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Datasheet for the decision of 27 October 2016

Case Number: T 0416/13 - 3.5.06

Application Number: 08166773.5

Publication Number: 2113821

IPC: G06F1/20, H05K7/20

Language of the proceedings: EN

Title of invention:
Dust eliminator for computer and control method thereof

Applicant:
LG Electronics Inc.

Headword:
Dust eliminator / LG

Relevant legal provisions:
EPC 1973 Art. 56

Keyword:
Inventive step - main request (no) - auxiliary request 1 (no) - auxiliary request 2 (yes)

Decisions cited:

Catchword:

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Case Number: T 0416/13 - 3.5.06

D E C I S I O N
of Technical Board of Appeal 3.5.06
of 27 October 2016

Appellant: (Applicant)	LG Electronics Inc. LG Twin Towers 20, Yeouido-dong Youngdungpo-gu Seoul 150-721 (KR)
Representative:	Vossius & Partner Patentanwälte Rechtsanwälte mbB Siebertstrasse 3 81675 München (DE)
Decision under appeal:	**Decision of the Examining Division of the European Patent Office posted on 24 August 2012 refusing European patent application No. 08166773.5 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chairman	W. Sekretaruk
Members:	G. Zucka
	A. Teale

Summary of Facts and Submissions

I. The appeal is against the decision by the examining division, with reasons dispatched on 24 August 2012, to refuse European patent application No. 08166773.5, on the basis that the subject-matter of the sole independent claim 1 of the main and of the auxiliary request did not involve an inventive step, Article 56 EPC.

Inter alia the following prior art documents were cited in the appealed decision:

D1= US 2007/0058346 A1
D3 = EP 1 531 384 A2
D4 = EP 1 798 629 A2
D5 = US 2006/0039113 A1.

II. A notice of appeal was received on 30 October 2012, the appeal fee being paid on the same day. A statement of grounds of appeal was received on 20 December 2012.

III. The appellant requested that the decision under appeal be set aside and a patent granted on the basis of the claims of a main request or one of two auxiliary requests, all filed with the grounds of appeal. The appellant also made a conditional request for oral proceedings.

IV. The board issued a summons to oral proceedings. In an annex to the summons, the board set out its preliminary opinion on the appeal. The following documents were introduced by the board, Article 114(1) EPC:

D8 = "Heat Pipe Reliability in High-Power Applications", C.A. Soule, Power Electronics

Technology, August 2004, retrieved from the Internet, at http://powerelectronics.com/mag/408pet23_web.pdf, on 22 June 2016.

D9 = "Challenges in Intelligent Thermal Control for Notebooks", D. Pivin, EE Times, 5 April 2005, retrieved from the Internet, at http://www.eetimes.com/document.asp?doc_id=1273009&print=yes, on 23 June 2016.

V. On 26 September 2016 the appellant filed amended claims according to a third auxiliary request.

VI. In the course of the oral proceedings, held on 27 October 2016, the appellant filed amended claims according to a new auxiliary request 2, based on auxiliary request 3 with handwritten amendments, as well as description pages for the new auxiliary request 2.

VII. The appellant requested that the decision under appeal be set aside and that a patent be granted on the basis of the main request or auxiliary request 1, both dated 20 December 2012, or in the following version (new auxiliary request 2):

claims 1-3, dated 27 October 2016;

description:
pages 1, 3, 4, 8-11, dated 27 October 2016,
page 2, dated 9 September 2010,
pages 5-7, as originally filed;

drawings sheets 1/3 - 3/3, as originally filed.

VIII. Claim 1, as sole independent claim of the main request, reads as follows:

"A dust eliminator for a computer, comprising:
a main body (30) having an internal space and a ventilating hole (32);
a heat-radiating fan (50) provided in the internal space of the main body (30) to form an air stream for exhausting heat in the main body (30) to the outside;
cooling means (60) having a plurality of micro gaps formed therein such that air can pass through it, the cooling means (60) being provided between the ventilating hole (32) and the heat-radiating fan (50), the cooling means (60) exchanging heat with the air stream passing therethrough;
a vibration-generating element (70) transmitting vibration to the cooling means (60) to shake off dust accumulated on the cooling means (60); and characterized by:
a heat pipe (80) contacting one surface of the cooling means (60) for transferring heat generated in a heat-generating component (33) provided in the main body (30) to the cooling means (60), wherein the vibration-generating element (70) is in contact with one surface of the cooling means (60) opposite to the surface thereof contacting with the heat pipe (80),
wherein a rotating speed of a rotating blade provided in the heat-radiating fan (50) is at highest speed or varied while the vibration-generating element is driven."

IX. Claim 1, the sole independent claim of auxiliary request 1, differs from claim 1 of the main request in

that the wording "at highest speed or" in the last line of the claim has been deleted.

X. Claim 1, the sole independent claim of auxiliary request 2, reads as follows:

"A computer, comprising:
a main body (30) having an internal space and a ventilating hole (32);
a control unit (40) in the main body (30);
a power supplying unit (90) for supplying the main body (30) with power;
and a dust eliminator; the dust eliminator comprising:
a heat-radiating fan (50) provided in the internal space of the main body (30) to form an air stream for exhausting heat in the main body (30) to the outside;
cooling means (60) having a plurality of micro gaps formed therein such that air can pass through it, the cooling means (60) being provided between the ventilating hole (32) and the heat-radiating fan (50), the cooling means (60) exchanging heat with the air stream passing therethrough;
a vibration-generating element (70) transmitting vibration to the cooling means (60) to shake off dust accumulated on the cooling means (60);
the computer further comprising a switch (92) for selectively supplying power from the power supplying unit (90) to the vibration-generating element (70) according to a signal of the control unit (40), and characterized by:
a heat pipe (80) contacting one surface of the cooling means (60) for transferring heat generated in a heat-generating component (33) provided in the main body (30) to the cooling means (60), wherein the vibration-generating element (70) is in

contact with one surface of the cooling means (60) opposite to the surface thereof contacting with the heat pipe (80),

wherein the vibration generating element is driven for a predetermined time from an initial time at which the computer is requested to be powered off to minimize vibration transmitted to the cooling means (60) while the user operates the computer,

wherein a rotating speed of a rotating blade provided in the heat-radiating fan (50) is at highest speed or varied while the vibration-generating element is driven."

XI. At the end of the oral proceedings, the chairman announced the board's decision.

Reasons for the Decision

1. The appeal is admissible

2. *All requests - interpretation of claims*

2.1 The end of claim 1 of the main request contains the expression "wherein a rotating speed of a rotating blade provided in the heat-radiating fan (50) is at highest speed or varied while the vibration-generating element is driven". The board considers this wording to be clear, although it means nothing more than that the rotating speed of the rotating blade is maximised or varied at least when the vibration-generating element is driven, and possibly also at other times.

2.2 The corresponding expression at the end of claim 1 of auxiliary requests 1 and 2 is interpreted in the same way.

3. *Main request*

3.1 It is undisputed that D1 forms the closest prior art for assessing inventive step and that it discloses (see §§ 7-9 and 15-16, and figures 3-4) a dust eliminator for a computer, comprising:

a main body (50) having an internal space and a ventilating hole (56);

a heat-radiating fan (60) provided in the internal space of the main body to form an air stream for exhausting heat in the main body to the outside;

cooling means (cooling fins 64) having a plurality of micro gaps formed therein such that air can pass through it, the cooling means being provided between the ventilating hole and the heat-radiating fan, the cooling means exchanging heat with the air stream passing therethrough;

a vibration-generating element (66) transmitting vibration to the cooling means to shake off dust accumulated on the cooling means.

3.2 It is further undisputed that the following features of claim 1 are not disclosed by D1:

(i) a heat pipe contacts one surface of the cooling means for transferring heat generated in a heat-generating component provided in the main body to the cooling means,

(ii) the vibration-generating element is in contact with one surface of the cooling means opposite to a surface thereof contacting with the heat pipe and

(iii) a rotating blade provided in the heat-radiating fan is rotated at highest speed or its rotating speed is varied while the vibration-generating element is driven.

3.3 The board accepts the appellant's argument (see letter dated 26 September 2016, 2.3, first paragraph) that the problem to be solved may be seen in improving the cooling efficiency of the type of notebook computer cooling system disclosed in D1. The board considers that, especially in the context of notebook computers, where heat tends to build up in relatively small spaces, the skilled person will obviously want to solve this problem, *i.e.* to improve cooling efficiency.

3.4 The board takes the view that feature (i) was well known before the priority date of the present application; see D8, first page, first paragraph. According to D8, "... *virtually every* notebook computer manufactured today uses at least one heat pipe assembly". Almost all notebook computers used heat pipes to transport heat from a heat source (*e.g.* CPU,...) to a remotely mounted heat sink, typically an aluminium finned heat sink. The spatial separation between the heat source and the heat sink allows for a more effective design of the cooling system. For example, the heat sink can be located at the edge of the notebook case, so that a fan can evacuate air which is heated by the heat sink directly to the outside of the notebook via a vent in the case adjacent to the heat sink.

Consistent with what is stated in the appealed decision, Reasons section 2.3.2, second paragraph, the board also considers that documents D3-D5 illustrate

that heat pipes were a standard feature in notebook computers already before the priority date of the present application. The skilled person would thus, as part of the solution to the problem to be solved, naturally install a heat pipe in the notebook computer, which would contact one surface of the cooling means and would transfer heat generated in a heat-generating component (*e.g.* CPU) provided in the main body to the cooling fin means. Such an arrangement is clearly shown in document D9 (see figure 1 and accompanying text passages), which again illustrates a common cooling system in a notebook computer.

3.5 The appellant submits (letter of 26 September 2016, 2.3, second paragraph) that the skilled person would avoid the use of a heat pipe, since it would transmit vibrations from the vibration-generating element to the heat-generating component. The board is however not convinced by this argument. Firstly, it observes that the effect of vibrations transmitted indirectly, through a heat pipe, would be weaker, and perhaps even negligible, compared to a direct transmission from the vibration-generating element to the heat-generating component. Secondly, the appellant has not provided any concrete evidence that the skilled person would indeed consider such a transmission of vibrations through a heat pipe to be problematic. On the contrary, the application itself seems simply to accept that the addition of a heat pipe is unproblematic in this respect. It neither mentions the issue nor shows any constructional elements that may be considered as mitigating said transmitted vibrations.

According to the appellant (*ibid.*), documents D4 and D5 show that a heat pipe is incompatible with a vibrator, given that both documents show dust-removal means which

are not of the vibrating type. The board observes however that neither document says anything about the use of a vibrator, in particular why such use should be avoided; they merely disclose a different type of dust removal means. These documents in fact seem to contain no indications of any kind, even implicit ones, which could be used to support the appellant's point of view in this respect.

3.6 Regarding feature (ii), the board first observes that, according to D1 (see § [0015], tenth to twelfth lines), "The base can be a heat sink" and "A plurality of fins 64 is installed on the base 22 for increasing the heat-dissipation area". Hence base 62 in D1 is actually one part of a finned heat sink, the other part being the plurality of fins 64. The skilled person would seek to transfer as much heat as possible to the cooling means via the heat pipe, which means that the heat pipe should contact preferably the entire surface of either the top or the bottom of the cooling means, these being the largest surfaces of said means. From figure 3 in D1 it is apparent that only the top of the heat sink is still available for being contacted by the heat pipe. The skilled person would therefore bring the heat pipe in contact with the top surface of the cooling means, which is opposite to the bottom surface of its base (62), the base being in contact with the vibration-generating element (66) (see D1, § [0015], eighteenth to nineteenth lines: "... vibrational device 66 installed on the base 62 ...).

The appellant has disputed whether D1 discloses the vibrational device 66 being in contact with the lower surface of the cooling means. The board does not agree, since the above passage in D1 only imposes the requirement that the vibrational device be installed on

the base, obviously so that the base can transmit these vibrations to the cooling fins, so as to shake off the dust that has collected on them. D1 does not specify the placement of the vibrational device more precisely and the skilled person would understand that it could equally well be attached at the underside of the base to achieve the same effect. This means that feature (ii) does not contribute to solving the indicated problem or any other problem. For example, it also does not improve the airflow in the cooling system. It should therefore be considered a mere design choice, which does not contribute to the presence of an inventive step.

3.7 Regarding feature (iii), the board holds that the skilled person would obviously consider the possibility of operating the fan at maximum speed, in order to eliminate the maximum amount of dust.

3.8 The board concludes that each of features (i)-(iii) produces an effect which the skilled person either already knows and will want to achieve, or which should be considered a mere design feature. The combination of the three features does not produce any additional effect that could be considered inventive.

3.9 The subject-matter of claim 1 of the main request is consequently considered not to involve an inventive step, Article 56 EPC 1973.

4. *Auxiliary request 1*

4.1 In claim 1 of auxiliary request 1 the alternative of the rotating blade being rotated at highest speed has been removed, leaving only that of varying the rotating speed while the vibration-generating element is driven.

4.2 The board finds that it was well known before the priority date of the current application to arrange a constant variation of the fan speed in response to various conditions that are themselves constantly changing; see, for example, the CPU thermal control discussed in D9, page 2, second paragraph. This corresponds to the feature of claim 1 of auxiliary request 1 distinguishing it from the main request, *i.e.* that "a rotating speed of a rotating blade provided in the heat-radiating fan is varied while the vibration-generating element is driven". It is noted that the claim's definition implies no link between driving the vibration-generation element and varying the rotation speed of the rotating blade other than that the latter happens at least at the same time as the former; see 2.1 above.

4.3 The appellant submitted during the oral proceedings that in the invention the rotation speed is varied at the moment when the vibration-generating element is driven, in order to improve the removal of dust from the fins at that moment. The board however considers that the claim is not limited to a relationship between both processes. The wording also covers the commonly used *continuous* variation of the fan speed shown, for example, in D9 (*ibid.*), which, when applied in the context of D1, would mean that the fan speed is, even if coincidentally, varied *also* when the vibration-generating element is driven.

4.4 The subject-matter of claim 1 of auxiliary request 1 is therefore also considered not to involve an inventive step, Article 56 EPC 1973.

5. *Auxiliary request 2*

5.1 With regard to claim 1 of auxiliary request 2, the board finds that none of the documents cited in the European Search Report discloses or renders obvious the feature of driving the vibration generating element for a predetermined time from the initial time at which the computer is requested to be powered off. Vibrations in the computer are thereby postponed until such time that the user is no longer using the computer, solving the problem of minimising user disturbance and even discomfort.

5.2 The board concludes that the subject-matter of claim 1 of auxiliary request 2 involves an inventive step, Article 56 EPC 1973.

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 European patent with the following documents:

claims 1-3, dated 27 October 2016;

description
pages 1, 3, 4, 8-11, dated 27 October 2016,
page 2, dated 9 September 2010,
pages 5-7, as originally filed;

drawing sheets 1/3 - 3/3, as originally filed.

The Registrar: The Chairman:

B. Atienza Vivancos W. Sekretaruk

Decision electronically authenticated