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Datasheet for the decision of 2 November 2020

Case Number: T 1737/19 - 3.2.01

Application Number: 09750141.5

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Title of invention:
LIGHT-GUIDE APPARATUS

Applicant:
Design LED Products Limited

Headword:

Relevant legal provisions:
EPC Art. 54, 56

Keyword:
Novelty - (yes)
Inventive step - (yes)

Decisions cited:

Catchword:

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Boards of Appeal

Chambres de recours

Boards of Appeal of the
European Patent Office
Richard-Reitzner-Allee 8
85540 Haar
GERMANY
Tel. +49 (0)89 2399-0
Fax +49 (0)89 2399-4465

Case Number: T 1737/19 - 3.2.01

D E C I S I O N
of Technical Board of Appeal 3.2.01
of 2 November 2020

Appellant: (Applicant)	Design LED Products Limited Alba Innovation Centre Alba Campus Livingston Lothian EH54 7GA (GB)
Representative:	Fulton, David James Lincoln IP 9 Victoria Street Aberdeen AB10 1XB (GB)
Decision under appeal:	**Decision of the Examining Division of the European Patent Office posted on 17 December 2018 refusing European patent application No. 09750141.5 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chairman	G. Pricolo
Members:	V. Vinci
	O. Loizou

Summary of Facts and Submissions

I. The appeal was filed by the appellant (applicant) against the decision of the examining division to refuse the patent application in suit.

II. In the decision under appeal the examining division found that the subject-matter of the independent claims 1 and 8 of the sole request on file lacked novelty in the meaning of to Articles 52(1) and 54 EPC in view of the following state of the art:

D2 : US 5 786 665 A

The written opinion of the international search administration cited the following additional documents:

D1 : GB 2 262 619 A
D3 : US2007/002205 A1

III. Following a telephone conversation with the rapporteur of the Board, the appellant withdrew with letter dated 14 October 2020 the main request filed with the statement of the grounds of appeal, the first auxiliary request filed on 31 August 2020 and the request for oral proceedings, and requested that:

the decision under appeal be set aside and a patent be granted on the basis of the second auxiliary request filed on 31 August 2020, the amended description as filed on 14 October 2020 and the drawings as originally filed.

IV. Claim 1 at stake reads as follows:

A method of manufacturing a light-guide apparatus (10) having a plurality of light extraction features (14) comprising the steps of:

printing a transparent textured ink onto a surface of light-guide plate (12) to define the position of each of the plurality of light extraction features (14); and curing the transparent textured ink to form light extraction features (14) consisting of the transparent textured ink, wherein the curing of the transparent textured ink causes an exterior surface of each of the light extraction features (14) to become uneven and irregular and comprise at least one randomly sized and shaped micro-lens-like element, wherein light rays passing through the light extraction features (14) that are incident upon the uneven, irregular exterior surface are refracted out of the light-guide apparatus (10).

Claim 8 at stake reads as follows:

A display comprising a light-guide apparatus (10) as manufactured in accordance with any of claims 1 to 7.

Reasons for the Decision

Amendments: Article 123(2) EPC

1. Method claim 1 of the second auxiliary request is based on the method claim 8 underlying the appealed decision, which was not objected under Article 123(2) EPC by the

examining division, and now specifies that transparent textured ink is printed onto a surface of the light-guide plate, and that curing of the transparent textured ink causes an exterior surface of each of the light extraction features to become uneven and irregular and to comprise at least one randomly sized and shaped micro-lens-like element. The alternative as in the method claim 8 underlying the appealed decision, according to which the step of obtaining the uneven and irregular exterior surfaces of the light extraction features could also be carried out by drying the transparent textured ink, has been deleted.

1.1 Printing of the transparent textured link onto the light-guide plate is unambiguously supported throughout the originally filed application, see for example page 7, lines 31-32 and dependent claims 11 and 12. The step of curing of the transparent textured ink is supported for example from original claim 20 which contained the step of drying or curing the transparent textured ink (see claim 30 as filed).

1.2 The Board thus concludes that the subject-matter of claim 1 fulfils the requirements of Article 123(2) EPC.

Novelty: Articles 52(1) and 54 EPC

Claim 1

In view of D2

2. Document D2 does not discloses the step of printing a transparent textured ink onto a surface of the light-guide plate. In fact, according to the embodiment of figure 39(d) of D2, which was found to be prejudicial to novelty of the method claim underlying the appealed

decision, a transparent resin containing micro-glass beads, which equates with the transparent textured ink in the meaning of claim 1, is merely applied to the light-guide plate(see column 28, lines 18-21). D2 does not thus disclose any printing process according to claim 1. Furthermore, no curing step is disclosed in D2.

Claim 1 is thus novel over D2.

In view of D1

2.1 According to D1, a diffusion reflection means (20) and a reflective means (30) overlapped on the top surface of the reflection means (20) form light extraction features in the meaning of claim 1 are provided on the light-guide plate. These light extraction features are obtained by printing on the light-guide plate and subsequently curing an ink substrate (21) in which a small amount of minuscule beads has been dispersed (see page 11, last paragraph to page 12, last full paragraph). However, curing does not cause an exterior surface of the light extraction features to become uneven and irregular and to comprise at least one randomly sized and shaped micro-lens-like element as required by claim 1. In fact, as it can be seen from the most relevant embodiment in figures 6 and 7, the exterior surface of the extraction features obtained by the method of D1 is even and regular and does not comprise any randomly sized and shaped micro-lens-like elements as required by claim 1.

2.2 Claim 1 is thus novel over D1

In view of D3

2.3 The light extraction features of the light-guide plate (12) shown for example in figures 5 and 6 are manufactured by providing a discrete distribution of a plurality of micro-lenses elements spaced from each other on the light-guide plate (see figures 3). D3 does not thus disclose either the step of printing a transparent textured ink onto the light-guide plate nor the following step of curing the transparent textured ink in order to obtain an uneven and irregular exterior surface on the light extraction features as defined in claim 1.

Claim 1 is thus novel over D3.

Claim 8

2.4 Claim 8 relates to a display comprising a light-guide apparatus manufactured in accordance with the method of claims 1 to 7.

2.5 In the present case the fact that the light-guide apparatus is manufactured by the method of claim 1 imparts clearly identifiable structural features to the claimed light-guide apparatus, namely to the light-guide plate thereof, which, for the following reasons, render it unambiguously distinguishable from the displays of the cited prior art.

In view of D2

2.6 The display according to claim 8 differs from the one of D2 in that the method of claim 1 will impart a transparent textured ink printed on the light-guide plate. Furthermore the method of claim 8 will result in

extraction features obtained by curing the textured transparent ink and having uneven and irregular exterior surfaces obtained by said curing process. They are also clearly distinguishable from the light extraction feature of the display of D2 which are obtained by dispersing micro-glass beads in a not cured base resin (see point 2. above).

In view of D1

2.7 The display of claim 8 is clearly distinguishable from the display of D1 in terms of structural technical features because the method of claim 1 will impart to the light-guide plate thereof light extraction features which, unlike those of D1, are uneven and irregular and comprise at least one randomly sized and shaped micro-lens-like element (see point 2.1 above).

2.8 The display according to claim 8 also differs from the one disclosed in D3 because the latter does not use a textured transparent cured link for producing the light extraction features on the light-guide plate of the light-guide apparatus but rather a plurality of micro-lenses elements spaced from each other (see point. 2.2 above). Also this structural feature is imparted by the manufacturing method of claim 1 and is clearly distinguishable.

2.9 It follows that the display of claim 8 is novel over the cited prior art (Articles 52(1) and 54 EPC).

2.10 In view of the above, the Board concludes that the second auxiliary request meets the requirements of Articles 52(1) and 54 EPC.

Inventive Step

3. In the Board´s view, document D2 represents the closest prior art in respect of claim 1 because, unlike D1, it shows in figure 37(d) light extraction features having an uneven and irregular exterior surface in the meaning of claim 1.

Claim 1

3.1 The subject-matter of claim 1 differs from the technical content of of D2 in the steps of:

"printing a transparent textured ink onto a surface of light-guide plate (12)", and of

"curing the transparent textured ink to form light extraction features (14) consisting of the transparent textured ink, wherein the curing of the transparent textured ink causes an exterior surface of each of the light extraction features (14) to become uneven and irregular and comprise at least one randomly sized and shaped micro-lens-like element."

The Board is of the opinion, that the wording of the second distinguishing feature above renders clear that, unlike D2, the uneven and irregular surface of the light extraction features is a direct consequence of the curing step, i.e. is not obtained by adding micro-glass beads.

3.2 These distinguishing features allow the manufacture of the light extraction surfaces on the light-guide plate by means of an efficient and thus cost-saving process.

Starting from D2, the technical problem to be solved is thus to provide an alternative and more efficient process for manufacturing the uneven and irregular surface of the light extraction features of the light-guide plate of a light-guide apparatus.

3.3 The solution to this technical problem as defined in independent claim 1 is considered to involve an inventive step in view of the available prior art for the following reasons:

As explained in paragraph 2.1 above, although document D1 does teach to provide the light extraction features by curing a transparent textured ink printed onto the light-guide plate, it does not give any hint directing the person skilled in the art to the idea of obtaining the required uneven and irregular exterior surface of each of the light extraction features, whereby the surface comprises at least one randomly sized and shaped micro-lens-like element, by simply curing of the transparent textured ink. In fact, unlike claim 1, the exterior surface of the extraction features of D1 is even and regular and reflection is enhanced by dispersing a small amount of reflecting beads in the ink. It follows that, even if the person skilled in the art would consider to apply the teaching of D1 (printing of a transparent textured ink onto the guide-light plate in order to obtain the light extraction features) in the method of D2, this would not result in the subject-matter of claim 1 because a curing step forming an uneven and irregular exterior surface of the light extracting features according to claim 1 would still be missing. The method according to document D3 is even less relevant because it does not use a transparent textured ink for obtaining the light

extraction features.

3.4 The Board is thus of the opinion that the subject-matter of claim 1 involves an inventive step over the cited prior art in the meaning of Articles 52(1) and 56 EPC.

Claim 8

3.5 The display of claim 8 also involves an inventive step over the cited prior art (Articles 52(1) and 56 EPC) because, starting from the display of D2, which is considered to represent the closest prior art, the person skilled in the art would not find any hint in the available state of the art encouraging him to modify light-guide apparatus of the display of D2 according to the distinguishing structural technical features imparted by the manufacturing method of claim 1 as presented above. The same reasoning given under point 4.3 above applies.

4. In view of the above, the Board is of the opinion that the second auxiliary request meets all the requirements of the EPC.

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 an European patent on the basis of the following documents:

Claims: 1 to 8 according to the second auxiliary request as filed on 31 August 2020.

Description: pages 1 to 14 as filed on 14 October 2020.

Figures: 1 to 9 as originally filed.

The Registrar: The Chairman:

A. Vottner G. Pricolo

Decision electronically authenticated