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vom / of / du 17 May 1983

Anmelder:
Applicant: Stanley Electric Co. Ltd.
Demandeur :

Stichwort:
Headword:
Référence :

EPÜ / EPC / CBE Article 52(1), 56
"Inventive Step"

Leitsatz / Headnote / Sommaire

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Case Number: T 138 / 82

DECISION

of the Technical Board of Appeal 3.4.1

of 17 May 1983

Appellant: Stanley Electric Co.Ltd
2-9-13, Nakameguro
Meguro-ku Tokyo
Japan

Representative: Harrison, David Christopher et al
Mewburn Ellis & Co.,
2/3 Cursitor Street
London EC4A 1BQ
United Kingdom

Decision under appeal: Decision of Examining Division 040 of the European Patent Office dated 19May 1982 refusing European patent application No 80 301 841.5 pursuant to Article 97(1) EPC

Composition of the Board:

Chairman: R. Kaiser
Member: O. Huber
Member: P. Ford

I. Summary of Facts and Submissions

1. European patent application No. 80 301 841.5 entitled "Multilayer liquid crystal device", filed on 3 June 1980 and published on 14 January 1981 (publication No. 0 022 311) and claiming priority of 15 June 1979 from a previous application in Japan, was refused by decisio of Examining Division 040 of the European Patent Office, dated 19 May 1982. The claims 1 - 9 considered were as originally filed apart from a clarifying amendment to claim 4. The ground for refusal was that the behaviour of the light in the two cells of the display device claimed in claim 1 was identical to that in the two cells of the device described in DE-A-2 345 794, Fig. 4. Therefore, the subject matter of claim 1 differed from this known display device only in the way of obtaining this behaviour of light, namely in the claimed device an appropriate orientation of the molecules contained in the two cells respectively, in the known device a half-wavelength plate between the two cells. The choice of this simple alternative was not inventive in the sense of Article 56 EPC. According to the decision, claim 1 and the dependent claims 2 - 9 were not allowable.

2. On 26 July 1982, the appellant lodged an appeal against the decision by telex and paid the appeal fee. A document reproducing the contents of the telex was filed on 28 July 1982. A Statement of Grounds was submitted on 13 September 1982.

3. During oral proceedings, held on 17 May 1983 at the request of the appellant, the appellant's professional representative asked for the decision under appeal to be set aside and a patent to be granted on the basis of the following points:

Claims 1 and 5 as submitted during the proceedings;
Claims 2-4, 6-9 as published;
Description as published and
one sheet of drawings as published

The present claim 1 reads as follows:

1. A guest-host type liquid crystal display device not requiring the use of external polarizers, characterised in that the two guest-host type liquid crystal cells (1,2) are directly juxtaposed to each other, liquid-contacting boundaries of the cells being treated such that the liquid crystal molecules contained in the respective cells and located close to a boundary (1b, 2a; 7'; 8) between the two cells are oriented in a direction parallel to the plane of the boundary, but that the direction of orientation of the molecules in one cell (1) is perpendicular to that in the other cell (2) when a voltage is applied, or alternatively when no voltage is applied.

The representative argues essentially as follows:

Certainly, the applicant has not invented the liquid crystal display device as such but a special very simple and advantageous type of it. The claimed device is made up of a minimum number of parts, comprising only two cells, and this is achieved by the new concept of setting

.../...

the orientation of liquid crystals at right angles in parallel planes in the two cells. The device according to the application does not require an external polarizing element as the display device decribed in "Journal of Applied Physics" 45, 1974, No. 11, pages 4718 - 4723 (the so-called White and Taylor cell) or a half-wavelength plate between the two cells as the device disclosed in Fig. 4 of DE-A-2 345 794. The essential technical advantage is indicative of invention. The alleged equivalence of the known and the claimed devices does not also exist since the subject matter of the application comprises one element less than the prior art.

Finally, the statement of the Examining Division that the applicant has chosen the only alternative to the device according to DE-A-2 345 794 is factually wrong since another alternative has been proposed, namely the White and Taylor cell. Taking into account all these facts, the subject matter of the application is based on an inventive step and the claims should be allowable.

II. Reasons for the Decision

1. The appeal complies with Articles 106-108 and Rule 64 EPC. It is therefore admissible.

2. There is no formal objection to the current claims, since they are supported by the original documents.

3.1 The guest-host type liquid crystal display device according to claim 1 is new.

The most relevant prior art is disclosed in DE-A-2 345 794, Fig. 4 in conjunction with Fig. 2A, 2B or Fig. 3A, 3B respectively. These Figures show a guest-host type liquid crystal display device which comprises two cells (9, 10, 13; 15, 16, 19) juxtaposed to each other the liquid-contacting boundaries (9, 10; 15, 16) of which are treated such that the liquid crystal molecules contained in the respective cells and located close to a boundary between the two cells are oriented in a direction parallel to the plane of the boundary when a voltage is applied (Fig. 2B), or alternatively when no voltage is applied (Fig. 3A).

The device according to claim 1 differs from these known devices in that the directions of orientation of the liquid crystal molecules in one cell is perpendicular to that in the other cell whereas in the known device the molecules have the same orientation in both cells. The mode of operation of guest-host type liquid crystal display devices is based on polarizing light passing through a cell. Therefore, in order to get "darkness" in the case of the known devices according to DE-A-2 345 794 the polarization plane of the light impinging onto the second cell must be shifted by 90° and this is achieved by an (additional) half-wavelength plate (14) between the two cells.

3.2 According to page 4, second paragraph of the description, the present application has for its object to provide a liquid crystal display device (a) which does not require the use of external polarizers and (b) which can give a display of clear images having a

high contrast against a coloured background (c) by application of a low voltage between the electrodes. The parts (b) and (c) of the problem are already mentioned in DE-A-2 345 794, see page 2, lines 1-4, 11, 12, 26 and 27. Furthermore, it must be stated that part (c) is not solved by the features of claim 1 but only by the feature of claim 2 (use of a "nematic" liquid crystal), see page 11, lines 12-27 of the description of the application.

In view of part (a) of the problem it is a permanent desire of the manufacturers to reduce the number of elements, in particular to conceive devices which do not require a polarizer or require only one polarizing element instead of two (one polarizer and one analyzer), cf. DE-A-2 345 794, page 2, lines 5-10, DE-A-2 310 733, page 2, lines 5-12, page 6, lines 1-4. Besides, the White and Taylor cell can already be operated without using either an external polarizer or an external analyzer, see description of the application, page 1, first paragraph, page 2, lines 5-18, page 3, lines 21-23. The same is true for a large number of other known liquid crystal display devices. Starting from the device according to Fig. 4 of DE-A-2 345 794 the problem evidently is to provide a display device which does not require a half-wavelength plate analogous to part (a) of the problem (saving a polarizer).

3.3 The problem is solved by the measure that the direction of orientation of the liquid crystal molecules in one cell is perpendicular to that in the other cell.

3.4 A person skilled in the art (in the present case a physicist in the optical field) looking for a two-cells-device without a half-wavelength plate will certainly start from the optical effects in the second cell: (a) the light leaving the first cell (Fig. 3A) and impinging onto the second cell is polarized since it is well known that a liquid crystal cell has the effects of an optical polarizer the polarization plane of which is defied by the orientation of the liquid crystal molecules; (b) the only condition in order to extinguish the polarized light impinging onto the second cell is that the orientation of the polarizsation plane of the second cell is perpendicular to that of the incident light, both orientations being parallel to the plane of the boundary, as a person skilled in the art knows. Considering these facts it is a natural consequence to conceive the idea of aligning the second cell optically in such a direction that its polarization plane is perpendicular to the polarization plane of the impinging light i.e. of aligning the molecules in the second cell perpendicular to the molecules in the first cell. This can be achieved by a simple treatment of the surfaces of the cell walls. Then, a half-wavelength plate which rotates the polarization plane of the incident light by 90° is superfluous.

There are also no obstacles or any difficulties to prevent a skilled man from doing so.

3.5 Thus, the guest-host type liquid crystal display device according to claim 1 does not involve an inventive step (Article 56 EPC). Claim 1 therefore, cannot be allowed under Article 52(1) EPC.

4. The claims 2-9 are formulated as dependent claims. They are not allowable since their existence is conditional on the allowability of claim 1. Furthermore, in view of the prior art, the Board cannot find any patentable features in the sub-claims.

III. Order

For these reasons,

it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

J. Rückerl R. Kaiser