



PATENTS ACT 1977

APPLICANT BlackLight Power Inc

ISSUE Whether patent applications numbers
GB0521120.6 and GB0608130.1 comply
with sections 1(1)(c) and 14(3).

HEARING OFFICER P Marchant

DECISION

Introduction

- 1 Patent applications GB0521120.6 and GB0608130.1 were filed in the name of BlackLight Power Inc. They relate respectively to a plasma reactor and a laser, each of which relies for its operation on what is described as a “new hydrogen species”. The new hydrogen species involves the electron in the hydrogen atom existing in a lower energy state than the lowest possible energy state recognised in standard physics.
- 2 The examiners in the two applications objected that the new hydrogen species proposed by BlackLight was unknown to science, that the invention was consequently contrary to generally accepted physical law and was therefore not capable of industrial application, as is required by section 1(1)(c) of the Patents Act. They also objected that since the claimed inventions rely for their operation on a material that current science would hold it is not possible to produce, the specification does not comply with the requirement of section 14(3) of the Act that: “the specification ... 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.”
- 3 Following a hearing in the Intellectual Property Office to consider the allowability of the applications, I upheld the examiners’ view and refused the grant of patents based on them¹. That result was reviewed in an appeal before Mr Justice Floyd. In his judgment (*Blacklight Power Inc. v The Comptroller-General of Patents* [2008] EWCH 2763 (Pat)) the learned judge remitted the cases to the Intellectual Property Office for consideration of the question: “Whether there is a reasonable

¹ See Office Decision O/114/08

prospect that on a full investigation with the benefit of expert evidence GUTCQM² will turn out to be a valid theory.” See paragraph 52 of the judgment. I understand that counsel raised with Mr Justice Floyd whether expert evidence should be sought and he confirmed that he did not expect the Office actually to commission expert evidence on the matter but to make the assessment on the basis of the information already before it.

- 4 The background to the remittal set out in the judgment is as follows. The judgment found (paragraph 13) that the correct approach to the question of patentability in this case was to consider whether the GUTCQM theory was true. In the original decision, I had attempted to do that on the basis of a number of criteria that I had proposed for assessing the validity of scientific theories, and against the standard of confidence that if I were to allow the applications to proceed, it should be more probable than not that the theory were valid. Mr Justice Floyd found that this approach was correct as far as it went. He said in paragraph 34 that: “It is not the law that any doubt, however small, on an issue of fact would force the Comptroller to allow the application to proceed to grant. Rather he should examine the material before him and attempt to come to a conclusion on the balance of probabilities...” However he considered that this did not go far enough where there was substantial doubt. He continued in paragraph 34: “... If [the Comptroller] considers that there is a substantial doubt about an issue of fact which could lead to patentability at that stage, he should consider whether there is a reasonable prospect that matters will turn out differently if the matter is fully investigated at a trial. If so he should allow the application to proceed.”
- 5 Paragraphs 30 to 33 of the judgment discuss what is meant by “substantial doubt” in this context. The terms of the remittal make clear that the court has already taken the view that there is substantial doubt in the present case about the validity of the GUTCQM theory so I do not need to consider that preliminary point but can proceed directly to consider the “reasonable prospect” question.

How should the “reasonable prospect” assessment be made?

- 6 Is there then a reasonable prospect that on a full investigation with the benefit of expert evidence that GUTCQM would turn out to be a valid theory? The approach I took to deciding whether the theory was valid in the original decision was set out in its paragraph 22. The criteria I adopted were firstly that a valid scientific theory should provide an explanation of physical phenomena which is either consistent with or better than existing generally accepted theories; secondly that experimental evidence should match the predictions of the new theory and should show rival theories to be false; and thirdly that the theory should be accepted as a valid explanation of physical phenomena by the community of scientists working in the relevant discipline.
- 7 In addressing this I took into account all the information and knowledge that was

² Floyd J in his judgment in the appeal adopted the acronym “GUTCQM” to refer to the theory of matter underlying the existence of the new hydrogen species.

at my disposal in what I considered to be the most appropriate manner, in order to determine the question I had set for myself. I was unable to make a definitive assessment of the first and second criteria because I do not possess the high level of expertise that would have been necessary to do so. However, I formed the view, largely on the basis of the third criterion, that GUTCQM was not a valid theory. I do not have any further knowledge or information to bring to the question posed by the learned judge so it will be necessary for me to address it rather by considering what different approach and criteria might come into play in a full investigation and how they might be assessed. I imagine that such an investigation would in fact look into very similar questions to the ones that I did because it (still) seems to me that they are the basic criteria that a valid scientific theory must fulfill. Although I do not have direct evidence from experts in the field, I expect for the same reason that they too would try to make an assessment on the basis of very similar criteria.

- 8 I think I have said all I can in my original decision about the first two factors and I consider that there is nothing further that I would be able to extract in considering how a full investigation might view them. I do not think that in referring to analysis of “the voluminous material placed before the Hearing officer” (in paragraph 49 of his judgment) that the learned judge was suggesting that I might be able to make any further assessment of it than I already have. The material was helpful in coming to a provisional view about experimental verification for the theory but it is not a practical proposition for me to make a considered assessment of the credibility of the body of material without for example personal experience of the experiments carried out, access to the researchers concerned and access to independent expert opinion. For the avoidance of doubt therefor I confirm that I am not in a position to make any more detailed assessment of this material than I already have in the original decision.
- 9 It also occurs to me to consider whether it would be worth taking into account the other possible criteria that I suggested in the original decision might be relevant in determining validity, viz. “that a successful theory should also be intellectually satisfying and economical in its explanation”. While they are criteria that might well be considered by an expert in the field, I have the impression that they are not always necessarily true of all theories and that they are likely to be somewhat more subjective than the other criteria. Consequently I feel that such an assessment is unlikely to help determine the matter and I will disregard these criteria as before.
- 10 Consequently, in determining the “reasonable prospect” question I therefore find once again that the most important factor must be what evidence there is of acceptance of GUTCQM as a valid theory by the relevant scientific community. I do in fact think that this provides very good indirect evidence as to the expert view of the theory because of the way scientific endeavour operates, as I shall explain below. As a result of all these considerations, I will therefore rely entirely on the acceptance of the theory by the scientific community in making the present determination.

How is GUTCQM viewed by the scientific community?

- 11 The field with which GUTCQM is concerned is the understanding of the nature of space and time and the fundamental particles and forces at the deepest level of physics. GUTCQM is particularly concerned with a quasi quantum explanation of atomic phenomena but, as discussed in my original decision, if the whole theory were true it would create a seismic upheaval in just about every aspect of fundamental physics as it is understood today. The field as a whole is an intensely busy research area involving thousands of physicists working in hundreds of universities and carrying out very largest and sophisticated experiments. Billions of dollars are spent on it each year. It is the field in which the Large Hadron Collider has been developed by CERN over a period of 20 years, in the hope of providing greater insight into these questions. Figures from CERN's 2007 Annual Report indicate a spend of about 1bn Swiss francs in the year 2007. The size of the directly employed team of scientists is around 1000, and there is collaboration with 9000 other scientists from 600 organisations in 60 different countries. There is huge investment and activity in the field.
- 12 Great efforts have been made over the last 100 years to understand at a more fundamental level what the implications are of quantum theory, and how quantum theory and general relativity might be subsumed in, or replaced by, a single overarching explanation of the world. In the current era, the work on string theory and other rival theories such as loop quantum gravity and modified Newtonian dynamics, which are concerned with these questions, are occupying the time and effort of thousands of physicists.
- 13 It is possible for the lay person to follow these developments in the popular science press and in books written by experts in the field. There is a large amount of such material available year by year. I have recently read "The Trouble with Physics" by Lee Smolin – Penguin; ISBN 978-0-141-01835-5. I mention this book because it includes an extensive tour d'horizon of the current state of play at the leading edge of research in the field. Another worth mentioning for similar reasons is "The Road to Reality; a complete guide to the laws of the universe" by Roger Penrose – Vintage Books. ISBN 978-0-099-44068-0. I take the subtitle to be somewhat tongue in cheek, given his view that our present understanding is far from complete, but it indicates the intention to provide comprehensive coverage of fundamental physics as it is currently understood.
- 14 One would expect any serious contender for a theory which would replace quantum theory and cause a wholesale reassessment of the foundations of fundamental physics to be discussed in these books. GUTCQM is not mentioned in either of them. GUTCQM has apparently been in the public domain since the early 1990s. It is quite clear that in that time it has made no impression on the scientific community and has created no place for itself in this scheme of activity. I would regard myself as a well informed lay person taking an interest in these matters over that time and I have seen no reference to the theory in any such book or in the popular science press. Furthermore, when I invited BlackLight before the original hearing to provide any substantiating information to help me with assessing the acceptance of the theory by the scientific community, they did

not refer me to any material which would indicate such acceptance.

- 15 Considering the means by which new theories make their way towards general acceptance, this seems to happen in one of two ways. Some theories, once expounded, provide immediate clarification of inconsistencies that have beset the field for a number of years and rapidly become accepted as a new and valid explanation of nature. They usually involve some new unifying principle which explains a number of outstanding problems at a stroke and provides both a new understanding of physical phenomena and startling new insights. Maxwell's explanation of electrodynamic phenomena, and Einstein's theories of special and general relativity were such developments. We can be sure that if GUTCQM had provided such a startling unifying principle, it would very quickly have been recognised as such and incorporated into the general view of nature.
- 16 The second route to acceptance is one that requires lengthy development over many years. It typically involves large numbers of researchers and institutions collaborating from time to time on some aspects of the theory and with rival approaches to other aspects. The whole body makes incremental advances by means of successive generations of experiment giving rise to further theoretical developments, and ideas and results are gradually pieced together until a coherent explanation emerges after many years of work. Quantum mechanics was an example of this kind of development and if string theory turns out to be correct, it will be another.
- 17 If GUTCQM is thought to be such a theory, I would observe that there appears to be no substantial body of work from any other practitioners than BlackLight. Since it has not been taken up at any point over the almost 20 years it has been in the public domain, it seems unlikely that the community would at some point in the future suddenly decide it was a topic that should be worked on. If it ever did come to be worked on to any extent, it would seem improbable that results even as tenuous as those currently claimed for string theory and rival quantum gravity theories would be arrived at in any short number of years. String theory has been worked on intensively since 1984 (according to Lee Smolin in the book I refer to above) and it has not yet received acceptance as a valid theory. It seems exceedingly unlikely that GUTCQM could, within the lifetime of a patent, be launched from nowhere into the sort of program of work which would generate convincing proofs of its theses and move on from there to general acceptance by the community. Such a scenario does not appear to be credible.
- 18 So how does the question of GUTCQM's reasonable prospect of being shown to be valid fare in this scheme of things? If an applicant for a patent put forward an invention based on one of the current candidate theories for the fundamental nature of space time, such as string theory, or loop quantum gravity, etc, the question whether the theory had a reasonable prospect of turning out to be valid would raise real issues. It would by no means be guaranteed that the answer in any of those cases would be in the affirmative. Those are well recognised and intensively researched ideas familiar to thousands of physicists. GUTCQM is not even a candidate theory in those terms. It is not a theory that has received any acknowledgement let alone critical assessment by the scientific community at large. Assessing it on the basis of the observations I have made above

concerning the two different routes to acceptance of theories, it has neither demonstrated that it provides an underlying principle nor is it a theory that is receiving attention and work by researchers in the scientific community. If I may refer to a consideration of the landscape of rival theories from the Roger Penrose book referred to above; on page 1017 he mentions a survey of scientific articles which lists eight different theoretical bases for research in the field of quantum gravity, the most popular theory in that survey attracting 69 articles in a month and the two least popular just one article each. This was in 1997 but I don't think the picture would be very different now. GUTCQM is not one of the eight; it does not attract one single article. It simply is not within the consideration of serious scientists in the field. It does not in my view get off the starting blocks for inclusion among the group of such theories which might eventually turn out to be valid.

Conclusion

- 19 My view on the present question is therefore that a full investigation as proposed by the learned judge would come to the conclusion that GUTCQM does not have a reasonable prospect of turning out to be a valid theory. I say that very much on the basis of the reaction of the scientific community to the theory, but I consider that reaction to be a robust and convincing indicator of the prospects for the theory's acceptance.
- 20 That finding disposes of the sole outstanding question in relation to the present patent applications. As a result I find that they do not comply with the requirements for patentability in sections 1(1)(c) and 14(3) of the Act, and I consequently refuse both applications under section 18(3) of the Act.

Appeal

- 21 Under the Practice Direction to Part 52 of the Civil Procedure Rules, any appeal must be lodged within 28 days.

P MARCHANT

Deputy Director acting for the Comptroller