



## PATENTS ACT 1977

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| APPLICANT       | Adrian Lynley Ashley   |
| ISSUE           | Whether patent application GB2105653.6 complies with section 14(3) |
| HEARING OFFICER | Dr Stephen Brown   |

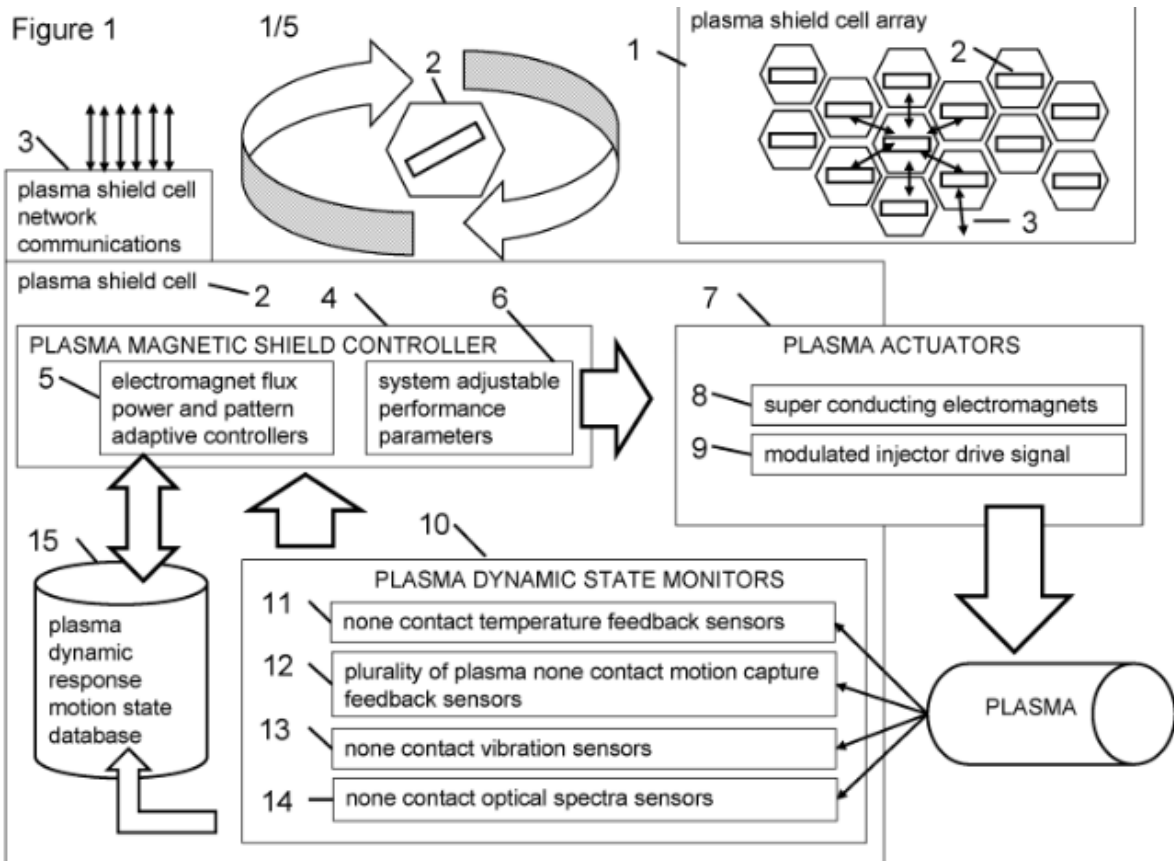
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### DECISION

- 1 Patent application GB2105653.6 (“the application”) entitled “Fusion reactor magnetic plasma shield” was filed on 20 April 2021 in the name of Mr. Adrian Lynley Ashley. It was published on 17 November 2021 as GB2595052.
- 2 After several rounds of correspondence, the examiner remains of the view that the claim lacks sufficiency and so an offer to request a hearing was made in the letter dated 10 July 2024. The applicant responded to this letter and report with amendments to the claims but did not request a hearing at this time. As foreshadowed by the examiner in their letter, the examiner instigated hearing proceedings and sent a pre-hearing report in a letter dated 31 October 2024 which stated that a decision by a Hearing Officer will be issued on the papers on file. This is that decision.

### The invention

- 3 The invention relates to shielding surfaces from plasma using magnetic fields to repel the plasma, in particular in the fields of thermonuclear fusion reactors and spacecraft.
- 4 The application suggests that even with standard magnetic containment plasma can touch surfaces causing issues, such as reduced fusion efficiency or heat contacting the surface of a spacecraft. The invention appears to relate to a smarter variation of magnetic shielding or containment where a specific response is deployed as a result of local variations in plasma across the surface of the reactor or spacecraft, the response being called from a set of stored responses in a database.
- 5 Figure 1 illustrates a shielding system in a schematic form with various components that map onto claim 1:



- 6 Figure 4 illustrates linear motor tracks in a corkscrew track 16, 17 and Figure 5 illustrates linear motor tracks in a circular track 16, 17.
- 7 The latest set of claims were filed on 15 July 2024, comprise 20 claims, including one independent claim 1, which is as follows:

*A linear motor magnetic plasma shield unit integrated into the lining of the fusion reactor containment vessel or integrating into the fuselage of a spacecraft comprising:*

*a linear motor magnet plasma shield can be applied the to underside of the spacecraft or applied to the inside lining of the containment chamber of a fusion reactor,*

*a plurality of plasma dynamic state monitors may communicate the plasma state,*

*said a plurality of plasma dynamic state monitors comprising of*  
*a plurality of none contact temperature feedback sensors*  
*a plurality of plurality of plasma none contact motion capture feedback sensors*  
*a plurality of none contact vibration sensors*  
*a plurality of none contact optical spectra sensors and*

*a plurality of plasma magnetic shield controllers controlled by computational means and at least one electromagnet flux power and pattern adaptive controllers and modifies a plurality of system adjustable performance parameters,*

*a plurality of plasma actuators comprising of;  
a plurality of super conducting electromagnets,  
a plurality of modulated injector drive signal to induce a modulated signal,*

*the past plasma dynamic movement states are stored in a plurality of plasma dynamic response motion state database the information and prior control responses are also stored for rapid control solutions given the plasma dynamic state and are used by the said electromagnet flux power and pattern adaptive controllers and optimised,*

*a plurality of electromagnets flux pattern controllers is provided by computational means such that a plurality of superconducting linear motor tracks configuration is feasible to circulate the plasma within the confinement chamber,*

*said plurality of superconducting linear motor tracks configuration is corkscrew and contra or none contra circulating adjacent to the adjacent track to circulate the plasma within the confinement chamber with mean for adjusting the phase and circulation clock wise or anticlockwise,*

*said plurality of superconducting linear motor tracks configuration is circular and contra or none contra circulating adjacent to the adjacent track to circulate the plasma within the confinement chamber with mean for adjusting the phase and circulation clock wise or anticlockwise.*

### **The issue to be decided**

- 8 The issue for me to decide is whether the disclosure of the invention is sufficient, as is required by section 14(3) of the Act. The issues of the novelty and inventive step of the invention were deferred by the examiner until the sufficiency issue was addressed and I will do likewise.

### **The law**

- 9 The relevant provision of the Act is reproduced below:

#### **Section 14(3)**

*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*

10 This section of the Act is often said to relate to “sufficiency”<sup>1</sup>. Its purpose is to prevent an applicant from laying claim to products or processes which the teaching of the specification does not allow the skilled addressee to perform. Essentially it asks whether the patent application provides enough information for a person with a reasonable knowledge and understanding of the technical area described to be able to carry out the invention.

11 The leading authority for assessing sufficiency is *Eli Lilly v Human Genome Sciences*<sup>2</sup>. In paragraph [239] of his judgement Kitchen J gave the following summary of the principles to be applied:

*"The specification must disclose the invention clearly and completely enough for it to be performed by a person skilled in the art. The key elements of this requirement which bear on the present case are these:*

*(i) the first step is to identify the invention and that is to be done by reading and construing the claims;*

*(ii) in the case of a product claim that means making or otherwise obtaining the product;*

*(iii) in the case of a process claim, it means working the process;*

*(iv) sufficiency of the disclosure must be assessed on the basis of the specification as a whole including the description and the claims;*

*(v) the disclosure is aimed at the skilled person who may use his common general knowledge to supplement the information contained in the specification;*

*(vi) the specification must be sufficient to allow the invention to be performed over the whole scope of the claim;*

*(vii) the specification must be sufficient to allow the invention to be so performed without undue burden."*

12 Whilst there is only one provision under the Act, it is now settled law that sufficiency of disclosure can be approached in three different ways:

*(1) Classical insufficiency*

*(2) Insufficiency by ambiguity*

*(3) Insufficiency by excessive claim breadth*

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<sup>1</sup> Manual of Patent Practice (MoPP) section 14.58

<sup>2</sup> [20 Eli Lilly v Human Genome Sciences \[2008\] RPC 29](#)

- 13 In this instance, the examiner considers the disclosure to be insufficient by classical insufficiency, which relates to the situation where there is no enabling disclosure. This has been usefully summarised by Floyd J in *Zipher Ltd v Markem Systems*<sup>3</sup>:

*“Classical insufficiency arises where the express teaching of the patent does not enable the skilled addressee to perform the invention. This type of insufficiency requires an assessment ...of the steps to which it would be necessary for the skilled reader or team to take in following the teaching of the specification and in order to arrive within the claim. Plainly the steps should not include inventive ones. But a patent can also be found insufficient if the steps can be characterised as prolonged research, enquiry or experiment.”*

### **Argument and analysis**

- 14 In order for an application to be sufficient, it must include at a minimum something amounting to one embodiment or example that can be put into effect. As noted in *Kirin-Amgen Inc v Hoescht Marion Roussel*<sup>4</sup>:

*“Whether the specification is sufficient or not is highly sensitive to the nature of the invention. The first step is to identify the invention and decide what it claims to enable the skilled man to do. Then one can ask whether the specification enables him to do it.”*

- 15 I thus need to begin by identifying the invention and what the skilled person would understand it claims to enable him to do. This involves applying a purposive construction to the claims, interpreting them in light of the description and drawings.

### Identifying the invention

- 16 Following the principle set down in *Eli Lilly*<sup>2</sup> the first step is to construe the claims. In conjunction with Figure 1 of the drawings and page 3 of the description, I believe that the key features of at least one embodiment of the claim are:

a) *A linear motor magnetic plasma shield for location in the lining of a plasma reactor. The shield comprising:*

b) *A plurality of plasma dynamic state monitors including:*

*non-contact temperature sensors;  
non-contact motion capture sensors;  
non-contact vibration sensors and  
non contact optical spectra sensors;*

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<sup>3</sup> *Zipher Ltd v Markem Systems Ltd* [2009] FSR1:

<sup>4</sup> *Kirin-Amgen Inc v Hoescht Marion Roussel* [2005] RPC 9.

- c) *A plurality of plasma shield controllers which include electromagnetic power controllers and pattern controllers to modify system performance parameters;*
- d) *A plurality of plasma actuators comprising of:  
a plurality of super conducting electromagnets,  
a plurality of modulated injector drive signals which induce a modulated signal,*
- e) *A database of responses to previous plasma states which provides a dynamic response to a current plasma state;*
- f) *Two kinds of superconducting linear motor tracks which can adjust the phase of circulation of plasma within a space, the tracks being laid in a corkscrew path and a circular path.*

17 For this construction I have omitted the relevance of the invention to a surface of a spacecraft as it is clear from the passages defining “motor tracks” that these are only used in relation to a containment vessel, as shown in Figures 4 and 5 which have the circular and corkscrew lining. Additionally, the claim comprises plasma actuators which can only be used in a plasma reactor. In the spacecraft embodiment the plasma is naturally occurring and not actuated, or injected, by artificial means.

18 For these reasons, it is my view that the plasma reactor embodiment is more clearly disclosed than the spacecraft shield embodiment and so I will focus on that embodiment for now.

19 Even with such a focus, construing the above features is difficult. Beginning with part (a), the term ‘linear motor’ usually means:

*“an electric motor that has had its stator and rotor “unrolled”, thus, instead of producing a torque (rotation), it produces a linear force along its length.”<sup>5</sup>*

20 Other than it consisting of magnetic components it is unclear to me exactly how such an arrangement could be used as a magnetic plasma shield. The description offers no extra help in this regard. I am thus forced to construe part (a) as being a magnetic plasma shield which has magnetic components, both permanent magnets and electromagnets, arranged as *if* it were a linear electric motor. How that might work in practice though, the application does not make clear.

21 Part (b) goes on to state that the shield also comprises a number of sensors for monitoring the dynamic state of the plasma. This, at least, appears relatively straightforward, comprising four different types of known sensor. I will thus take this part at face value.

22 Part (c) defines that the plasma shield has a plurality of controllers, including electromagnetic power controllers and pattern controllers. The former type is straightforward to construe if I assume that the electromagnets being controlled are those in the plasma shield. ‘Pattern controller’ though is not a term of art, and again the description offers little help. I will thus take a ‘stab in the dark’ and assume that

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<sup>5</sup> Wikipedia

these refer to controlling the magnets in the shield in accordance with some sort of pattern.

- 23 Part (d) specifies a plurality of plasma actuators, each comprising a plurality of superconducting electromagnets and a plurality of modulated injector drive signals. It is unclear whether the superconducting electromagnets are *in addition* to those making up the linear motor arrangement or are, in fact, the electromagnets that are an essential part of any electric motor. For simplicity, and given the layout of the claim, I shall assume the latter.
- 24 Similarly, it is unclear exactly what the modulated injector signals are actually driving. Again, I will resort to simplicity and assume that it is the superconducting electromagnets mentioned in the sentence immediately prior.
- 25 Part (e) mentions a database of responses to previous plasma states. This appears straightforward. The skilled person would easily appreciate how such a database could be used to provide a suggested response to a current plasma state.
- 26 Finally, part (f) implies that all of parts (b) to (e) allow a configuration of superconducting linear motor tracks which can adjust the circulation of plasma thereby producing the linear motor magnetic plasma shield of part (a).
- 27 Part (f) also specifies that the tracks are laid in a corkscrew path *and* a circular path. However, since these two paths are shown in two separate figures (fig.4 & 5) I will construe the 'and' in this part as 'and/or'.
- 28 At this point I will note that the description also states that the linear motor magnetic plasma shield is comprised of a number of plasma shield cells, drawn as hexagons (2) in the figures. While this detail is not in the claims, I cannot easily reconcile it with the construction above, or indeed with the rest of the disclosure.

#### Identifying the skilled person

- 29 The application needs to be sufficient such that it can be performed by a person skilled in the art. It is therefore necessary to establish the parameters of such a skilled person.
- 30 In *Medimmune v Novartis*<sup>6</sup>, Arnold J, at paragraph 91, outlined the nature of the skilled person:

*“A patent specification is addressed to those likely to have a practical interest in the subject matter of the invention, and such persons are those with practical knowledge and experience of the kind of work in which the invention is intended to be used. The addressee comes to a reading of the specification with the common general knowledge of persons skilled in the relevant art, and he or she reads it knowing that its purpose is to describe and demarcate an*

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<sup>6</sup> *Medimmune Ltd v Novartis Pharmaceuticals UK Ltd, Medical Research Council* [2011] EWHC 1669 (Pat).

*invention. He or she is unimaginative and has no inventive capacity. In some cases the patent is addressed to a team of persons with different skills.”*

- 31 Thus, the invention, as construed, is intended to be performed by a skilled person, or a team, with common general knowledge, but no inventive capacity and no need to perform extensive research to reach the invention.
- 32 To echo the language of Eli Lilly<sup>2</sup> as the linear motor magnetic plasma shield (henceforth, ‘shield’) is clearly a product, to *perform the invention* means that the shield must be able to be made by the skilled person.

#### What the skilled person learns from the specification

- 33 Before beginning this part of the analysis, I will note that some parts of the invention are components that would be readily accessible to the skilled person or within their common general knowledge. Specifically, I believe that all of the monitors mentioned in part (b), above, would be within the skilled person’s common general knowledge. Thus, their mere listing is sufficient. The skilled person would not need any more detail to implement this element of the invention.
- 34 Likewise, I believe that the skilled person would easily appreciate how a database of responses to previous plasma states could be created to provide suggested responses. Thus part (e) does not need any detailed support from the description.
- 35 However, this leaves the following features of the invention that I believe cannot be considered part of the skilled person’s common general knowledge:
- a) How a linear motor ‘structure’ can be used to make a magnetic plasma shield for location in the lining of a plasma reactor;
  - c) How to construct a plurality of plasma shield controllers which include electromagnetic power controllers and pattern controllers such that they modify system performance parameters;
  - d) How to construct a plurality of plasma actuators comprised from superconducting electromagnets and modulated injector drive signals;
  - f) How the superconducting linear motor ‘structure’ can be laid in a corkscrew path and/or a circular path to adjust the phase of circulation of the plasma; and, additionally:
  - g) How all of these features interact with each other to achieve the claimed results.
- 36 All of these features appear to relate either to new terms in the art (e.g. plasma actuators, injector drive signals) or where they are potentially known objects (e.g. linear motors) they have no known relationship to controlling plasma. Consequently, these features require further elaboration within the rest of the specification to allow the skilled person to make the invention.

- 37 Unfortunately, I can find no such teaching in the application. There are no additional details in the description, claims or drawings from which the skilled person can learn how to make the features listed above. Indeed, what extra details there are (i.e. that the plasma shield is comprised of a number of cells) only add further questions rather than providing any unambiguous answers.
- 38 For these reasons, I believe that it would be impossible for the skilled person to make the invention of claim 1 without an undue burden of research. As a result, I conclude that the application is insufficient.
- 39 While I have focussed my analysis on the plasma reactor embodiment, I can see even less support in the specification for the spacecraft shield embodiment. I therefore have no doubt that the application is insufficient in regards to this embodiment too and so do not need to consider it any further.
- 40 I thus decide that the application does not meet the requirements of section 14(3) of the Act.

#### **Other matters**

- 41 It is possible that other issues, such as added matter, may have arisen as a result of amendment. However, as I have decided that the application does not comply with section 14(3) it is not necessary to consider such issues.

#### **Conclusion**

- 42 I have concluded that the specification does not sufficiently disclose the invention such that a person skilled in the art would be enabled to perform it. I therefore refuse this application under section 18(3).

#### **Appeal**

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

**Dr STEPHEN BROWN**

Patent Examination Group Head