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D E C I S I O N
of 13 November 1997

Case Number: T 0715/94 - 3.4.2

Application Number: 85304642.3

Publication Number: 0167368

IPC: G02F 1/133, B60Q 3/04

Language of the proceedings: EN

Title of invention:
Liquid crystal display device

Patentee:
Nippon Seiki Co. Ltd.

Opponent:
Mannesmann VDO Aktiengesellschaft

Headword:
-

Relevant legal provisions:
EPC Art. 54, 56

Keyword:
"Novelty (no)"

Decisions cited:
-

Catchword:
-

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Case Number: T 0715/94 - 3.4.2

D E C I S I O N
of the Technical Board of Appeal 3.4.2
of 13 November 1997

Appellant: (Opponent 02)
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Decision under appeal: **Decision of the Opposition Division of the European Patent Office posted 6 July 1994 rejecting the opposition filed against European patent No. 0 167 368 pursuant to Article 102(2) EPC.**

Composition of the Board:

Chairman: E. Turrini
Members: A. G. Klein
M. Lewenton

Summary of Facts and Submissions

I. European patent No. 0 167 368 was granted on the basis of European patent application No. 85 304 642.3.

II. Two oppositions were filed against the patent.

The first opposition was based on an objection of lack of inventive step in view in particular of documents:

D11: DE-U-8 217 670,

D14: DE-A-2 631 329, and

D19: "G-H Color LCDs for Automotive Use", T. Nakanishi et al, JEE, September 1982, pages 35 to 38.

The second opposition was based on objections of lack of novelty and lack of inventive step in view in particular of documents:

D1: DE-A-3 247 531,

D3: GB-A-2 121 583,

which belongs to the same patent family as document D1,

D5: US-A-4 294 517, and

D7: JP-A-59-044027 and Patent Abstracts of Japan, vol. 8, No. 144, (P-284)[1581].

The first opposition was withdrawn before the Opposition Division took its decision.

III. The Opposition Division rejected the second opposition on the ground that a skilled person starting form the nearest prior art construction as disclosed in documents D1 or D3 would not have arrived in an obvious way to the claimed subject-matter.

IV. The opponent (appellant) filed an appeal against the decision of the Opposition Division, submitting in his statement of the grounds of appeal that the claimed subject-matter resulted from an obvious combination of the teachings of documents D11 and D19.

V. In a communication issued by the Board in preparation for the oral proceedings which were held on 13 November 1997, the Board expressed its provisional opinion that the Opposition Division's conclusion that it would not have been obvious to a skilled person to arrive at the claimed construction when starting from D1 or D3 as the nearest prior art, which was not contested by the appellant in his statement of the grounds of appeal, appeared to be founded, and that a combination of the teachings of documents D11 and D19 would not lead to a structure comparable to the one defined in claim 1.

The Board in its communication however expressed its doubts whether claim 1 actually recited any distinguishing feature over the device disclosed in document D5.

VI. The appellant requested that the decision under appeal be set aside and that the European patent be revoked. Auxiliary he requested that the case be remitted to the first instance for further prosecution.

VII. The respondent for his part requested that the appeal be dismissed and that the patent be maintained as granted (main request) or in amended form in accordance with his first to eighth auxiliary requests.

Claim 1 of the main request reads as follows:

1. A liquid crystal display device (3) comprising:

a box-shaped securing member (6) serving as a foundation piece for assembly of the device and having a penetrating portion (6a) at a peripheral portion thereof;

a liquid crystal element (9) in which the directions of arrangement of the molecules of the liquid crystal (32) vary in response to the application of signal potentials for controlling transmission of light to effect indication;

a holding member (8), disposed on the side of said liquid crystal element (9) remote from said securing member (6), for holding said liquid crystal element (9) on said securing member (6);

a circuit board (17), on which is provided a drive circuit (15) for outputting signal potentials for controlling said liquid crystal element (9), said circuit board (17) being disposed on the side of said securing member (6) remote from said liquid crystal element (9); and

a conducting member (23);

said circuit board (17) and holding member (8) being secured to said securing member (6) so that said conducting member (23) establishes electrical connection between said liquid crystal element (9) and said circuit board (17);

characterised by an illuminating member (12) arranged on one side of said securing member (6), in layered relationship with said liquid crystal element (9), and said conducting member (23) being located in said penetrating portion (6a) of said securing member (6).

Claim 1 of the first auxiliary request is distinguished from claim 1 of the main request only in that the last feature of the characterising portion of the latter claim, stating that the conducting member (23) is located in said penetrating portion (6a) of said securing member (6), has been shifted to the preamble of the claim.

Claim 1 of the second auxiliary request is distinguished from claim 1 of the first auxiliary request only in that the expression "an illuminating member" in the latter claim has been replaced by the expression "a separate illuminating member".

Claim 1 of the third auxiliary request is distinguished from claim 1 of the first auxiliary request in that the illuminating member has been specified to be "separate" as in the second auxiliary request, and in that the expression "in layered relationship with said liquid crystal element (9)" has been replaced by the expression "in layered relationship with said securing member (6) and said liquid crystal element (9)".

Claim 1 of the fourth auxiliary request is distinguished from claim 1 of the first auxiliary request in that the expression "an illuminating member" has been replaced by the expression "a flat plate illuminating member", and in that the expression "in layered relationship with the liquid crystal element

(9)" has been replaced by the expression "in layered relationship with said securing member (6) and said liquid crystal element (9)", as in the third auxiliary request.

Claim 1 of the fifth auxiliary request is distinguished from claim 1 of the first auxiliary request in that it sets out at the beginning of the characterising portion the additional feature of "a light source (16) provided on said circuit board (17)".

Claims 1 of the sixth and seventh auxiliary requests are distinguished respectively from claim 1 of the first and fourth auxiliary requests by the addition, at the end of the claim, of the following statement:

"the securing member (6) being shaped to receive the illuminating member (12), the liquid crystal element (9) and the conducting member (23) such that these individual components are automatically placed in position relative to each other".

Claim 1 of the eighth auxiliary request is distinguished from claim 1 of the first auxiliary request by the addition at the end of the claim of the expression:

"said illuminating member (12) being a light transmissive member in the form of a flat plate which takes in light from a light source (16) provided on said circuit board (17) through a light intake portion (12a) provided at least at a portion of a side face of said light transmissive member (12) and which transmits the light to said liquid crystal element (9);

and wherein said light transmissive member (12) is positioned by said securing member (6) and a heat radiating member (13), made of a material having a high

heat conduction, is interposed between the liquid crystal element (9) and the light transmissive member (12), said heat radiating member (13) covering the face of said light transmissive member (12) and having portions cut away in correspondence with indicating portions of said liquid crystal element (9) while another portion thereof is exposed outwardly towards said securing member (6)."

VIII. In support of his requests the appellant at the oral proceedings essentially submitted that a liquid crystal display device as defined in claim 1 of respondent's main and first auxiliary requests was disclosed in document D5. In particular member 10 as shown in the figures of document D5 received many of the elements which formed the device described there, like the flat illuminating member 3, the circuit board 13 and the rubber connecting members 18, 20. The circuit board 13 was clearly secured to board member 10 by the clamps extending from holding member 26, since the assembly had to provide sufficient compression of the rubber connecting members 18, 20 disposed between the edges of the liquid crystal element and the corresponding connection pads on the circuit board.

Concerning respondent's second to fourth auxiliary requests, there would be no doubt either that the separate and flat illuminating member 3 in the device of document D5 also extended over a large area corresponding substantially to the surface of the liquid crystal cell of which it thus provided uniform illumination.

The provision on the circuit board of a light source as set out in the fifth auxiliary request was known for instance from document D14.

Finally, the automatic positioning of the various individual components relatively to each other as set out in the sixth and the seventh auxiliary requests had not been claimed earlier by the respondent who presented these limitations for the first time in the oral proceedings. The appellant could not in so short a delay, present any comprehensive defence against this feature, nor against the numerous new features introduced into claim 1 of the eighth auxiliary request. It would accordingly appear appropriate that the case be remitted for further prosecution to the first instance, in case the Board envisaged to maintain the patent as amended on the basis of any of these requests.

IX. The respondent for his part expressed his surprise that document D5, which was cited in the European Search Report only for illustration of the background art and not taken into consideration by the Examining Division, which was referred to in the opposition procedure only incidentally, in connection with a dependent claim, and not relied upon by the appellant in his statement of the grounds of appeal, was now invoked in support of a novelty objection. The fact that this document had not been invoked earlier in the procedure showed that it constituted at best an accidental anticipation, which at the first glance and in consideration only of the characterising portion of the claim might perhaps appear to be relevant, but which was clearly distinguished from the device defined in the preamble.

In this respect, the preamble of the claim required the box-shaped securing member to serve as a foundation piece for assembly of the device, which implied that all elements constituting the device were mounted on said securing member. In contrast the element of the

assembly disclosed in document D5 were only stacked loosely on top of the pod member 10 before being engaged by holding member 26, which rendered the whole device extremely difficult to assemble.

In addition, there was no disclosure in document D5 of the circuit board 13 being secured to the pod member 10. The circuit board might indeed be held to some extend by the clamps extending downwardly from holding member 26, but the construction shown in the figures did not comprise any means for preventing the circuit board from being disengaged laterally from pod member 10. The expression "secured to" in claim 1 of the patent in suit had been selected on purpose, to express that the circuit board was more than just held onto the securing member.

As a further difference, the illuminating member 3 of the device disclosed in document D5 was located within the top surface of pod member 10, not "on" one of its sides in the sense of present claim 1.

Similarly, the statement in claim 1 that the illuminating member was arranged "in layered relationship with" the liquid crystal element implied that it extended over the whole surface of said crystal element, thus providing uniform illumination, whilst the smaller illuminating member 3 of document D5 could not but result in a brightly illuminated spot in the middle of the display device.

For the above reasons, the device described in document D5 could not solve any of the objects of the invention, which were to improve the uniformity of illumination of the prior art device disclosed in documents D1 or D3 whilst simultaneously providing easier assembly.

The further limitations set out in the auxiliary requests were intended to accentuate the differences of the claimed device over the device disclosed in document D5. This document was in particular dedicated to display devices illuminated with an encapsulated self-luminous backlight assembly, as clearly indicated in the title, which aimed at overcoming the disadvantages of the use of conventional light bulbs. This document could not therefore suggest the provision of a light source in accordance with the fifth auxiliary request.

Document D5 was also entirely silent as to the shaping of the pod member 10 in such a way as to achieve automatic positioning of the individual components relatively to each other in the sense of the sixth and seventh auxiliary requests.

Finally, claim 1 of the eighth auxiliary request was based on a combination of original claims 1, 2 and 4, which the Examining Division expressly considered to be inventive in the first communication it issued in the examining procedure.

Reasons for the Decision

1. The appeal is admissible.

2. *Main and first auxiliary requests*

2.1 Document D5 undisputedly discloses the following features of claim 1 of respondent's main request:

a box shaped member 10' (see Figure 5) having a penetrating portion 11' at a peripheral portion thereof;

a liquid crystal element 6 (Figure 2) in which the directions of arrangement of the molecules of the liquid crystal vary in response to the application of signal potentials for controlling transmission of light to effect indication;

a holding member 26, disposed on the side of said liquid crystal element 6 remote from said member 10', for holding said liquid crystal element on said member;

a circuit board 13, on which is provided a drive circuit 12 for outputting signal potentials for controlling said liquid crystal element, said circuit board being disposed on the side of said member 10' remote from said liquid crystal element;

a conducting member 18,20;

said holding member 26 being secured to said member 10' and said conducting member 18, 20 establishing electrical connection between said liquid crystal element 6 and said circuit board 13;

an illuminating member 3;

and said conducting member 18, 20 being located in said penetrating portion 11' of said member 10'.

The description made in document D5 of the specific prior art construction of Figure 1, which is distinguished from the construction of the other figures only by the constitution of the illuminating member 5, further shows that member 10 or 10' - which is called "pod member" - includes a receptacle 10a in the surface facing the display, for receiving said illuminating member (see column 1, line 65 to column 2, line 10). The receptacle also receives circuit board 13 which is "supported against the rear surface of the pod

member", the contacts for the electronic circuitry being connected to the display by spaced compressible lead connectors 18 and 20. A clamp 26 holds the aforementioned components together. Accordingly, pod member 10' explicitly serves as a support for the liquid crystal element 6 placed on top of it, as a receptacle for illuminating member 5 and conducting members 18, 20 and as a further support for the circuit board 13 applied to its rear surface, these components being held together by the clamps extending from holding member 26. Thus, in the Board's opinion, pod member 10' actually constitutes a "securing member serving as a foundation piece for assembly of the device" in the sense of claim 1.

2.3 Also, since circuit board 13 is firmly supported against the rear surface of pod member 10' by the clamps of holding member 26, it is in the Board's view effectively "secured" to it in the sense of the claim. The support provided to the circuit board shall indeed be sufficiently firm to maintain adequate electrical connection with the liquid crystal element via compressed conducting members 18 and 20. The support thus achieved via the clamps extending from holding member 26 cannot be considered fundamentally different from the support obtained through screws in the embodiment actually disclosed in the present patent, and the Board cannot identify any distinction over the construction of document D5 in the mere statement in claim 1 that the circuit board is "secured" to the securing member.

2.4 Finally, the respondent also contested that in the construction of document D5 the illuminating member 5 was "arranged on one side of said securing member, in layered relationship with said liquid crystal element" in the sense of claim 1 of the main request. In the Board's view, however, the above quoted statement

simply means that the illuminating member is arranged on that side of the securing member which faces the liquid crystal display, and that it forms an illuminating layer which covers most of the surface of the overlaying display. These features, which do not clearly exclude that the illuminating member be partly or entirely integrated within the top surface of the securing member, are disclosed in the figures of document D5; see also column 3, lines 51 to 57: "a more or less rectangular illumination area is formed corresponding generally to the shape of the visible portion of the liquid crystal display". As a matter of fact, in the embodiment actually described in the patent in suit, the flat plate 12 which forms the illuminating member is also entirely integrated within the space defined by the upper edges of securing member 6 just as in the device of document D5 (see Figures 5 and 6).

The Board cannot either accept the argument put forward by the respondent that the illuminating member of the document D5 would not meet the claimed requirement of a layered relationship with the liquid crystal element since it would not achieve uniform illumination as a result of the formation of hot spots on the display device. As a matter of fact, the claim does not recite any limitation as to the degree of uniformity to be achieved by the illuminating member.

2.5 For these reasons, the subject-matter of claim 1 of the main request is considered to lack novelty in the sense of Article 54 in view of the disclosure of document D5. The same conclusion applies to the subject-matter of claim 1 of respondents first auxiliary request, which differs from claim 1 of the main request only by a different distribution of the same features into the preamble and characterising portions.

2.6 It is true that document D5 had been cited in the European Search Report as an illustration of the background art only, and that no particular relevance was attached to it by the Examining and Opposition Division's, nor by the opponent, in the earlier procedures. Much emphasis had indeed been put previously on the contents of document D3 - which describes a prior art construction proposed also by the respondent, in which a single element serves both as an illuminating member and as a securing member - and on the corresponding disadvantages which the subject-matter of the present patent was meant to overcome (see e.g. column 1, line 53 to column 2 line 21 of the present specification). The evident differences between the construction of document D5 and that of document D3, subjectively considered in the earlier procedures as forming the nearest prior art, might explain why document D5 did not receive the attention it deserved.

The Board in its assessment of the patentability of the claimed subject-matter in compliance with established case law objectively determined the nearest prior art on the basis of a comparison between the **claimed** features and those exhibited by the various pieces of prior art available on the file. Since it could not, for the above reasons, identify in claim 1 of the main and first auxiliary request any feature that distinguished the claimed subject-matter from the device of document D5, it had to come to the conclusion that these claims lacked novelty in the sense of Article 54 EPC.

Incidentally, it is noticed that the respondent did not actually contest the Board's power to raise an objection of novelty based on document D5 in the appeal procedure. The Board was indeed entitled to do so, for novelty had already been questioned and document D5

cited , admittedly in relation to dependent claims only, in appellant's notice of opposition dated 8 January 1993 (see page 4, second to fourth paragraphs).

3. *Respondent's second auxiliary request*

Claim 1 of respondent's second auxiliary request is distinguished from claim 1 of the main and first auxiliary requests by the addition of the feature that the illuminating member arranged on one side of the securing member is a "separate" illuminating member.

The illuminating member 3 shown in Figure 2 of documents D5 also forms a separate element which is simply received within receptacle 10a formed into securing member 10 between conducting members 18 and 20 (see the sentence bridging columns 3 and 4). Attaching the illuminating member to the securing member by adhesive and the like is only presented as an option (see column 4, lines 22 to 24).

Accordingly, the subject-matter of claim 1 of respondent's second auxiliary request also lacks novelty in the sense of Article 54 EPC.

4. *Respondent's third, fourth and fifth auxiliary requests*

The illuminating member of the liquid crystal display device described in document D5 is constituted by self-luminous light sources comprising a glass or other transparent shell coated with radioluminescing phosphor and filled with tritium gas or other radioactive material (see column 3, lines 38 to 43).

Document D5 is dedicated to improving such self-luminous light sources, but the use of radioactive materials for illuminating liquid crystal displays exhibits self-evident disadvantages in terms of potential health and environmental risks. Accordingly, in the Board's opinion, it would be an obvious object for the skilled person starting from the construction of document D5 to seek for an alternative, safer, illuminating means free of dangerous materials.

Document D14 discloses such an illuminating device for a liquid crystal display (see title) which comprises a separate, flat plate arranged between the liquid crystal display and the circuit board for its drive circuit and which takes in light from a light source provided on said circuit board (see Figures 1 and 3, claims 1 and 12).

In the Board's view, it would be obvious to the skilled person to replace the illuminating member of document D5 with the one disclosed in document D14, and thus to provide a similar "separate and flat plate illuminating member" between the securing member and the liquid crystal element of document D5, i.e. "in layered relationship with said securing member and said liquid crystal element", together with "a light source provided on said circuit board" as set out in the characterising portions of respondent's third, fourth and fifth auxiliary requests, respectively.

The subject-matter of these claims is therefore considered to lack an inventive step in the sense of Article 56 EPC.

5. *Respondent's sixth and seventh auxiliary requests*

As compared to claim 1 of the first and fourth auxiliary requests, claim 1 of the sixth and seventh auxiliary requests have been supplemented with the indication at the end of the claim that the securing member is shaped to receive the illuminating member, the liquid crystal element and the conducting member such that these individual components are automatically placed in position relative to each other.

The securing member 10' shown in Figure 5 of document D5 comprises elongated slots 11' for the conducting members and a receptacle for illuminating member 3', and is therefore already "shaped to receive the illuminating member and the conducting member such that these individual components are automatically placed in position relative to each other". Securing member 10' does not comprise any additional locating means for the liquid crystal element (6), which is simply placed on top of it and maintained by the clamps of holding member 26.

In the Board's view, however, it is a common endeavour of the skilled person to facilitate the assembly of structures formed by several components. In order to avoid that liquid crystal element 6 with its front and rear polarisers 22 and 24 accidentally slide off the top surface of securing member 10' before been secured by holding member 26 the skilled person would without the exercise of inventive ingenuity contemplate to provide the securing member with some ridges or positioning pins so as to automatically place in position also the liquid crystal element relatively to the other elements.

Incidentally it is noticed that providing a liquid crystal display device which permits easy and accurate assembly of its component parts was already stated to be the first object of the invention disclosed in document D3 (see page 2, lines 44 to 50), which was met there in particular by several ribs 2b, 2c and 2d formed in securing member 2 to determine the appropriate position of liquid crystal elements 1A, 1B and 1C (see Figure 1, page 4, lines 115 to 119 of the description and claim 2).

For these reasons, the subject-matter of claim 1 according to respondent's sixth and seventh auxiliary requests is not considered to involve an inventive step in the sense of Article 56 EPC.

6. *Respondent's eighth auxiliary request*

Claim 1 of respondent's eighth auxiliary request is distinguished from claim 1 of his first auxiliary request by the following additional features:

(a) the illuminating member is a light transmissive member in the form of a flat plate which takes in light from a light source provided on the circuit board through a light intake portion provided at least at a portion of a side face of said light transmissive member and which transmits the light to said liquid crystal element;

(b) said light transmissive member is positioned by said securing member; and

(c) a heat radiating member made of a material having a high heat conduction is interposed between the liquid crystal element and the light transmissive member, said heat radiating member covering the

face of said light transmissive member and having portions cut away in correspondence with indicating portions of said liquid crystal element while another portion thereof is exposed outwardly towards said securing member.

An illuminating member formed of a light transmissive member in accordance with feature (a) is known from document D14 and its inclusion into the prior art device of document D5 does not involve an inventive step for the reasons indicated in paragraph 4 above in relation with claim 1 of respondent's third to fifth auxiliary requests.

The positioning of the illuminating member by the securing member as set out in feature (b) is known from document D5 for the illuminating member disclosed there (see paragraph 5 above), and using the same positioning technique for the light transmissive member of document D14 when used as an alternative to the known illuminating member is not considered to involve an inventive step either.

The provision of a heat radiating member with cut away portions in correspondence with the liquid crystal display with another outwardly exposed portion as defined in feature (c) is a known means for avoiding undue temperature rise in a liquid crystal display device illuminated by a lightbulb (see document D7, Figures 1, 3 and 6; abstract), which the skilled person would in an obvious way envisage to use also in the structure of document D5, for the same purpose.

For these reasons the subject-matter of claim 1 of respondent's eighth auxiliary request is considered to lack an inventive step in the sense of Article 56 EPC.

7. Since claim 1 of respondent's main and first to eighth auxiliary requests fail to meet the requirements of either Article 54 EPC or Article 56 EPC and the grounds for opposition mentioned in Article 100(a) therefore prejudice the maintenance of the European patent, the latter shall be revoked under Article 102(1) EPC, in accordance with appellant's main request.

8. As a result, appellant's auxiliary request that the case be remitted to the Opposition Division for further prosecution need not be considered further.

For the sake of completeness it is noticed that respondent's initial request for apportionment of costs incurred during oral proceedings (see the paragraph bridging pages 1 and 2 of his letter dated 1 March 1995), which he did not reiterate at the oral proceedings, could not have been granted under Article 104 EPC since if would not have been justified by reasons of equity. The oral proceedings which took place on 13 November 1997 have been summoned at the respondent's own auxiliary request, in order to give him an adequate opportunity to defend his patent.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The European patent No. 0 167 368 is revoked.

The Registrar: The Chairman:

P. Martorana E. Turrini