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**Datasheet for the decision  
of 3 November 2010**

**Case Number:** T 0394/09 - 3.4.02

**Application Number:** 98937203.2

**Publication Number:** 1019780

**IPC:** G02F 1/00

**Language of the proceedings:** EN

**Title of invention:**

Optical exposure systems and manufacturing of alignment layers  
for liquid crystals

**Patentee:**

Elsicon, Inc.

**Opponent:**

Becher, Claus Thomas

**Headword:**

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**Relevant legal provisions:**

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**Relevant legal provisions (EPC 1973):**

EPC Art. 100(b), 83

**Keyword:**

"Sufficiency - claims 1 and 9 (yes)"

**Decisions cited:**

-

**Catchword:**

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Case Number: T 0394/09 - 3.4.02

**DECISION**  
of the Technical Board of Appeal 3.4.02  
of 3 November 2010

**Appellant:** Elsicon, Inc.  
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**Decision under appeal:** Decision of the Opposition Division of the  
European Patent Office posted 3 December 2008  
revoking European patent No. 1019780 pursuant  
to Article 101(3)(b) EPC.

**Composition of the Board:**

**Chairman:** A. G. Klein  
**Members:** M. Rayner  
B. Müller

## Summary of Facts and Submissions

- I. The patent proprietor has appealed against the decision of the opposition division revoking European Patent No. 1 019 780 (application number 98937203). The patent concerns optical exposure systems.

In its summons to oral proceedings, the opposition division observed that a skilled person would recognise that throughout the application the divergence of the light source is actively limited (by curved mirrors and/or apertures) only in one dimension, whereas the divergence in the orthogonal dimension remains "unaffected" and is thus not further limited. If understood in that sense, examples 1-3 are clearly covered by the subject-matter of claims 1 and 10. It is, furthermore, hardly doubtful that the opposed patent provides sufficiently clear and complete information for a skilled person to carry out Examples 1-3. It appears, moreover, that a skilled person would not need any further information in order to carry out the invention for divergences along the orthogonal direction which are outside the range of the examples.

- II. During oral proceedings before the opposition division, the chairman stated that due to the fact that amended claim 9 is a combination of claims 9 and 10, a clarity issue must have been already present in the granted patent and can therefore not be considered as being a consequence of the amendments made. Hence, there was no need to discuss clarity of claim 9.

III. In the decision under appeal, the reasoning of the opposition division can be summarised as follows.

In the present case, it is somewhat unclear what is meant by the expression "unlimited divergence along the orthogonal dimension" as it does not have a well-recognised meaning in the art of light exposure. The skilled reader would therefore have to look for an interpretation which is consistent with both the examples and the general teaching of the patent. The following interpretations might be considered by a skilled person:

(a) a divergence of  $360^\circ$

A skilled person would immediately see that a divergence of  $360^\circ$  cannot be meant since this interpretation is in contradiction to all the examples.

(b) a divergence provided by the lamp which is not further limited by any optical means

The skilled reader would recognise that passages in the description seem to point towards this interpretation since light rays in the orthogonal dimension are said to be "unaffected". However, given that a cylindrical elliptical mirror clearly limits the divergence in the plane parallel to its cylindrical axis, it is not quite clear what may actually be meant by the term unaffected. No limitation at all of the divergence in the  $180^\circ$  region below the lamp is clearly inconsistent with the examples all disclosing limiting the divergence in the direction orthogonal to the scan direction.

- (c) a divergence which may reach any value without any limit, i.e. any value between 0 and 360°.

This interpretation allows divergence in the orthogonal dimension to take any value.

However, this includes a divergence of 0° or close to it, i.e. a beam which has a high degree of collimation in the orthogonal dimension. None of the examples shows a divergence in the orthogonal dimension of less than 20°.

- (d) a divergence which does not have an upper limit

This interpretation does not differ in substance from interpretation (c) as neither an upper limit nor a lower limit for the divergence values is defined so that the full range from 0 to 360° is defined. The same reasoning as thus applies.

Therefore, the requirements of Article 83 are not met.

IV. The appellant requested that the decision be set aside and the patent be maintained based on the main request filed on 10th September 2008, during the opposition proceedings. Should the decision under appeal be set aside, remittal to the first instance for consideration of the other grounds for opposition was requested. Oral proceedings were requested on an auxiliary basis.

Arguments of the appellant in support of its case can be summarised as follows.

The opposition division correctly interpreted and understood the simple definitions and teaching in its preliminary opinion attached to the summons to attend oral proceedings. In its decision, the Opposition

Division made several alternative interpretations of the term "unlimited divergence", which are contrary to the invention and the teaching of the patent as a whole. A low degree of collimation is such that it generates a more diffuse illumination along that dimension that minimizes irregularities in the exposure uniformity due to defects in the optical components. For those skilled in the art the low degree of collimation means that the divergence is not actively controlled unlike the actively controlled divergence in the other dimension of greater than about  $5^\circ$  and less than about  $30^\circ$ . It is not relevant whether several elements are present that clearly limit the divergence of the lamp orthogonal to the scanning direction because it is simply not controlled unlike the actively limited divergence in the other dimension. Some collimation may be present but is not essential as it is irrelevant. The only reasonable conclusion that a skilled man willing to understand the invention would arrive at is that the term "unlimited divergence" should be construed to mean that there is no limit to the amount of divergence of the light in the orthogonal direction; the amount of divergence can take any value.

Once the skilled person has so construed the claim, the remaining question is whether he is able to put the invention into effect based on the disclosure of the patent and his common general knowledge. If the divergence in the first dimension is between about  $5^\circ$  and about  $30^\circ$ , the skilled person will be working within the forbidden area of the claims, irrespective of the divergence in the orthogonal dimension. The patent specification clearly includes several examples of ways of carrying out the invention. Examples 1 to 3

and 13 to 15 describe embodiments with divergence in the orthogonal dimension of between 30 and 45°. Example 8 describes an embodiment with divergence in the orthogonal dimension of 20°. Furthermore, paragraphs [0020] to [0022] give examples of ways of putting the invention into effect.

The burden of proof is upon the opponent to establish on the balance of probabilities that a skilled reader of the patent, using his common general knowledge, would be unable to carry out the invention. The opponent also bears the burden of proving that the invention cannot be carried out within the whole range claimed. The opponent has not discharged these burdens.

Claim 9 corresponds to a combination of claims 9 and 10 as granted and is thus not open to objection of lack of clarity in post grant proceedings. Moreover, the amendment concerned merely brings the claim into line with claim 1. Furthermore, there is no teaching in the patent that the one direction has to be the transport direction.

- V. The respondent (=opponent) requested that the appeal be rejected, oral proceedings be arranged in the case the board considers taking any decision adverse to it, and the case be remitted should the board consider the main or any auxiliary requests of the appellant to fulfil the requirements of Article 83 EPC.

Arguments of the respondent in support of its case can be summarised as follows.

Sufficient disclosure with respect to the feature of the "unlimited divergence" is not given, such that the skilled person is unable to carry out the subject-matter claimed in claim 1. The objection relies on what is said in the patent, no evidence needing to be submitted.

The problem addressed by the patent is that of providing an efficient system. What is known is a highly collimated system, which according to the patent, is less efficient. The solution offered is that in one direction there is unlimited divergence, which direction is, however, not clearly defined with respect to the transport direction. The relationship of the direction of transport to the unlimited direction should be in the claim, because if the values are inverted, the problem is not solved.

The skilled person with a mindset wanting to understand the term "unlimited divergence" would investigate the limitation intended using the entire disclosure of the patent in combination with common general knowledge. The term "unlimited" is understood, in a literal sense, to mean "not having any (lower and/or upper) limit", or "without any (lower and/or upper) limit", resulting in a divergence of the light having any value between 0 and 360°, i.e. a divergence is always present in the full range between 0 and 360°. However, when further considering the specification on the basis of this literal interpretation of the term, there is disclosed that a "low degree of collimation in the dimension perpendicular to the scan direction" is desired such that any interpretations of the term "unlimited" which includes a 0° divergence, i.e. perfectly collimated

light, would be excluded. Furthermore, when considering the claim features stating a (limited) range of between  $5^\circ$  and  $30^\circ$ , the distinction between limited and unlimited would not make any sense if the term "unlimited" included any divergences below  $30^\circ$ . Accordingly, the skilled person is still left in the dark about the claim limitation that is intended by the term "unlimited divergence".

The specification does provide, in column 5, line 27, an explicit definition of the term "limited divergence" as a divergence of less than  $45^\circ$ . Accordingly, the term "unlimited divergence" would then refer to divergences greater than  $45^\circ$ , in particular a range of  $45^\circ$  to  $360^\circ$ . However, when considering the examples in the specification, it becomes apparent that these do not disclose an exposure system or process in which an unlimited divergence in the orthogonal dimension greater than  $45^\circ$  is generated as reference is made to  $30$  to  $45^\circ$ . It is to be noted that the passage describing the examples states that the optical elements have a small limiting effect on the divergence.

There is no support for defining the expression "unlimited divergence" to mean that the divergence is not actively controlled or affected in the orthogonal dimension in contrast to the actively controlled divergence in the one dimension. On the contrary, the divergence of the light in the orthogonal dimension is obviously controlled in all embodiments shown and discussed in the entire disclosure namely by means of the curved or cylindrical mirror in combination with the apertures. Moreover, if "unlimited" is argued to be unrestricted, if  $20^\circ$  as in Example 8 is unlimited, then

any value is nevertheless included. Values from greater than  $5^\circ$  and less than  $30^\circ$  in both directions would not improve the system or solve the problem. For example, if one direction is collimated to  $33^\circ$  and the other to  $20^\circ$ , it cannot even be determined if the claim wording is met. The other direction might even be more collimated than the one direction.

Accordingly, the skilled person does not find sufficient teaching as to how to provide an optical exposure system which is ready to generate partially collimated light having a divergence of greater than about  $5^\circ$  and less than about  $30^\circ$  along one dimension and an unlimited divergence along the orthogonal dimension.

Even though clarity is not a ground for opposition, amended claim 9 lacks clarity as it, after amendment in opposition proceedings, comprises an unclear term, namely the term "unlimited divergence". Clarity is not excluded from consideration when considering an amended claim post grant, even if the amendment is a combination with a dependent claim. After all, dependent claims are not so thoroughly examined during the examination procedure and it may be that a dependent claim escaped full attention. Therefore, the argument that the claim is a combination is not a full defence.

VI. Consequent to the auxiliary requests of the parties, the board appointed oral proceedings. During the oral proceedings, the parties advanced arguments including those given in Sections IV and V above. The Chairman observed that the board tended to consider that there

was an active limitation of divergence in one direction but not in the other. Therefore it did not seem that Figure 5 was compatible with the claims as amended. The parties replied that they had nothing else to add in reply to the Chairman's comment.

VII. Independent claims 1 and 9 are worded as follows.

"1. An optical exposure system for manufacturing an alignment substrate with partially polarized and partially collimated light comprising:  
at least one source of optical radiation;  
means for partially collimating said optical radiation;  
means for partially polarizing said optical radiation, wherein the polarization ratio of partially polarized light ranges from 1:100 to 100:1, excluding the states of about 1:1;  
and  
means for transporting the substrate relative to the partially collimated and polarized optical radiation, wherein the partially collimated light has a divergence of greater than about 5 degrees and less than about 30 degrees along one dimension and an unlimited divergence along the orthogonal dimension.

9. A process for manufacturing an optical alignment layer comprising:  
providing an optical alignment layer;  
exposing an optical alignment layer to partially polarized light, wherein the polarization ration of partially polarized light ranges from 1:100 to 100:1, excluding the states of about 1:1, wherein the alignment layer absorbs the partially polarized light;  
and

wherein said exposing step induces anisotropic dielectric properties in the optical alignment layer; and further comprising exposing the optical alignment layer to partially polarized and partially collimated light, wherein the partially collimated light has a divergence of greater than about 5 degrees and less than about 30 degrees along one dimension and an unlimited divergence along the orthogonal dimension, and wherein the partially polarized and partially collimated light is absorbed by said optical alignment layer."

VIII. At the end of the oral proceedings, the board gave its decision.

### **Reasons for the Decision**

1. The appeal is admissible.
2. Sufficiency
  - 2.1 With its summons to oral proceedings, the opposition division gave a first view, with which the board concurs, of what it considered the skilled person would have understood the term "unlimited divergence" to mean, i.e. the light source is actively limited (by curved mirrors and/or apertures) only in one dimension, whereas the divergence in the orthogonal dimension remains "unaffected" and is thus not further limited. Moreover, the division saw no insufficiency in this view in the light of teaching relating to the disclosure of examples 1 to 3 in the patent in dispute. The board observes that no allegation has been made

that examples 1 to 3 cannot be performed, nor consequently has any proof in this direction been offered.

2.2 A check through the complex of reasons for the decision of the opposition division and submissions of the parties in the subsequent opposition and appeal proceedings reveals the following specific challenges to the first view of the opposition division.

2.2.1 A cylindrical mirror limits divergence in the plane parallel to its cylindrical axis (part of interpretation (b) of the opposition division).

Many optical components and apertures give rise by their nature to divergence limiting effects of one sort or another so that the statement above can be considered true. However, the divergence in this plane is not "actively limited" as understood in the first view of the opposition division and is not therefore in disagreement therewith. Accordingly, this challenge offers no reason for the board to change its view.

The approach of the opposition division to the matter is not convincing because in forming its objection the division remarked that it was not actually clear what was meant by the term "unaffected", yet, in the context of a cylindrical mirror, the board considers just this is sufficiently explained to a skilled person, for example, in paragraph [0022] of the patent "For example, a linear lamp may be relatively well collimated by a cylindrical optic in one direction. The orthogonal direction is unaffected".

2.2.2 Example 8 in Figure 5

The respondent took a similar line to that of the opposition division as set out in section 2.2.1, pointing out, additionally, that an active limitation takes place in the embodiment of example 8. In this embodiment, a vertical shields 14 block light at an angle greater than  $10^\circ$  with respect to vertical in a direction perpendicular to the scan direction. This limits the divergence of the light perpendicular to the scan direction to  $20^\circ$ . Accordingly, the board agrees this embodiment is not consistent with claim 1 as granted.

In view of the amendment to "unlimited divergence" now also made to independent claim 9, further consideration of the status of any disclosure in the patent in dispute inconsistent with the independent claims may need to be made in subsequent proceedings. Be that as it may, any inconsistency is not a matter of sufficiency and does not therefore detract from the sufficiency of the independent claims under appeal in relation to the term "unlimited divergence" as construed according to the first view of the opposition division.

2.3 The specific challenges to the first view of the opposition division are not therefore considered persuasive as to insufficiency by the board.

2.4 A number of other ways of construing the term "unlimited divergence" have been postulated in the subsequent opposition and appeal proceedings, both by the opposition division and the respondent, but the

board does not consider that these constructions call the first view of the opposition division into question. For example, the term at issue is "unlimited divergence" not "some limited divergence, less than 45°" from the passage around column 5, line 27 of the patent in dispute as referred to by the respondent.

The main reason for the board's view is that even in the process of their postulation, the constructions concerned are, as set out in the Facts and Submissions section above, dismissed by the proposer concerned as not viable because of contradiction with the disclosed examples, not making sense or leaving the reader in the dark. They are therefore constructions of an artificial nature, which are illogical for a reader desiring to understand the teaching and are thus not persuasive as to lack of sufficiency. Accordingly, the board sees no reason to consider them further, having also no wish, unnecessarily, to influence subsequent proceedings relating to differing grounds of opposition.

2.5 The board is therefore satisfied as to sufficiency of independent claims 1 and 9.

3. Clarity of amended claim 9

The respondent considers the term "unlimited divergence" not to be clear, submitting that the position of the opposition division, that a combination of granted claims is not open to objection for lack of clarity, does not offer the appellant a full defence because the subject matter of dependent claims may have escaped detailed pre-grant examination. However, since, as submitted by the appellant, claim 9 has been brought

into line with claim 1, an independent claim which did contain the term "unlimited divergence" was subject to examination. Accordingly, the respondent's submission did not persuade the board.

4. Further objection

The respondent has objected that the direction of "unlimited divergence" is not clearly defined with respect to the transport direction. Since lack of clarity is not a ground of opposition, the board sees no reason to comment further on this objection.

**Order**

**For these reasons it is decided that:**

1. The decision under appeal is set aside.
2. The case is remitted to the first instance for further prosecution.

The Registrar

The Chairman

M. Kiehl

A. G. Klein