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**Datasheet for the decision
of 13 March 2007**

Case Number: T 0169/05 - 3.2.03

Application Number: 96119355.4

Publication Number: 0779482

IPC: F25B 41/06

Language of the proceedings: EN

Title of invention:
Refrigeration cycle

Patentee:
MATSUSHITA ELECTRIC INDUSTRIAL CO., LTD.

Opponent:
BSH Bosch und Siemens Hausgeräte GmbH

Headword:
-

Relevant legal provisions:
EPC Art. 54, 56

Keyword:
"Scope of opposition"

Decisions cited:
G 0009/91

Catchword:
-



Case Number: T 0169/05 - 3.2.03

D E C I S I O N
of the Technical Board of Appeal 3.2.03
of 13 March 2007

Appellant:
(Opponent)

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Respondent:
(Patent Proprietor)

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Decision under appeal:

Interlocutory decision of the Opposition
Division of the European Patent Office posted
23 August 2004 concerning maintenance of
European patent No. 0779482 in amended form.

Composition of the Board:

Chairman: J.-P. Seitz
Members: C. Donnelly
Y. Jest

Summary of Facts and Submissions

- I. The Appellant (Opponent) lodged an appeal against the interlocutory decision of the opposition division posted on 23 August 2004 which found that the European Patent No. 0779482, in the form as amended during the opposition proceedings according to the main request, satisfied the requirements of the EPC.
- II. The contested European patent concerns the particular problem of sludge precipitation in refrigeration apparatus which can arise when using chlorine-free refrigerants if there is moisture ingress. The properties of such refrigerants require that ester derivative synthetic oil is used in the compressor, however, if there is ingress of moisture, this type of lubricant is susceptible to hydrolysis which leads to the formation of fatty acids. These acids attack and dissolve certain parts of the piping system. At high temperatures the material dissolved from the piping components remains in solution, however, at lower temperatures precipitation occurs and sludge is formed which can block critical components such as capillary tube expansion devices.
- III. The appellant argued in the grounds of appeal that the subject-matter of claim 1 as maintained in amended form is not new in view of DE-A-4120651 (D1) and not inventive in the light of a combination of EP-A-0 563 718 (D2) and EP-A-0 594 431 (D3).

By letter of 10 June 2005, the respondent (patent proprietor) rejected the arguments of the appellant and

requested that the appeal be dismissed and the patent maintained in its present form.

IV. In accordance with the auxiliary requests of both parties, oral proceedings were held on 13 March 2007.

The appellant confirmed that the extent of the opposition was limited to claims 1 and 2 as granted.

During the oral proceedings the appellant also argued that the subject-matter of claim 1 is not inventive in the light of either a combination of D1 and D3 or D1 in combination with the "Montreal Protocol on Substance that Deplete the Ozone Layer". The appellant further suggested that combining the preamble of claim 1 with D3 also leads to the subject-matter of claim 1 in an obvious manner.

At the issue of the debate concerning the main request, the respondent filed auxiliary requests 1 and 2.

The appellant confirmed the request for the decision under appeal to be set aside and for the patent as maintained by the opposition division to be revoked. The appellant further argued that auxiliary requests 1 and 2 should not be admitted into the proceedings as they were late filed.

The respondent confirmed the request for the appeal to be dismissed, or failing that, for the decision to be set aside and the patent maintained in amended form on the basis of either the first or the second auxiliary request filed during the oral proceedings.

V. *Main request*

Independent claim 1 of the main request corresponds to that as amended during the opposition procedure and reads as follows:

"A refrigeration cycle comprising: a compressor (1), a condenser (2), an expansion device (3), and an evaporator (4), piping (5) connecting said compressor, said condenser, said expansion device, said evaporator in a loop, and refrigerant circulating in said compressor, said condenser, said expansion device, said evaporator, and said piping, said refrigerant being a compound not containing chlorine atom in its chemical formula, said expansion device (3) including a capillary tube (3a), and connecting means for connecting said capillary tube and said piping (5), said connecting means being a connection pipe (3b) having a larger inside diameter than the inside diameter of said capillary tube (3a), characterised in that an end portion (3c) of said capillary tube (3a) projects freely into the inside of said connection pipe (3b) so that any foreign matter interfering with the flow of said refrigerant deposits in an inside space of said connection pipe (3b) and an outer surface of said free projecting end (3c), and in that said connection pipe (3b) possesses a slope (6) gradually decreasing in inside diameter from said piping side to said capillary tube side."

Auxiliary request 1

Claim 1 of auxiliary request 1 is identical to claim 1 of the main request with the exception that the final characteristic is amended to read:

"said connection pipe (3b) being a separate pipe not integrated with the piping (5) and decreasing in inside diameter from said piping side to said capillary tube side"

Auxiliary request 2

Claim 1 of auxiliary request 1 is identical to claim 1 of the main request with the exception that the following characteristic has been added:

"said connection pipe (3b) possesses an oleophilic treated inner surface."

VI. The arguments of the parties concerning the main request can be summarised as follows:

Novelty

The appellant maintained that the arrangements of both figures 1 and 4 of D1 display all the features of claim 1.

The respondent disputed that D1 discloses:

- (i) - that said refrigerant is a compound not containing chlorine atom in its chemical formula;
- (ii) -any foreign matter interfering with the flow of said refrigerant deposits in an inside space of said

connection pipe and an outer surface of said free projecting end;
and that in the case of the arrangement disclosed in figure 4 that:
(iii) the connection pipe is a separate element.

The appellant reasoned that feature (i) is implicitly disclosed in D1 as reference is made at column 1, lines 43-47 to the introduction of new types of refrigerants which have other material properties. Since at the priority date of D1 the Montreal protocol on Substances that Deplete the Ozone layer of 1987 had entered into force, it is implicit that "new refrigerants" can only mean refrigerants not containing a chlorine atom in their chemical formulas.

The appellant also argued that as the expansion device of D1 displays all the constructional features of the claimed device described as being necessary to achieve the functional characteristic (ii) then it follows that the device according to D1 must also achieve the same effect.

The alleged feature of the connection pipe being a separate element is not defined in the claim.

The respondent argued that the term "new refrigerants" in D1, could also mean new HCFC compounds, such as HCFC 123 which was used to replace CFC-11 since it could be implemented relatively rapidly in existing plant and had a relatively small ozone depleting effect. Hence, the reference in D1 to "new refrigerants" does not clearly and unambiguously mean refrigerants containing no chlorine atoms.

As regards feature (ii), the respondent was of the view that foreign matter would not accumulate in the inside space of the connection pipe and an outer surface of the free projecting end of the device according to figure 1 of D1 since this space was already filled with the end of the pipe 9. As regards the configuration according to figure 4 of D1 the respondent argued that it would not be possible to operate such a device with a bi-directional flow.

Concerning feature (iii) it is implicit from the wording of the claim, the description and all the figures of the contested patent that the connection pipe must be a separate element.

Inventive step

The appellant argued that the subject-matter of claim 1 is not inventive in the light of:

- (i) D2 in combination with D3;
- (ii) the preamble of claim 1 in combination with D2
- (iii) a combination of D1 and D3;
- (iv) D1 in combination with the "Montreal Protocol on Substances that Deplete the Ozone Layer",

(i) D2 in combination with D3;

The appellant accepted that D2 does not explicitly disclose:

- (i) - that said refrigerant is a compound not containing chlorine atom in its chemical formula;

(ii) - that any foreign matter interfering with the flow of said refrigerant deposits in an inside space of said connection pipe and an outer surface of said free projecting end.

However, in the appellant's view D2 implicitly discloses feature (ii) as the capillary device has an identical construction to that claimed and it is specifically stated at column 2, lines 17 to 43 that the flow out of the capillary tube is laminar. Hence, in the absence of any turbulence, there must be an area of stagnation between the outside of the capillary tube and the inside of the connecting pipe.

As regards feature (i), D3 at column 2, lines 10 to 20 indicates that a chlorine-free refrigerant R-134a is suitable for replacing chlorine containing refrigerant R-12 providing that a suitable lubricant is used for the compressor.

Faced with the objective technical problem of providing a refrigerant cycle that does not deplete the ozone layer in accordance with the Montreal Protocol, the skilled person is thus given the solution by D3.

(ii) the preamble of claim 1 in combination with D2

By definition, the appellant reasoned it must be accepted by the respondent that the features of the preamble are known. As explained above figure 2 of D2 describes all the features of the characterising portion and it would be obvious for the skilled person to apply this configuration.

In answer to both of the above arguments, the respondent pointed out that the device of D2 could not meet the functional requirements imposed by feature (ii) since it was primarily designed to limit the amount of noise emitted during operation of the refrigerator. This object was achieved by widening the internal diameter of the capillary (see figures 3 to 6 of D2) immediately before outlet such that the flow is slowed and becomes laminar. Consequently in the device of D2 the deposit of foreign matter would occur internally of the capillary tube where the flow first slows and not in the exterior space between the projecting tube end and the connecting pipe. In practice, the device of D2 would in fact rapidly become clogged if it were used without a filter.

(iii) a combination of D1 and D3

In the appellant's view D3 teaches that it is possible to replace chlorine containing and ozone destructive R-12 by chlorine-free and ozone-layer friendly R-134a with the proviso that a suitable ester lubricant is used in the compressor (see column 2, lines 10 to 20). The skilled person faced with the problem of providing an ozone friendly refrigeration apparatus would thus apply the solution given by D3 to the apparatus of D1, in either of the configurations according to figures 1 and 4, and arrive at the subject-matter of claim 1 in an obvious manner.

The respondent replied that D3 goes on to state that a filter must be installed in the pipework upstream in the flow direction of the refrigerant in the capillary tube, as explained in the description of the contested

patent at paragraph 0008. Since, the contested patent implicitly rules out the use of a filter, a combination of D1 and D3 would not result in the device of claim 1. As argued above under "Novelty" D1 also does not describe or suggest the further distinguishing features (ii) and figure 4 fails to show feature (iii).

(iv) D1 in combination with the "Montreal Protocol on Substances that Deplete the Ozone Layer",

The appellant contended that the "Montreal Protocol on Substances that Deplete the Ozone Layer" would have obliged the skilled person to consider and experiment with chlorine-free refrigerants in the apparatus according to D1. Accordingly the skilled person would have had no option but to obtain the device according to claim 1.

The respondent argued that the version of the "Montreal Protocol on Substances that Deplete the Ozone Layer" filed by the appellant was published in the year 2000, and hence could not be considered prior art. The skilled person would have anyway been satisfied with using HCFC's to meet the requirements to phase out CFC's. As argued above, D1 also does not describe or suggest the further distinguishing features (ii) and (iii).

Auxiliary requests

The appellant argued that both requests should not be admitted into the proceedings as they have been filed too late. In particular auxiliary request 1 takes a

feature out of the description and figures and could not have been anticipated.

The respondent was of the opinion that auxiliary request 1 merely explicitly stated that which was already implicit in claim 1. Both requests were made in response to new arguments brought forward by the appellant in the oral proceedings and consequently should be admitted.

Reasons for the Decision

1. The appeal is admissible.
2. *Novelty*

The Board is of the view that in D1 the term "new refrigerants" could also mean new HCFC compounds. These compounds have a relatively small ozone depleting effect and are scheduled to be phased out at a much later date than CFC's. It is well known in the art that HCFC's, and in particular HCFC 123, were used in the period following the Montreal Protocol of 1987 to replace CFC refrigerants such as R-12 because of their better compatibility with existing systems when compared with chlorine free refrigerants such as R134a, which meant they could be implemented in a shorter time. Hence, the reference in D1 to "new refrigerants" does not clearly and unambiguously mean refrigerants containing no chlorine atoms in their chemical formula. In conclusion the subject-matter of claim 1 as upheld in amended form meets the requirements of Article 54 EPC.

3. *Inventive step*

In the Board's opinion the skilled person taking D1 as the nearest prior art and taking into account the requirements of the Montreal Protocol would arrive at the subject-matter of claim 1 of the main request in an obvious manner.

D1, in particular figure 1, describes:

a refrigeration cycle comprising:
a compressor, a condenser (see column 3, lines 58-59), an expansion device (7), and an evaporator (1), piping (10) connecting said compressor, said condenser, said expansion device, said evaporator in a loop, and refrigerant circulating in said compressor, said condenser, said expansion device, said evaporator, said piping, said expansion device including a capillary tube (7), and connecting means (8) for connecting said capillary tube (7) and said piping, said connecting means (8) being a connection pipe having a larger inside diameter than the inside diameter of said capillary tube (see figure 1),
and wherein an end portion of said capillary tube (7 - see figure 1) projects freely into the inside of said connection pipe (8) so that any foreign matter interfering with the flow of said refrigerant deposits in an inside space of said connection pipe and an outer surface of said free projecting end, and in that said connection pipe (8) possesses a slope (see figure 1) gradually decreasing in inside diameter from said piping side to said capillary tube side.

As concerns the above analysis, it is admitted that D1 is silent on the problem of the deposition of foreign matter and the possible blockage of the capillary tube. However, the functional specification of claim 1 does not necessarily mean that foreign matter is present in the refrigeration cycle, but rather that should **any** become present, for instance through an ingress of moisture, then the capillary tube/connection pipe geometry is such that deposition **would** occur.

The respondent explained during the oral proceedings that, in order for foreign-matter to be deposited without causing blockage, it was only necessary for the end of the capillary tube to project into a widening space provided by the sloping sides of the connection pipe such that the flow slowed and an area of stagnation was created. This is in contrast to the situation shown in figure 2 of the contested patent where the end of the capillary tube is flush with the end of the constant diameter section of the connecting pipe and any foreign-matter precipitating out of the refrigerant will block the outlet end of the capillary tube.

The respondent further argued that it is not possible for any foreign matter to be deposited in an inside space of said connection pipe and an outer surface of the free projecting end of the capillary tube in the arrangement of figure 1 of D1, since this space is filled by the end of the inlet pipe 9. However, the Board cannot accept this argument because the extremity of the inlet pipe 9 does not entirely fill the space between the connection pipe and the outer surface of

the free projecting end of the capillary tube. Consequently, it is possible for foreign-matter to be deposited on the outside of the projecting end of the capillary tube in the manner shown in figure 3 of the contested patent.

Since the capillary tube arrangement according to D1 possesses all the physical characteristics specified in claim 1 and in view of the fact that the respondent has not identified any further constructional limitation implied by the stated function, the Board can only conclude that should **any** foreign matter become present in the refrigerant of D1, for whatever reason, it too **would** deposit in an inside space of the connection pipe and an outer surface of the free projecting end. The difference in the stated intended effect of each arrangement, i.e. to facilitate fitting/soldering of the capillary tube in D1 as against prevention of clogging by deposits of foreign matter in the contested patent, does not give rise to any distinction between the apparatus in this case since it lies only in the minds of the respective designers.

The respondent has also argued that D1 does not disclose that the connection pipe is a separate element, however, this feature is not specified in claim 1 of the main request.

Accordingly, the subject-matter of claim according to the main request differs therefrom in that:

i) - said refrigerant is a compound not containing chlorine atom in its chemical formula.

The distinguishing feature has the technical effect of not depleting the ozone layer should it leak to the atmosphere.

The objective technical problem is therefore to be seen as providing a refrigeration cycle which is less destructive of the ozone layer whilst at the same time maintaining refrigeration performance.

The appellant has cited the "Montreal Protocol on Substances that Deplete the Ozone Layer" and argued that in view of this document the skilled person would have no choice but to use refrigerant compounds not containing chlorine. It is therefore necessary to clarify the status of this prior art. As stated by the respondent it is true that the version of the Montreal Protocol provided by the appellant was published in the year 2000 i.e. after the priority date of the contested patent. It is also correct that the Board has no immediate way of identifying exactly what amendments may have been made to the original version. However, the Board has no doubt that the original version of the "Montreal Protocol on Substances that Deplete the Ozone Layer" must have made it abundantly clear to the skilled person, well before the priority date, that CFC's have to be replaced. In particular Article 2A, (relating to the abolition of CFC's), paragraph 4 of the year 2000 version indicates that consumption of CFC's must not exceed zero commencing on 1 January 1996. It is improbable that this date would have been altered retroactively, moreover, such a drastic restriction would have been indicated to industry well in advance. Further, the Board is of the opinion that it was common knowledge at the time that

CFC's were to be phased out and indeed this was one of the main factors to be considered in refrigerator design.

Given these circumstances, it is clear that the skilled person at the priority date of the contested patent was in fact told by the legislator what kind of solution should be adopted to solve the above objective technical problem - i.e CFC's must eventually be eliminated.

As already discussed when dealing with novelty, the skilled person reading D1 would understand that both HCFC's or chlorine free refrigerant such as R134a come into the category of "new refrigerants" ("neuer Kältemittel") which achieve this end.

In this situation, the skilled person would have tried out a chlorine-free refrigerant in the apparatus of D1 in a bid to fulfil the requirements of the Montreal Protocol in the most straightforward manner. Further, when testing the chlorine free refrigerant, such as R134a, the skilled person would have tried an ester derivative synthetic oil in the compressor, since lubricant compatibility is an essential parameter in refrigerant selection trials. In this situation, should the phenomenon of foreign-matter dissolution have manifested itself (because of moisture ingress) it would have done so by the formation of deposits on the outside of the projecting end of the capillary tube for the reasons explained above. Accordingly, the skilled man would have realised that it was possible to use the chlorine-free refrigerant without filters since the design of the existing apparatus already prevented

clogging of the capillary tube. Hence, the skilled person would have obtained and retained as viable an apparatus according to the subject-matter of claim 1 of the main request without the need to exercise any inventive skill (Article 56 EPC).

Given that the subject-matter of claim 1 of the main request does not meet the requirements of Article 56 EPC for the above reasons, there is no need to discuss the validity of the other lines of attack made by the appellant.

Auxiliary request 1

Auxiliary request 1 introduces subject-matter from the description and drawings. Accordingly, particularly in view of the fact that it was only filed during the oral proceedings, it cannot be admitted into the procedure as such an amendment would have been impossible for the appellant to anticipate.

Auxiliary request 2

This request corresponds to the subject-matter of claim 17 as granted and as such falls outside the scope of the opposition. In spite of the request being late filed, in view of the fact that it relates to an as granted claim the Board sees fit to admit it into the proceedings. The Board also has no reason on the basis of already available information to doubt the validity prima facie of the claim's subject-matter (see G 9/91 - Headnote). In this situation the Board has no power to decide on the revocation of the patent in suit beyond

the extent to which it was opposed in the notice of opposition.

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 with the order to maintain the patent on the basis of the following documents:
 - Claims: 1 to 14 of AR2 as filed during the oral proceedings before the Board.
 - Description: pages 2 to 9 as filed during the oral proceedings before the Board.
 - Figures: 1 to 15 as granted.

The Registrar:

The Chairman:

A. Counillon

J.-P. Seitz