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D E C I S I O N
of 29 July 1998

Case Number: T 0985/97 - 3.2.3

Application Number: 91905369.4

Publication Number: 0468046

IPC: F25B 15/00, F25D 17/06, G05D 25/00, F28D 7/10, F28D 7/02, F28D 7/12

Language of the proceedings: EN

Title of invention:
Heat transfer apparatus for heat pumps

Applicant:
Columbia Gas System Service Corporation

Opponent:
-

Headword:
-

Relevant legal provisions:
EPC Art. 54

Keyword:
"Novelty (yes)"

Decisions cited:
-

Catchword:
-

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Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 0985/97 - 3.2.3

D E C I S I O N
of the Technical Board of Appeal 3.2.3
of 29 July 1998

Appellant: Columbia Gas System Service Corporation
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Wilmington, DE 19807 (US)

Representative: Cole, David John
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Decision under appeal: **Decision of the Examining Division 2.3.01.074 of the European Patent Office posted 16 April 1997 refusing European patent application No. 91 905 369.4 pursuant to Article 97(1) EPC.**

Composition of the Board:

Chairman: C. T. Wilson
Members: H. Andrä
J.-P. Seitz

Summary of Facts and Submissions

I. European patent application No. 91 905 369.4, filed as International Application PCT/US 91/00914 on 8 February 1991 and published under No. WO 91/12472, was refused by a decision of the Examining Division dated 16 April 1997.

II. The decision was based on Claims 1 to 13 submitted on 1 February 1996. The reason given for the refusal was that the subject-matter of Claim 1 lacked novelty in view of the prior art disclosed in US-A-4 065 264. Reference was further made in the decision to a communication of the Examining Division setting out that the dependent claims might contain patentable subject-matter.

III. An appeal was lodged against this decision on 13 June 1997 together with payment of the appeal fee.

The Statement of Grounds of Appeal was submitted on 18 August 1997 together with an independent Claim 1 according to an auxiliary request.

The Appellant requests that the decision under appeal be set aside and that a patent be granted on the basis of Claims 1 to 13 underlying the decision under appeal and submitted with letter dated 16 January 1996, received on 1 February 1996, according to the main request, auxiliarily on the basis of Claim 1 submitted by telefax of 18 August 1997 and Claims 2 to 13 according to the main request.

The Appellant submitted that the subject-matter of all claims on file is new with regard to the prior art within the meaning of Article 54 EPC and thus does

constitute a patentable invention under the terms of Article 52 EPC.

IV. Independent Claim 1 according to the main request reads as follows:

"A tube-in-cylinder heat exchanger (400) characterised by a twisted fluted tube (402) having crests (408) thereon and formed as a plurality of coils about a coil center-line (426) in a generally annular cylindrical composite form with the coils juxtaposed one to the next so that the crests (408) contact each other, and with the coils enclosed in an annular cylinder (420) with a cylinder center-line (426) coextensive with the coil center-line (426) and with the crests (408) of the tube (402) contacting the annular cylinder (420); and through which annular cylinder (420) a fluid can flow through voids (410, 414) formed by contact of the crests (408) of the tube (402) with each other and with the cylinder (420) in cross flow in a direction generally perpendicular to the coils and parallel to the coil center-line (426)."

Reasons for the Decision

1. The appeal is admissible.

2. *Main request*

2.1 Article 123(2) EPC

Claim 1 is supported by original Claims 50 to 52 in combination with page 31, paragraph 2 of the original description.

The replacement of the term "A divided-flow tube-in-cylinder heat transfer device" in original Claim 50 by the term "A tube-in-cylinder heat exchanger" in present Claim 1 is supported by page 31, lines 20 to 22 of the original description. According to this passage, it is advantageous, that is optional, but not obligatory to divide the fluid flow within a single coil into at least two separate flows as shown in Figure 17. The passage on page 32, lines 7 to 10 of the original description

"To further improve the division and mixing of two fluids...when using the divided flow arrangement of Figure 17, a general dividing and mixing device 450 has been developed"

corroborates that the use of divided-flow tube-in-cylinder heat exchanger is regarded to be a facultative measure. The original application provides therefore a basis for deleting the restriction to a divided-flow tube-in-cylinder heat exchanger. Claim 1 is not, therefore, objectionable under Article 123(2) EPC.

2.2 The Examining Division refused the application on the ground that the subject-matter of Claim 1 lacks novelty over the disclosure of US-A-4 065 264. It is unchallenged by the Appellant that US-A-4 065 264 according to the embodiment of Figures 1 and 2 describes the nearest prior art.

Contrary to the conclusion in the decision under appeal, the Appellant disputes that US-A-4 065 264 discloses the feature that the coils formed by the fluted tube are juxtaposed one to the next so that the crests contact each other.

2.3 According to the decision under appeal, at least some of the crests of one coil are shown in Figure 1 of

US-A-4 065 264 to contact the crests of an adjacent coil whereas a substantial gap exists therebetween in the illustration of Figures 3 and 5. The figures are rather detailed and exact drawings and the different distances between the crests of the tubes in Figure 1 on the one hand and in Figures 3 and 4 are therefore not accidental. Further according to the decision, the skilled person will therefore derive from Figure 1 that the adjacent turns of the tubes may be so close to each other that at least part of the crests of the tubes contact the crests of an adjacent tube.

In order to answer the question whether contact between some of the crests of a tube coil with the crests of an adjacent tube coil is sufficient to comply with the above-cited feature, the original disclosure has to be investigated. On page 31, paragraph 2 of the original description it is specified that the second cross-flow heat-exchange fluid flows in a direction generally perpendicular to the coils in the voids formed inter alia as a result of the crests 408 of the fluted tubes 402 contacting the walls 404 and 406 of the confining annular cylinder 420 and as a result of the crests 408 contacting each other (voids 410; Figures 16 and 17). The term "the crests 408 contacting each other" cannot be interpreted such that only a limited number of the crests are in contact with each other but, as can be recognised from the reference to Figures 16 and 17, all or nearly all of the crests of adjacent coils, that is the great majority thereof contact one another. Hence, the case in which contact between only some of the crests of adjacent coils occurs, is not included in the above-cited feature of Claim 1.

2.4 The Appellant sets out that Figures 1 and 2 of US-A-4 065 264 are hopelessly ambiguous as to whether contact between the crests of the tube is intended or not.

In fact, the depiction of the coils in the citation reveals gaps between the juxtaposed coils as shown in Figure 1 with the coils drawn in cross-section and partially with the coils not drawn in cross-section and in Figure 2 with the coils not drawn in cross-section. Hence, for a substantial portion of juxtaposed coils there are depicted gaps between adjacent crests.

When consulting the description of the citation in respect of this issue, column 4, lines 35 to 41 specifies that peripheral portions of the ribs 43 on the helically ribbed tubes 39 and 41 are advantageously in contact with the exterior surface of the column 30 and the interior wall 51 of the bubble oxygen chamber 11. The description does not, however, appear to specify in any way that the ribs of juxtaposed coils contact each other.

2.5 Taking account of the facts that the feature concerning contact between the crests of adjacent coils is not disclosed in the description of US-A-4 065 264 and further that the drawings thereof also do not disclose that all or even the majority of the crests of adjacent coils contact each other, the Board comes to the conclusion that this feature cannot be regarded as being known from US-A-4 065 264.

Among the remaining documents cited in the European Search Report, only US-A-1 852 490 and US-A-4 926 659 relate to tube-in-cylinder heat exchangers having a twisted fluted tube with crests thereon. The former citation whilst describing the contact of the crests of the tube with the annular cylinder does not disclose the feature that juxtaposed coils contact each other with their crests. The latter citation does not even disclose that the twisted fluted tube of the heat exchanger is formed as a plurality of coils about a

coil center-line. The other citations are further away from the subject-matter of Claim 1.

Summing up, the Board comes to the conclusion that the subject-matter of Claim 1 satisfies the requirement of novelty (Article 54 EPC).

3. The examination of the application as to patentability has not yet been completed by the first instance. The Board therefore considers it apropriate to remit the case to the first instance for further prosecution on the basis of the claims according to the main request and, if necessary, of the claims according to the auxiliary request (Article 111(1) EPC).

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the first instance for further prosecution on the basis of the claims specified in paragraph III above.

The Registrar:

N. Maslin

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The Chairman:

C. T. Wilson

Beglaubigt/Certified Certifiée conforme: München/Munich

Geschäftsstelle Registry/Greffe

25. SEP. 1998

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