, which also includes a radiating conduction fin 13 and an arched radiating conduction fin 16, to increase heat exchange efficiency of evaporation type refrigerant, which should be no problem in terms of current technology, and therefore this application is filed for a patent right. 15 20

Claims 25

1. A condensation radiation pipe for evaporation type refrigerating or air-conditioning facility, having a section in a shape of a streamlined water drop, the water drop having a larger arch at one end and a small arch at another end thereof. 30
2. The condensation radiation pipe of claim 1, wherein, on the small arch of the condensation radiation pipe is an extension of a radiating conduction fin. 35
3. The condensation radiation pipe of claim 1, wherein, the radiating conduction fin extending from the small arch of the condensation radiation pipe is optionally made in the shape of a plurality of radiating conduction fins. 40
4. The condensation radiation pipe of claim 2, wherein, the radiating conduction fin extending from the small arch of the condensation radiation pipe is optionally made in the shape of an arched radiating conduction fin. 45

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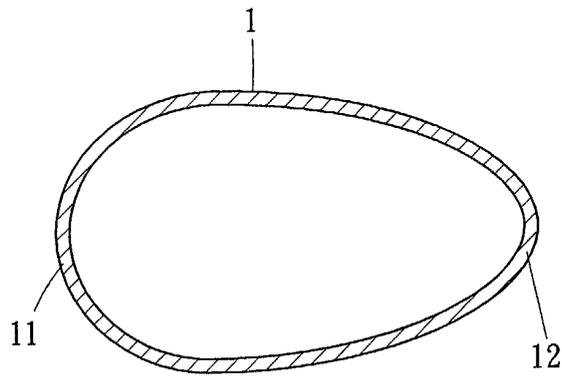


Fig. 1

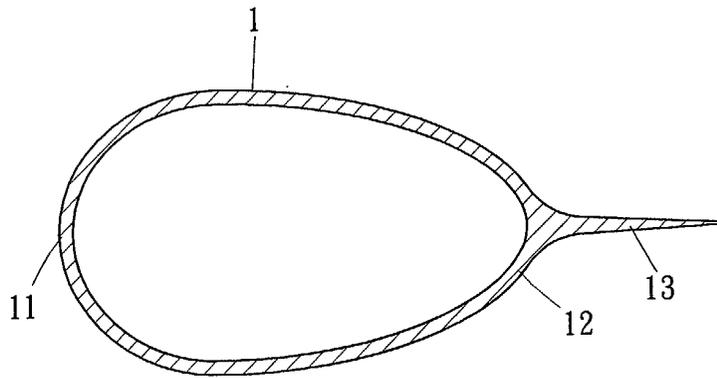


Fig. 2

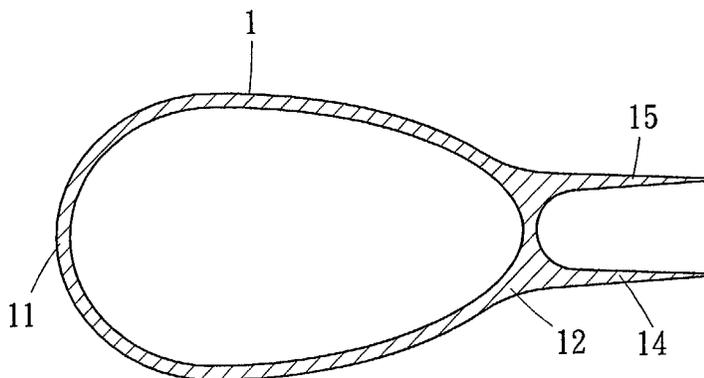


Fig. 3

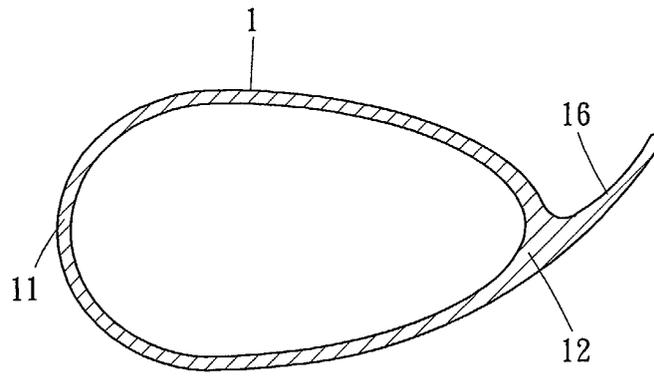


Fig. 4

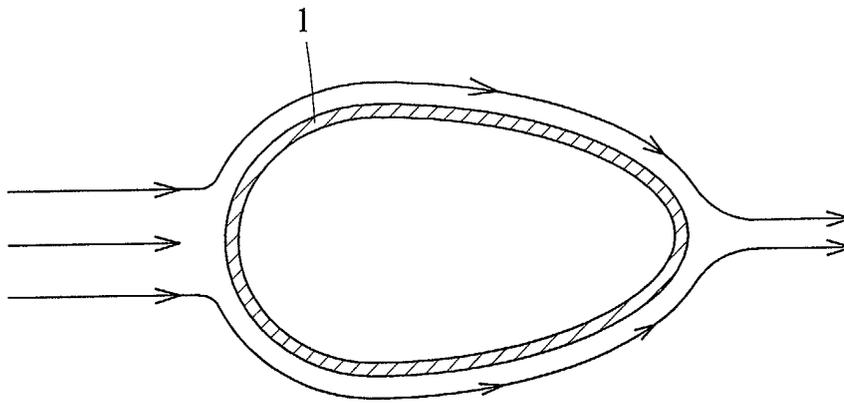


Fig. 5

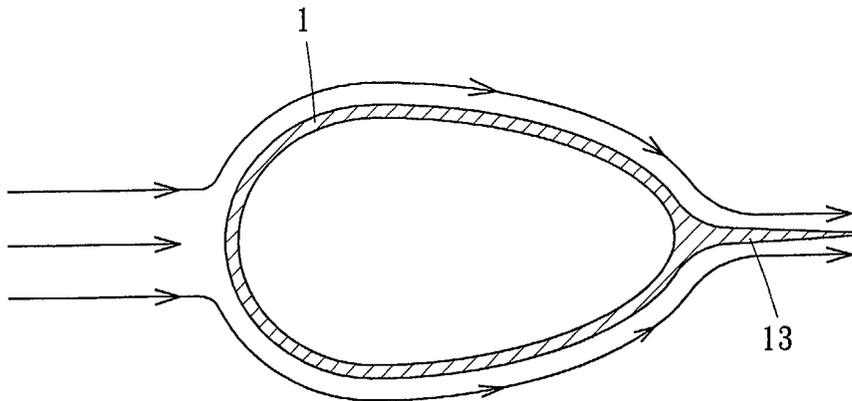


Fig. 6



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EUROPEAN SEARCH REPORT

Application Number
EP 03 25 0237

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	FR 926 146 A (MERTZ ALFRED) 23 September 1947 (1947-09-23) * figure 3 *	1-4	F28F1/02 F28D5/02
X	--- US 3 885 936 A (LIMEBEER GERALD JOHN NICHOLSON) 27 May 1975 (1975-05-27) * figure 5 *	1	
X	--- GB 397 358 A (HILDING SANDBERG) 24 August 1933 (1933-08-24) * figures 2-5 *	1	
X	--- US 5 355 946 A (WEI WILLIAM ET AL) 18 October 1994 (1994-10-18) * figure 1 *	1	
X	--- GB 468 980 A (HAROLD LIVSEY) 16 July 1937 (1937-07-16) * figure 1 *	1	
X	--- PATENT ABSTRACTS OF JAPAN vol. 2000, no. 11, 3 January 2001 (2001-01-03) & JP 2000 234882 A (DENSO CORP), 29 August 2000 (2000-08-29) * abstract *	1	TECHNICAL FIELDS SEARCHED (Int.Cl.7) F28F F28D
X	--- PATENT ABSTRACTS OF JAPAN vol. 012, no. 332 (M-738), 8 September 1988 (1988-09-08) & JP 63 096490 A (ISHIKAWAJIMA HARIMA HEAVY IND CO LTD), 27 April 1988 (1988-04-27) * abstract *	1	
X	--- GB 471 553 A (EDWIN JAMES BOWMAN) 7 September 1937 (1937-09-07) * figure 1 *	1	
The present search report has been drawn up for all claims			
Place of search MUNICH		Date of completion of the search 28 May 2003	Examiner Bain, D
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ----- & : member of the same patent family, corresponding document	

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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 03 25 0237

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on the European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

28-05-2003

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
FR 926146	A	23-09-1947	NONE	
US 3885936	A	27-05-1975	GB 1422611 A	28-01-1976
			ZA 7201381 A	31-10-1973
			AU 476906 B2	07-10-1976
			AU 5256073 A	29-08-1974
			DE 2309937 A1	13-09-1973
			FR 2174218 A1	12-10-1973
			US 3969448 A	13-07-1976
GB 397358	A	24-08-1933	NONE	
US 5355946	A	18-10-1994	DE 4234006 A1	14-04-1994
			FR 2696822 A1	15-04-1994
			GB 2271418 A ,B	13-04-1994
GB 468980	A	16-07-1937	NONE	
JP 2000234882	A	29-08-2000	NONE	
JP 63096490 2	A		NONE	
GB 471553	A	07-09-1937	NONE	