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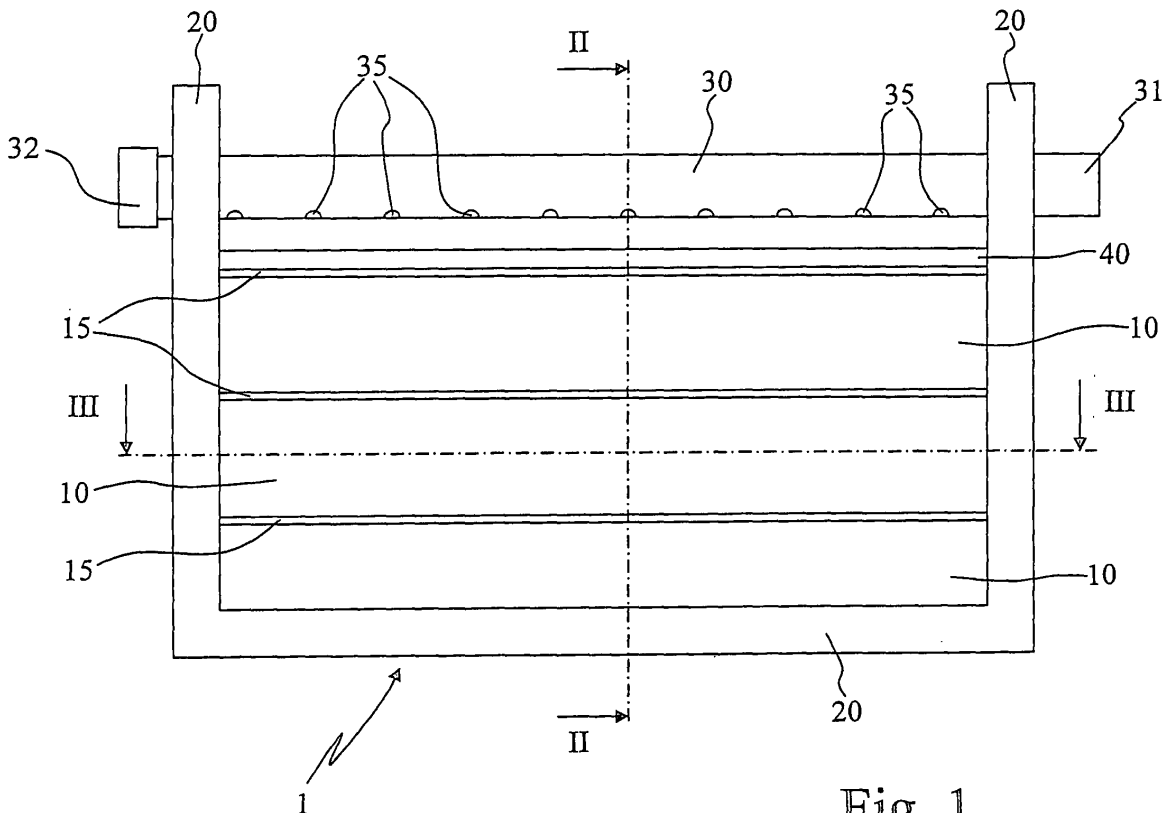
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**(54) Device for automatic disposal of condensate**

(57) A device is described for automatic disposal of condensate in liquid state produced by an air conditioning system, provided with at least one collection block made

of absorbent and/or hydrophilic material, at least one frame to support the collection block, and means to convey condensate to the collection block.



**Fig. 1**

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## Description

**[0001]** The present invention relates to a device for removing condensate produced by refrigeration systems and, in particular, a device intended for automatic disposal of condensate produced by air conditioning systems.

**[0002]** It is known that air conditioning systems allow removal of humidity from the air present in an indoor environment by making it condense to transform it into liquid state and then discharging it through appropriate ducts.

**[0003]** However, there are frequent cases in which condensate is simply discharged into a collection vessel such as a tank or the like, positioned on the outside of the cooled environment and, frequently, in proximity of the motor of the system.

**[0004]** This occurs above all for air conditioning systems installed in existing buildings, for which the discharge line for condensate produced by cooling units has not been connected to the wastewater system.

**[0005]** It is evident that simple collection of condensate in a vessel requires this vessel to be periodically emptied to prevent overflow of the water collected. This operation may be necessary more frequently in areas with persistent hot and humid climates.

**[0006]** To attempt to overcome this problem, particularly complex and costly solutions have been proposed to date, such as nebulisation or evaporation of condensate using electrical devices. Besides requiring a further waste of power, these devices can be somewhat unreliable as, in the case of breakage, the liquid condensate dispersed, but not nebulised or evaporated, could cause damage to the air conditioning system and/or to the building in which the system is installed.

**[0007]** The object of the present invention is to propose a device which allows the automatic disposal of condensate produced by an air conditioning system in a simple and inexpensive manner.

**[0008]** Another object of the present invention is to propose a device of the aforesaid type which is more reliable with respect, to known systems for automatic condensate disposal.

**[0009]** These objects are achieved by the present invention, which relates to a device for automatic disposal of condensate in liquid state produced by an air conditioning system, provided with at least one collection block made of absorbent and/or hydrophilic material, at least one frame to support the collection block, and means to convey condensate to the collection block.

**[0010]** Condensate coming from the air conditioning system is conveyed to the collection block by means of a duct closed at one end and provided with a plurality of radial holes. The duct is fastened to the frame with the radial holes preferably oriented towards the collection block.

**[0011]** The collection block preferably includes a plurality of separate evaporator packs, each made of compressed cellulose with honeycomb form. The evaporator

packs are preferably mutually separated by absorbent cloths which allow homogeneous distribution of humidity.

**[0012]** In the device according to the invention, condensate accumulated in the evaporator packs can advantageously be removed by utilising the forced ventilation produced by the motor of the air conditioning system. In fact, the device according to the present invention can be disposed in proximity of the motor of the system, in such position that it is affected by the forced air flow generated by the fan of the motor of the system.

**[0013]** Besides being simple to produce, the condensate disposal device according to the present invention is particularly reliable. In fact, condensate produced while the system is operating is removed in a continuous and automatic manner as a result of the ventilation produced by the motor of this system.

**[0014]** When the system is switched off or shuts down, condensate production is reduced considerably until it ceases. The evaporator packs ensure that the residual condensate is retained and removed by natural evaporation.

**[0015]** The invention will now be described, by way of non-limiting example, with reference to the accompanying drawings, wherein:

- Figure 1 is an elevation view of a condensate disposal device according to a possible embodiment of the present invention;
- Figure 2 is a cross sectional view of the device according to the plane II-II of Figure 1;
- Figure 3 is a longitudinal sectional view of the device according to the plane III-III of Figure 1; and
- Figure 4 shows a device according to the present invention installed on the motor unit of an air conditioning system.

**[0016]** With reference to Figures 1 to 3, a device 1 for automatic condensate disposal includes a collection block made of absorbent and/or hydrophilic material formed essentially by a plurality of evaporator packs 10 made, for example, of compressed cellulose with a honeycomb form (Figure 3). Cloths 15 made of absorbent material are interposed between the evaporator packs to allow homogeneous distribution of humidity.

**[0017]** The evaporator packs 10 and the absorbent cloths 15 are supported by a U-shaped frame 20 produced, for example, with a profile made of plastic material, such as PVC, polyethylene or polypropylene, or made of a metal material, such as steel, or aluminium and its alloys.

**[0018]** Condensate is carried towards the evaporator packs 10 and the absorbent cloths 15 through a duct 30 having an inlet connection 31 and, at the opposite end, a closed end 32. The duct 30, for example made of plastic material such as PVC, polyethylene or polypropylene, is fastened to the frame 20 and includes a plurality of radial holes 35 oriented towards the collection block below.

**[0019]** Between the duct 30 and the first evaporator

pack 10 there are disposed an absorbent cloth 15 and a plate 40 having the function of clamping and retaining the collection block composed of the evaporator packs 10 and of the absorbent cloths 15, and of conveying condensate in liquid state towards these through a groove 45 (Figure 2) or a plurality of holes aligned longitudinally along the centre line. The plate 40 can, for example, be made of made of metal materials, such as steel, or aluminium and its alloys, or also plastic materials such as PVC, polyethylene or polypropylene.

[0020] The view of Figure 2 also shows a hook 50 which can be used to removably install the device 1 according to the invention on the motor unit 100 of an air conditioning system as shown in Figure 4. Other coupling means can be provided in place of the one represented here schematically, for example other types of hook, removable straps and the like.

[0021] The sectional view of Figure 3 schematically shows the "honeycomb" structure of the evaporator packs 10, i.e. a structure having a high volume-to-surface ratio and which facilitates the passage of an air flow between the fibres in order to aid removal of the humidity retained by the evaporator packs.

[0022] The device 1 can be coupled, for example, to the protective grille 80 of the fan of a motor unit 100 for air conditioning systems, in such position to receive condensate discharge coming from the cooling units installed in the indoor environments through a duct 90.

[0023] The device 1 is then installed in proximity of the motor unit of the system 100 and, preferably, in such position to be affected by the forced air flow generated by the fan of the motor unit.

[0024] The dimensions of a device according to the present invention can be determined as a function of the quantity of condensate to be removed in the hottest and most humid periods. A prototype which has given optimal results in the majority of applications was produced in a frame having dimensions of approximately 20 x 30 cm, with a profile width slightly greater than approximately 5 cm.

[0025] Although the device according to the present invention has been described and illustrated with particular reference to air conditioning systems, it is obvious that these principles can be applied to other refrigeration systems in general, or in any case to systems which require automatic condensate disposal.

## Claims

1. A device for automatic disposal of condensate in liquid state produced by an air conditioning system, **characterized by** including at least one collection block made of absorbent and/or hydrophilic material, at least one frame to support said collection block, and means to convey condensate to said collection block.

2. The device according to claim 1, wherein said means to convey condensate to said collection block include at least one duct closed at one end and provided with a plurality of radial holes.

3. The device according to claim 2, wherein said duct is fastened to said frame with said radial holes oriented towards said collection block.

4. The device according to claim 1, wherein said collection block includes a plurality of separate evaporator packs.

5. The device according to claim 4, wherein said evaporator packs are made of compressed cellulose with a honeycomb form.

6. The device according to claim 4, wherein said collection block includes absorbent cloths interposed at least between adjacent pairs of evaporator packs.

7. The device according to any of the preceding claims, wherein said means to convey condensate to said collection block include at least one perforated and/or grooved rigid plate suitable to retain said evaporator packs and said absorbent cloths in said frame.

8. An air conditioning system, **characterized by** including a condensate disposal device according to any of claims 1 to 7.

9. The system according to claim 8, wherein said condensate disposal device is disposed in proximity of the motor unit of the system.

10. The system according to claim 8, wherein said condensate disposal device is disposed in such position to be affected by the forced air flow generated by the fan of the motor unit of the system.

11. The system according to claim 8, wherein said condensate disposal device is fastened removably to the grille in front of the fan of the motor unit of the system.

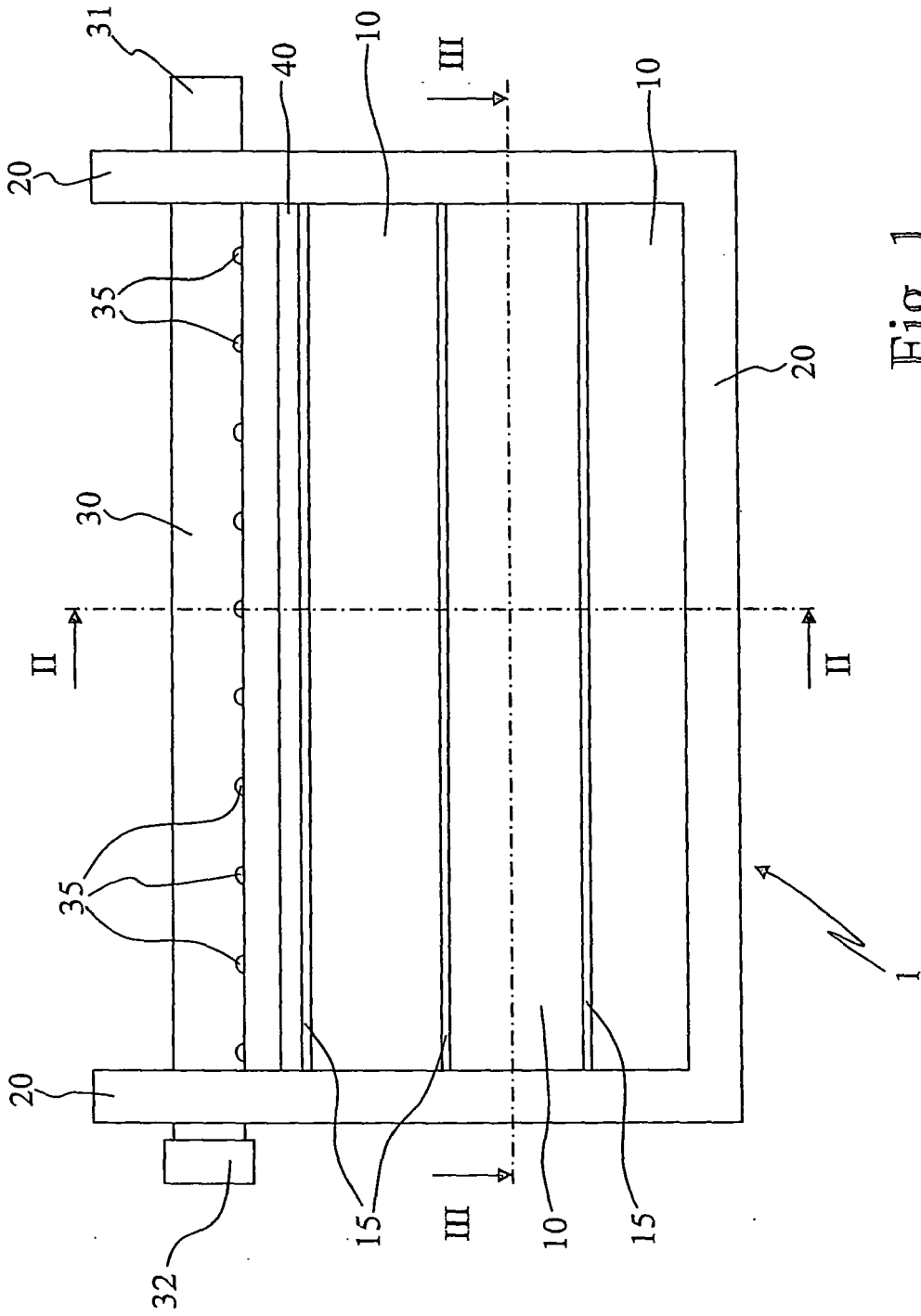


Fig. 1

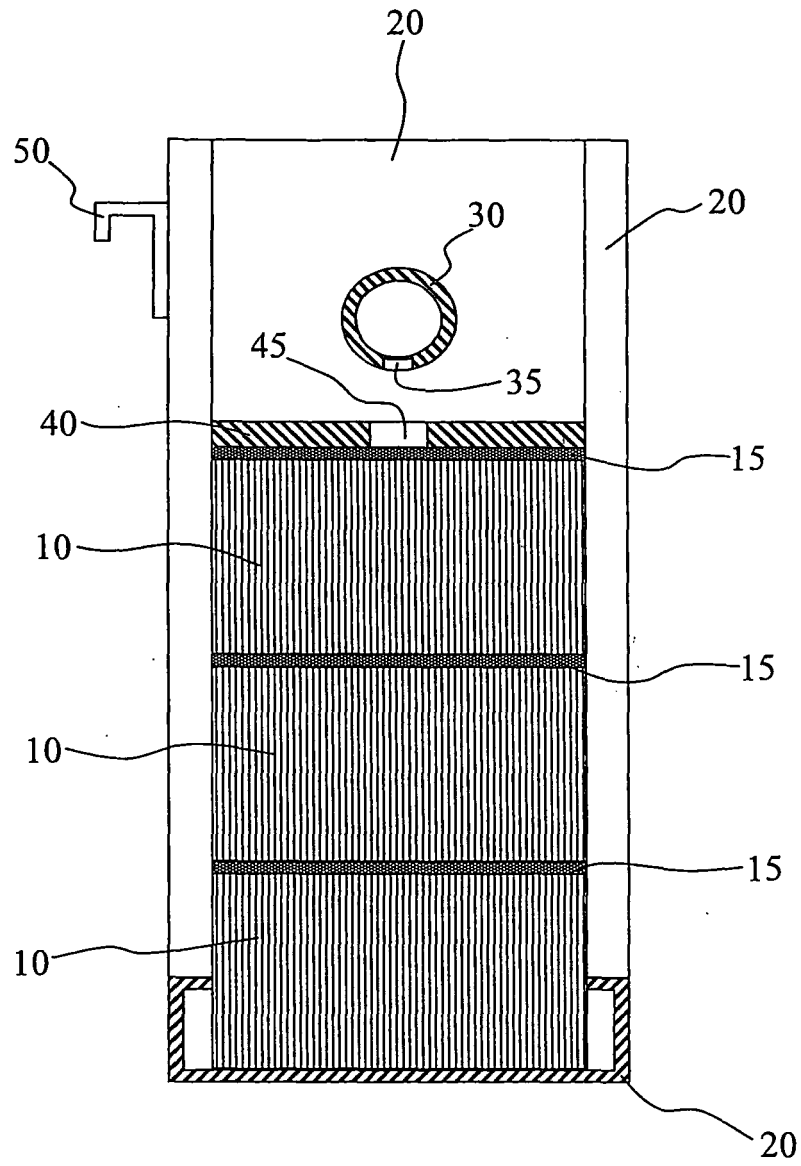


Fig. 2

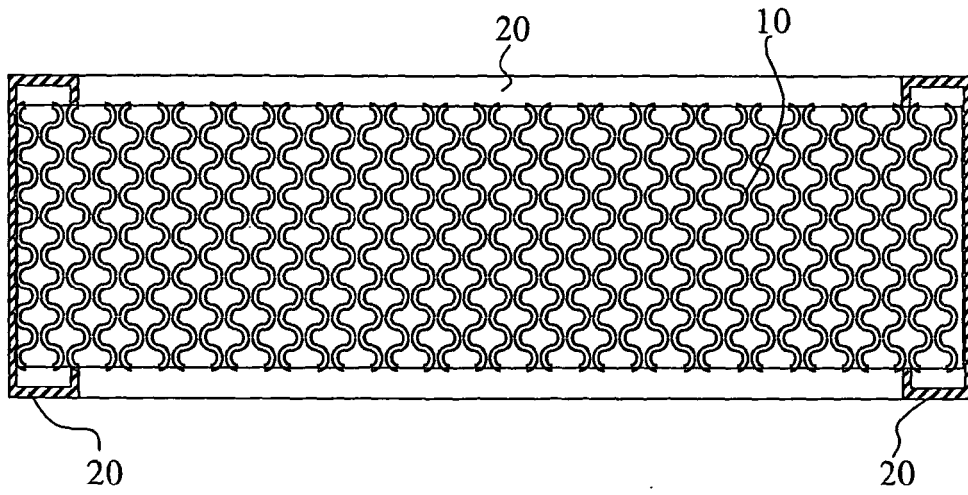


Fig. 3

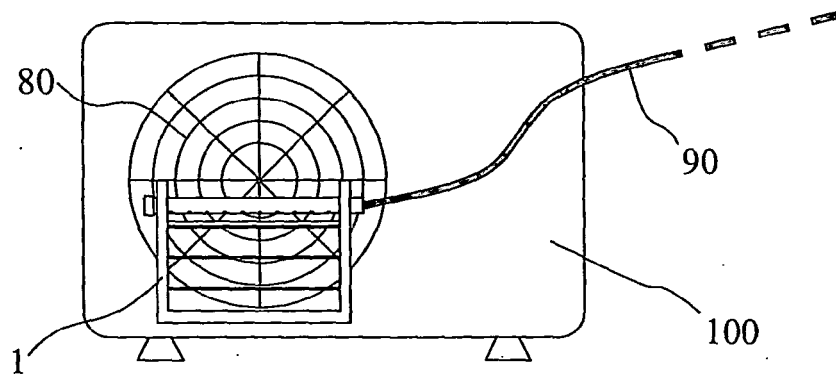


Fig. 4



EUROPEAN SEARCH REPORT

Application Number  
EP 09 00 2325

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	FR 2 872 568 A (PAUL ANDRE [FR]) 6 January 2006 (2006-01-06)	1-5,8-11	INV. F24F13/22
Y	* the whole document *	1-5,8-11	
Y	----- JP 2003 004252 A (FUJITSU GENERAL LTD) 8 January 2003 (2003-01-08) * abstract *	1-5,8-11	
Y	----- US 5 392 944 A (JENNINGS RAY [US]) 28 February 1995 (1995-02-28) * abstract *	1-5,8-11	
A	----- US 2007/000274 A1 (LI ZHIMING [CN]) 4 January 2007 (2007-01-04) * abstract *	1	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC)
			F24F
Place of search		Date of completion of the search	Examiner
Munich		19 May 2009	Valenza, Davide
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**ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.**

EP 09 00 2325

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19-05-2009

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
FR 2872568	A	06-01-2006	NONE	
-----				
JP 2003004252	A	08-01-2003	NONE	
-----				
US 5392944	A	28-02-1995	NONE	
-----				
US 2007000274	A1	04-01-2007	NONE	
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82