Intellectual Property Office

BL O/282/19

23 May 2019

PATENTS ACT 1977

APPLICANT	Mr Roger West
ISSUE	The Patents Act 1977: whether patent application GB1417440.3 complies with section 1(1)(b) of the Act
HEARING OFFICER	Dr L Cullen

DECISION

Introduction

1 This decision concerns patent application GB1416440.3 entitled "*Development of the Application of a Multi-Parameter Embedment Transducer*". More specifically, it concerns whether the invention claimed in this application involves an inventive step as defined in Section 1(1)(b) and Section 3 of the Patents Act 1977 (hereafter the Act).

Background

2 The application was filed on 2 October 2014 and was published as GB2533903 on 13 July 2016. Mr West has represented himself throughout the prosecution of the application

3 The application was subject to accelerated examination in June 2018. The examiner objected to a lack of clarity in the claims and a lack of novelty or inventive step. The applicant has amended several times in response to the examiner's reports, with the claims now under consideration being those filed on 22 August 2018. The examiner remains of the view that this latest set of claims lack an inventive step, and further that they require amendment for clarity. Accordingly, the applicant was offered, and accepted, an oral hearing on the matter.

4 The matter came before me at a hearing conducted by telephone on 25 March 2019. The applicant, Mr Roger West, represented himself with support from his spouse, Mrs Wendy West, who is also a director of the applicant's company. Also present at the hearing were the examiner, Mr Alex Swaffer; Ms Eleanor Wade acting as assistant to the Hearing Officer, and an observer who attended for training purposes.

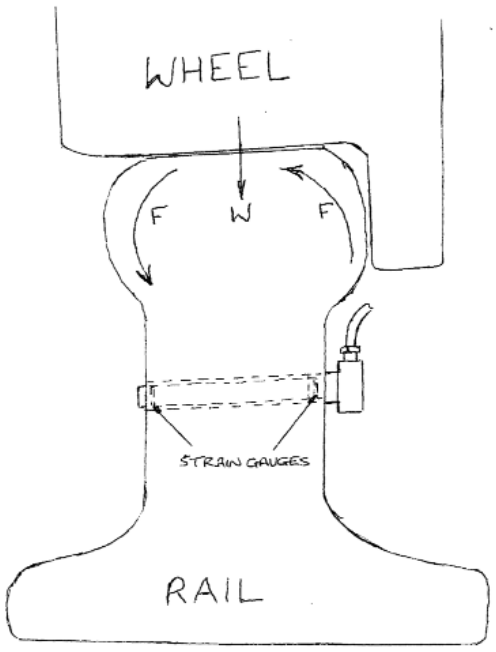
The application

5 The application relates to a multi-parameter embeddable sensor for monitoring variables within rail vehicle components, including the vehicles themselves and the rails they run on. The measurements may be used to indicate the condition of the component or may be representative of the weight of the vehicle. The weight measurement is achieved by monitoring compressive or shear stress forces through components which are subject to stress due to the weight of the vehicle.

6 The apparatus comprises a transducer which is to be embedded in a component subject to weight stress. This component may be a journal or axle box of the vehicle or may be a rail upon which the vehicle runs. Signals from the transducer may be amplified with an in-built amplifier and transmitted by a telemetry system.

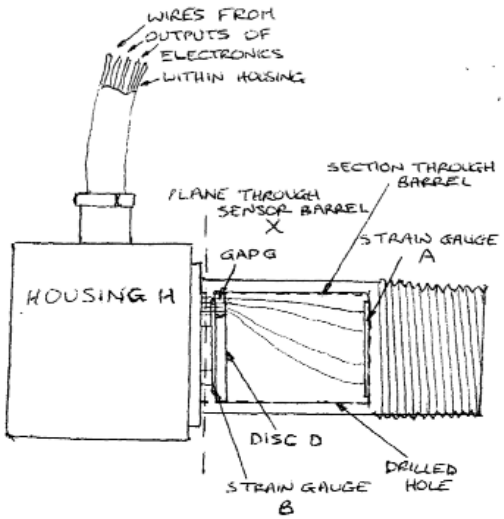
7 By mounting the transducer on the mechanically neutral axis of the chosen component it becomes virtually immune to any forces which are likely to corrupt the stress/weight measurement. Further, by forming the transducer with a pair of strain gauges spanning the vertical neutral axis (as shown in Fig 3 and Fig 4 of the application as filed, reproduced below), corrupting torsional or bending forces can be corrected for by summing the output of the strain gauges.

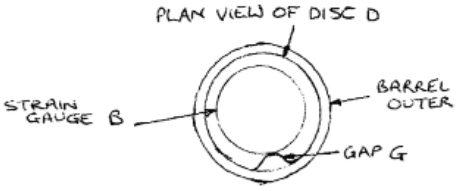
FIG 3



W = VERTICAL FORCE
F = TORSIONAL FORCE IN RAIL

FIG 4





8 In this embodiment the apparatus comprises a pair of strain gauges housed within a barrel such that when the barrel is embedded in a through-hole or bore of a rail, the strain gauges are each within the web[1] of the rail. The weight stress due to the weight of a vehicle on the rail is indicated by the sum of the strain gauge outputs which corrects for torsional/bending forces. Fig 4, as filed, further shows the relative locations of the strain gauges and the inclusion of a disc D having gap G to allow wires from the strain gauge distal to the housing to pass by the strain gauge proximal to the housing.

The Invention

9 The current claims on file are those filed on 22 August 2018 and comprise a single independent claim directed to a transducer mounted in a rail or rail vehicle. Five dependent claims, claims 2-6, are also included. Independent claim 1, as currently on file, reads as follows:

> **"*Claim 1***
>
> *A transducer which is mounted/embedded in a rail or rail vehicle such as a truck freight wagon locomotive or passenger car. This transducer will monitor the weight stress through the component in which it is mounted. The transducer will be mounted at a position where it will be subject to compressive or shear stress. The sensor/system will measure these coplanar forces. This transducer is equipped with pairs of strain gauges mounted within the transducer barrel such that the electric outputs of these strain gauges can be summed to give larger outputs. The gauges are mounted in such a way as to span the vertical neutral axis to neutralise the corrupting forces and provide accurate weighing signals*."

Correction to the Application

10 At the hearing Mr West highlighted a typographical error in the application as filed at page 1, line 27 of the description which read '*by using pairs of strain gauges (shown as A and B in FIG 3) such that…*'. He submitted that this should refer to Figure 4 and not Figure 3.

11 Figure 3 of the application as filed (see FIG 3 above) does not contain references A and B. Therefore, it is obvious that there is an error in the application as filed. In this instance, there are two possibilities of what was originally intended. Either the description should have referred to Figure 4 or, the pair of strain gauges shown in Figure 3 should have been labelled A and B. Each of these options has the same effect as both figures show the same embodiment of the invention.

12 The correction requested by Mr West is allowable and I have proceeded on the basis that page 1, line 27 should have read '*by using pairs of strain gauges (shown as A and B in **FIG 4**) such that…*'.

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[1] See also https://en.wikipedia.org/wiki/Rail_profile#Types for explanation of structure of railway rails, including the web of the rail.

The Issue to be decided

13 The issue to be decided in this application is whether the claimed invention contravenes Section 1(1)(b) of the Act and lacks an inventive step over the cited prior art.

14 As noted by the examiner in his pre-hearing report dated 19 October 2018, the current claim set lacks clarity and completion of the prior art search has been deferred until the inventive step objection has been dealt with. Accordingly, if I find that the claims as amended, comply with section 1(1)(b), I will remit the application to the examiner for completion of the examination process.

The Relevant Law

Inventive step

15 Section 1(1)(b) and Section 3 of the Act are concerned with whether the invention involves an inventive step.

16 Section 1 of the Act reads as follows:

> *1(1). A patent may be granted only for an invention in respect of which the following conditions are satisfied, that is to say:*
>
> *(a) …;*
>
> *(b) It involves an inventive step;*
>
> *(c) …;*
>
> *(d) ….*

17 Section 3 of the Act, entitled 'Inventive Step' reads:

> *An invention shall be taken to involve an inventive step if it is not obvious to a person skilled in the art, having regard to any matter which forms part of the state of the art by virtue only of Section 2(2) above (and disregarding Section 2(3) above).*

18 Section 2(2) of the Act, which refers to the state of the art, reads:

> *The state of the art in the case of an invention shall be taken to comprise all matter (whether a product, a process, information about either, or anything else) which has at any time before the priority date of that invention been made available to the public (whether in the United Kingdom or elsewhere) by written or oral description, by use or in any other way.*

19 The approach to assessing inventive step favoured by the UK courts is the structured approach found in *Windsurfing International Inc. v Tabur Marine (Great Britain) Ltd*[2]

[2] *Windsurfing International Inc. v Tabur Marine (Great Britain) Ltd*, [1985] RPC 59

(*Windsurfing*) as modified by Jacobs LJ in *Pozzoli SPA v BDMO SA*[3] (*Pozzoli*). This approach involves the following steps:

> *(1) (a) Identify the notional "person skilled in the art"*
>
> *(b) Identify the relevant common general knowledge of that person;*
>
> *(2) Identify the inventive concept of the claim in question or if that cannot readily be done, construe it;*
>
> *(3) Identify what, if any, differences exist between the matter cited as forming part of the "state of the art" and the inventive concept of the claim or the claim as construed;*
>
> *(4) Viewed without any knowledge of the alleged invention as claimed, do those differences constitute steps which would have been obvious to the person skilled in the art or do they require any degree of invention?*

Claim Construction

20 Sections 125(1) and 125(3) of the Act concern claim construction. They read as follows:

> *"(1) For the purposes of this Act an invention for a patent for which an application has been made or for which a patent has been granted shall, unless the context otherwise requires, be taken to be that specified in a claim of the specification of the application or patent, as the case may be, as interpreted by the description and any drawings contained in that specification, and the extent of the protection conferred by a patent or application for a patent shall be determined accordingly.*
>
> *….*
>
> *(3) The Protocol on the Interpretation of Article 69 of the European Patent Convention (which Article contains a provision corresponding to subsection (1) above) shall, as for the time being in force, apply for the purposes of subsection (1) above as it applies for the purposes of that Article."*

Added Matter

21 Section 76 of the Act, entitled ***"****Amendments of applications and patents not to include added matter*, is concerned with preventing any amendment from being made which discloses matter not present when the application was first filed.

22 Section 76(2) of the Act states:

> *"No amendment of an application for a patent shall be allowed under section 15A(6), 18(3) or 19(1) if it results in the application disclosing matter extending beyond that disclosed in the application as filed."*

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[3] *Pozzoli SPA v BDMO SA* [2007] EWCA Civ 588

Analysis

23 Applying the above-mentioned Windsurfing/Pozzoli steps in turn:

(1)(a) Identify the notional "person skilled in the art";

24 The first step is to identify the notional "person skilled in the art". The examiner has characterised the person skilled in the art as being "*a technician working in the field of railway rail and vehicle mounted transducers."*

25 At the hearing Mr West submitted that the person skilled in the art would be more specialised than this, proposing that they would be a technician concerned only with the field of weighing railway vehicles using railway rail and vehicle mounted transducers. Mr West contends that the same person would not be skilled in the use of transducers for measuring other forces within a rail or vehicle member, in particular longitudinal forces in rails.

26 I have considered carefully Mr West's argument that the present application concerns only the weighing of rail vehicles, taking vertical measurements, and that, as a consequence, the person skilled in the art should therefore be drawn narrowly.

27 The "person skilled in the art" is not a highly skilled expert or a Nobel prize winner, nor is he some form of lowest common denominator. Instead he is best seen as someone who is good at their job, a fully-competent worker. He is assumed to be at least sufficiently interested to address his mind to the subject and to consider the practical application of the information which he is deemed to have. The level of skill of the "person skilled in the art" is determined by the scope of the application under consideration[4], they may be seen as an individual with expertise in a field relevant to the application or they may be seen as a team composed of skilled people from a number of fields relevant to the application. They should be taken to be a person who has the skill to make routine workshop developments but not to exercise inventive ingenuity or think laterally.

28 I note that the application in hand refers to a "*multi-parameter*" sensor, and that the invention relates to the incorporation of strain gauges into a unitary sensor for utility in weighing rail vehicles. In the application as filed, claim 1 included a reference to measuring acceleration in more than one axis, i.e.:

> *"This transducer can monitor the weight/stress, temperature, vibration and acceleration in three axes and through the component in which it is mounted."*

[4] see, for example, Dyson Appliances Ltd v Hoover Ltd [2001] RPC 26, upheld by the Court of Appeal [2002] RPC 22.

29 In view of the above, I consider that the person skilled in the art proposed by Mr West is too specialised. I conclude that the person skilled in the art in this case would be skilled in the use of sensors, in particular transducers, to measure a wide range of stresses, forces and acceleration in components of railway rails and vehicles, rather than only forces in the vertical axis. They would have technical knowledge of strain gauge and strain gauge housing technology to address the problem of building a sensor with strain gauges for incorporation into a rail. The skilled person is thus, in my view, "*a technician working in the field of railway rail and vehicle mounted transducers*". Thus, I find myself in agreement with the examiner.

(1)(b) Identify the relevant common general knowledge of that person;

30 The examiner has proposed that the relevant common general knowledge of the person skilled in the art would cover the use of different types and arrangements of transducers and strain gauges, and their mounting in or on railway rails and vehicles. In view of this the examiner considers that the common general knowledge of the person skilled in the art would include the practice of mounting a strain gauge on each side of a railway rail so as to improve accuracy. The examiner has provided two documents as exemplifying this, GB2194065 and GB1364534. I note that these are just two examples of many and that the practice appears to be widespread in the industry.

31 Mr West does not appear to disagree with this, acknowledging at the hearing that positioning strain gauges either side of the vertical neutral axis is a long-standing solution to improving accuracy of measurement.

32 The common general knowledge of the person skilled in the art would also include the different uses of strain gauges and that the axis in which a gauge measures forces can be changed by changing the orientation of the gauge

(2) Identify the inventive concept of the claim in question, or if that cannot readily be done, construe it;

33 As highlighted by the examiner in his pre-hearing report, claim 1 lacks a degree of clarity as it is defined using multiple sentences. However, I do not consider that this hinders the identification of the inventive concept and I have set aside the multiple sentences of claim 1 and considered them as a whole.

34 The examiner identifies the inventive concept of claim 1 as:

> A transducer mounted in a railway rail or vehicle, the transducer comprising a pair of strain gauges mounted within a barrel, and the barrel being mounted within a rail or vehicle component such that the strain gauges span its vertical neutral axis.

I am partially in agreement with the examiner's identification of the contribution. However, this identification is lacking in that it omits the essential feature that the transducer will monitor the *weight stress* through the component in which it is mounted. As Mr West highlighted at the hearing, his invention is a 'weighing system' which is distinct from transducers embedded within a rail to measure other forces. This is an

essential feature defined in claim 1 and therefore should form part of the inventive concept.

35 In his discussion of the inventive concept at the hearing Mr West highlighted several important features of the invention which can be summarised as:

> A weighing system provided in a plug aperture of a rail such that it forms an interference fit. The system comprising a barrel having a (Wheatstone bridge) strain gauge at each end wherein the wires of the distal strain gauge pass through a gap in a disc upon which the other strain gauge is mounted.

36 He asked me to focus on the aspect of his invention which is embedded within a railway rail. He emphasised that the inventive step of his invention is the use of two strain gauges mounted within a barrel such that the gauges are within the web of the rail. This feature should therefore also be included within the identification of the inventive concept.

37 I find Mr West's identification of the inventive concept problematic in that a number of the features he identified are not present in the claim at issue (see above). Those features that he identified which I consider to have been defined in claim 1 amount to 'a weighing system, provided in an aperture of a rail, comprising a barrel having a strain gauge at each end.' However, the term 'at each end' differs in scope to the requirement of claim 1 which defines the location of the strain gauges as 'mounted in such a way as to span the vertical neutral axis'. As Mr West emphasised that the inventive step of his invention is the use of two strain gauges within the web of the rail, it is important to note that this limitation is not present in claim 1. As such, this latter feature cannot form part of the inventive concept of claim 1.

38 Having considered claim 1 and the views of the examiner and the applicant, I construe the inventive concept of this claim to be as follows:

> A transducer mounted/embedded in a component of a railway rail or vehicle to monitor the weight stress through the component, the transducer comprising a pair of strain gauges mounted within a barrel, and the barrel being mounted/embedded within a rail or vehicle component such that the strain gauges span a vertical neutral axis.

(3) Identify what, if any, differences exist between the matter cited as forming part of the "state of the art" and the inventive concept of the claim or the claim as construed;

39 In his pre-hearing report the examiner cited GB2371114 as forming part of the "state of the art". He considered this document to disclose '*a transducer which comprises a single strain gauge mounted within a barrel, the barrel being located in a hole through a railway rail such that the strain gauge coincides with the vertical neutral axis of the rail, so as to eliminate any bending effects*.' As such, the examiner identified the difference between GB2371114 and the inventive concept of the present application as '*the presence of two strain gauges within the barrel, with the strain gauges spanning the vertical neutral axis*.'

40 At the hearing Mr West highlighted that the disclosure of GB2371114 relates to an apparatus for measuring axial forces longitudinally down a rail to detect cracking of the rail. He submitted that this was fundamentally different to the invention of the current application which is measuring vertical forces in order to weigh a rail vehicle.

41 I agree with Mr West's point in so far as GB2371114 clearly relates to an apparatus for measuring axial forces to detect cracking, which is different to the invention of the current application. At the hearing the examiner similarly accepted this point such that it is now common ground.

GB2371114 relates to an instrument aimed at measuring the tensile and/or compressive forces in the rail for the detection of cracking. It discloses that the measurement can be taken by a sensor similar to, or the same as, that described in Mr West's prior patent documents GB9817770.2 (published as GB2340609), GB2305729, GB2050624A, GB8313834, GB8308372 and US4530245. It goes on to highlight that the measurement can easily be achieved by moving the prior art sensor through 45º to measure tensile/compressive forces rather than shear force, which was the purpose originally conceived for the sensor.

42 Mr West also considered that this was the difference between the disclosure in RU2145700 and the application in suit.

43 The sensor disclosed in GB2371114 is a transducer which comprises a single strain gauge mounted within a barrel. The barrel is located in a hole bored through a railway rail such that the strain gauge coincides with the vertical neutral axis of the rail. This acts to eliminate any bending effects on the measurement.

44 I consider that the disclosure of GB2371114 differs from the inventive concept of claim 1 of the application in question in that it does not disclose the measurement of the weight of a vehicle using a transducer comprising two strain gauges within a barrel, the strain gauges spanning a vertical neutral axis.

45 Mr West further submitted that the inventive difference between his invention and the prior art is the feature of two strain gauges *within the web of the rail*. As discussed above, I do not consider this feature to form part of the inventive concept as it is not defined in independent claim 1 as currently on file. Consequently, it cannot act as a difference over the prior art.

46 At the hearing, Mr West observed that GB2371114 relates to measurement of forces longitudinal to the rail, and not to a sensor which could be used to weigh a rail vehicle. Accordingly, Mr West contended that the skilled person would not be drawn to consider GB2371114 in seeking to develop a system for weighing a rail vehicle.

47 I have determined that the skilled person is "*a technician working in the field of railway rail and vehicle mounted transducers*" and that they would have a broader understanding of the use of sensors than that proposed by Mr West. They would recognise that sensors and transducers can be used to measure a wide range of stresses, forces and acceleration in components of railway rails and vehicles, rather than only forces in the vertical axis. As a consequence, I am satisfied that the person skilled in the art would consider GB2371114 to be relevant to the development of a sensor for weighing of rail vehicles.

(4) Viewed without any knowledge of the alleged invention as claimed, do those differences constitute steps which would have been obvious to the person skilled in the art or do they require any degree of invention?

48 In his pre-hearing report the examiner considered that the skilled person seeking to improve accuracy would think it obvious to modify the invention disclosed in GB2371114 to include a strain gauge mounted either side of the neutral axis. He noted that the practice of mounting a strain gauge on each side of a rail to improve accuracy was part of the skilled person's common general knowledge. In support of the latter the examiner referred to GB2194065 and GB1364534 as two examples of many which show that this practice was well known. As a consequence, the examiner concluded that the difference identified between GB2371114 and the invention as claimed amounted to no more than a routine workshop modification.

49 Mr West's primary submission at the hearing was that the person skilled in the art would not have considered GB2371114 relevant as it relates to measurement of a fundamentally different force for a different purpose. His second submission was to highlight that the invention fulfils a long-felt want and that in practice it is technically difficult to mount a strain gauge at the end of a barrel. I will consider each of these submissions in turn.

50 As rightly highlighted in Mr West's second submission, it is important that I consider any evidence that the invention fulfils a long-felt want when assessing obviousness. As Aldous J held at page 166 in *Optical Coating Laboratory Inc. v Pilkington*[5], while it is always important to consider why a possibly inventive step had not been suggested before, without evidence of a long-felt want or unsuccessful attempts to solve a particular problem, any evidence as to novelty, years of delay in developing the prior art and an advantage stemming from the invention carries no weight.

51 At the hearing, Mr West spoke at some length about how his invention had not been conceived before and now that it had, a national rail company were considering deploying it within their units. Having fully considered the entirety of Mr West's comments in relation to this submission, I have been unable to find any evidence that the invention fulfils a long-felt want and has been commercially successful. Whilst a national rail company may be considering deploying the invention, this does not (yet) indicate a commercial success. As such, I see nothing in this submission which aids Mr West's case.

52 Mr West also made reference to the difficulty in mounting a strain gauge at the distal end of the barrel. He submitted that the skilled person would not consider mounting a strain gauge at either end of the barrel for two reasons. Firstly, the difficulty in routing the wires from the distal strain gauge past the proximal strain gauge. This was said to require mounting the proximal strain gauge on a disc that had a gap built into it to allow the wires to pass the proximal gauge. Secondly, correctly mounting a strain gauge at a distal end of a barrel is a complex task because it needs to be both bonded and tightly fitting.

53 The first of these difficulties does not aid Mr West's case as claim 1 is not limited to requiring that the wires from the distal strain gauge pass the proximal strain gauge.

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[5] *Optical Coating Laboratory Inc. v Pilkington P.E. Ltd.* [1995] RPC 145

There are a number of alternative arrangements falling within the scope of claim 1 that do not encounter this difficulty. For example, the wires from the distal strain gauge could pass into a separate housing at the distal end such that they need not pass the proximal gauge. Similarly, the second difference does not assist as claim 1 only requires that the strain gauges are mounted within the barrel. The prior art document GB2371114 discloses the mounting of a strain gauge within a barrel. As such the skilled person would know how to achieve the mounting of a strain gauge within a barrel. These difficulties therefore do not point away from the skilled person having considered the differences as obvious.

54 Finally, considering Mr West's primary submission relating to the relevance of GB2371114, it is worth reiterating that I do not consider the skilled person to work in as narrow a field as that suggested by Mr West. If, as Mr West implied, the skilled person was limited to working only in the field of embeddable sensors for weighing rail vehicles, this submission might be more persuasive. However, as I have already noted, I consider the skilled person to work in the broader field of railway rail and vehicle mounted transducers. As such, the skilled person would be aware of a range of applications for transducers which can measure a range of forces depending on their configuration. Consequently, they would not immediately dismiss GB2371114 because it relates to the measurement of axial forces to detect cracking of railway rails.

55 GB2371114 discloses the use of a transducer to measure tensile and/or compressive forces in a rail and notes that the sensor could easily be moved through 45º to measure shear forces. This teaches the measurement of various forces depending on the orientation of the sensor. The person skilled in the art considering this document would, in my view, think it was obvious that the sensor could be used to measure further alternative forces, such as weight, by a further reorientation of the sensor. This would have been obvious given the knowledge of the skilled person which includes the use of different arrangements of transducers and strain gauges to measure various forces.

56 GB2371114 further differs from the inventive concept in that it does not disclose a strain gauge mounted either side of the neutral axis. As accepted by Mr West, the practice of mounting a strain gauge on each side of a rail, and consequently the neutral axis, to improve accuracy is part of the common general knowledge of the person skilled in the art. The person skilled in the art seeking to improve the accuracy of GB2371114 would have thought it obvious that you could substitute the single strain gauge located on the natural axis for a strain gauge either side of the natural axis. They would have been led to do this as it is commonly known to use two strain gauges to improve accuracy by accounting for corrupting forces. This difference amounts to a routine workshop alteration to include a feature commonly known in the art.

57 Consequently, I do not consider that the differences between the inventive concept of claim 1 and the disclosure of GB2371114 demonstrate an inventive step.

Conclusion

58 Taking account of all the above, I find that the application, as currently claimed, lacks an inventive step according to section 1(1)(b) of the Act over the disclosure in GB2371114.

59 After consideration of the application as originally filed, it appears to me that there are possible amendments which would overcome this objection. As noted above, a number of Mr West's submissions hinged around features which were not included in the claim at issue but would appear to be supported by the application as filed. In particular, the inclusion of a disc having a gap to allow wires from the distal strain gauge to pass the proximal strain gauge. Support for a possible amendment to include this feature could be drawn from figure 4 of the application as filed, as well as from original claim 2. Inclusion of this feature within the independent claim would appear to form a patentable claim over GB2371114.

60 Mr West may wish to consider the above points and work with the examiner to agree an amendment to overcome the inventive step objection. However, Mr West should note that, as the examiner indicated in his pre-hearing report, the search is not yet complete; further citations may be found, and new objections raised against the amended claim.

61 I am remitting the current application to the examiner so that the examination process under Section 18 of the Act can be completed.

Compliance Period

62 The prescribed period under section 20 of the Act for putting this patent application in order, referred to as the compliance period, currently expires on 22 June 2019. If no amendments are agreed by the end of this period, based on my conclusion above, the application will be refused under section 18(3) of the Act for failure to comply with the requirements of the Act, specifically, section 1(1)(b) of the Act.

63 I would suggest that there is sufficient time for the applicant to resolve matters before expiry of the compliance period. I do acknowledge that it would be possible for the applicant, Mr West, to seek an extension to the compliance period under rule 108 of the Patents Rules 2007 (as amended). However, this would require payment of a fee (£200) and an application in writing using patent form F52.

Appeal

64 Any appeal must be lodged within 28 days after the date of this decision

Dr L Cullen

Deputy Director, acting for the Comptroller