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Datasheet for the decision of 12 March 2009

Case Number: T 1894/06 - 3.2.03

Application Number: 98941762.1

Publication Number: 1022524

IPC: F25B 47/00

Language of the proceedings: EN

Title of invention:
Apparatus and method for cleaning pipes of refrigerating unit

Applicant:
DAIKIN INDUSTRIES, LIMITED

Opponent:
-

Headword:
-

Relevant legal provisions:
EPC Art. 54, 56

Relevant legal provisions (EPC 1973):
-

Keyword:
"Novelty (yes)"
"Inventive step (yes)"

Decisions cited:
-

Catchword:
-

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Case Number: T 1894/06 - 3.2.03

D E C I S I O N
of the Technical Board of Appeal 3.2.03
of 12 March 2009

Appellant: DAIKIN INDUSTRIES, LIMITED
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Decision under appeal: **Decision of the Examining Division of the European Patent Office posted 27 July 2006 refusing European application No. 98941762.1 pursuant to Article 97(1) EPC.**

Composition of the Board:

Chairman: U. Krause
Members: C. Donnelly
K. Garnett

Summary of Facts and Submissions

I. The appeal lies from the decision of the examining division, posted on 27 July 2006, to refuse the European Patent application no. 98941762.1.

The examining division held that the subject-matter of independent claims 1 and 12 filed with letter of 3 September 2003 lacked novelty with respect to US-A-5 533 359 (D1), US-A-4 982 576 (D2) and EP-A-5 167 126 (D3).

II. The patent proprietor (hereinafter "the appellant") filed a notice of appeal on 27 September 2006 and paid the fee the same day. The grounds of appeal dated 16 November 2006 were received on 17 November 2006.

III. The Board informed the appellant of its provisional opinion in a communication pursuant to Article 15(1) RPBA dated 24 November 2008 annexed to the summons to oral proceedings. In particular, the Board expressed its view that the subject-matter of claims 1 and 12 filed with letter of 3 September 2003 according to the main request were not new with respect to D1, D2 and D3.

IV. With letter of 10 February 2009 appellant filed a new main request and new first, second and third auxiliary requests.

V. Oral proceedings before the Board were held on 12 March 2009.

VI. At the end of these proceedings the appellant requested that the impugned decision be set aside and a patent

granted on the basis of claims 1 to 17 of the sole request filed during the oral proceedings.

VII. Independent claim 1 of the sole request filed during the oral proceedings of 12 March 2009 reads:

"A piping cleaning system (1) for refrigeration units, in which refrigerant piping (3,5) is cleaned by circulating a cleaning medium through the refrigerant piping (3,5), the system (1) comprising:
- a cleaning circuit (2) and
- a cleaning unit (7) provided in the cleaning circuit (2) and adapted to forcedly circulate the cleaning medium through the cleaning circuit (2) and the refrigerant piping (3,5), the cleaning unit (7) having:
- cleaning medium amount detecting means (100,22,23) adapted to detect an amount of cleaning medium while it is circulating through the cleaning circuit (2) and through the refrigerant piping (3,5); and
- adjusting means (72,73) adapted to adjust during the cleaning the cleaning medium amount circulating through the cleaning circuit (2) and through the refrigerant piping (3,5) during the cleaning and based on the amount detected by the detecting means (100,22,23)."

Independent claim 12 of the sole request reads as follows:

"A piping cleaning method for refrigeration units, in which refrigerant piping (3,5) is cleaned by circulating a cleaning medium through the refrigerant piping (3,5), the method comprising the steps of:

- forcedly circulating the cleaning medium through a cleaning circuit (2) and through the refrigerant piping (3,5);
- detecting an amount of cleaning medium while it is circulating through the cleaning circuit (2) and through the refrigerant piping (3,5); and
- based on the detected amount of cleaning medium, adjusting during the cleaning the amount of cleaning medium circulating through the cleaning circuit (2) and through the refrigerant piping (3,5) during the cleaning."

Reasons for the decision

1. *Basis for the amendments - Article 123(2) EPC*

Amended independent claims 1 and 12 of the sole request are essentially based on claims 12 and 15 as originally filed respectively.

The presence of a cleaning unit 7 and its connection into the cleaning circuit 2 is shown in figure 1 and described at page 21, lines 7 to 19 of the application as filed. The feature of the detection means being adapted to detect an amount of cleaning medium while it is circulating is disclosed in that the detection means 100,22,23 are incorporated into the cleaning circuit and can therefore detect an amount of the cleaning medium while it is circulating.

From originally filed description page 32, line 5 to page 35, line 2, it can be seen that the adjusting means (72,73) are adapted to adjust, during the

cleaning, the cleaning medium amount circulating through the cleaning circuit (2) and the refrigerant piping (3,5) during the cleaning and based on the amount detected by the detecting means (100,22,23). In particular, lines 2 to 4 of page 34 indicate that "the next-described refrigerant bleeding operation during the piping cleaning operation is executed".

Page 40, lines 15 to 18 of the original description indicate that the cleaning refrigerant may also be circulated by an ordinary transfer pump. Thus, it can be accepted that the independent claims need not be limited to the specific embodiment using the heat pump circuit and that there is forced circulation of the cleaning medium.

Thus, the amended claims are considered to meet the requirements of Article 123(2) EPC.

2. *Novelty and Inventive Step - Articles 54 and 56 EPC.*

D1 is considered to constitute the most relevant prior art since it is the only document which specifically describes a system with a mode of operation whereby simultaneous charging and recovery of refrigerant for cleaning purposes takes place.

This document describes:

a piping cleaning system for refrigeration units in which refrigerant piping ("external system") is cleaned by circulating a cleaning medium (i.e. refrigerant - see column 12, lines 25 to 28) through the refrigerant piping, the system comprising:

- a cleaning circuit, and
- a cleaning unit (see figures 8A,8B) provided in the cleaning circuit and adapted to forcedly circulate the cleaning medium through the cleaning circuit and the refrigerant piping ("external system"), the cleaning unit having:
- cleaning medium amount detecting means ("float" 96 see column 8, lines 42 to 44) adapted to detect an amount of cleaning medium while it is circulating through the cleaning circuit and through the refrigerant piping; and
- adjusting means (112, V8) adapted to adjust the cleaning medium amount to the predetermined amount to be circulated through the cleaning circuit and the refrigerant piping.

Since claim 1 specifies the detection of *an* (rather than "the") amount of cleaning medium whilst it is circulating, the float switch 96 which detects *an* amount of refrigerant in the accumulator chamber 94a, whilst it is circulating through the cleaning circuit and through the refrigerant piping, meets this requirement. In effect this float switch corresponds to some extent to the upper level sensor in the detecting means 22 of the application.

However, the float switch 96 functions to limit the amount of refrigerant admitted from the external system in order to prevent over-filling of the accumulation chamber 94a (see column 8, lines 42 to 44), but does not act to regulate the total amount of the circulating cleaning medium. In the system according to D1 the adjustment means formed by the load cell (22), microprocessor (112) and valves (V2,V7,V8) controls the

amount of refrigerant charged from the storage cylinder (20) into the system and operates independently of the float switch to charge a predetermined amount or refrigerant into the system (see column 11, lines 28 to 30 and column 12, lines 13 to 28).

The subject-matter of claim 1 differs therefrom in that:

(a) the adjusting means are adapted to adjust, during the cleaning, the cleaning medium amount circulating through the cleaning circuit and the refrigerant piping during the cleaning and based on the amount detected by the detecting means.

Similarly the subject-matter of independent method claim 12 differs from the method disclosed in D1 by the step of:

(a) - based on the detected amount of cleaning medium, adjusting during the cleaning the amount of cleaning medium circulating through the cleaning circuit and through the refrigerant piping (3, 5) during the cleaning.

In both cases this distinguishing feature solves the objective technical problem of allowing the cleaning system to automatically adapt to varying volumes of piping to be cleaned, such as would arise when connecting valves to branch lines or ancillary apparatus are opened or closed.

By using the system and method according to the invention, it is not necessary to know the exact volume

of the piping to be cleaned, since the system is adapted to adjust the cleaning medium amount automatically as a function of the detected amount of cleaning medium circulating.

None of the other documents cited in the European search report either describes or suggests a cleaning system or method wherein there is monitoring of the cleaning medium amount while it is being circulated and wherein the result of this monitoring is used to control adjustment means to regulate the amount of cleaning medium in circulation during the cleaning operation. In the systems according to D1 and D2 a predetermined amount of refrigerant is measured and charged into the system. However, such systems and methods require that the volume of the refrigerant piping to be cleaned is known in order that the correct amount of refrigerant can be charged.

The apparatus described in D3 can be set for use in 8 modes (see column 8, line 64 to column 9, line 4), including a mode for refrigerant transfer from charging cylinder 82 to air-conditioning system 1. The apparatus of D3 is essentially intended to recover and recycle used refrigerants by cleaning them i.e. the apparatus is intended to remove refrigerant from a device, clean and store it until needed (see Abstract). The system is equipped with various pressure limiting devices (76,92) and float (120) switches; however, these are not unambiguously disclosed as being used to adjust the amount of cleaning fluid in the cleaning circuit while it is circulating. In a similar manner to D1 and D2, the "metering means" specified in claims 1, 2 and 46

discharge a predetermined amount of refrigerant from the charging cylinder to the air-conditioning system.

In the system according to EP-A-1 016 837, which is prior art under Article 54(3) EPC, no cleaning medium amount detecting means are present.

For these reasons the Board considers that the subject-matter of claims 1 and 12 is new and inventive and meets the requirements of Article 54 and 56 EPC.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the Examining Division with the order to grant a patent on the following basis:

   (a) Claims 1 to 17 according to the sole request filed during the oral proceedings before the Board on 12 March 2009;

   (b) Pages 1 to 20 of the amended description as filed during the oral proceedings before the Board on 12 March 2009 and pages 21 to 42 as originally filed.

   (c) Figure 1 as originally filed.

Registrar: Chairman:

A. Counillon U. Krause