



PATENTS ACT 1977

APPLICANT	Silixa Ltd
ISSUE	Whether patent application GB1421510.7 complies with Section 14(3) of the Patents Act 1977
HEARING OFFICER	Peter Slater

DECISION

Introduction

- 1 Patent application GB1421510.7 is a divisional application divided from GB1120619.0 which is the national phase of a PCT application filed by Silixa Ltd on 27 May 2010 and published as WO 2010/136810. The earliest priority date of the applications is 27 May 2009.
- 2 The first examination report included a section indicating that the examiner had concerns about sufficiency of disclosure but no formal sufficiency objection was made. The subsequent examination report made no reference to sufficiency, and did not suggest that further consideration of the issue had been deferred. The applicant submitted observations and amendments in response to the objections in these reports.
- 3 The original compliance period of 18 May 2015 was extended at the applicant's request to 18 July 2015. After the end of this extended compliance period the examiner informed the applicant that he believed the application should be refused for failure to comply with Section 14(3) and invited the applicant to be heard on this issue. On 5 August 2015 the examiner issued a final communication (a 'pre-hearing report') to the applicant including, for the first time, a detailed sufficiency objection.
- 4 The single substantive issue before me at the hearing was therefore whether the disclosure is sufficient, i.e. whether the disclosure is complete and clear enough for the skilled person to perform the invention defined in the claims.
- 5 The applicant was represented by Nicholas Wallin and Bethan Halliwell of Withers and Rogers LLP. Dr Mahmoud Farhadiroushan and Dr Fauzia Farooq of Silixa also attended the hearing. Dr Farhadiroushan is co-founder and Chief Executive Officer of Silixa and one of the named inventors of the application. The examiner (Colin Powys), the hearing officer's assistant (Stephen Jennings) and an observer (Andy Hughes) were also present.

The law

6 Section 14(3) of the Patents Act states:

The specification of an application shall disclose the invention in a manner which is clear enough and complete enough for the invention to be performed by a person skilled in the art.

The invention

7 In general terms the application relates to a distributed fibre optic sensor which can be used to perform acoustic measurements. Distributed fibre optic acoustic sensors operate by launching a light pulse into a sensing optical fibre. The light travels along the fibre and a small amount of this light is backscattered and/or reflected. Acoustic signals incident on the fibre change the strain in the fibre and this influences the backscattered or reflected light. Analysis of the backscattered/reflected light provides a measurement of the incident acoustic signal at different locations along the entire length of the fibre.

8 The claims in this application are directed towards synchronising measurements of relative phase, frequency and amplitude of the received light from the length of the fibre in order to enhance signal sensitivity. The most recent set of claims was filed on 6 March 2015. Claims 1 and 9 are independent and relate to a corresponding system and method. Claim 1 reads as follows:

A fibre optic distributed acoustic sensing system, comprising:

an optical sensing fibre arranged in use for receiving pulsed optical signals;

a means for receiving light backscattered and/or reflected from along the optical sensing fibre as the pulsed optical signals travel therealong, the light being backscattered and/or reflected in dependence on acoustic perturbations incident along the fibre; and

a means for processing the received light to measure the relative phase, frequency and amplitude of the received light from along the length of the optical sensing fibre to detect the acoustic perturbations, wherein the relative phase, frequency and amplitude measurements taken from along the length of the optical sensing fibre are synchronised to enhance signal sensitivity.

Arguments and analysis

9 A skeleton argument and a witness statement from Dr Farhadiroushan were provided prior to the hearing. I am grateful for the assistance that both submissions provide, but I do not need to discuss them in detail here.

10 Mr Wallin and Ms Halliwell presented a twofold argument, first raising a procedural point before dealing with the substantive issue. I will briefly address the procedural point before considering the arguments on the subject of sufficiency.

Estoppel, procedural error

- 11 Mr Wallin and Ms Halliwell contended that the examiner was estopped from raising a sufficiency objection because he had raised the matter (albeit informally) on his first examination report but (by implication of his silence on the issue) had dropped the objection when he issued his second examination report.
- 12 Whilst the concept of estoppel is well known in post grant inter-partes proceedings, I am not convinced that, in general, the principle of estoppel applies during the pre-grant examination process. Ideally examiners raise all significant objections in their first examination report¹, but there are inevitably occasions when re-examination, either in the light of amendments/observations or upon the realisation of an earlier error, necessitates a new objection or a reconsideration of an earlier objection. Surely, it would be wrong to tie the examiner's hands and to prevent him from raising potentially valid objections because they had been inadvertently missed at an earlier stage or proposed amendments required a previously disposed of issue to be revisited. The overriding consideration is the validity of the granted patent, and examiners should be free to raise objections which cast doubt upon that validity at anytime prior to grant. There is a place for estoppel and this is not the place.
- 13 Mr Wallin and Ms Halliwell also pointed out that a formal and detailed objection to lack of sufficiency was only presented to the applicant after the expiry of the compliance period, thus giving the applicant no opportunity to amend to address the objection.
- 14 On this point, I have a great deal of sympathy with the applicant. In hindsight the examiner should have formally raised the sufficiency objection prior to the expiry of the compliance period, or at the very least made clear in the second examination report that he had deferred the issue so that the applicant was forewarned of the possibility of a further objection. It is unfortunate that this did not happen, but even so the applicant should have been presented with the option of further extending the compliance period under rule 108(3) to (7), or possibly rule 107 given the circumstances, thus providing the applicant the proper opportunity to address an objection that had not previously been raised.
- 15 In summary, then, there has indeed been a procedural error here, but it is not that the examiner has raised an objection which he was estopped from raising but rather that the applicant should have been enabled, if he so wished, to provide a fully reasoned response and/or amendments to the objection prior to the expiry of the compliance period, further extended as required.
- 16 I intimated at the hearing that I would afford the applicant the opportunity to amend to address the sufficiency objection, should it prove necessary, by extending the compliance period under rule 107. Mr Wallin and Ms Halliwell, however, argued that no such amendment is necessary and addressed me on sufficiency issue. I will now turn to their arguments on the substantive issue.

¹ See 18.01.5 in the Manual of Patent Practice

Sufficiency

- 17 In a nutshell, the applicant's argument is that the specification provides adequate instructions to build the interferometer which is the crucial component of the distributed fibre optic acoustic sensor system (as shown for instance in figure 7), and that the synchronisation of the measurements from along the fibre in order to enhance signal sensitivity, to which the claims are directed, is an inherent feature of the system.
- 18 Mr Wallin and Ms Halliwell, with the assistance of Dr Farhadiroushan, explained in detail how the invention defined in the claims works and I will now set out my understanding of their explanation.
- 19 The first six lines of claim 1 simply set out the basic operational principle of the fibre optic distributed acoustic sensing system (or indeed any such system); nothing turns on this. It is the remainder of the claim that contains the inventive concept.
- 20 The paragraph of the description spanning pages 8 and 9 (as originally filed), with reference to figure 7, teaches that light emitted by a laser 701 and modulated by a pulse signal 702 is input to a sensing fibre 712. A processor 714, which is time synchronised with the pulse signal 702, processes electrical signals derived from the received light from the fibre. This means that the processor knows when each pulse is input to the fibre. The travel time of each pulse to each point along the fibre and back to the sensing unit is also known (since the speed of the pulse is known). When an acoustic signal is incident upon a point on the fibre this modulates the light pulse returned from that point, so analysing the characteristics of the returned light pulses therefore provides information about acoustic perturbations at points along the fibre. Because the timings of the input pulses and received pulses are known, the measurements from points along the fibre are automatically time synchronised. I therefore agree with Mr Wallin and Ms Halliwell that the provision of a processor which is time synchronised with an input laser pulse inherently provides time synchronised measurements from points along the length of the fibre.
- 21 The claim does not merely recite that the measurements are synchronised, but that they are synchronised to enhance signal sensitivity. Mr Wallin and Ms Halliwell explained that this could involve superimposing several measurements of the same acoustic signal, from different points along the fibre, so as to enhance signal sensitivity, and drew attention to the description at lines 4-6 on page 15 which says exactly this. It explains that since the measurements are synchronised they can be processed to enhance signal sensitivity, achieve a wide dynamic range and provide field imaging using beam forming techniques. Likewise lines 17-20 on the same page says that signals detected along the fibre, which are synchronised, can be processed using addition processing such as beamforming, to map the near-field and far-field. It is true that the application does not explain how beamforming works, but I do not think that it needs to. Beamforming is a well known signal processing technique that involves combining signals obtained at spaced apart sensors (from different points along the fibre, in this case) using appropriate time delays. I therefore consider that the specification does disclose the idea of processing the synchronised measurements from along the length of the sensing fibre in order to

enhance signal sensitivity, and that it provides sufficient information to guide the skilled person as to how to process the measurements.

- 22 The specification certainly would have benefitted from a better explanation of this aspect of the invention which may well have avoided the examiner's sufficiency objection and thus obviated the need for a hearing. That said, I am persuaded that the specification as it stands is clear enough and complete enough for the person skilled in the art to perform the claimed invention, for the reasons I have set out above.

Conclusion

- 23 I have found that specification discloses the invention defined in the claims in a manner which is clear enough and complete enough for the invention to be performed by a person skilled in the art, and as such the application complies with Section 14(3) of the Patents Act.
- 24 The examiner's final communication to the applicant on 5 August 2015 does not identify any outstanding matters or actions that have been deferred. In addition the examiner confirmed at the hearing that he considered the search for prior art to be complete.
- 25 Accordingly I conclude that the application was in order at the end of the compliance period, and that the patent may now be granted.

Appeal

- 26 Any appeal must be lodged within 28 days after the date of this decision.

Peter Slater

Deputy Director, acting for the Comptroller