Intellectual Property Office

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08 April 2024

PATENTS ACT 1977

APPLICANT	A&I Power Group Inc
ISSUE	Whether patent application GB2111007.7 complies with section 1(1)(c) of the Patents Act 1977
HEARING OFFICER	B Micklewright

DECISION

Introduction

1 Patent application GB2111007.7 is the national phase application of Patent Cooperation Treaty (PCT) application PCT/IB2020/050004, filed on 2 January 2020 with a declared priority date of 3 January 2019. It was published under the PCT on 9 July 2020 as WO 2020/141467 A1. The national phase application was published as GB 2594667 A on 3 November 2021.

2 The examiner has maintained that the claimed invention lacks industrial application because it operates contrary to the law of conservation of energy. The applicant disagrees and, following several rounds of correspondence, requested a hearing. The matter therefore came before me at a video hearing held on 15 December 2023. The applicant was represented by Mr Rami Filfil of Canadian firm Filfil IP and Ms Kathryn Sayer of Kilburn Strode.

3 In response to my invitation at the hearing, the applicant filed further submissions on 8 January 2024 for which I am grateful. I confirm I have taken these (and all the arguments put forward in the correspondence) into account in reaching my decision.

4 The examiner has deferred full consideration of novelty, inventive step and clarity. Therefore, if I find in the applicant's favour on the matter of industrial application then the application will be remitted back to the examiner to complete the examination.

The application

5 The invention is described as a power generation system using induction.

6 Production of electricity in power plants typically uses a fuel source (such as coal or natural gas) to boil water in order to drive a steam turbine which is used to spin a shaft connected to a rotor of a generator. The rotor comprises an electromagnet (or permanent magnet) and is surrounded by a stator comprising coils of wire. Rotation of the rotor causes the magnetic field lines of the magnet to cross through the wire of the

coils in the stator and induce an electric current in the wire according to Faraday's law of induction.

7 Faraday's law shows that if the magnetic flux through a surface bounded by a wire changes, an electromotive force (emf) equal in magnitude to the rate of change of the flux is induced in the wire. As discussed on page 10 of the application, this is represented by the following equation:

$$\varepsilon = -\frac{d\Phi_B}{dt}$$

where ε is the emf, Φ_B is the magnetic flux, and d/dt denotes rate of change over time. Where an external circuit is connected to the wires this emf drives a current.

8 The magnetic flux through a flat surface area S in a uniform magnetic field B is given by the following equation:

$$\Phi_B = BScos\theta$$

where θ is the angle between the magnetic field line and the normal to the surface.

9 These equations show that the flux can be changed by increasing or decreasing B, by increasing or decreasing S, or by changing the angle θ. In each case an emf will be induced in a wire enclosing the surface that is equal in magnitude to the rate of change of the magnetic flux through the surface.

10 In the case of the typical power plant discussed above, the emf (and therefore current) is induced by the rotation of the magnet causing a change in the angle θ.

11 The concept of the present invention is that instead of rotating the rotor in order to change the angle θ, the flux is changed simply by increasing and decreasing the strength of the magnetic field B. This is achieved by modifying a rate of change of an electric current supplied to the electromagnet from a power supply. According to paragraph [0045], the need to rotate the rotor is therefore eliminated. The same emf will be induced in the stator without having to physically move the rotors. The need for a shaft and turbine is therefore eliminated, and without all these components the energy loss due to friction, heat, torque, etc. will be eliminated. According to the application, without such energy loss the efficiency of the induction generator is increased.

12 There are three independent claims. An amendment, in the form of a first auxiliary request, was submitted with the further submissions of 8 January 2024 to be considered in the event that the claims on file (the main request) are found to be unallowable. The amendment amounts to a single word being added to claim 1, shown underlined in the reproduction of the claims below.

1. An induction power generating system comprising:

at least one stationary electromagnet receiving an excitation voltage from a power supply; the at least one stationary electromagnet having a north pole, a south pole and a magnetic field;

at least one stationary coil positioned inside the magnetic field of the at least one stationary electromagnet and intersected by magnetic field lines of the magnetic field;

wherein the power supply is configured for modifying a rate of change of an electrical current supplied from the power supply to only the at least one stationary electromagnet, such that when the at least one stationary electromagnet is excited by the power supply, an electromotive force (EMF) is induced in the at least one stationary coil.

15. A method for generating electricity using magnetic induction, the method comprising:

powering a stationary electromagnet using a power supply;

modifying a rate of change of an electrical current supplied from the power supply to the stationary electromagnet; and

inducing an electrical current on at least one stationary coil positioned inside a magnetic field of the stationary electromagnet and intersected by magnetic field lines of the magnetic field, the induction occurring when the at least one stationary electromagnet is excited by the power supply.

16. A method of modifying a traditional induction generator to increase output efficiency, the method comprising:

fixing a rotor and an electromagnet therein of the traditional induction generator stationary in relation to a stator of the traditional induction generator;

disabling any rotational movement of the rotor and removing any system component contributing to such movement; and

applying a modulated current to the electromagnet on the stationary rotor to generate a rapid rate of change in the modulated electrical current supplied to the electromagnet, and

inducing an Electromotive force (EMF) and a current on winding of the stator due to the rapid rate of change of the modulated electrical current.

The law

13 Section 1(1) of the Patents Act 1977 (“the Act”) states:

A patent may be granted only for an invention in respect of which the following conditions are satisfied, that is to say -
…
(c) it is capable of industrial application;
…
and references in this Act to a patentable invention shall be construed accordingly.

14 Section 4(1) of the Act states:

> *An invention shall be taken to be capable of industrial application if it can be made or used in any kind of industry, including agriculture.*

15 Processes or articles alleged to operate in a manner which is clearly contrary to well-established physical laws are regarded as not having industrial application, as is set out in paragraph 4.05 of the Manual of Patent Practice.[1]

Arguments and analysis

16 Claim 1 is directed to a power generating system, claim 15 is directed to a method of generating electricity and claim 16 is directed to modifying a traditional induction generator. All the claims are therefore directed to electrical power generation.

17 The examiner has objected to lack of industrial application on the grounds that for the claimed system to be considered a power *generator* there must be more electricity output from the system than is input. This is contrary to the law of conservation of energy so it is not physically possible and thus it must lack industrial application. The issues to be considered therefore relate to what is meant by a "power generating system" in the context of the invention and whether the system contravenes the law of conservation of energy.

18 Mr Filfil explained that the invention is referred to as a power generator because it transforms one form of energy into another more useful form of energy. The invention replaces the mechanical energy of the prior art generator with an electrical component. The reason why the applicant calls it a power generator is because it is converting magnetic potential energy to electricity. A point emphasised by the applicant in the correspondence on file is that a traditional generator does not actually convert mechanical energy to electrical energy but rather converts magnetic energy into electrical energy. As the present invention also converts magnetic energy into electrical energy it must be considered a power generator.

19 Mr Filfil further asserted that the only requirements for an induction generator are a magnetic field and a change in flux of the magnetic field. Mr Filfil argued that because this is achieved in the present invention, it must be considered an induction power generator.

20 I am not convinced by these arguments. A transformer converts magnetic energy to electricity and also involves a change in flux of a magnetic field to induce a current and therefore meets these suggested definitions, but it is undeniably not considered a power generator. As the examiner states, the typically accepted definition of an electrical generator requires the conversion of a non-electrical source of energy, such as mechanical, into electrical energy. As the applicant puts it themselves in their letter of 10 July 2023, electricity generation is typically defined as the process of generating electric power from sources of primary energy. The present invention clearly does not meet this definition because both the input and the output are electrical energy. However, the examiner argues that the skilled person would understand from the

[1] The Manual of Patent Practice is available at https://www.gov.uk/guidance/manual-of-patent-practice-mopp

description that the intended meaning of power generation in this context is that the system generates more electrical output than is input. I agree that this is how the skilled person would construe the invention defined by the claims.

21 The examiner observed that the features of the claimed system may amount to a power converter or transformer, but did not believe there was support to treat it as such given the clear indication in the specification that the invention is intended to be a generator. When I put this to Mr Filfil at the hearing, he was in agreement that the invention cannot be construed as a transformer and this was confirmed in his further submissions. This is consistent with the agent's letters on file, which clearly assert the invention is not a transformer.

22 Having understood the invention to be directed to a power generator in the sense of producing more electrical output than is input, the issue to be addressed is whether the system satisfies the law of conservation of energy. This law states that the total energy of an isolated system remains constant, meaning that energy can neither be created nor destroyed but may be converted from one form to another.

23 At the hearing, I asked Mr Filfil what would happen if the output of the system was connected to the input. Mr Filfil said that if all the energy harvested goes back into the system, then it will overcome the resistance in the wires and it will run perpetually, but there would be no point in this because the whole point is to generate electricity for use.

24 I note that later in the hearing Mr Filfil came back to this point and said that the system is *not* contemplated as a perpetual motion machine and *cannot* work as such without external power feeding into it to maintain the change in magnetic flux. When I asked for clarification of whether the system was generating more electrical power than was being put in, Mr Filfil stated that there was more electrical power being produced than was being put into the electromagnets.

25 In their letter of 1 November 2023, the applicant argues that the output of the invention will always be less than the actual input of the system because not all the input energy is harvested and converted to electrical output, and therefore the application clearly shows that the law of conservation of energy is not violated. The applicant states that the electrical input to the system is not the total input energy. It is not entirely clear in the applicant's letter what the other input energy is or where it comes from. However, in Appendix A, provided with the agent's letter, it is suggested that the additional input energy is the inductance energy in the input coils acting as an oscillating circuit at resonant frequency.

26 Additionally, in their letter of 20 February 2023, the applicant argues that the law of conservation of energy is obeyed if the energy from unpaired electrons in the highly conductive stator coil was taken into account. However, I note this line of argument was not advanced by the applicant in any of their further correspondence or in the hearing.

27 The arguments and explanation put forward at the hearing are somewhat confusing and contradictory. On the one hand the system produces more power than is input such that it can power itself perpetually, but on the other hand it requires external power to maintain its operation, though the electrical output is still greater than the

electrical input. As far as I understand it from the correspondence on file, the applicant believes there is more electrical power being produced than is being input but this is because there is actually some extra input energy arising from the inductance at the input coils that traditional measurement techniques do not account for. Once this extra energy is correctly measured it accounts for the apparent increase in power at the output.

28 I am not at all convinced by this explanation. It is clear that the applicant believes that the electrical output is greater than the electrical input, which is why it has been described and claimed as a power generator. The arguments put forward as to why this does not violate the law of conservation of energy are not persuasive. The only input to the system is the electrical power provided to the electromagnet. It is a fundamental principle of physics that it is impossible for the electrical output to be greater than this input. Consequently, I conclude that the described invention violates well-established physical laws and so is not capable of industrial application under section 1(1)(c) of the Act.

Conclusion

29 I have found that the invention as described does not comply with section 1(1)(c) of the Act. I have considered the specification in its entirety and have been unable to identify any allowable amendment that would overcome this issue. The difference between the claims of the main request and the claims of the first auxiliary request has no material effect on the decision. I therefore refuse the application under section 18(3) of the Act.

Appeal

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

B Micklewright

Deputy Director, acting for the Comptroller