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**Datasheet for the decision
of 30 July 2009**

Case Number: T 1802/06 - 3.4.02

Application Number: 02256997.4

Publication Number: 1300672

IPC: G01N 21/53

Language of the proceedings: EN

Title of invention:

Improvements in transmission measuring apparatuses

Patentee:

TELVENT AUSTRALIA PTY LTD

Opponent:

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Headword:

-

Relevant legal provisions:

-

Relevant legal provisions (EPC 1973):

EPC Art. 56

Keyword:

"Main request: inventive step (yes, after amendment)"

Decisions cited:

-

Catchword:

-



Case Number: T 1802/06 - 3.4.02

D E C I S I O N
of the Technical Board of Appeal 3.4.02
of 30 July 2009

Appellant: TELVENT AUSTRALIA PTY LTD
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Representative: Vernout, Robert
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Decision under appeal: Decision of the Examining Division of the
European Patent Office posted 20 September 2006
refusing European application No. 02256997.4
pursuant to Article 97(1) EPC.

Composition of the Board:

Chairman: A. G. Klein
Members: M. Stock
C. Rennie-Smith

Summary of Facts and Submissions

I. The applicant and appellant has appealed against the decision of the examining division refusing European patent application number 02256997.4 (published as EP 1 300 672 A1). In the decision reference was made to the following documents:

D1: US-A-5 787 385 (cited in European Search Report ESR)

D5: "Manual of Runway Visual Range Observing and Reporting Practices" (Doc 9328-AN/908) published by the International Civil Aviation Organisation, Second Edition, 2000 (filed by the applicant)

In the written procedure the examining division had in addition made reference to the following documents (numbering amended by Board, since both documents were designated as D2 by the examining division):

D2: US-A-4 520 360 (cited in ESR)

D2*: US-A-5 373 367 (not cited in ESR)

The examining division reasoned in its decision that claim 1 then on file was not clear (Article 84 EPC 1973) and that its subject-matter did not involve an inventive step (Article 56 EPC 1973) in view of the prior art according to documents D1 and D5.

II. In its statement of grounds of appeal the appellant requested that the decision of the examining division be set aside and a patent be granted on the basis of amended documents filed with the grounds of appeal. The

appellant argued that claim 1 was clear and that the subject-matter defined therein was new and involved an inventive step. The arguments submitted by the appellant can be summarised as follows:

Claim 1 was rewritten in the proper two-part form departing from D1, which was the closest prior art according to the examining division.

D1 did not disclose that:

- 1) the optical devices are movable independently from each other by respective ones of a (moving) mechanism, and that
- 2) said light transmitter unit and said light receiver unit are mutually connected by a communication link, wherein
- 3) said processor means are arranged to control both of said mechanisms through said communications link in order to
- 4) control the alignment of light transmitted via said light pathway between said light transmitter unit and said light receiver unit.

Therefore claim 1 was new over D1. The objective problem solved by the above differing features was that due to soil movements (for instance when the soil freezes or unfreezes), the optical devices might move, whereby the light transmitted by the transmitter unit might not point exactly towards the receiver unit, causing the measurement to be incorrect, without the user even being aware of this.

The claimed invention solved the problem by providing an automatic adjustment, continuously or at relative short intervals, of the optical devices at both ends of the light path. D1 described a transmissometer of a different, reflecting type, wherein the transmitter and receiver units are fixedly mounted together on a plate assembly (the first optical device), and wherein a multitude of reflectors (the second optical devices) was placed predetermined distances from the assembly to reflect the light emitted from the assembly back to said assembly. Said transmissometer comprised servomotors controlled by processor means for switching the direction of the assembly between said reflectors. The second optical devices, being the reflectors, did not comprise servomotors, because there was no recognised need to switch their direction. In use displacements, which might be caused by freezing or unfreezing of the soil, of the carrier on which the plate assembly was mounted might be compensated by said direction switching mechanism, but this was not described in D1. However, displacements of the carriers on which the reflectors were mounted could not be compensated, because they were mounted in a fixed manner. Even a slight displacement of a reflector could send the light beam in a completely different direction, such that the light beam would not return to the receiver unit.

The above mentioned problem was recognized and solved in D1 by spreading the transmitted beam by using a slightly concave reflector. This, however, as admitted in D1, led to an attenuation of the signal level, which was a disadvantage not occurring with the solution of the claimed invention. Also, by using a concave

reflector the problem of "forward scattering" as described in D5 occurred. Thus, D1 could benefit from the teachings of the currently claimed invention, by applying servomotors also to the reflector units, and applying a processor algorithm to align both groups of optical devices, thereby avoiding the need for concave reflectors.

In a non-reflecting situation as described in the application, the man skilled in the art would be taught by D1 to spread the beam transmitted by the optical device at one end of the optical path (the mirror or lens in the transmitter unit), for instance by making said mirror slightly concave or by using a non-focusing lens, and make the optical device at the other end of the optical path (the mirror or lens in the receiver unit) movable and provide it with a control mechanism for aligning the optical device with respect to the concave mirror or non-focusing lens.

According to the examining division it was obvious to the skilled person reading D1 to arrive at the solution of the invention, and provide both the transmitter unit and the receiver unit in D1 with a mechanism and processor means to control both mechanisms. However, this was not the solution of the invention. The equivalent solution of the invention in the situation of D1 was to also provide the reflector units with a moving mechanism and processor means to control said mechanism. The invention was not obvious because D1 did not give any reason to apply the aligning mechanism of the plate assembly of the transmitter and receiver unit also to the reflectors, since the function of this

aligning mechanism in D1 was to switch the plate assembly between the multitude of reflectors.

None of the other documents cited during examination of the application taught or suggested the solution of the claimed invention to the problem. Therefore the invention as claimed in claim 1 involved an inventive step.

III. In an annex to the summons to oral proceedings requested by the appellant, the Board made preliminary non-binding comments, expressing in particular doubts that the subject-matter of the claims then on file involved an inventive step in view of document D5 which was considered to represent the closest prior art. For details of the alignment reference was made to D1.

IV. As a reaction to the summons to oral proceedings the appellant submitted new claims according to a main and an auxiliary request and requested to grant a patent on the basis of these claims. The following documentation consisting of D6 to D10 was also filed and accompanied by arguments for proving commercial success of the claimed solution and the large acceptance it encountered despite the traditionally conservative attitude prevailing in the field of air traffic control and airport security:

D6: brochure "Telvent RevolverTM" of 3 December 2008

D7a: brochure "Vaisala MITRAS Transmissometer" of November 1995

D7b: brochure "Vaisala Transmissometer LT31" of December 2004

D8a: brochure "MTECH 5000-200 Transmissometer" of 2005

D8b: brochure "MTECH 5000-200-EMOR" of 2008
D9a: brochure "Degreane Horizon TR 30"
D9b: brochure "Degreane Horizon TR 30DB"
D10: article "Measuring the RVR" by Pekka Utela, in
"Airport International", issue October 2002

During the oral proceedings claim 1 according to the main request was again amended. Grant of a patent on the basis of this final main request or the auxiliary request was requested. At the end of the oral proceedings the decision was given by the Board.

The independent claims according to the final main request read as follows:

"1. A visibility transmissometer for installation at an airport, having a light transmitter unit (11) and a light receiver unit (13), the light transmitter unit (11) and the light receiver unit (13) each being contained in a separate housing (25), the light transmitter unit (11) being arranged to transmit light via a light pathway (15) to the light receiver unit (13), the light transmitter unit (11) and the light receiver unit (13) each having an optical device (35, 39) for directing said light pathway (15), said optical devices (35,39) being movable independently from each other by respective mechanisms (43) in at least one plane, **characterised in that** said light transmitter unit (11) and said light receiver unit (13) are mutually connected by a communication link (21), wherein the transmissometer has processor means (55) arranged to control both of said mechanisms (43) through said communications link (21) in order to control the alignment of light transmitted via said

light pathway (15) between said light transmitter unit (11) and said light receiver unit (13), said processor means (55) being responsive to the level of light received by said light receiver unit (13) and controlling said mechanisms (43) to optimise target light to said light receiver unit (13), and wherein said transmissometer is provided with an arrangement to redo said alignment under control of the processor means (55) at a time after installation by giving an alignment command.

8. Use of a visibility transmissometer at an airport, said transmissometer having a light transmitter unit (11) and a light receiver unit (13), the light transmitter unit (11) and the light receiver unit (13) each being contained in a separate housing (25), said housings being placed a predetermined distance apart, the light transmitter unit (11) being arranged to transmit light via a light pathway (15) to the light receiver unit (13), the light transmitter unit (11) and the light receiver unit (13) each having an optical device (35, 39) for directing said light pathway (15), said optical devices (35,39) being movable independently from each other by respective mechanisms (43) in at least one plane, **characterised in that** said light transmitter unit (11) and said light receiver unit (13) are mutually connected by a communication link (21), wherein the transmissometer has processor means (55) arranged to control both of said mechanisms (43) through said communications link (21) in order to control the alignment of light transmitted via said light pathway (15) between said light transmitter unit (11) and said light receiver unit (13), said processor means (55) being responsive to the level of light

received by said light receiver unit (13) and controlling said mechanisms (43) to optimise target light to said light receiver unit (13), wherein said alignment is redone under control of the processor means (55) at a time after installation by giving an alignment command."

Reasons for the Decision

1. *Original disclosure*

Present Claim 1 contains all features recited in the original claim 1 and in addition the following features the disclosure of which in the A-publication of the present application is indicated in parenthesis:

- (a) "for installation at an airport" (see paragraphs 2 and 36, first sentence);
- (b) the light transmitter unit and the light receiver unit each being contained in a "separate" housing (25) (see Figure 1);
- (c) "and wherein said transmissometer is provided with an arrangement to redo said alignment under control of the processor means (55) at a time after installation by giving an alignment command" (see paragraph 54, first sentence, paragraph 55, and original claim 8 together with paragraph 30).

Present claim 8 is related to the use of the transmissometer as defined in claim 1. Such use is

mentioned in paragraphs 2 and 36 of the A-publication, already cited above in connection with feature (a).

Therefore the Board is satisfied that the amendments meet the requirements of Article 123(2) EPC 1973.

2. *Novelty*

The claimed subject-matter is novel within the meaning of Article 54(1) and (2) EPC 1973 as will become apparent from the discussion of whether this subject-matter involves an inventive step.

3. *Inventive step*

3.1 The Board concurs with the appellant that D5 represents the closest prior disclosing in Figure 7-1a) at page 40 a (double-ended) transmissometer according to the preamble of claim 1. D1 for its part discloses a computer controlled single-ended or reflective transmissometer for detecting environmental conditions, such as fog, along a highway. Since the present invention in terms of problem and solution is concerned with a double-ended transmissometer suitable for installation at airports, D5 which also discloses a visibility transmissometer used at airports is a more appropriate starting point for the discussion of inventive step.

3.2 Whereas the problem solved by the invention is generally related to automation, which indeed might always be considered by the skilled person, it specifically concerns automation of the fine realignment operations required when operating a

visibility transmissometer, and the claimed solution relies on the recognition that such automated alignment can actually be achieved in a manner sufficiently accurate and reliable to meet the strict security standards dictated by airport authorities.

3.3 The Board can accept the arguments of the appellant that at the priority date of the present application skilled persons were deterred from applying a fully automated transmissometer for security-relevant purposes in the air-traffic control and would stick to the traditional solution according to which very stable mounts, e.g. concrete blocks, of the light transmitter unit and the light receiver unit are employed, suffering from as small relative movement as possible and requiring readjustment only at longer intervals, which could then be effected manually.

3.4 As discussed at the oral proceedings, support for the existence of such prejudice can be found in the fact that all technical means required for automating the prior art transmissometers, like microprocessors, optical detectors and optical devices movable through processor-controlled mechanisms, had been available for a long time to the skilled person before the date of the invention, but never used in the claimed context. Document D2 for instance (see also point 3.6 below) filed about 20 years before the present application shows a fully automated optical visibility controlling apparatus for unattended airports, which *inter alia* includes a light source, a detector, one of which is movable by a motor, and a processor for controlling the motor movement and processing the detector signal (see claim 1). The apparatus also comprises a device for

detecting misalignment, but although most of the components which might be needed for automated realignment are present in the apparatus - which itself is specifically designed for automated operation - the document merely teaches to output an alert signal calling for maintenance in case of misalignment (see column 2, lines 57 to 66). On the other hand the appellant filed the documentation D6 to D9 in which connection it was explained by an employee of the appellant at the oral proceedings that shortly after the transmissometer with automatic alignment of the appellant was presented at a fair in Maastricht in 2003, several competitors began to follow the same idea by developing and marketing transmissometers with automatic alignment. The employee also confirmed that most of the equipment sold to date by his company includes the claimed capability. The Board can accept these elements as an indication of the large recognition of advantages achieved by the present invention in the relevant technical field.

- 3.5 D1, apart from the fact that it is not concerned with the use at airports, does not describe the realignment step defined in the last feature of present claim 1. Alignment under the control of a computer is effected only during the installation of the transmissometer, but it doesn't seem to be redone later on a regular basis contrary to what is expressed by present claim 1. During the scans performed in D1, values needed for controlling the scanning are derived from look-up tables, see column 3, lines 8 to 43, which are prepared during the alignment. However, realignment was avoided in D1, see column 6, lines 62 to 67. Therefore, the

teaching of D1 does not lead to the present invention in an obvious manner.

3.6 D2 (US-A-4 520 360), see the abstract, discloses unattended measurements of horizontal and vertical visibility, which are broadcast at airports to aircraft pilots. A calibration mechanism is provided along with sensors to determine mis-alignment. However, there is only monitoring of the apparatus consisting of a light source and a detector by a processor, which does not carry out realignment, but calls for maintenance if necessary, see column 3, lines 58 to 66. Therefore the subject-matter of present claim 1, which, in particular, performs alignment of the transmissometer, was not obvious from D2.

3.7 The visibility sensor described in D2* (US-A-5 787 385), see column 3, line 51 to column 4, line 8, works on forward scattering of light, which is an entirely different principle to the transmissometer of the present invention. Such a device does not produce a light pathway between a light transmitter and light receiver and does not determine the visibility by the attenuation in light received by the light receiver as in the case of the transmissometer according to the present invention. A forward scatter visibility sensor measures the amount of light scattered by particles in the atmosphere by placing a receiver out of line with the transmitter and measuring the scattered light. An increase in scattered light indicates an increase in particles in the atmosphere and therefore a decrease in visibility. It is therefore not obvious that a combination of D2* with any of the remaining documents, in particular with D5 , leads to the claimed subject-

matter. In fact, forward scattering is discussed in D5, see page 41, right-hand column, point 7.1.6 b), as an inherent source of error of the present transmissometer based on the receiver signal represented by the initial light intensity minus the light absorbed or scattered out of the beam. The consideration of the remaining documents cited in the ESR leads to no other result.

- 3.8 For the above reasons, after due consideration of the fact that the prior art documents on file neither disclose nor hint at the idea of automating alignment of a transmissometer for installation at an airport, and that convincing evidence has been presented both for the presence of a technical prejudice against that idea and for the large recognition of its practicality and advantages in the relevant technical field, the Board came to the conclusion that the subject-matter of claim 1 according to the main request meets the requirements of Article 52(1) EPC 1973 with respect to an inventive step within the meaning of Article 56 EPC 1973. This applies also to claim 8 related to a use of the transmissometer claimed in claim 1. The dependent claims 2 to 7 are related to embodiments of such a transmissometer. The description has been adapted to the amended claims in terms of the relevant prior cited and disclosure of the invention and as such also meets the requirements of the EPC.

4. *Conclusion*

For these reasons the main request of the appellant is allowable, and accordingly, there is no need to discuss the auxiliary request.

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 with the order to grant a patent in the following version:

Description:

Pages: 1 and 3, filed during the oral proceedings on 30 July 2009.

Pages: 2 and 4, filed with the statement of grounds of appeal filed on 8 November 2006.

Pages: 6 to 13, as originally filed.

Claims: 1 to 8, filed during the oral proceedings on 30 July 2009 in accordance with the main request.

Drawings: Figures 1 to 7, as published.

The Registrar:

The Chairman:

M. Kiehl

A. G. Klein