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Datasheet for the decision of 25 August 2011

Case Number: T 1451/07 - 3.5.06

Application Number: 99310524.6

Publication Number: 1026571

IPC: G06F 1/20

Language of the proceedings: EN

Title of invention:
Cooling device and method of controlling the same

Applicant:
FUJITSU LIMITED

Opponent:
-

Headword:
Cooling device/FUJITSU

Relevant legal provisions:
RPBA Art. 15(3)(5)(6)

Relevant legal provisions (EPC 1973):
EPC Art. 56
EPC Art. 113(1)

Keyword:
"Inventive step - no (main and first and second auxiliary requests)"
"Basis of decisions - opportunity to comment (yes)"

Decisions cited:
-

Catchword:
-

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Case Number: T 1451/07 - 3.5.06

D E C I S I O N
of the Technical Board of Appeal 3.5.06
of 25 August 2011

Appellant: FUJITSU LIMITED
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Decision under appeal: **Decision of the Examining Division of the European Patent Office posted 26 March 2007 refusing European patent application No. 99310524.6 pursuant to Article 97(1) EPC 1973.**

Composition of the Board:

Chairman: D. H. Rees
Members: A. Teale
C. Heath

Summary of Facts and Submissions

I. The appeal is against the decision, posted on 26 March 2007, by the examining decision to refuse European patent application No. 99 310 524.6 based on the state of the file. The decision referred to communications from the examining division dated 26 July 2005 and 10 November 2006 which had *inter alia* raised an objection against the claims then on file of lack of inventive step, Article 56 EPC 1973, in view of, amongst others, the following document:

D3: "Integrated Heat Pipe Fan", IBM Technical Disclosure Bulletin, IBM Corporation, New York, US, vol. 38, No. 12, 1 December 1995, pages 531 to 532, XP 000588228, ISSN: 0018-8689

in combination with another document.

II. A notice of appeal together with a statement of grounds of appeal and a set of amended claims were received on 1 June 2007, the appeal fee having been paid on 31 May 2007. The appellant contested the decision in its entirety, requested that the decision be set aside and, as a main request, that the case be remitted to the first instance for further examination on the basis of the amended claims. Oral proceedings were requested in the event that the board contemplated issuing a decision unfavourable to the appellant.

III. The board set out its preliminary view on the appeal in an annex to a summons to oral proceedings, raising objections under Article 84 EPC 1973 (clarity), and

Article 56 EPC 1973 (inventive step) in view of *inter alia* D3.

IV. With a response received on 25 July 2011 the appellant filed amended sets of claims according to a new main and first and second auxiliary requests. The appellant did not comment on inventive step.

V. In a letter received on 26 July 2011 the appellant stated that it would not be represented at the oral proceedings and requested a decision on the state of the file.

VI. Oral proceedings were held on 25 August 2011 in the absence of the appellant, as announced in advance. At the end of the oral proceedings the board announced its decision.

VII. The claims according to the main request comprise an independent claim 1 and dependent claims 2 to 4, claim 1 reading as follows:

"A portable electronic apparatus equipped with a cooling device, the cooling device comprising: a fin (24) disposed within a body of the portable electronic apparatus (10); a ventilation fan (26) disposed within the body so as to generate airflow directed to the fin (24); a heat radiation plate (23) disposed within the body; and a heat conduction component (32) including a first heat path (37) and a second heat path (38) extending in opposite directions from a high temperature component (19), the first heat path (37) for transmitting heat to the heat radiation plate (23), the second heat path for transmitting heat to the fin

(24), characterized in that the heat radiation plate (23) covers an upper surface of the high temperature component (19), the heat conduction component (32) is fixed to the heat radiation plate (23) for evenly contacting with the heat radiation plate (23) at an overall length along the first heat path (37), and the heat conduction component (32) contacts with the fin (24) in the second heat path."

VIII. The claims according to the first auxiliary request comprise an independent claim 1 and dependent claims 2 to 3, claim 1 reading as follows (text inserted with respect to claim 1 of the main request being indicated in **bold**):

"A portable electronic apparatus equipped with a cooling device, **a keyboard (13) being assembled in the body of the portable electronic apparatus,** the cooling device comprising: a fin (24) disposed within a body of the portable electronic apparatus (10); a ventilation fan (26) disposed within the body so as to generate airflow directed to the fin (24); a heat radiation plate (23) disposed within the body **parallel to the keyboard (13)**; and a heat conduction component (32) including a first heat path (37) and a second heat path (38) extending in opposite directions from a high temperature component (19), the first heat path (37) for transmitting heat to the heat radiation plate (23), the second heat path for transmitting heat to the fin (24), characterized in that the heat radiation plate (23) covers an upper surface of the high temperature component (19) **and extends fully widthwise in the body of the portable electronic apparatus**, the heat conduction component (32) is fixed to the heat

radiation plate (23) for evenly contacting with the heat radiation plate (23) at an overall length along the first heat path (37), and the heat conduction component (32) contacts with the fin (24) in the second heat path**, the fin (24) being positioned to face an opening (25) defined in a housing of the body (11)**."

IX. The claims according to the second auxiliary request comprise an independent claim 1 and dependent claim 2. Editorial amendments aside, claim 1 differs from that according to the first auxiliary request in that the following passage has been added at the end:

"and in that the cooling device further comprises a heat diffusion plate (34) directly contacting the high temperature component (19), and a metallic block (35) superposed on the heat diffusion plate (34), the metallic block (35) allowing the heat conduction component (32) to penetrate therethrough."

X. The further elements of the application on file are:
Description:
Pages 2, 9 and 11 to 19, as originally filed;
(Original pages 6 to 8 were deleted in the response received on 24 March 2005);
Pages 1 and 3, received on 24 March 2005;
Pages 4, 5 and 10, received on 30 January 2006.

Figure sheets:
1 to 7 as originally filed.

Reasons for the Decision

1. *The admissibility of the appeal*

In view of the facts set out at points I and II above, the board finds that the appeal is admissible.

2. *The appellant's non-attendance at the oral proceedings*

As announced in advance, the duly summoned appellant did not attend the oral proceedings. In accordance with Article 15(3) RPBA (Rules of Procedure of the Boards of Appeal, OJ EPO 2007, 536), the board relied for its decision only on the appellant's written submissions. The board was in a position to decide at the conclusion of the oral proceedings, since the case was ready for decision (Article 15(5,6) RPBA), and the voluntary absence of the appellant was not a reason for delaying a decision (Article 15(3) RPBA).

3. *The context of the invention*

The application concerns means for cooling the CPU (referred to as the "high temperature component" in the claims) of a portable electronic device such as a laptop computer. Heat from the CPU is transferred to a heat pipe (an evacuated metallic tube containing a volatile fluid) which conducts heat away from the CPU in two directions. The first direction, termed the "first heat path", leads to a metal "heat radiation plate" arranged beneath the keyboard of the laptop. The heat radiation plate can typically dissipate the heat generated by the CPU when it is operated in a lower power mode (for instance, when the laptop is being

powered by its battery). The second direction, the "second heat path", allows the laptop to respond to the CPU being operated in a higher power mode (for instance, when the laptop is connected to the mains supply) and thus dissipating more heat. Heat is led to a fin structure next to an opening in the case of the laptop fitted with a ventilation fan which can generate an airflow across the fin structure and thus dissipate heat into the ambient environment.

4. *The admittance of the amended claims into the procedure*

4.1 The main and first and second auxiliary requests comprising amended claims filed with the letter dated 25 July 2011 constitute an amendment to the appellant's case after it has filed its grounds of appeal and thus, under Article 13(1) RPBA, may be admitted and considered at the board's discretion. The discretion shall be exercised in view of *inter alia* the complexity of the new subject-matter submitted, the current state of the proceedings and the need for procedural economy. Moreover, since these amendments were submitted after oral proceedings had been arranged, under Article 13(3) RPBA they shall not be admitted if they raise issues which the board cannot reasonably be expected to deal with without adjournment of the oral proceedings.

4.2 *The extent of the amendments*

4.2.1 The claims according to the main request have been restricted with respect to those on which the annex to the summons to oral proceedings was based in a manner which overcomes the board's objections under Article 84 EPC 1973 (clarity). Claim 1 according to the

first auxiliary request results from the combination of claims 1 and 2 of the main request, the dependent claims having been renumbered accordingly. Claim 1 according to the second auxiliary request results from the combination of claims 1 and 2 of the first auxiliary request, dependent claim 3 having been renumbered accordingly.

4.2.2 The amendments in substance make only minor changes to the subject-matter set out in the claims, so that the effect of the amendments could be readily assessed by the board.

4.3 *The requirements of Article 113(1) EPC 1973*

4.3.1 The board has considered whether, given the appellant's absence at the oral proceedings, the board's consideration of the inventive step, Article 56 EPC 1973, in the light of D3 of the subject-matter of the amended claims according to the main and first and second auxiliary requests required an adjournment of the oral proceedings to give the appellant an opportunity to comment. The board finds that no such adjournment is necessary for the following reasons.

4.3.2 Inventive step, Article 56 EPC 1973, in view of *inter alia* D3 was discussed in the annex to the summons to oral proceedings in the context of the then valid claims. Hence the appellant could reasonably have expected the board to consider the same issue in the context of the amended claims according to the main and first and second auxiliary requests at the oral proceedings and could therefore have provided arguments on these issues in the letter received on 25 July 2011.

No such arguments were made in this letter. The appellant also chose not to avail itself of further opportunities to comment in the letter received on 26 July 2011, in which the appellant requested a decision on the state of the file but did not comment on the substance of the case, and by not attending the oral proceedings.

4.4 *Conclusion on admittance of the amended claims*

Since an adjournment of the oral proceedings was not necessary to decide on the main and first and second auxiliary requests, they were admitted into the procedure.

5. *Document D3*

5.1 D3 concerns the cooling of a portable computer comprising a keyboard (see figures) and a CPU; see page 532, lines 1 to 3. A heat pipe is used to conduct heat away from the CPU across the keyboard to an aluminium spreading plate over which air can flow due to a fan which runs in cases of high CPU power dissipation. The lower figure shows an "aluminium mounting block" between the heat pipe and the CPU; see page 532, fourth paragraph, first sentence. According to page 532, fourth paragraph, third sentence, "**At any location** of the heat pipe, an aluminium spreading plate is used to connect the heat pipe to the cooling fan installed at the side of the chassis" (emphasis added by the board).

5.2 According to the reasons for the decision (see communication dated 26 July 2005, page 3, last

paragraph), the expression "At any location" means that it is not critical where the aluminium spreading plate is located vis-à-vis the heat pipe. The board agrees with this interpretation.

5.3 The reasons for the decision (see communication of 26 July 2005, pages 3 to 4) also treat the keyboard in D3 as the claimed "heat radiation plate" and the "Al spreading plate" as the claimed "fin". However the board finds that the keyboard cannot be fairly regarded as a "heat radiation plate" in the sense of the claims, since the skilled person would understand the claimed plate to be of metal, the description of the application (page 11, lines 16 to 19) referring to "... a radiation plate ... made of a metallic plate such as an aluminum plate ...", and it is not directly and unambiguously derivable from D3 that the keyboard comprises a metal plate.

5.4 The board interprets the "Al spreading plate" known from D3 (see figures and description, fourth paragraph) as a fin and the keyboard as a heat radiation means. It follows from the figures that the "Al spreading plate" is positioned to face an opening defined in a housing in the body of the portable electronic apparatus to allow the airflow from the fan to escape.

6. *Novelty, Article 54(1,2) EPC 1973*

6.1 *Main request*

6.1.1 In view of the above analysis, D3 discloses the following features of claim 1:

a portable electronic apparatus equipped with a cooling device, the cooling device comprising: a fin ("Al spreading plate") disposed within a body of the portable electronic apparatus; a ventilation fan disposed within the body so as to generate airflow directed to the fin; a heat radiation means (keyboard) disposed within the body; and a heat conduction component ("heat pipe") including a first heat path from a high temperature component (CPU) (see Top View) for transmitting heat to the heat radiation means, the heat conduction component being fixed to the heat radiation means for evenly contacting with the heat radiation means at an overall length along the first heat path.

6.1.2 Hence the subject-matter of claim 1 differs from D3 in that:

a. the heat conduction component further includes a second heat path from the high temperature component in which the heat conduction component transmits heat to and contacts with the fin, the first and second heat paths extending in opposite directions and

b. the heat radiation means is a heat radiation plate covering an upper surface of the high temperature component.

6.2 *First auxiliary request*

6.2.1 Compared to claim 1 according to the main request, amongst other changes, claim 1 now distinguishes the heat radiation plate from the keyboard.

6.2.2 D3 discloses the following features of claim 1:

a portable electronic apparatus equipped with a cooling device, a keyboard being assembled in the body of the portable electronic apparatus, the cooling device comprising: a fin ("Al spreading plate") disposed within a body of the portable electronic apparatus; a ventilation fan disposed within the body so as to generate airflow directed to the fin; and a heat conduction component ("heat pipe") including a first heat path from a high temperature component (CPU) (see Top View).

6.2.3 The subject-matter of claim 1 differs from the disclosure of D3 in the following features:

a. a heat radiation plate disposed within the body parallel to the keyboard and extending fully widthwise in the body of the portable electronic apparatus;

b. the heat conduction component also including a second heat path extending in the opposite direction to the first heat path from the high temperature component, the first heat path for transmitting heat to the heat radiation plate, the second heat path for transmitting heat by contact with the fin,

c. the heat radiation plate covers an upper surface of the high temperature component, the heat conduction component being fixed to the heat radiation plate for evenly contacting with the

heat radiation plate at an overall length along the first heat path.

6.3 *Second auxiliary request*

6.3.1 Compared to claim 1 according to the first auxiliary request, claim 1 now sets out the arrangements for transferring heat from the high temperature component to the heat conduction component. The board interprets the "Aluminium mounting block" known from D3 as the claimed "heat diffusion plate".

6.3.2 The subject-matter of claim 1 differs from the disclosure of D3 in difference features "a", "b" and "c" set out above for the first auxiliary request and in the following difference feature:

d. the cooling device further comprises a metallic block superposed on the heat diffusion plate, the metallic block allowing the heat conduction component to penetrate therethrough.

7. *Inventive step, Article 56 EPC 1973, starting from D3, main request*

7.1 According to the reasons for the decision (see communication dated 26 July 2005, page 3), the problem to be solved is to provide more flexibility in the disposition of the cooling means. The board does not agree that this can be regarded as the objective technical problem, as it already contains a hint at the solution of a geometrical rearrangement of the cooling device. The original application does not mention the problem solved by the claimed arrangement. The board

finds that the objective technical problem is to improve the cooling effect of the cooling device, an obvious problem in itself starting from D3.

7.2 Both of difference features "a" and "b", set out above, concern matters of usual design contributing to the solution of this problem. There is no synergistic effect between difference features "a" and "b". In D3, from the point of view of the CPU, the fin and the heat radiating means are thermally in series, whilst difference feature "a" means arranging them in parallel, thereby reducing the combined thermal impedance presented to the high temperature component and allowing more effective cooling of the CPU. Moreover D3 emphasizes that the cooling fan and thus also the fin can be connected to the heat conduction component "at any location", thereby encouraging the skilled person to experiment with the location. Difference feature "b" also reduces the thermal impedance presented to the CPU as the thermal impedance of the first heat path drops with the proximity of the heat radiation means to the high temperature component, a plate of metal having a low thermal impedance.

7.3 The appellant has argued that the claimed arrangement reduces operation of the fan in the second heat path by presenting the first heat path, with the heat radiation plate in contact with the heat conduction component over the whole length of the first heat path, directly to the high temperature component. The board is not convinced by this argument because, according to the invention, the second heat path is also presented directly to the high temperature component. Thus the difference features not only improve the cooling

performance of the first heat path; the cooling performance of the second heat path is also improved.

7.4 The board finds that the skilled person starting from D3 would have arrived at the subject-matter of claim 1 in an obvious manner. Consequently the subject-matter of claim 1 does not involve an inventive step, Article 56 EPC 1973.

8. *Inventive step, Article 56 EPC 1973, starting from D3, first auxiliary request*

8.1 The board finds that, as with the main request, the objective technical problem is to improve the cooling effect of the cooling device, an obvious problem in itself starting from D3.

8.2 Difference features "a", "b" and "c", set out above, concern independent matters of usual design contributing to the solution of this problem, there being no synergistic effect.

8.3 The skilled person starting from D3 would have recognised that the keyboard would not necessarily either conduct or dissipate heat effectively and would therefore have added a separate heat radiation plate (difference feature "a") in contact with the heat pipe as a matter of usual design. Given the geometry of the laptop shown in D3, the arrangement of the heat radiation plate so that it is parallel to the keyboard and extending fully widthwise in the body of the laptop is regarded as a usual choice. Turning to difference feature "b", from the point of view of the CPU, the fin and the keyboard in D3 are thermally in series, and the

skilled person would have realized that by arranging the fin and heat radiation plate thermally in parallel the combined thermal impedance presented to the high temperature component would be reduced. Moreover D3 emphasizes that the cooling fan and thus also the fin can be connected to the heat conduction component "at any location", thereby encouraging the skilled person to experiment with the location. Difference feature "c" also reduces the thermal impedance presented to the CPU as the thermal impedance of the first heat path drops with the proximity of the heat radiation plate to the high temperature component and the amount of the heat radiation plate in contact with the first heat path.

8.4 The board finds that the skilled person starting from D3 would have arrived at the subject-matter of claim 1 in an obvious manner. Consequently the subject-matter of claim 1 does not involve an inventive step, Article 56 EPC 1973.

9. *Inventive step, Article 56 EPC 1973, starting from D3, second auxiliary request*

9.1 As for the main and first auxiliary requests, the board finds that the objective technical problem is to improve the cooling effect of the cooling device, an obvious problem in itself starting from D3.

9.2 Difference features "a", "b", "c" and "d" all concern independent matters of usual design contributing to the solution of this problem, there being no synergistic effect. Difference features "a", "b" and "c" do not involve an inventive step for the same reasons as set out above for the first auxiliary request.

9.3 Turning to difference feature "d", D3 (lower figure) is somewhat schematic in nature as to how heat is transferred from the "Aluminium mounting block" to the heat pipe, since only one side of the heat pipe is shown as being in contact with the "Aluminium mounting block". The skilled person starting from D3 would have realized that such an interface, in practice, would have resulted in inefficient cooling of the CPU and sought to improve its efficiency. The claimed solution, to provide contact with the heat pipe on all sides (see application, figure 4; heat pipe 32 and metallic block 35) by means of an additional metallic block through which the heat conduction penetrates, is a matter of usual design to achieve a better heat transfer.

9.4 The board finds that the skilled person starting from D3 would have arrived at the subject-matter of claim 1 in an obvious manner. Consequently the subject-matter of claim 1 does not involve an inventive step, Article 56 EPC 1973.

10. *Conclusion on the main and first and second auxiliary requests*

Since the subject-matter of claim 1 according to the main and first and second auxiliary requests does not involve an inventive step, Article 56 EPC 1973, these requests cannot be allowed and the appealed decision cannot be set aside.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

B. Atienza Vivancos D. H. Rees