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Datasheet for the decision of 23 November 2020

Case Number: T 1837/17 - 3.4.02

Application Number: 09702040.8

Publication Number: 2238485

IPC: G02B5/124, G01V8/22, G06F3/042

Language of the proceedings: EN

Title of invention:
RETROREFLECTOR FOR USE IN TOUCH SCREEN APPLICATIONS AND POSITION SENSING SYSTEMS

Applicant:
Avery Dennison Corporation
SMART Technologies ULC

Relevant legal provisions:
EPC Art. 56, 123(2)

Keyword:
Added subect-matter (no, amended claims)
Inventive step (yes, amended claims)

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Case Number: T 1837/17 - 3.4.02

D E C I S I O N
of Technical Board of Appeal 3.4.02
of 23 November 2020

Appellant: (Applicant 1)	Avery Dennison Corporation 150 North Orange Grove Boulevard Pasadena, CA 91103-3596 (US)
Appellant: (Applicant 2)	SMART Technologies ULC 3636 Research Road NW Calgary, Alberta T2L 1Y1 (CA)
Representative:	Katérle, Axel Wuesthoff & Wuesthoff Patentanwälte PartG mbB Schweigerstraße 2 81541 München (DE)
Decision under appeal:	**Decision of the Examining Division of the European Patent Office posted on 31 January 2017 refusing European patent application No. 09702040.8 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chairman	R. Bekkering
Members:	F. J. Narganes-Quijano
	T. Karamanli

Summary of Facts and Submissions

I. The appellant (applicant) lodged an appeal against the decision of the examining division refusing European patent application No. 09702040.8.

II. During the first-instance proceedings reference was made, among other documents, to the following documents:

D3 : US 5936770 A
D6 : US 2002 0163505 A1
D10: US 4588258 A.

III. In its decision, the examining division held in respect of the main request and the first and second auxiliary requests then on file that

- the subject-matter of claim 1 of the main request and the second auxiliary request did not involve an inventive step in view of documents D3 and D6 (Article 56 EPC), and

- claim 1 of the first auxiliary request did not meet the requirements of Article 123(2) EPC.

IV. On 24 April 2020, the board issued a summons to oral proceedings. In a communication under Article 15(1) of the Rules of Procedure of the Boards of Appeal in the version of 2020 (RPBA 2020, OJ EPO 2019, A63), annexed to the summons, the board gave its preliminary opinion.

V. In reply to the board's communication, the appellant filed by letter dated 15 October 2020, among other application documents, amended pages 1, 4, 9, 12 to 14,

16 and 23 of the description and an amended sheet 7/10 of the drawings.

VI. Oral proceedings before the board were held on 23 November 2020.

The appellant submitted amended claims 1 to 4 according to a new main request, and amended pages 3, 3a and 5 of the description.

The appellant requested that the decision under appeal be set aside and that a patent be granted in the following version:

- Claims: Nos. 1 to 4 of the main request filed at the oral proceedings on 23 November 2020.
- Description: Pages 2, 6 to 8, 10, 11, 15 and 17 to 22 as originally filed; pages 1, 4, 9, 12 to 14, 16 and 23 filed by letter dated 15 October 2020; and pages 3, 3a and 5 filed at the oral proceedings on 23 November 2020.
- Drawings: Sheets 1/10 to 6/10 and 8/10 to 10/10 of the application as published; and sheet 7/10 filed by letter dated 15 October 2020.

At the end of the oral proceedings the chairman announced the decision of the board.

VII. Claim 1 of the main and sole request reads as follows:

"A position detection system (100), comprising:

a two-dimensional detection area (104), wherein the position detection system (100) is configured to detect an existence and a location of an object (109) within the two-dimensional detection area (104);

at least one source (110; 112) of electromagnetic radiation for outputting an electromagnetic radiation over at least a portion of the detection area (104);

a prismatic film (108) positioned along at least a portion of a periphery of the detection area (104), wherein the prismatic film (108) is positioned with respect to the at least one source (110; 112) so that it retroreflects towards the source(s) the electromagnetic radiation directed by the respective source(s) towards the prismatic film (108), the prismatic film (108) comprising:

a retroreflective substrate (132) including a plurality of triangular cube corner retroreflective elements (140) and a metallized layer (142) disposed over at least a portion of the retroreflective substrate (132),

wherein base edges (210) of the cube corner retroreflective elements (140) are linear and in a common plane perpendicular to the detection area (104), and wherein each cube corner retroreflective element (140) forms an isosceles triangle cube shape with two of the base edges (210) being approximately the same length,

wherein the cube corner retroreflective elements (140) have a cant in a range of 8 to 35 degrees in a direction, such that only one cube face (202) is more parallel to a reflector front surface of the prismatic film (108) than any face of an uncanted cube, and a cube depth between 25.4 and 304.8 micrometers (0.001 and 0.012 inches) in relation to the common plane, and

wherein a cube axis is defined as a central axis that is a trisector of an internal space defined by the three intersection faces of the respective cube corner element (140) and wherein said cant is measured as an angle between the cube

axis and a sheeting surface normal of the reflector front surface of the prismatic film (108),

and wherein the cube corner retroreflective elements (140) are joined together in one or more tiles all having the same cube corner orientation; and

a camera (117; 118) positioned to receive electromagnetic radiation reflected from the prismatic film (108)."

The request also includes dependent claims 2 to 4 referring back to claim 1.

Reasons for the Decision

1. The appeal is admissible.

2. *Amendments - Article 123(2) EPC*

The present claims result from amendments made by the appellant during the appeal proceedings in reaction to objections raised by the board, and in the board's opinion the claims are clear (Article 84 EPC) and based on the application as originally filed. In particular:

- claim 1 is based on independent claim 16 as originally filed, together with the features of independent claim 9 as originally filed and the following passages of the description of the application as filed: paragraphs [0029] to [0032], [0036] and [0059], page 16, lines 4 to 7 and lines 9 and 10, and page 17, lines 5 to 13; and

- dependent claims 2, 3 and 4 are respectively based on dependent claims 2, 3 and 5 as originally filed, together with paragraphs [0008], [0044] and [0045] of the description as filed.

The objection addressed under Article 123(2) EPC by the examining division in its decision in respect of claim 1 of the first auxiliary request then on file (*cf.* point III above) concerned features relating to a predetermined relationship between the depth of the cube corner elements and the size of the detection area which are not defined in the present claims, and therefore the mentioned objection is no longer pertinent.

The amendments to the description relate to the adaption of some of its passages to the invention as defined in the present claims (Article 84 and Rule 42(1)(c) EPC), and to the acknowledgement of the pertinent state of the art in the introductory part of the description (Rule 42(1)(b) EPC).

Therefore, the application as amended according to the present request of the appellant complies with the requirements of Article 123(2) EPC.

3. *Novelty and inventive step*

3.1 The examining division did not object to the novelty of the subject-matter of the claims of the requests then on file, and the board has no reason to question the novelty of the subject-matter of the claims of the present request. In particular:

3.1.1 Document D6 discloses a position detection system configured to detect an object within the two-dimensional detection area of a display (abstract, together with Fig. 1, 4 and 9 and the corresponding description, in particular paragraph [0038]). The system includes two sources of electromagnetic radiation for outputting an electromagnetic radiation over the detection area (light sources 6 in Fig. 1, and paragraph [0039], lines 1 to 12), a retroreflective means constituted by a plurality of reflectors positioned along the periphery of the detection area so that they retroreflect towards the sources the electromagnetic radiation directed by the respective sources towards the reflectors (reflectors 7 in Fig. 1, and paragraph [0039], lines 12 to 26), and a light-receiving device positioned to receive electromagnetic radiation reflected from the retroreflectors and constituted by a camera (light receiving device 13 in Fig. 2, 3, 5, 6 and 10b, together with paragraphs [0052] and [0063]).

The system defined in claim 1 differs from the system disclosed in document D6 in that the retroreflective means is constituted by a prismatic film having the features defined in the claim.

3.1.2 Document D3 discloses a retroreflective sheeting in the form of a prismatic film constituted by a plurality of triangular cube corner retroreflective elements formed on a substrate (Fig. 1 and 4, together with column 3, lines 10 to 18, and column 4, line 46, to column 5, line 3) and overlaid by a metallized layer (column 8, lines 53 to 56). The base edges of the cube corner retroreflective elements are linear (Fig. 1 and 4) and the cube corner retroreflective elements are canted relative to an axis normal to the plane of the

substrate (column 3, lines 18 to 25, column 4, lines 32 to 41, and column 4, line 64, to column 5, line 24) in a direction such that the base edges form an isosceles triangle (column 5, lines 48 to 53).

According to a first embodiment disclosed in the document for comparative purposes by reference to document D10 cited in the document (column 2, lines 5 to 24, and column 6, lines 5 to 17), the direction of cant, the value of the cant angle, and the dimensions of the canted cube corner retroreflective elements are such that the retroreflective sheeting has the angular light retroreflective efficiency shown in the isobrightness graph represented in Fig. 2 (document D3, column 6, lines 5 to 17).

According to a second embodiment, the retroreflective sheeting is a dual orientation retroreflective sheeting (see title, and Fig. 1) in which the retroreflective cube corner elements have a cant of about 8.15 degrees in a direction such that only one cube face is more parallel to the plane of the substrate than any face of an uncanted cube, and a cube depth of 88,9 micrometers (column 5, lines 48 to 54), and the canted retroreflective cube corner elements are joined together in a plurality of tiles (tiles 6 in Fig. 1), the canted retroreflective cube corner elements of some of the tiles being rotated 90 degrees with respect to the canted retroreflective cube corner elements of the remaining tiles (abstract, first sentence, together with Fig. 1, column 3, lines 30 to 46, and column 5, lines 25 to 59). The dual orientation retroreflective sheeting has the angular light retroreflective efficiency shown in the isobrightness graph represented in Fig. 3 (column 6, lines 27 to 48).

However, both document D3 and document D10, cited in document D3, are silent as to the incorporation of the retroreflective sheeting in a position detection system as claimed.

3.1.3 The remaining documents on file are less pertinent than documents D3, D6 and D10.

3.1.4 Consequently, the subject-matter of claim 1, and therefore also that of dependent claims 2 to 4, is new over the documents on file (Articles 52(1) and 54(1) EPC).

3.2 The board concurs with the examining division's finding that document D6 constitutes the closest state of the art.

3.2.1 Document D6 discloses that the retroreflective means retroreflects, for any angle of incidence with respect to the direction normal to the periphery of the detection area, the fan-shaped light emitted by the sources in the plane of the detection area back to the sources (paragraph [0039]), and the document already mentions the problem of the reduction of the retroreflective efficiency at high angles of incidence (paragraph [0065]). In addition, the distinguishing features of claim 1 over document D6 (see point 3.1.1, last paragraph, above) have the effect of improving the angular retroreflective efficiency of the retroreflective means, in particular at high angles of incidence, thus improving the uniform illumination of the detection area and, therefore, also improving the detection capability of the system (see description of the application as filed, page 2, line 20, to page 3, line 3, and paragraphs [0043] and [0055]).

The objective technical problem solved by the claimed position detection system over the system disclosed in document D6 can therefore be seen as how to improve the uniform illumination of the detection area and, therefore, of the detection capability of the position detection system.

3.2.2 The board also concurs with the examining division that the skilled person, faced with the objective technical problem formulated above, would have consulted the technical field of retroreflective sheetings and would, in particular, have considered the teaching of document D3 (see point 3.1.2 above) relating to retroreflective sheetings with an enhanced angular retroreflective efficiency since these sheetings would improve the uniform illumination of the detection area of the detection system of document D6, thus improving the detection capability of the system.

As noted in point 3.1.2 above, document D3 discloses a first and a second embodiment of retroreflective sheetings having the angular retroreflective efficiency shown in the isobrightness graphs of Fig. 2 and 3, respectively, and a comparison of these two graphs shows that the highest angular retroreflective efficiency, in particular at high entrance angles, is achieved by the first of the mentioned embodiments in the horizontal axis - i.e. in the horizontal angular direction - of Fig. 2 (document D3, column 6, lines 5 to 17). The skilled person would therefore have considered replacing the retroreflective means of document D6 by the retroreflective sheeting of the first embodiment, the retroreflective sheeting being oriented with respect to the detection area in such a way that the angular horizontal direction of Fig. 2

spans the detection area of the position detection system.

However, the mentioned first embodiment is based on the retroreflective sheeting disclosed in document D10 (see document D3, column 6, lines 5 to 8) and comprising cube corner elements having a cant in the direction of a base edge (see document D10, Fig. 1, 2A, 2B, 2C, 3, 4A and 4B, together with the corresponding description, in particular column 4, lines 51 to 64) and therefore in a direction such that two cube faces (faces 12 and 13 in Fig. 1) of the cube corner elements are more parallel to the plane (base plane 16 in Fig. 1) of the retroreflective sheeting than any face of an uncanted cube (or, following the alternative terminology specified in paragraph [0030] of the description of the application, in an "edge-more-parallel" direction), and this approach would not result in the system of claim 1 which requires that the cube corner elements are canted in the opposite direction, i.e. in a direction such that only one face of the cube corner elements is more parallel to the plane of the retroreflective sheeting than any face of an uncanted cube (or, following the mentioned alternative terminology, in a "face-more-parallel" direction).

3.2.3 In its decision, the examining division held that the skilled person would have considered replacing the retroreflective means of document D6 by a single one of the tiles of retroreflective elements constituting the dual orientation retroreflective sheeting of the second embodiment of document D3 (see point 3.1.2 above), thus resulting in the claimed system.

The board, however, cannot follow the examining division's line of argument for the following reasons:

First, the objective technical problem formulated above would have suggested to the skilled person the selection, from among the retroreflective sheetings disclosed in document D3, of the retroreflective sheeting of the first embodiment, and not that of the second embodiment having a lower angular retroreflective efficiency at high entrance angles along each of the two orthogonal angular directions than the angular retroreflective efficiency of the first embodiment along the horizontal angular direction (see point 3.2.2 above, and the isobrightness graphs of Fig. 2 and 3 of document D3).

Furthermore, assuming that the skilled person would - in spite of the previous considerations - have considered selecting the retroreflective sheeting of the second embodiment instead of that of the first embodiment, he would then have considered - as submitted by the appellant - replacing the retroreflective means of document D6 by the whole dual orientation retroreflective sheeting of the mentioned embodiment in which the retroreflective elements are joined together in a plurality of tiles with the retroreflective elements of some of the tiles having an orientation different than the retroreflective elements of the remaining tiles, and he would not have arrived at the claimed system which requires that the retroreflective elements are joined together in one or more tiles all having the same cube corner orientation - or, in the terminology used in the description of the application as filed (page 17, lines 6 to 13), that the prismatic film is an unpinned prismatic film.

In addition, the skilled person could have contemplated replacing - as held by the examining division in its

decision - the retroreflective means of document D6 by a single one of the tiles of the dual orientation retroreflective sheeting of the second embodiment of document D3, but - as submitted by the appellant - there is no indication or hint in document D3 that would have suggested to the skilled person to follow this approach. In particular, the second embodiment is disclosed in document D3 as a dual orientation retroreflective sheeting in which the tiles have been specifically designed not to individually optimize the angular retroreflective efficiency along a predetermined angular direction, but to simultaneously optimize, when used in combination with each other in such a way that the canted retroreflective cube corner elements of different tiles have a different orientation, the angular retroreflective efficiency along two orthogonal angular directions (column 3, lines 7 to 10, column 4, lines 21 to 45, column 6, lines 17 to 20, and column 6, line 49, to column 7, line 14), and the relatively high angular retroreflective efficiency along two orthogonal angular directions achieved by the combination of tiles does not imply that each, or a predetermined one, of the tiles would, when separated from the other tiles, necessarily exhibit a correspondingly high angular retroreflective efficiency along one of the mentioned two angular directions at high incidence angles.

Therefore, the skilled person could, but, in the board's opinion, would not have followed the approach on the basis of which the examining division concluded that the claimed system did not involve an inventive step.

3.2.4 In view of these considerations, the claimed position detection system does not result in an obvious way from

the disclosure of document D6 under consideration of the teaching of either one, or of both, of documents D3 and D10.

3.3 The remaining documents on file are less pertinent than documents D3, D6 and D10 for the issue of inventive step.

3.4 It follows that the subject-matter of claim 1 - and therefore also that of dependent claims 2 to 4 - involves an inventive step over the documents of the prior art considered during the appeal proceedings (Articles 52(1) and 56 EPC).

4. In view of the above considerations, the board concludes that the appellant's request for grant of a patent on the basis of the application documents of the present main and sole request is allowable.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the department of first instance with the order to grant a patent in the following version:

- Claims: Nos. 1 to 4 of the main request filed at the oral proceedings on 23 November 2020.

- Description: Pages 2, 6 to 8, 10, 11, 15 and 17 to 22 as originally filed; pages 1, 4, 9, 12 to 14, 16

and 23 filed with letter dated 15 October 2020; and pages 3, 3a and 5 filed at the oral proceedings on 23 November 2020.

- Drawings: Sheets 1/10 to 6/10 and 8/10 to 10/10 of the application as published; and sheet 7/10 filed by letter dated 15 October 2020.

The Registrar: The Chairman:

L. Gabor R. Bekkering

Decision electronically authenticated