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Case Number: T 2427/11 - 3.4.03

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Language of the proceedings: EN

Title of invention:
Image display device having a backlight

Applicant:
Sanyo Electric Co., Ltd.

Headword:

Relevant legal provisions:
EPC 1973 Art. 56
EPC Art. 52(1)

Keyword:
Inventive step - main request (no) - auxiliary request (no)

Decisions cited:

Catchword:

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Case Number: T 2427/11 - 3.4.03

D E C I S I O N
of Technical Board of Appeal 3.4.03
of 16 March 2017

Appellant: (Applicant)	Sanyo Electric Co., Ltd. 5-5, Keihanhondori 2-chome, Moriguchi-shi, Osaka (JP)
Representative:	Glawe, Delfs, Moll Partnerschaft mbB von Patent- und Rechtsanwälten Postfach 13 03 91 20103 Hamburg (DE)
Decision under appeal:	**Decision of the Examining Division of the European Patent Office posted on 21 June 2011 refusing European patent application No. 08008206.8 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chairman	G. Eliasson
Members:	S. Ward
	C. Heath

Summary of Facts and Submissions

I. The appeal is against the decision of the Examining Division refusing European patent application No. 08 008 206 on the ground that the claimed subject-matter did not involve an inventive step within the meaning of Article 56 EPC.

II. At the oral proceedings held before the Board the appellant requested that the decision under appeal be set aside and that a patent be granted on the basis of either the main request filed on 24 February 2011 (and rejected by the Examining Division) or the first auxiliary request filed with the letter of 16 February 2017.

III. The following documents are referred to in this decision:

D2: US 5 164 849
D6: US 2002/0089422 A1

IV. Claim 1 of the main request reads as follows:

"An image display device comprising a cabinet (2), the cabinet (2) comprising:
a display for displaying a video signal;
a backlight (6) for irradiating the display;
a power supply unit (8) for supplying power to the backlight (6);
a microcomputer (4) for controlling the power supply;
sensor means for measuring temperature in the cabinet (2), and
a video processor (26),
wherein the cabinet (2) is hermetically closed and adapted to outdoor use

characterized in that the image display device is capable of operating in a standby mode in which power is supplied to the microcomputer (4) and the sensor means while stopping the power supply to other electronic parts, and a pseudo standby mode in which no image is displayed based on a dark signal from the video processor (26) while maintaining the backlight (6) on, and
the microcomputer (4) has a switching function of shifting to the pseudo standby mode when it is determined in the standby mode that the temperature measured by the sensor means is equal to or less than a first predetermined temperature."

Claim 1 of the auxiliary request is identical to claim 1 of the main request, apart from the addition of the following feature inserted just before the full stop:

"and shifting to the standby mode when it is determined in the pseudo standby mode that the temperature measured by the sensor means is equal to or higher than a second predetermined temperature being higher than the first predetermined temperature."

V. The appellant's arguments, insofar as they are relevant to the present decision, may be summarised as follows:

Document D6 disclosed a laptop computer, wherein the detection of an unusually low temperature which could cause failure of the components resulted in direct warming of the components by a heating coil. This method was costly, and also dangerous in the event of failure of the heating coil.

The present application solved the problem using a low cost and extremely safe method of including the

electronic parts in a hermetically closed space, whereby when the temperature became equal to or less than a first predetermined temperature, the backlight was turned on and warmed the electronic parts. D6 did not suggest or disclose this.

In this pseudo standby mode "no image is displayed based on a dark signal from the video processor", so that "a viewer does not know the turn-on of the backlight (6) and does not feel odd."

In the system of D6, the display could be driven in response to all incoming data, including a dark/black signal. However, in the subject application the dark signal was applied to the display when the display was in the pseudo standby mode, whereas in an ordinary image display device no video signal was sent to display during the standby mode. In D6 there was no reference to a pseudo standby mode or to a dark signal, or to the video processor sending a dark signal to display in pseudo standby mode.

In D2, darkening the display was performed not during the standby mode but in the warm up mode to shorten the time to return to normal operation of the display. In the warm up mode in D2, information was displayed, and darkening the display was done for better visibility.

Claim 1 of the auxiliary request defined that the mode was shifted from the pseudo standby mode to the standby mode when the temperature became equal to or higher than the second predetermined temperature.

Conversely, D2 described that when the predetermined operating temperature of the display had been reached, the display of the LCD and backlight were started in

accordance with normal procedures; there was no description in D2 to "return to the standby mode". In addition, D2 and D6 did not teach an arrangement in a hermetically closed cabinet.

Reasons for the Decision

1. The appeal is admissible.

2. *Matter to be decided*

2.1 No objections were raised in the contested decision under Article 123(2) EPC, and the Board also sees no reason to raise objections in this regard.

2.2 The issue to be decided in the present appeal is therefore whether the subject-matter of claim 1 of the main request or of claim 1 of the auxiliary request involves an inventive step within the meaning of Articles 52(1) EPC and 56 EPC 1973.

3. *The disclosure of document D6*

3.1 The Examining Division found that document D6 (in particular the embodiment depicted in Figs. 6, 7A and 7B, and described in paragraphs [0043]-[0045]) provides the most suitable starting point for the discussion of inventive step, and this has not been disputed by the appellant.

3.2 The following features of claim 1 are disclosed in document D6:

- An image display device comprising a cabinet (a laptop housing), the cabinet comprising:
- a display (606) for displaying a video signal;
- a backlight (implicit) for irradiating the display;
- a power supply unit (battery - paragraph [0043]) for supplying power to the backlight;
- a microcomputer for controlling the power supply (it is implicit that the power supplied to the backlight will be controlled by a processing means);
- sensor means for measuring temperature in the cabinet (paragraphs [0044], [0045]);
- a video processor (implicit in a display device); wherein
- the cabinet is adapted to outdoor use (a laptop may be used outdoors).

3.3 A further claimed feature is that:

"the image display device is capable of operating in a standby mode in which power is supplied to the microcomputer and the sensor means while stopping the power supply to other electronic parts".

Since the claim defines that the device is shifted from the "standby mode" to the "pseudo standby mode" when the temperature is measured to be equal to or less than a first predetermined temperature, it follows that the device is only ever in the "standby mode" when the temperature is *greater* than the first predetermined temperature. The claimed "standby mode" is therefore a normal functional mode in which the device operates when the temperature is not determined to be dangerously low.

For this reason the Board cannot share the view of the Examining Division that the claimed "standby mode" may be identified with the "suspend" mode disclosed in paragraph [0050] of document D6, since it is clear that the "suspend mode" refers to a mode of operation into which the device shifts when damaging environmental conditions are detected (see paragraphs [0008], [0031], [0032], [0036], [0042], [0045] and [0050]).

Nevertheless, the Board regards it as implicit that the device of Fig. 6 of document D6 (a laptop computer) would, like any modern personal computing or display device, have some form of energy saving mode in which the backlight and (at least some) other components would be switched off (for example, after a period of prolonged inactivity), and the term "standby mode" is commonly used for this state. In this mode, it is clear that power must still be supplied to the processor, at least to enable it to recognize and process signals indicating a return to an active mode.

It is thus implicit that the image display device of document D6 is capable of operating in a standby mode in which power is supplied to the microcomputer while stopping the power supply to other electronic parts, as set out in claim 1.

3.4 The claimed device is also defined to be:

> *"capable of operating in a ... pseudo standby mode in which no image is displayed based on a dark signal from the video processor (26) while maintaining the backlight (6) on".*

Any display device is "capable" of operating with the backlight on but with all pixels switched to off (or

dark) as a result of a completely black image signal being sent from the video processor. Simply naming this mode of operation "the pseudo standby mode" does not establish a technical difference over the prior art.

Document D6 also discloses that the device has a switching function, i.e. the function of switching on the heating coil, which is implicitly controlled by a processor (a "microcomputer"). This warming procedure is initiated at a "potentially harmful cold temperature", i.e. when it is determined that the temperature measured by the sensor means is equal to or less than a first predetermined temperature.

4. *Differences of claim 1 of the main request over document D6*

In the light of the above, the Board identifies the following differences (in bold) in the claimed subject-matter of the main request compared to document D6:

(a) the cabinet is **hermetically closed**;

(b) the image display device is capable of operating in a standby mode in which power is supplied to the microcomputer **and the sensor means** while stopping the power supply to other electronic parts;

(c) the microcomputer has a switching function of shifting **to the pseudo standby mode** when it is determined that the temperature measured by the sensor means is equal to or less than a first predetermined temperature.

(d) the temperature determination mentioned under point (c) is made **in the standby mode.**

5. *Problems and solutions*

5.1 The first difference (the cabinet is hermetically closed) is only mentioned in the description in paragraph [0004], in what appears to be acknowledgement that this feature is comprised prior art (as proposed by the applicant-appellant). The application does not specify any particular problem solved by this feature, indeed it appears to be presented as leading to the disadvantage that "dew is formed in the cabinet".

At oral proceedings, the appellant argued that if the cabinet is not hermetically sealed, the backlight would not be sufficiently powerful to heat all of the components. This alleged technical effect is nowhere explained - or even mentioned - in the application, and the Board regards it as merely speculative.

The Board can see nothing in the application itself, or in the appellant's submissions, which would indicate that a persuasive argument in support of an inventive step could be based on this feature.

5.2 The second difference also does not appear to be inventive. In the embodiment of Fig. 6 of document D6, the aim is to detect a potentially harmful cold temperature, and, where detected, to initiate a protective warming procedure. It is therefore obvious that the sensor must be active (i.e. power must be supplied to it) in any operating mode in which such a harmful temperature could occur, including any standby mode.

5.3 According to the third difference, the device shifts to the pseudo standby mode when it is determined in the

standby mode that the temperature measured by the sensor means is equal to or less than a first predetermined temperature. Although not explicitly stated in the claim, the pseudo standby mode is a warming mode, in which the backlight is effectively used as a heater ("by light-on of the backlight (6), the inside of the cabinet (2) is heated, so that dew condensation or an operation failure in an internal electronic part can be effectively prevented" - paragraph [0011]).

By contrast, according to document D6 (paragraphs [0043]-[0045]), when a potentially harmful cold temperature is detected, a "warming device 602, such as a heating coil, may be used to protect the digital information appliance from cold related influences".

The difference over the closest prior art in this respect is therefore not the *principle* of warming a display device when an excessively low temperature is measured to prevent operational failure - this is already disclosed in document D6 - but the *means* by which the device is heated.

5.4 The application does not explain why, according to the invention, the backlight, rather than a conventional heater such as a heating coil, is used to warm the device. Nevertheless, plausible advantages can be imagined. A heating coil is not a standard component of a laptop or display, and the provision of one would add to the cost and complexity of the device. Moreover, failure in a heating coil could pose an electrical or fire hazard. The present invention may therefore be seen as addressing the problem of heating the display, while avoiding these disadvantages. This analysis of the problems solved was also accepted by the appellant.

5.5 Document D2 discusses prior art arrangements in which heater elements are used to warm displays up to operational temperatures (column 1, lines 20-29). In the light of the hazards posed by such devices (column 1, lines 30-37) an alternative solution to warming the display is proposed, according to which, when it is determined that the display has an internal temperature below a predetermined threshold, the brightness of the backlight is increased - preferably to a maximum - and the elements of the LCD are darkened (column 3, lines 4-20; column 4, lines 4-22).

Hence, document D2 proposes heating the display by switching into a "pseudo standby mode" (using the terminology of the present application). This method is explicitly provided to overcome one of the problems mentioned above, namely the safety hazards associated with heater elements. It would furthermore be obvious to the skilled person that dispensing with a heating coil and using only elements which are routinely present in an image display device (backlight, video processor, display panel) would have cost benefits.

5.6 The appellant argues that the claimed condition: "in which no image is displayed based on a dark signal from the video processor" is different to the following condition disclosed in document D2: "the power supply and drive electronics 18 darken all of the elements in the active matrix LCD 12". The Board does not agree.

In both cases, it appears that what is being referred to is a state in which the LCD is electrically addressed in such a manner that all pixels are in light blocking mode. This is clear from the passage in column 3, lines 51-54: "Depending upon the quality of the

elements in the active matrix LCD 12, some of the light from the backlight 14 may escape the display 10 even when all of the elements in the active matrix LCD 12 are darkened". In other words, the elements being "darkened" means they are all configured to block the light, even if, in lower quality LCDs, some residual light may escape.

5.7 Hence, document D2 explicitly teaches the advantages of warming a display device by means of what is, in effect, a pseudo standby mode in all but name. The third difference cannot therefore be seen as inventive.

5.8 The fourth difference is that the temperature determination which may result in shifting to the pseudo standby (heating) mode takes place *in the standby mode*.

Firstly, the Board has already stated its view that it is implicit that the device of document D6 has such a standby mode (see point 3.3, above).

Moreover, according to document D6, the display device may sustain damage if the temperature is excessively low, and the skilled person would understand that there would be a risk of damage whatever mode the device happened to be in at the time (in fact, the likelihood of detecting a very low temperature would be greater in the standby mode, in which the backlight would be switched off, thereby generating no heating effect, than in the active mode). The skilled person would therefore ensure that the warming procedure is initiated when the detection of an excessively low temperature occurs in any mode, including the standby mode.

These considerations would apply whether the warming procedure was carried out by means of a heating coil (as taught in document D6) or whether the skilled person chose - for the reasons stated above - to use instead the "pseudo standby mode" (as taught in document D2).

6. Furthermore, even if it were argued that (at least some of) the differences (a)-(d) combined to solve the posed problems, the Board can see no persuasive evidence of any synergy, that is to say, an unforeseeable mutual reinforcement of the technical effects achieved.

7. In the light of the above, the Board judges that the skilled person would find it obvious to incorporate the distinguishing features into the closest prior art.

8. *Auxiliary request*

8.1 Claim 1 of the auxiliary request adds the following feature:

"and shifting to the standby mode when it is determined in the pseudo standby mode that the temperature measured by the sensor means is equal to or higher than a second predetermined temperature being higher than the first predetermined temperature."

In document D6, various measures are proposed for ensuring that adverse environmental conditions do not damage the digital appliances, including initiating a warming procedure (as explained above) or entering a "suspend mode" (paragraph [0032]).

At least in the case of the suspend mode, it is explicitly acknowledged that the sensor may

continuously detect the environmental influence to determine if it remains potentially harmful, and that "once the danger has passed, the sensor could waken the digital information appliance 222 from the suspend mode to continue operation." Thus the emergency measure remains in place for a limited duration while the danger persists.

For the embodiment of paragraphs [0043]-[0045], the emergency measure proposed in response to the detection of a potentially harmful cold temperature is a warming procedure. In the judgement of the Board, it is implicit in this case also that this emergency measure is not intended to remain in place in perpetuity, but only while necessary to prevent damage to the device. Once the danger of damage is no longer present the heating procedure would be terminated and the appliance would be returned to a normal mode of operation, the most obvious choice being the mode the appliance was in prior to the warming procedure, e.g. the standby mode.

8.2 Furthermore, since a temperature sensor is provided in document D6, and the warming procedure is initiated in response to a temperature detected by this temperature sensor, it would be obvious to determine the point at which the warming procedure should be terminated in the same way.

8.3 It would merely remain to set the respective initiation temperature and termination temperature for the warming procedure. Clearly the termination temperature would not be set lower than the initiation temperature (or the warming procedure would never end). Similarly, setting the termination temperature and the initiation temperature both equal to a single threshold temperature would have obviously undesirable effects. A

temperature drop to the threshold temperature would trigger the warming procedure, and the resultant small rise in temperature which would occur in a very short time would result in the temperature of the appliance rising above the threshold, and consequent termination of the warming. Without the warming procedure, the temperature would quickly drop back down to the threshold and the warming procedure would be triggered again. The result would be that the warming procedure would flip on and off at a rapid rate.

8.4 To prevent this, it would be obvious for the skilled person to set the threshold for terminating the warming procedure at a predetermined temperature higher than the predetermined temperature at which the warming procedure is initiated.

9. For the reasons given above, and on the basis of either the main request or the auxiliary request, the Board judges that the claimed subject-matter does not involve an inventive step within the meaning of Article 52(1) EPC and Article 56 EPC 1973.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

S. Sánchez Chiquero G. Eliasson

Decision electronically authenticated