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Case Number: T 0319/17 - 3.2.03

Application Number: 09849210.1

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Language of the proceedings: EN

Title of invention:
AIR CONDITIONING DEVICE

Applicant:
Mitsubishi Electric Corporation

Headword:

Relevant legal provisions:
EPC Art. 123(2), 84, 111(1)

Keyword:
Claims - clarity after amendment (yes)
Amendments - added subject-matter (no)
Appeal decision - remittal to the department of first instance (yes)

Decisions cited:

Catchword:

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Case Number: T 0319/17 - 3.2.03

D E C I S I O N
of Technical Board of Appeal 3.2.03
of 11 October 2019

Appellant: (Applicant)	Mitsubishi Electric Corporation 7-3 Marunouchi 2-Chome Chiyoda-ku Tokyo 100-8310 (JP)
Representative:	Pfenning, Meinig & Partner mbB Patent- und Rechtsanwälte Theresienhöhe 11a 80339 München (DE)
Decision under appeal:	**Decision of the Examining Division of the European Patent Office posted on 9 September 2016 refusing European patent application No. 09849210.1 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chairman	G. Ashley
Members:	C. Donnelly
	E. Kossonakou

Summary of Facts and Submissions

I. The appeal lies from the decision of the examining division refusing European application no. 09 849 210.1.

In its decision the examining division held that the subject-matter of claim 1 according to the then main and first auxiliary requests did not meet the requirements of Article 123(2) EPC. It also decided that the subject-matter of the then second and third auxiliary requests did not meet the requirements of Articles 84 and 123(2) EPC.

The applicant (hereinafter: the "appellant") lodged an appeal against this decision.

II. With the summons to oral proceedings, the Board sent a communication pursuant to Articles 15(1) and 17(2) of the Rules of Procedure of the Boards of Appeal (RPBA) indicating to the appellant its preliminary, non-binding opinion of the case.

III. By letter of 23 August 2019, the appellant submitted new auxiliary requests 1 to 6 to replace those filed with the grounds of appeal and presented further arguments in response to the Board's provisional opinion.

IV. Oral proceedings took place on 11 October 2019. At the end of the debate, the appellant requested that the decision under appeal be set aside and that a patent be granted on the basis of the main request filed with the statement setting out the grounds of appeal dated 19 January 2017 or of one of auxiliary requests 1 to 6 filed by letter dated 23 August 2019.

V. Claim 1 as filed reads:

"An air-conditioning apparatus comprising:

a compressor; a heat source side heat exchanger; an expansion device; a heat exchanger related to heat medium; a pump; and a use side heat exchanger,
the compressor, the heat source side heat exchanger, the expansion device, and the heat exchanger related to heat medium being connected with refrigerant pipes to form a refrigerant circuit in which a heat-source-side refrigerant is circulated, the pump, the use side heat exchanger, and the heat exchanger related to heat medium being connected with heat medium pipes to form a heat medium circuit in which a heat medium is circulated,
the compressor and the heat source side heat exchanger being housed in an outdoor unit,
the expansion device, the heat exchanger related to heat medium, and the pump being housed in a relay unit,
the use side heat exchanger being housed in an indoor unit,
the heat exchanger related to heat medium exchanging heat between the heat source-side refrigerant and the heat medium, wherein
the heat medium pipes have a larger inner cross-sectional area per unit capacity than that of the refrigerant pipes."

Claim 1 according to the main request reads as follows (amendments in addition to the inclusion of reference signs with respect to claim 1 as filed are shown in bold/italics, deletions are depicted by strike-through):

" An air-conditioning apparatus (100) comprising: a compressor (10); a heat source side heat exchanger (12); an expansion device (16); a heat exchanger related to heat medium (15); a pump; and a ***plurality of*** use side heat-exchangers (26),

the compressor (10), the heat source side heat exchanger (12), the expansion device (16), and the heat exchanger related to heat medium (15) being connected with refrigerant pipes (4) to form a refrigerant circuit in which a heat-source-side refrigerant is circulated,

the pump, the ***plurality of*** use side heat exchangers (26), and the heat exchanger related to heat medium (15) being connected with heat medium pipes to form a heat medium circuit in which a heat medium is circulated,

the compressor (10) and the heat source side heat exchanger (12) being housed in an outdoor unit (1)

the expansion device (16), the heat exchanger related to heat medium (15), and the pump being housed in a relay unit (3),

each of the ***plurality of*** use side heat exchangers (26) being housed in an indoor unit (2),
the heat exchanger related to heat medium (15) exchanging heat between the heat-source-side refrigerant and the heat medium,

characterized in that

the refrigerant pipes (4) are configured such that an inner cross-sectional area of a refrigerant pipe among

the refrigerant pipes (4), which connects between the outdoor unit (1) and the relay unit (3) and through which a high-pressure refrigerant flows, is smaller than an inner cross-sectional area of a refrigerant pipe (4) among the refrigerant pipes (4), which connects the outdoor unit (1) and the relay unit (3) and through which a low-pressure refrigerant flows, and

a heat medium pipe among the heat medium pipes***, which connects the relay unit (3) and the indoor unit (2), is configured such that each*** ~~have a larger~~ inner cross-sectional area **of the heat medium pipe** per capacity unit ***of measurement of the plurality of the indoor units is larger*** than ~~that of~~ the ***inner cross-sectional area of the*** ~~each~~ *refrigerant pipes (4) per capacity unit* ***of measurement of the outdoor unit through which the low pressure refrigerant flows."***

Claim 1 according to auxiliary request 1 (amendments with respect to the main request are shown in bold/ italics, deletions are depicted by strike through) reads as follows:

"An air-conditioning apparatus (100) comprising: a compressor (10); a heat source side heat exchanger (12); an expansion device (16); a heat exchanger related to heat medium (15);

a pump; and a plurality of use side heat exchangers (26), the compressor (10), the heat source side heat exchanger (12), the expansion device (16), and the heat exchanger related to heat medium (15) being connected with ***two*** refrigerant pipes (4) to form a refrigerant circuit in which a heat-source-side refrigerant is circulated,

the pump, the plurality of use side heat exchangers (26), and the heat exchanger related to heat medium (15) being connected with heat medium pipes to form a heat medium circuit in which a heat medium is circulated, the compressor (10) and the heat source side heat exchanger (12) being housed in an outdoor unit (1), the expansion device (16), the heat exchanger related to heat medium (15), and the pump being housed in a relay unit (3),
each of the plurality of use side heat exchangers (26) being housed in an indoor unit (2), the heat exchanger related to heat medium (15) exchanging heat between the heat-source-side refrigerant and the heat medium,

characterized in that

the refrigerant pipes (4) are configured such that ~~an~~ ***the*** inner cross-sectional area of ~~a~~ ***each*** refrigerant pipe ***(4)***,~~among~~ ***which connects*** between the outdoor unit (1) and the relay unit (3) and through which a high-pressure refrigerant flows, is smaller than ~~an~~ ***the*** inner cross-sectional area of ~~a~~ the refrigerant pipe (4) ~~among~~ ***which connects*** the outdoor unit (1) and the relay unit (3) and through which a low-pressure refrigerant flows, and

~~a~~ **the** heat medium pipe*s* ~~among the heat medium pipes,~~ which connect~~s~~ the relay unit (3) and the indoor units (2), ~~is~~ ***are*** configured such that each inner cross-sectional area of the heat medium pipe*s* per capacity unit ~~of measurement of the plurality of the indoor units~~ is larger than the inner cross-sectional area per capacity unit ~~of measurement of the outdoor unit through which the low pressure~~ ***of the*** refrigerant ***pipes (4)*** ~~flows~~."

Claim 1 according to auxiliary request 2 corresponds to claim 1 of auxiliary request 1 but with the addition of the phrase "among said refrigerant pipes (4)" in the last but one feature.

Claim 1 according to auxiliary request 3 corresponds to claim 1 of auxiliary request 2 wherein the last feature has been amended to read:

".....per capacity unit of the refrigerant pipes (4(1), 4(2)), which connect the outdoor unit (1) and the relay unit (3)."

Claim 1 according to auxiliary request 4 is as auxiliary request 1 with the additional feature specifying:

"wherein the heat medium is water and the heat medium pipes are copper pipes"

Reasons for the Decision

1. Main request, Added subject-matter, Article 123(2) EPC

The main request corresponds to the claims of the main request decided upon in the contested decision.

1.1 In comparison with claim 1 as filed, the characterising portion of claim 1 of the present main request comprises the following additional feature according to which:

"the refrigerant pipes (4) are configured such that an inner cross-sectional area of a refrigerant pipe among

the refrigerant pipes (4), which connects between the outdoor unit (1) and the relay unit (3) and through which a high-pressure refrigerant flows, is smaller than an inner cross-sectional area of a refrigerant pipe (4) among the refrigerant pipes (4), which connects the outdoor unit (1) and the relay unit (3) and through which a low-pressure refrigerant flows"

1.2 As reasoned by the examining division, this feature is a two-fold generalisation of the original disclosure given in claim 3 as filed which specified that:

"the refrigerant pipes are configured such that the inner cross-sectional area of each refrigerant pipe through which a high-pressure refrigerant flows is smaller than that of the refrigerant pipe through which a low-pressure refrigerant flows."

The Board agrees with the examining division that the feature introduced into claim 1 implies that there can be multiple refrigerant pipes connecting the outdoor unit to the relay unit and through which a high-pressure refrigerant flows, and of these refrigerant pipes any refrigerant pipe can be selected to have such a cross-sectional area. However, claim 3 as filed clearly specifies that each refrigerant pipe through which a high-pressure refrigerant flows fulfills said condition.

The appellant's argument that "which" refers to a refrigerant pipe and not to "among the refrigerant pipes" does not overcome the above objection since it does not alter the fact that only one of a possible plurality of refrigerant pipes carrying high-pressure

refrigerant is required to have a smaller cross-sectional area rather than each one.

1.3 Also, according to claim 3 as filed there is only one refrigerant pipe through which a low-pressure refrigerant flows. Hence, there is no basis for the feature "a refrigerant pipe among the refrigerant pipes...through which a low-pressure refrigerant flows".

1.4 Furthermore, the use of the indefinite article "an" introduces a generalisation since it means that the respective inner cross-sectional area of the pipes need not be constant along the whole length of the pipe. To meet the specification as now claimed it would only be necessary for a portion of each pipe to have cross-sections which meet the specified requirement.

1.5 Thus, claim 1 according to the main request does not meet the requirements of Article 123(2) EPC since it comprises added subject-matter .

2. Auxiliary request 1, added subject-matter, Article 123(2) EPC

The characterising portion of claim 1 according to auxiliary request 1 has been amended to read:

"the refrigerant pipes (4) are configured such that ~~an~~ *the* inner cross-sectional area of ~~a~~ *each* refrigerant pipe ~~among~~ *which connects* between the outdoor unit (1) and the relay unit (3) and through which a high-pressure refrigerant flows, is smaller than ~~an~~ *the* inner cross-sectional area of ~~a~~ the refrigerant pipe (4) ~~among~~ *which connects* the outdoor unit (1) and the

relay unit (3) and through which a low-pressure refrigerant flows, and

~~a~~ *the* heat medium pipe*s* ~~among the heat medium pipes,~~ which connect~~s~~ the relay unit (3) and the indoor units (2), ~~is~~ *are* configured such that each inner cross-sectional area of the heat medium pipe*s* per capacity unit ~~of measurement of the plurality of the indoor units~~ is larger than the inner cross-sectional area per capacity unit ~~of measurement of the outdoor unit through which the low pressure~~ *of the* refrigerant *pipes (4)* ~~flows~~."

2.1 The amendments made in claim 1 overcome the above objections raised under Article 123(2) EPC since the wording of originally filed claim 3 is now adhered to.

2.2 The second feature of the characterising portion of claim 1 as amended also complies with the requirements of Article 123(2) EPC since it specifies that the heat medium pipes have a larger inner cross-sectional area per capacity unit than that of the refrigerant pipes as originally disclosed in claim 1 as filed.

3. Auxiliary request 1, clarity, Article 84 EPC

3.1 As submitted by the appellant and explained in the description, paragraph [0108], the use of the parameter "inner cross-sectional area per capacity unit", typically expressed in mm^2/KW, allows the pipe/heat medium combination to be specified irrespective of the capacity of the indoor unit 2 which is necessary when the total capacity is split between a plurality of indoor units. However, in order to meet the requirements of Article 84 EPC, the skilled person must

be in a position to know when a particular apparatus meets the specified requirements.

3.2 According to equations 4 and 5, given in the description at paragraphs [103] and [104], this parameter depends on the properties of the heat medium flowing in the pipe and the operating conditions, meaning that the cross-sectional area per capacity unit will be inversely proportional to the density, specific heat and velocity of the medium flowing in the pipe, as well as the temperature difference effected on the medium. Thus, a small diameter pipe transporting water at high velocity can have the same cross-sectional area per capacity unit as a larger diameter pipe transporting water at a lower velocity if the volume flow-rates are the same.

3.3 Therefore, it is unclear to specify that the heat medium and refrigerant pipes have a particular "inner cross-sectional area per capacity unit" since this parameter depends upon the type of heat medium and the operating conditions which are not specified and can only be measured once the apparatus is in use.

3.4 Thus, the subject-matter of claim 1 according to auxiliary request 1 does not meet the requirements of Article 84 EPC since it is not clear.

4. Auxiliary requests 2 and 3, clarity, Article 84 EPC

Similarly, the subject-matter of claim 1 according to auxiliary requests 2 and 3 does not meet the requirements of Article 84 EPC.

5. Auxiliary request 4, clarity, Article 84 EPC

5.1 Auxiliary request 4 comprises the further limitation that the heat medium is water and the heat medium pipes are copper pipes.

5.2 By specifying water as the heat medium and that the pipes are copper, the number of unknown variables in equations 4 and 5 is reduced since it is evident that the density and specific heat of water are generally known. Also, as explained at paragraph [0102] of the application, the person skilled in the art of air-conditioning design is aware that, in order to avoid degradation of the copper pipe by erosion and corrosion, the maximum permissible water velocity must be set to 1.5m/s. If a velocity lower than 1.5m/s is used this would tend to increase the inner cross-sectional area per unit capacity.

5.3 As argued by the appellant, the skilled person is also aware that the temperature difference in such air-conditioning systems would be set at around 5^{o}C to avoid excessive heat exchange losses.

5.4 Therefore, the skilled person in combination with their general knowledge can calculate the inner cross-sectional area per unit capacity of the heat medium pipes as shown, for example, in the description paragraphs [0103] to [0108] of the application.

5.5 Since the design process for the refrigerant pipes, as set out in paragraphs [0092] to [0100] of the application, is well known in the art, the skilled person is then in a position to know whether an apparatus meets the requirements of claim 1.

5.6 In view of the embodiment shown in figures 10 and 11 in which both high and low-pressure refrigerant passes through pipe 4(2) (see page 45, lines 22 to 24 and page 47, lines 4 to 10), claim 1 is also restricted to the two-pipe configuration shown in figures 1 to 9 (see page 38, lines 19 to 27).

5.7 Thus, the requirements of Article 84 EPC are met.

6. Further prosecution

Since the contested decision does not address the issues of novelty of inventive step, the Board considers it appropriate to exercise its discretion under Article 111(1) EPC to remit the case to the examining division for further prosecution.

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 for further prosecution on the basis of the claims of auxiliary request 4.

The Registrar: The Chairman:

C. Spira G. Ashley

Decision electronically authenticated