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**Datasheet for the decision
of 25 October 2006**

Case Number: T 0600/04 - 3.4.02

Application Number: 99902079.5

Publication Number: 0966656

IPC: G01F 23/292

Language of the proceedings: EN

Title of invention:

Fluid overflow probe with anti-reflective guard

Applicant:

SCULLY SIGNAL COMPANY

Opponent:

-

Headword:

-

Relevant legal provisions:

EPC Art. 54, 56, 84

Keyword:

"Main request - clarity (no)"

"Auxiliary request - clarity claim 1 (yes)"

"Novelty and inventive step (yes)"

Decisions cited:

-

Catchword:

-



Case Number: T 0600/04 - 3.4.02

D E C I S I O N
of the Technical Board of Appeal 3.4.02
of 25 October 2006

Appellant: SCULLY SIGNAL COMPANY
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Representative: Kindermann, Manfred
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Decision under appeal: Decision of the Examining Division of the
European Patent Office posted 19 December 2003
refusing European application No. 99902079.5
pursuant to Article 97(1) EPC.

Composition of the Board:

Chairman: A. Klein
Members: M. Rayner
M. Vogel

Summary of Facts and Submissions

- I. The present appeal is against the decision of the examining division refusing European patent application number 99 902 079.5 (International Publication Number WO99/35471) concerning a fluid overflow probe with anti-reflective guard. The examining division decided that the independent claims according to the main request before it lacked clarity (Article 84 EPC). In particular, neither the shape nor the form of a guard were defined. No particular reflective surface is specified and it is not clear how the guard is positioned. The problem of back reflection of light is known and the application based on adapting the prism and guard to solve this problem. As the claim does not specify how this is to be performed, it both lacks clarity and does not go beyond a statement of the problem. These objections also apply correspondingly to the method claim.
- II. With respect to these lacks of clarity, the division had suggested during the written proceedings, with reference to Figures 1 and 7, that the shape of the prism and guard should be properly defined to meet its objections (section 3.1 of the communication dated 04.02.2002 or 6 of the communication dated 06.09.2002).
- III. The examining division was also of the view that, whether or not light reflected from a reflective surface re-enters the prism and reaches the detector, depends on the index of refraction of the fluid to which the probe is applied. As no fluid is indicated, the probe as defined in claim 1 before it was not clear for this reason.

IV. An auxiliary request with a claim including a feature involving a guard being in a position below the probe prism within a distance X was filed during oral proceedings before the division, but not admitted, the reason given in the decision being that the claim concerned was, prima facie, not clear in view of use of the terms "below the prism" and the disposition of the reflective surface recited.

V. During the preceding written proceedings, the examination division also established that the subject matter of the independent claims, so far as it could be determined in view of the lack of clarity, was not patentable (see e.g. section 5 of the communication of 11.06.2001 or 06.09.2002) over the disclosure of document

D1 US-A-5 198 681.

VI. The appellant requests that the decision under appeal be set aside and that the case be granted on the basis of a main or an auxiliary request. Oral proceedings were requested on an auxiliary basis.

VII. Oral proceedings were appointed by the board consequent to the auxiliary request of the appellant. In a communication accompanying the summons, the board referred to a problem with clarity of claim 1 involving the definition of distance X, as, according to the description (see for example page 8, line 12 and 28), this involves the refractive index of the fluid. The claim is thus directed to a probe with a dimension relying for its definition on the fluid and properties

thereof which are not part of the probe as such. Of course, the board did not doubt, that the skilled person understands the terms used in the claim, but the clarity problem is caused because this person has first to know which fluid is concerned before distance X can be determined. Without knowing the fluid, the skilled person cannot say if any given probe meets the definition of distance given in the claim.

During the oral proceedings, the board referred to the suggestions made by the examining division and other possibilities whereby that it may be possible to formulate a clear claim to a probe involving features pertaining to the shape or form of the guard.

VIII. The independent claims of the main and auxiliary request are as follow:

Main Request

"1. A probe for detecting overflow of a fluid comprising:
a light source (12) which emits an optical signal within a predetermined wavelength range;
a photodetector (14) which detects the optical signal, the photodetector and the light source being positioned on opposite sides of the centerline (24) of a prism (10);
wherein the optical signal from the light source is coupled into the prism (10) and undergoes internal reflection within the prism if the surfaces of the prism at which the optical signal is internally reflected (16, 18) are covered by a medium with a relatively low index of refraction, the optical signal

being no longer internally reflected within the prism if a fluid having a relatively high index of refraction covers said surfaces of the prism at which light is internally reflected and, as a result, the optical signal is no longer detected by the photodetector; and

a prism guard (17) separated from the prism (10) that reduces the possibility that light external to the probe enters the prism in a direction that would result in its reaching the photodetector (14);

characterized in that

the guard (17) is centered below the prism within a distance X from the prism and has a shape relative to the centerline (24) that blocks light for only a portion (32) of the directions along which light can reach the prism surface (18) from a side of the guard away from the prism, the portion of said directions blocked by the guard including those directions along which light can reach said prism surface (18) and be redirected to the photodetector (14);

the guard (17) is positioned within the distance X and has a proximity to the prism (10) that a reflective surface (22), oriented essentially perpendicular to the centerline (24) and positioned between the guard and the prism, would be too close to the prism to reflect light exiting the prism, in a single reflection, directly back to the prism along a path that would allow its detection by the photodetector (14); and the distance X is a function of the separation of the light source (12) from the photodetector (14), the refractive qualities of the prism and the fluid and the wavelength of the light emitted by the light source and is the distance at which a reflective surface (22)

perpendicular to the centerline (24) would reflect a maximum amount of light exiting the prism (10) to be redirected back to the prism (Figure 3)."

The wording of independent claim 15 is not given for the reasons set out in section 2.5 of the reasons.

Auxiliary Request

"1. A method of detecting when fluid in a fluid container reaches a predetermined level, the method comprising the steps of locating in the container at substantially the predetermined level a fluid overflow probe having:

- a prism;
- a light source (12) which emits an optical signal within a predetermined wavelength range;
- a photodetector (14) which detects the optical signal, wherein the optical signal from the light source is coupled into the prism (10) and undergoes internal reflection within the prism if the surfaces of the prism at which the optical signal is internally reflected (16, 18) are covered by a medium with a relatively low index of refraction, the optical signal being no longer internally reflected within the prism if a fluid having a relatively high index of refraction covers said surfaces of the prism at which light is internally reflected and, as a result, the optical signal is no longer detected by the photodetector; and
- a prism guard (17) separated from the prism (10) that reduces the possibility that light external to the probe enters the prism in a direction that would result in its reaching the photodetector (14);

characterized by the steps of:

positioning the photodetector and the light source on opposite sides of the centerline (24) of a prism (10) positioning the guard (17) below the prism (10) along the centerline within a distance X from the prism and providing the guard (17) with a shape relative to the centerline (24) for blocking light in only a portion (32) of the directions along which light can reach the prism surface from a side of the guard away from the prism, the portion of said directions blocked by the guard including those directions along which light can reach said prism surface and be redirected to the photodetector (Figure 5),

a proximity of the guard (17) to the prism (10) being such that a reflective surface (22), oriented essentially perpendicular to the centerline (24) and positioned between the guard and the prism, would be too close to the prism to reflect light exiting the prism, in a single reflection, directly back to the prism along a path that would allow its detection by the photodetector, and

wherein the distance x is a function of the separation of the light source (12) from the photodetector (14), the refractive qualities of the prism and the fluid and the wavelength of the light emitted by the light source, and is the distance at which a reflective surface (22) perpendicular to the centerline would reflect a maximum amount of light exiting the prism (10) to be redirected back to the photodetector (Figure 3)."

The board notes that there is an obvious error in this claim in that reference is made to "a" prism in the first occurrence of the word "prism" in the characterising part of the claim, whereas the wording

should be **"the"** prism in view of the antecedent basis in the pre-characterising part of the claim.

IX. In support of its position, the appellant argued as follows:

(a) Clarity

In the independent claims as amended, the position of the guard is well defined in terms understandable by the expert. Amendment of the apparatus claim to the shape or the form of a guard as suggested by the examination division or referred to during the oral proceedings before the board is too restrictive. In the present case, specifying a specific fluid in the claim would, moreover, lead to a claim which is easily avoidable, as even petroleum products, which are in an important area of application can have quite different refractive indices. In practice, the skilled person has a set of probes available, somewhat like a toolkit, and simply has to choose the probe appropriate for the fluid used. It is quite common to mention a medium outside the device in the claim, one can think, say, of the gliding surface of cross country skis for snow or the road surface in relation to vehicle tyres. Similar considerations apply to air in relation to aerofoils in speed measurement devices. The properties concerned in the present case are available to the skilled person or can be easily measured using common general knowledge by the skilled person. Consequently, the claim is clear within the meaning of Article 84 EPC.

(b) Amendments

With respect to support for amendments, the claims are fully supported by the description and drawings. Reference is made to Figures 3-6 and the related description. In particular, the internal and external reflection conditions of the prism are described in detail at page 6, line 24, to page 7, line 25 of the description. The shape of the guard and its position are shown and described in Figures 4-6 and pages 10 to 11, line 14. Figure 5 also clearly shows that only a limited range of directions along which light may travel through the prism is blocked by the guard, and that this range is specifically adapted to the optical properties of the prism. Type and effect of reflective surface 22 is shown and described in Figure 3 and at page 7, line 27, to page 8, line 24. The orientation of the reflective surface 22 essentially perpendicular to the centerline of the prism is clearly shown in Figure 3. The definition of the distance X is shown and described in Figure 3 and from page 8, line 25, to page 9, line 14, and page 9, line 22, to page 10, line 10.

The description has been amended for consistency with the claims and to discuss the prior art. Minor corrections have also been made. The description therefore meets the requirements of the Rules concerned.

(c) Patentability

With respect to inventive step, document D1 employs a mirror which is avoided by the invention. By using a guard with a small dimension on the centreline below

the prism, the possibility of an object getting caught between the guard and prism is minimised, but selected light directions are still blocked. The structure is thus completely different from that of document D1 and the skilled person has no hint towards avoiding detrimental effects of reflective surfaces in a probe which uses a prism directly exposed to the fluid. The whole arrangement of a prism in a tube makes it unlikely that items having a reflective surface float between the housing and the prism. Even if this happened, disruption of the probe could be expected following trapping of the particle so any back reflection would be without effect. The invention therefore contains an inventive step over the prior art.

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

Reasons for the Decision

- 1. The appeal is admissible.
- 2. *Main Request*
 - 2.1 The board was not convinced by the approach of the appellant, that the claim is clear because the skilled person has a toolkit of probes for different fluids, since the claim is directed not to a toolkit of different probes, but to a single probe.
 - 2.2 In reality, the distance X as defined in claim 1 is, without knowledge of the fluid concerned, open because it relies on refractive properties of the fluid for its

definition. In fact, the limit is not just to a particular distance, but, in essence, an upper limit of a range. This means that the unclear wording of the claim does not exclude a probe for some fluids, where a large X is defined, covering a fluid where a small X is required. The skilled person is therefore, without knowledge of the fluid, at a loss to know whether any given probe will work and fall within the wording of the claim or not - in other words the claim is not clear within the meaning of Article 84 EPC.

2.3 It may be possible, in some contexts, to define at least implicitly features of a device by reference to its use. One can refer, for example, to a decision taken by the present board in a different composition, T 0841/95, which mentioned for instance the "hook for a crane" example referred to in the Guidelines for examination as implying certain strength and dimensional qualities (see section 2.3.2.3 of the Reasons). Equally, reference to air, snow and road surface as referred to by the appellant may, in context, imply features. However, in the present case, reference is made to refractive qualities of the fluid, without any indication of which fluid is concerned, and, even without speculating about all possible fluids, just petroleum products have, as the appellant remarked, quite different indices. It is not therefore possible to imply any value of refractive index from such a general reference.

2.4 Looking again at decision T 0841/95, it is explained that a self cleaning pipette tip is defined with reference to surface tension and mass density of a liquid to be dispensed. In that case, the board was

convinced by the appellant that it was not viable to define the pipette tip in any way other than with reference to the liquid to be aspired (see point 2.3.2.1 of the reasons). The present case is different because it would indeed have been possible to define the probe in terms of its shape and form, for instance, as indicated by the examining division.

2.5 The board therefore had to conclude that for lack of clarity, claim 1 of the main request does not satisfy Article 84 EPC. Since the request fails for this reason, it is not necessary, in the present decision, to deal with the independent method claim or with any other claim of the request.

3. *Auxiliary Request*

3.1 Amendments

The board sees no reason to disagree with the position of the appellant as set out in section IX(b) of the Facts and Submissions above and is therefore satisfied as to admissibility of the amendments made. In addition the obvious error referred to at the end of section IX of the Facts and Submissions above requires correction, namely use of the definite article "the" consequent to the antecedent basis in the claim.

3.2 Clarity

3.2.1 Since claim 1 of this request relates to a method claim, the fluid is "in" the claim so that the lack of clarity established above in relation to claim 1 of the main request concerning refractive qualities of the fluid no

longer exists. Moreover, the examining division did not make any objection for lack of clarity in this respect.

3.2.2 Since, when performing the method, the skilled person can easily see whether the guard is positioned "below" the prism, the word is considered clear in the method claim as amended. Moreover, the reflective surface and its orientation and position are specified in a way which does not give rise to objection under Article 84 EPC.

3.2.3 While the shape and form of the guard is not specified, the guard is nevertheless adequately defined in the amended method claim in a functional way as, knowing the fluid concerned, the skilled person can put the method into practice without undue burden.

3.3 Patentability

3.3.1 Probes of the type at issue in the present case find application where tanks are filled with petroleum products. Light from a source is reflected back to a detector, part of the route being outside the probe. When that part is in air, the signal is received so filling is permitted, but when the part is in petroleum product, the signal is interrupted so filling should stop.

3.3.2 The subject matter of method claim 1 according to the auxiliary request is novel over the closest prior art document D1 by virtue of the characterising features of the claim. The problem solved by these features is preventing generation of a false permit signal, in particular, caused by objects suspended in the fluid.

3.3.3 The probe disclosed in document D1 is rather different because a mirror 45 is used to couple the light source 46 and detector 48, which means that they are on the same side of the centreline of the prism 42. This in its turn means that the shield (guard) 10 has a sleeve like form axially perpendicular to the centreline of the prism. The board agrees with the appellant that the problem of generation of a false permit signal consequent to objects floating around the prism is not a real issue in the sleeve arrangement and therefore considers the subject matter of claim 1 to involve an inventive step over the disclosure of document D1. Nothing in the remaining prior art in the file gives the board any other reason to doubt inventive step.

3.3.4 Accordingly, the subject matter of claim 1 can be considered to involve an inventive step within the meaning of Article 56 EPC, The same conclusion applies to the dependent claims by virtue of their dependence from claim 1.

Order

For these reasons it is decided that:

The decision under appeal is set aside.

The case is remitted to the department of first instance with the order to grant a patent on the basis of the following application documents

- claims

claims 1-7 as filed during the oral proceedings as auxiliary request [note: the obvious correction referred to in section IX of the Facts and Submissions is to be effected]

- description

pages 3A and 9 as filed during the oral proceedings,
pages 3, 8,10 and 13 as filed with the letter of 11.12.2001,
pages 1,2, 4-7, 11, 12 and 14 as published under the PCT,

- drawings

pages 1-5 as published under the PCT.

The Registrar

The Chairman

S. Sánchez Chiquero

A. G. Klein