



PATENTS ACT 1977

APPLICANT	Roger William Hall
ISSUE	Whether application GB2101352.9 complies with Sections 2(1), 14(3) & 14(5)(b) of the Patents Act 1977
HEARING OFFICER	Laura Starrs

DECISION

Background

- 1 The application was filed on 1 February 2021 with no earlier priority. It was published on 7 September 2022 as GB2604329 A. The unextended compliance period is due to end on 1 August 2025.
- 2 In the Examination Opinion of 1 September 2021, the search examiner highlighted the requirements for the application to be novel and inventive over the prior art, citing three prior art documents which were considered to show that all six claims as filed lacked both novelty and an inventive step. It was noted at that time that the search was truncated and that the three citations listed were mere examples of a much larger number of documents available which appeared to anticipate the claimed invention.
- 3 The applicant emailed observations on the three citations after receipt of the report on 1 September 2021 and proceeded to request substantive examination on 8 September 2021. These observations were considered by the substantive examiner who issued an examination report on 24 June 2024 raising objection to clarity and novelty. Other aspects of the examination, including completion of the search, were deferred.
- 4 The applicant filed amended claims on 15 July 2024 and in the examination report of 12 September 2024, the examiner continued to object to the amended claims on the grounds that they were not sufficiently disclosed by the specification as filed and that the claims were not new over the cited prior art. The applicant filed further amendments on 18 September 2024 which replaced the claims of 15 July with a single amended claim. The examiner maintained their view that the amended claim 1 was insufficient and lacked novelty and they issued a final examination report on 18 November 2024. Having reached an impasse, the examiner offered a hearing in their

correspondence of 18 November 2024 which the applicant subsequently accepted by email on 21 November 2024.

- 5 The substantive examiner issued a pre-hearing report on 6 December 2024, in it he raised sufficiency, clarity and novelty. I also note that the search had still not been brought up to date at this time. I am grateful to the applicant for the skeleton arguments submitted on 31 December 2024. I confirm that I have considered the skeleton arguments, pre-hearing report and all other correspondence on the file in coming to my decision.
- 6 The matter came before me at an in-person hearing at the Office on 17 January 2025. The applicant, My Hall, represented himself. Also present at the hearing was my assistant, Mr Thomas Britland, and an observer.
- 7 The issues on which I must decide are whether the invention, as set out in the claim filed on 18 September 2024, is disclosed by the specification in a manner which is clear enough and complete enough to be performed by a person skilled in the art under section 14(3), whether the claim clearly defines the invention under section 14(5)(b) and whether the claim is novel under section 2(1) of the Patents Act 1977 ("the Act"). I note that the examiner has, in previous examination reports, objected to the invention being incapable of industrial application under sections 1(1)(c) and 4 of the Act as it would not, in their view, work in the manner set out in the specification. However, the issue of industrial application was not formally raised in the pre-hearing report, and I am not asked to decide upon it.

The Application

- 8 The application relates to a device where the rotor of an electric motor is coupled to a series of bearings which transfer the angular momentum of the rotor to the electric motor housing which is in turn coupled to the stator of the electric motor. This is described in the specification as providing an "action-action" sequence or a "reaction-reaction" sequence, which is achieved by transferring the angular momentum of the rotor into the stator via the bearings, counteracting the reaction generated in the stator when driving the rotor. It is noted that the specification states that this "produces angular momentum".

- 9 There are provided four figures to aid understanding of the invention, the best example of what is intended by the invention is shown in figure 2. The electric motor comprises a stator 9 and a rotor coupled to a drive shaft 8 and the drive shaft 8 is connected to an inner race 10 of a 3-race bearing 11. The outer race 12 of the bearing is connected to the same object as the stator.

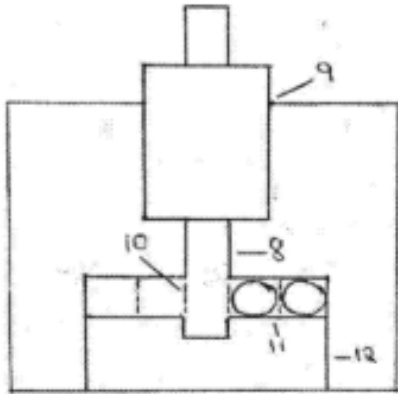


Figure 2.

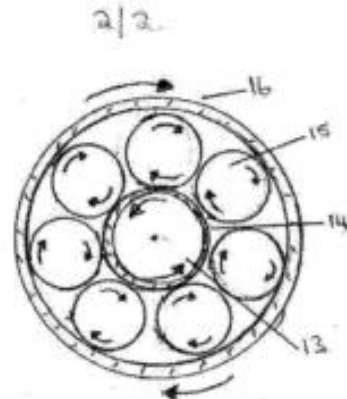


Figure 3

- 10 According to the specification, as the rotor rotates (e.g. clockwise) the stator will try to rotate in the opposite direction (counterclockwise). The inner race would rotate in the same direction as the drive shaft (clockwise). The inner race imparts opposite rotation on the inner set of bearings (e.g. anticlockwise) which in turn impart that same direction of rotation on the middle race 11. The middle race then imparts the opposite rotation to the outer set of bearings (e.g. clockwise) which is then imparted onto the outer race 12. The outer race is then physically connected to the casing of the electric motor, which is coupled to the stator 9, causing the stator to rotate in the same direction as the rotor (clockwise). This action of causing the stator to rotate in the same direction as the rotor is intended to reduce or negate the counter rotation of the stator.
- 11 Figure 3 shows how angular momentum is allegedly transferred through a bearing. A drive shaft 13 rotating counter-clockwise is connected to the inner race 14 of the bearings which causes the ball bearings 15 to rotate clockwise and then interact with the outer race 16 of the bearing so that it rotates counter clockwise. In the embodiment of Figure 2, the outer race 16 shown in Figure 3 would be the middle race 11. An initial application of the device disclosed in the specification is the rotation of satellites in orbit, using the system to either address the issue of saturation in reaction wheels or negating their requirement entirely. A second application that is provided is addressing the counter-rotation generated on a helicopter body by driving the main rotor that generates lift on the helicopter.
- 12 While the claims initially focused purely on the device in isolation, through amendment the claimed invention was tied to the example of the helicopter. The device is intended to be mounted in a helicopter to negate or reduce the torque reaction of the helicopter's main rotor.

The Claims

13 There is one claim. It reads as follows:

1. A device where an electric motor is used to rotate a drive shaft and connecting the drive shaft to the inner race of a bearing, the stator of the electric motor and the outer race of the bearing being connected to the structure of a helicopter with the intent of negating or reducing the torque reaction of the main rotor.

14 For the purposes of this decision, I will refer to “the device” as being the electric motor and bearing structure in isolation, with the device being connected to the structure of a helicopter.

Argument and analysis

Sufficiency

15 I will begin by considering whether or not the specification is sufficient, given that if I find the specification to be insufficient it will not be patentable regardless of whether it is novel or clear. While the examiner never explicitly stated the sections of the Act or any pieces of case law which are relevant here, the applicant identified several paragraphs in the Manual of Patent Practice which he felt to be relevant in the skeleton arguments, in particular paragraphs 14.60 on sufficiency and 14.85 on undue burden. As such, I believe it to be fair that I refer explicitly to the relevant sections of the Act and relevant case law discussed at those points of the manual to which Mr Hall has referred.

16 The examiner raised an objection to sufficiency, the relevant provision of the Act is section 14(3) which is shown below:

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.

17 The relevant principles to be applied when assessing sufficiency was set out by Kitchin J in *Eli Lilly v Human Genome Sciences* [2008] RPC 29:

"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."

- 18 The examiner's objection simply set out that he believed that the specification lacked sufficient detail with regards to how the device is integrated into a helicopter in order to negate or reduce the torque reaction of the main rotor.
- 19 At the hearing the applicant's argument was that the specification was sufficient as it clearly described the device and how it worked. He went on to say that the mounting of the device in a helicopter would be readily performed by a skilled person using their common general knowledge without undue burden.
- 20 I believe the best way to proceed is to apply the principles as set out by Kitchin J in *Eli Lilly v Human Genome Sciences*. First, I must identify the invention by reading and construing the claims. The claim, as amended on 18 July 2025, defines the invention as requiring an electric motor which rotates a drive shaft that is connected to the inner race of a bearing. The claim further requires the stator of the electric motor and the outer race of the bearing to be connected to the structure of a helicopter in such a way as the torque reaction of the helicopter's main rotor is negated or reduced. This is my understanding of the invention which was confirmed by the applicant during the hearing.
- 21 Claim 1 is directed towards a device, i.e. a product, albeit it one that is defined in part by the function which the product is intended to carry out, i.e. negating or reducing the torque reaction of the helicopter's main rotor. Therefore, in deciding whether the invention has been disclosed clearly and completely enough for the invention to be performed by the person skilled in the art I must consider whether the skilled person can make or obtain the product based on a reading of the specification as a whole. In order to do this, I need to identify the skilled person and their common general knowledge before considering whether it would be possible for such a person to perform the invention without undue burden.

The skilled person & their common general knowledge

- 22 There was significant discussion regarding the skilled person, at the hearing, who they are and what they know as common general knowledge. The applicant identified the skilled person as a helicopter engineer or a helicopter design engineer, the type of person who would work for a helicopter manufacturing firm. Their common general knowledge would include knowing how to build a helicopter and they would be aware of the issue with torque reaction which results in the helicopter body counter-rotating as a result of the main rotor. The possibility of the skilled person being a skilled team which included someone capable of computer modelling the helicopter and the device was also mentioned.

23 In my view the person (or team of people) skilled in the art is an engineer involved in the manufacture of helicopters, i.e. a helicopter engineer. Although it was not covered explicitly in the hearing, it is important to remember that the skilled person, while being a fictional person analogous to the type of engineer working for a helicopter manufacturing firm, must necessarily lack the ability to *exercise any invention*. To my mind a “design engineer” is someone who seeks to produce something new, to improve on something existing as opposed to an engineer who would be fully competent in following a design and could perform minor modifications with what would be available to hand in their workshop. It is this skilled, but un-inventive, person who must be able to perform the invention based only on what is disclosed in the specification and their common general knowledge which they can use to supplement the information in the specification.

What is the person skilled taught by reading the specification?

24 Throughout the prosecution of the application and at the hearing, Mr Hall has pointed to the fact that the description is full of detail. Therefore, the person skilled in the art would be able to make the device as claimed.

25 The examiner has not argued that the device, i.e. the electric motor and bearing structure, is not described in detail. The objection raised is that claim 1 requires that the device be connected to the structure of a helicopter with the intent of negating/reducing the torque reaction of the main rotor but that there is no discussion in the application as to how the effect is to be achieved. This not only refers to the main question of *where* the device is mounted within the helicopter but also *how* it is constructed; its size and materials used. The specification as filed contains no reference to size or materials and the only reference to helicopters is the following sentence on page 1, 4th paragraph:

“The invention will also be of benefit to any system where counter rotation is a problem. Reducing or negating the torque reaction of a helicopters main rotor would be one example where an engine is used to rotate a drive shaft”.

26 In the absence of any detail in the specification, I asked the applicant during the hearing where he believed the device would be mounted. The applicant stated that, while he was not a person skilled in helicopter engineering, he considered that the device would likely be mounted within the helicopter body, somewhere near the axis of rotation of the main rotor drive shaft. He also made it clear that the skilled person would put the device in the best possible position, likely using a computer model. I agree with the applicant on his main point, it would seem that a device intended to negate a torque generated about an axis of rotation would likely be mounted proximal to and/or aligned with that axis of rotation.

27 As for size and materials, the applicant again referred directly to the skilled person’s common general knowledge and the use of computer models. The size would be the size necessary to function and the materials, the bearings especially, would be the type the skilled person would be able to purchase “off the shelf”. The specification is silent on these matters and gives no indication of what factors the person skilled in the art should take into account when selecting appropriate materials and sizes for the bearings.

Can the skilled person perform the invention across with whole scope of the claim without undue burden?

- 28 The question then is whether the skilled person, with only the information disclosed in the specification and their common general knowledge, would be able to construct and mount the device *without undue burden*. The applicant referred me to paragraph 14.85 of the Manual of Patent Practice where it states that the specification does not need to disclose all the details of the operation to be carried out to perform the invention since an enabling disclosure is to be interpreted by the skilled person, in light of common general knowledge, who is reasonably expected to carry out tests. I agree with this statement. However, following the judgement in *Eli Lilly v Human Genome Sciences* I must also consider that the specification must be sufficient to allow the invention to be performed without undue burden. In this I must be sensitive to the nature of the invention, the abilities of the skilled person (or team) and the art in which the invention has been made at the time of filing.
- 29 As I noted previously, the applicant commented that the skilled person would likely not just assign a location for the device but would consult a computer model to determine the optimal location. This is an attractive thought, that computer modelling is now so ingrained in our technical landscape that anything could be readily modelled. This line of thinking has deep implications about what would be considered “undue burden” as tedious trial and error could be avoided. However, I believe the line of thinking “it can be modelled” is too simplistic. In my view, there can be no computer model in existence which can, at the touch of a button, generate a digital representation of the device, fully programmed in size, shape, materials and function, to be added to a digital representation of a helicopter in order to model how the device and helicopter would operate in action. Therefore, the computer model must be built and while I do not doubt that a skilled team including a computer programmer would be able to create a computer model, they must be able to fully construct the digital representation of the device. If the skilled person is unable to describe the disposition of the device outside of the computer without applying inventive thought, they are unable to do so within the computer.
- 30 So, the question comes back to can the skilled person, the helicopter engineer, construct and mount the device within a helicopter using only the specification and their common general knowledge without undue burden? I do not believe they can.
- 31 The claimed device is intended to negate or reduce the torque reaction, this negation or reduction has to be construed as more than a negligible or trivial proportion of the torque. The applicant himself stated that the device is intended to remove the need for the tail rotor of a helicopter, although this isn’t mentioned in the specification.
- 32 The device must be sized, at least, to have enough mass to allow it to sufficiently offset the torque reaction in the helicopter rotor blades using the angular momentum of the device alone. Without going into a calculation of the angular momentum of a helicopter, it appears to me that for the device to negate a significant amount of the torque reaction, the device itself must have significant size and weight. It must be capable of generating greater angular momentum than the helicopter itself as the bearings do not transfer the angular momentum perfectly but rather impart small amounts through friction. The bearings themselves also need to survive the operation of the device long enough for safe flight. This is not trivial as the bearings

will heat up or lock and slide, irreparably destroying them if the friction gets too high. These are all significant issues which the skilled person needs to overcome without any direction from the specification on how this can be achieved. Indeed, the specification does not even inform the skilled person that these issues exist. The specification leaves the actual dimensions and materials entirely open with no hint as to what materials would even have the necessary strength to make the operating device structurally sound while also being light enough that the helicopter could still fly, assuming both of these requirements can be met at the same time.

- 33 In my view, the additional information the person (or team) skilled in the art would have to add to fill in the gaps in the disclosure of the specification as filed goes beyond what could be considered as common general knowledge. To supplement the information disclosed, the skilled person would, on the balance of probabilities, have to carry out extensive experimentation, in the real world or by computer simulation, and exercise some inventive thought in order to put the claimed invention in to practice.
- 34 As an aside, I also want to address the point that the applicant raised regarding the existence of tail rotors, as this is discussed with regards to novelty, below. The applicant stated that the claimed invention removes the need for a tail rotor because the device itself provides the same function as the tail rotor. This adds an extra complexity for the skilled person/team when we consider sufficiency. The specification makes no mention of tail rotors or other existing approaches to addressing the torque reaction. There is nothing to tell the skilled person that their starting point for deciding where to mount the device is a tailless helicopter. The skilled person/team not only have to decide where to mount the device but they have to construct an entirely new type of helicopter in the process without being told to do so.
- 35 Consequently, I find that the application is insufficient as required by section 14(3) of the Act.
- 36 Although I have found the application insufficient, I will briefly consider the other points raised in the pre-hearing report for completeness.

Novelty

- 37 The examiner has also objected to claim 1 on the grounds that it is not novel. The requirement for novelty is set out in section 1(1)(a) of the Act which states:

A patent may be granted only for an invention in respect of which the following conditions are satisfied, that is to say -

(a) the invention is new; ...

Section 2(1) goes on to further state:

An invention shall be taken to be new if it does not form part of the state of the art.

And section 2(2) defines the state of the art as follows:

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.

38 The examiner has raised two pieces of prior art which he believes to anticipate claim 1. The applicant, at hearing, highlighted that both examples show standard types of helicopters which use tail rotors (or fans) to provide a horizontal thrust opposite to the torque reaction in order to negate the torque. The applicant argued that his invention does not require fans, and the bearings used in the claimed invention are not “support bearings” as they are in the citations.

39 It appears to me that CN 108750102 A is the better of the two citations. In order to destroy novelty, the citation only needs to disclose the features as set out by the claim as construed by the specification as a whole. To my mind, the structure of CN 108750102 A, with reference to figure 2, provides the following:

A device where an electric motor (drive motors 31, 32 & 33) is used to rotate a drive shaft (tail rotor 34) and connecting the drive shaft 34 to the inner race of a bearing 21 (this is implicit), the stator of the electric motor and the outer race of the bearing being connected to the structure of a helicopter 10 with the intent of negating or reducing the torque reaction of the main rotor.

40 Although there is no mention of the “races”, the bearings 21 & 22 must contact a designated strip on both the rotor and the casing of the motor, which would be considered races. The device generates a side-ways thrust through the rotation of a fan 51 which is intended to negate or reduce the torque reaction from the main rotor. While the applicant argued at the hearing that the present invention does not need the fan, this isn’t reflected in either the claim or the specification as a whole. Claim 1 is a functional claim which includes a minimum list of features necessary provide a particular function. Claim 1 is still considered to be anticipated if a citation discloses all of those features or shows them to be implicit and performs the claimed function. Even if more features are required in the citation to perform the function, it is still considered anticipated unless the claim itself states that such features (i.e. a tail rotor) must not be present. As such, there is nothing in the claim to differentiate from the device of CN 108750102 A from claim 1 and the claim therefore lacks novelty.

41 Similarly, the other piece of cited prior art, US 2020/298970, also shows an arrangement which in my view anticipates claim 1 as amended. With reference to figure 2, the system of US 2020/29870 has an electric motor (122) which is used to rotate a drive shaft (118). Bearings (120) are shown supporting the drive shaft. The electric motor would implicitly comprise a rotor associated with the drive shaft and a stator associated with the electric motor housing. An outer race of the bearings is connected to the tail boom of the helicopter and the electric motor would be mounted to a structural frame of the helicopter on to which the tail boom is mounted. The arrangement is intended to counteract the torque rotation of the helicopter. Therefore, although it does not operate in the same way as alleged in the application

before me, the system disclosed by US 2020/298970 does anticipate the features of claim 1.

Clarity

- 42 The examiner highlighted that the claim as amended sets out a series of features and a function they perform without clearly setting out how they are arranged in order to perform the function. His objection was that the invention was defined by a result that is to be achieved and that it was not clear how the components in the claim would achieve the desired result, i.e. a reduced torque reaction of the main rotor. The applicant argued that it is clear, in light of the description, how the torque reaction of the main rotor is negated or reduced. This point is moot as I have found the specification lacks the essential detail necessary to allow a skilled person to create the device capable of performing the function.

Other matters

- 43 I should note that I have considered the sufficiency of the application based on the assumption that the device would work in the way the applicant has described. As it was not put to me in the pre-hearing report, I have not considered the industrial applicability of the invention and whether the device would operate as the applicant describes. However, I would say that I think it is unlikely a system which uses the angular momentum of an electric motor's rotor to cause its stator to rotate in the same direction would operate in a manner in accordance with the physical principle of conservation of momentum.

Conclusion

- 44 I find the specification of the application does not sufficiently disclose the invention as set out in the claim. Therefore, the application does not comply with Section 14(3) of the Patents Act 1977. I also find that claim 1 as amended also lacks novelty as required by Section 2(1) of the Patents Act 1977.
- 45 Having reviewed the application, I do not consider that any saving amendments are possible. I therefore refuse the application under Section 18(3).

Appeal

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

Dr Laura Starrs

Patent Examination Group Head