

0/125/92

PATENTS ACT 1977**IN THE MATTER OF PATENT APPLICATION No. 8721617.2
IN THE NAME OF GRAHAM ALLAN STEVENS****STATEMENT OF REASONS FOR SECOND INTERIM DECISION**

Application No. 8721617.2 was filed on 15th September 1987. It relates to a means of extracting water from the atmosphere by condensation and aims to provide means of providing the conditions necessary for condensation of water in quantities useful for growing plants or for human consumption in regions of the world where there is a shortage of water; for example deserts, savanna, or regions of intermittent rainfall. The aim is to use enhanced cooling effects for condensing water by lowering the temperature of a cooling surface below the dew point and collecting the condensation which forms.

In the first report under Section 18(3) the Examiner objected *inter alia* that the alleged invention was not new and that claim 1 was obscure in scope and did not clearly relate to a patentable invention. Further discussions between the Examiner and Mr Stevens, who was prosecuting the application himself, failed to resolve the issues and the matter first came before me at a hearing on 11th March 1992.

At that Hearing I gave an oral interim decision upholding the Examiner's objections and refusing to allow the application to progress to grant on the grounds that it did not meet the requirements of Section 14(5) (a) and (b) in that the claims did not define the matter for which the applicant seeks protection and were not clear and concise, that the alleged invention was not new and did not involve an inventive step as required by Sections 1(1) (a) and (b), and that the claim before me was not a claim to a patentable invention within the meaning of Section 1(2)(a). I gave the applicant an opportunity to amend to overcome this finding but I expressed the opinion that it is unlikely that an acceptable claim could be drafted which is broader in scope than the specific embodiment described on page 3 of the application as filed and illustrated in Fig 1 of the drawings. I indicated that such amendments should be submitted within the period prescribed by Section 20(2) for appealing that decision, which, being a substantive issue, was six

weeks from the date of the oral decision, namely 11th March 1992. I stated that if no satisfactory amendment is submitted in that period, I shall refuse to allow the application to proceed.

The reasons for that decision are set out in the Statement of Reasons for Interim Decision dated 31 March 1992.

Subsequent to that Hearing, Mr Stevens dictated by telephone on 13 March 1992, an amended claim 1, to which the Examiner objected that it suffered from many of the defects of earlier claims, namely it is excessively broad in its definition of materials which in any case appear conventional and are already well known in the art. Further discussions between the Examiner and Mr Stevens failed to resolve the issues and the matter came before me at a further hearing on 10th April 1992. Mr Stevens appeared in person and Mr N J Miles was present as the Examiner in the case.

Before dealing with the matters in dispute, I will refer to Mr Steven's complaint that the nature of the objections to his application were not made clear to him until close to the end of the period for putting the application in order. The first report under Section 18(3) was issued on 31 January 1991. In that report, the examiner objected *inter alia* that the invention claimed was not new having regard to the matter contained in certain cited documents and warned that further search may be necessary when amendments were effected to avoid this objection. Further, objection was raised to claim 1 that it did not clearly define the invention and was not sufficiently distinguished from the prior art. In addition it was objected that those claims which disclose natural surfaces such as shallow ponds and radiating rock piles as condensing surfaces did not constitute an invention within the meaning of Section 1(2). A reply to this official action was due on 31 July 1991 but no written reply was received. It was however agreed that Mr Steven's telephone discussion with the examiner would be treated as an acceptable response. During that telephone conversation the objections to the application were discussed and a further period for reply of four months was specified (ie by 26 November 1991). A written response was submitted by fax on 26 November 1991. This response consisted of an amended claim 1 to which the examiner objected in an Official Letter dated 5 December 1991 that the amended claim still failed to avoid anticipation by previously cited documents and the period for reply was set at 7 weeks (ie by 23 January 1992).

Mr Stevens telephoned the examiner on 22 January 1992 to discuss amendments and was reminded that the period for reply was due to expire the next day. At his request, Mr Stevens was granted a further week in which to reply and an amended application was filed on 29 January. The examiner again objected that the invention claimed in claim 1 was not distinguished from the prior art and the definition of the "optically selective materials" which now appeared to characterise the invention was not clear. Further discussions between the Examiner and Mr Stevens, including an interview, failed to resolve the issues and as stated above the matter came before me at a hearing on 10th April 1992 where I refused to allow the application to proceed.

Accordingly I am satisfied that the Office has consistently maintained the objections that the alleged invention is not sufficiently distinguished from the prior art and that it is not clearly defined. It is these objections which are still before me at this hearing.

Coming now to the examiners objections, the following documents were cited in the first report under Section 18(3) in support of an objection under Section 1(1)(a):-

GB A 2,178,670 (Roger Harrington)	-	Page 1, lines 31 to 65
GB 958,698 (Kyrle William Willons)	-	Page 1, lines 79 to 86

In addition, the following document was submitted by the applicant prior to the first Hearing as being illustrative of the prior art:-

RADIATIVE COOLING TO LOW TEMPERATURES WITH SELECTIVELY EMITTING SURFACES, Granqvist et al, published 1981.

During the first Hearing, my attention was drawn to GB 1,577,720 in the name of the present applicant, particularly page 3, lines 80 to 85 and 96 to 102.

GB 2,178,670 describes a dehumidification apparatus in which water is condensed from moist air by cooling the air by passing the air over heat exchange surfaces which may be made from metal, plastics or glass.

GB 958,698 relates to condensing vapours from gases by passing a relatively cool gas through a chamber containing heat absorbent material until the temperature of the heat absorbent material is substantially equal to the temperature of the cool gas and then passing relatively warm, vapour laden gas through the chamber, whereby to condense vapour from the vapour laden gas. In a preferred embodiment, the chamber comprises tunnels cut in an earth or rock hillside and filled with blocks of stone or metal piled one upon another in rows extending across the chamber (page 1, lines 32 to 38). This type of condenser is said to be particularly adapted for use in tropical and sub-tropical regions where there is a considerable difference between day and night air temperatures (page 1, lines 79-83).

The amended claim submitted by telephone on 13 March 1992 reads as follows:-

A system for condensing atmospheric water consisting of a condensing space and or surface shielded from radiant, conductive and convective heat and cooled by a combination of passive and/or mechanically operated means, such as refrigeration providing radiative cooling and using materials in combination to radiate in the 4 to 35 micron waveband and accessible to ambient air so as to condense part of its moisture content as water.

At the start of the Hearing, Mr Stevens submitted for my consideration a further amended claim 1. I indicated to Mr Stevens that it would have been more appropriate to have submitted this claim for consideration by the examiner before requesting a Hearing so that any objections could have been formulated prior to the Hearing. However, in view of the very limited period remaining for putting the application in order, I agreed that this latest claim would be considered. This latest form of claim reads as follows:-

A system for condensing atmospheric water consisting of; a condensing space and/or surface cooled by radiating to space and/or refrigeration and shielded from the conduction, convection and radiation of heat from its surroundings, the condensing space and/or surface being so arranged as to be accessible to ambient air to condense part of its moisture content as water and shielded from and/or reflecting direct and diffuse solar radiation and thermal radiation from the atmosphere.

The claim as submitted included some suggested alternative wordings but it was agreed with Mr Stevens that the above represented the amended claim in its broadest form.

I put it to Mr Stevens that the first step must be to consider whether this form of claim satisfies the requirements of Section 14(5) in that it must (a) define the matter for which he seeks protection, (b) be clear and concise and (c) be supported by the description, and that in doing so it would be necessary to ascertain whether the amended claim introduces new matter contrary to the requirements of Section 76.

I asked Mr Stevens to explain what he considers to be the inventive concept embodied in his latest claim. As I understand his reply, the inventive concept lies in the use of a condensing surface which provides radiative cooling in conjunction with shielding that surface from conduction, convection and radiation of heat from its surroundings. In this respect I pointed out that the proposed claim is not limited to this concept in that the phrase "*cooled by radiating to space and/or refrigeration*" includes a system wherein radiative cooling does not occur. After some considerable discussion, Mr Stevens agreed with this interpretation. In order to clarify the scope of the claim it was considered in detail and the following observations were put to Mr Stevens:-

1. The phrase "*a condensing space and/or surface*" implies that there is some significant difference between a space and a surface in the present context. However, it would appear from the embodiments described and illustrated in the application as filed that condensation always occurs onto a surface. The surface may be shaped so as to enclose a space, but condensation still occurs on the surface.
2. With regard to the phrase "*cooled by radiating to space*", I put it to Mr Stevens that almost any surface may lose heat to the space it occupies by radiation. It is not clear from the claim that a specific form of cooling known as "radiative cooling" is required.
3. The phrase "*cooled by radiating to space and/or refrigeration*" makes it clear that cooling is essential but that this cooling may be achieved by radiative cooling or by refrigeration. This is at odds with Mr Stevens statement above regarding the inventive concept.

4. The requirement that the condensing surface is "*shielded from the conduction, convection and radiation of heat from its surroundings*" is not in agreement with the application as filed. On page 3 of the original application it is stated that "*there are many different design configurations in which the basic principals may be applied, some of these are illustrated in drawing 2, numbers 1-22.*" However, in some of these embodiments the surface is not shielded at all, eg. the dew pond (1) and the rock pile (2). In others there is shading from direct sunlight but no other shielding is apparent, eg. the wall shade (5), the moveable shade (6), the solar actuator (7) and the cooling wall (14).
5. The final passage which reads "*the condensing space and/or surface being shielded from and/or reflecting direct and diffuse solar radiation and thermal radiation from the atmosphere.*" appears to repeat the requirement discussed in 4. above, but is different in scope in that it allows an alternative to shielding the condensing surface from radiation of heat from its surroundings; namely that it may reflect such radiation.

With regard to point 1, Mr Stevens agreed that the condensing space is merely an embodiment of the condensing surface.

With regard to point 2, Mr Stevens stated that radiating to space refers to "outer space" ie. heat is lost by radiation directly to space rather than to the atmosphere. Mr Stevens further pointed out that this phenomenon is explained in his application as filed; "*the atmosphere absorbs radiation and acts as a radiator to earth and space in the Far Infra Red (FIR) wavelength; between approximately 4 and 35 microns, with an 'atmospheric window' between 8-13 microns in which the atmosphere is partially transparent to FIR radiation.*" Cooling by radiating to space occurs in this so called atmospheric window range. I put it to Mr Stevens, and he agreed, that cooling by radiation to space is a function of the materials used to provide the condensing surface and that such surfaces are those which reflect radiation outside the wavelength range 8-13 microns but absorb and emit within these limits as a black body.

With regard to point 3, as indicated above, Mr Stevens conceded that the claim was not limited to a system wherein the condensing surface is cooled by radiating to space.

With respect to point 4, Mr Stevens agreed that certain embodiments illustrated in the drawings do not fall within the scope of the amended claim, and with regard to point 5, Mr Stevens conceded that the two statements are inconsistent.

I further put it to Mr Stevens that the material of the condensing surface is an important feature of the alleged invention but that this material is not defined in the claim other than in terms of the result achieved, ie. that it is cooled by radiation to space. In this respect, as in the first hearing, I invited Mr Stevens to put himself in the position of someone reading his claim and having to decide what the limits of the monopoly are. He agreed that it would be difficult for a reader of the present claim to determine which materials he may or may not use to form the condensing surface.

For the reasons set out above, I am satisfied that in the form submitted at the hearing, the amended claim still does not satisfy the requirements of Section 14(5) (a) and (b) in that it does not define the matter for which the applicant seeks protection and is not clear and concise.

In looking to the possibility of an amended claim based on the application as filed, consideration was given to the nature of the material of the condensing surface. It was noted that a variety of materials are specified in the application as filed, namely; white paint, plastic, metal, glass, stone, aluminised Tedlar (Trade Mark), polythene or Teflon (Trade Mark). In addition, it was noted that materials which have the necessary optical properties to undergo cooling by radiation to space are those which "*reflect all radiation outside the wavelength range 8-13 microns but absorb and emit within these limits as a black body*", as specified on page 1 of the application as filed.

With regard to defining the material of the condensing surface in terms of its optical properties, I again refer to the an article entitle "RADIATIVE COOLING TO LOW TEMPERATURES WITH SELECTIVELY EMITTING SURFACES" by Granqvist *et al*, published in 1981, which was submitted by Mr Stevens prior to the first hearing. It states that:-

"Efficient radiative cooling is feasible with surfaces which radiate predominantly in the 8 - 13 micron atmospheric window range"

and that:-

"... the experiments seem to open up several possibilities for passive cooling ... in areas with arid climate."

This suggests to the man skilled in the art that in a situation where radiative cooling effects are called for, it would be obvious to select materials exhibiting the property of radiating predominantly in the 8 - 13 micron range. This is precisely the preferred criteria specified in the present application for selecting materials having optical properties that provide maximum radiative cooling. In addition it would appear to be directed specifically to the skilled man working in areas with arid climate. Accordingly, a claim corresponding to the present claim 1 but wherein the choice of materials was limited in this way would not involve an inventive step.

Mr Stevens expressed the view that the reference in Granqvist to areas with arid climate would not lead the skilled man to select materials with such optical properties for the present application since the present invention is intended to extract atmospheric moisture and the word "arid" implies a dry atmosphere. In support of this contention he drew my attention to the graph on page 562 of Granqvist which shows that the "optical window" effect decreases as atmospheric moisture levels increase. However, I note that in the opening paragraph of his application Mr Stevens refers to the use of his invention in *"deserts, savanna or regions of intermittent rainfall."* I am satisfied that the term *"areas with arid climate"* in Granqvist would lead the skilled man (and indeed the man in the street) to deduce that the specified optical properties would be applicable to deserts. In this respect I note the Pocket Oxford Dictionary definition of arid: "Dry, parched, (desert region)"

Consideration was again given to restricting the claim to the aluminised plastics materials referred to on page 3 paragraph 3 of the original application and which appear to be the most preferred materials, ie. aluminised Tedlar (Trade Mark), polythene or Teflon (Trade Mark). As in the first hearing, my attention was drawn to the Applicant's own patent, GB 1,577,720, which is directed to structures with walls comprising an outer skin of a plastics film material that is transparent to short wave solar radiation while being relatively opaque to long wave heat radiation. In

discussing such materials it is stated on page 3 lines 80-85 and lines 96-102 that:-

"Such reflectivity can conveniently be accomplished by "silvering" the base material of the skin as by metal deposition thereon or by incorporation of a suitable metallic layer in a laminated skin construction. if the characteristics of the inner skin are such that it reflects solar energy it may take up a temperature below the dew-point of the ambient atmosphere and so be available for use as a condensing surface."

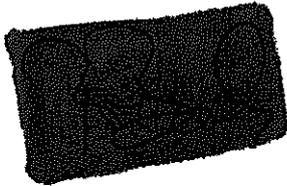
This would appear to indicate to the skilled man that such "silvered" plastics film will provide a suitable surface for condensation wherein the surface itself is cooled by radiative cooling. Accordingly, a claim restricted to such materials would not appear to involve an inventive step.

Accordingly, an amended claim restricting the scope of the invention to the use of materials which *"reflect all radiation outside the wavelength range 8-13 microns but absorb and emit within these limits as a black body"* or to specified aluminised plastics materials disclosed in the application as filed would not satisfy the requirements of Section 1(1)(b) for the reasons set out above.

With regard to the patentability requirements of Section 1(2)(a) and the novelty requirement of Section 1(1)(a), the additional materials specified in the application as providing suitable condensing surfaces, namely; white paint, plastic, metal, glass and stone, are clearly well known. The discovery that these materials have new properties that make them particularly suitable as condensing surfaces is not in itself patentable although the use of such materials in a new process may be patentable. In this case, the discovery appears to involve the realisation that materials having particular optical properties are suitable for use as condensing surfaces. However, selection of materials on the basis of these optical properties results in the use of materials which are already known to provide good condensing surfaces, eg. the metal or stone referred to in GB 958,698, the metal, plastics or glass referred to in GB 2,178,670 and the aluminised plastics materials referred to in GB 1,577,720. Thus the application of the apparently new selection criteria results in the use of materials which are indistinguishable from materials already in use for the same purpose. Accordingly, the alleged invention as claimed in the present claims is not novel and is not patentable within the meaning of Sections 1(1)(a) and 1(2)(a).

In summary, I find that the application still does not meet the requirements of Section 14(5) (a) and (b) in that the claims do not define the matter for which the applicant seeks protection and are not clear and concise, that the alleged invention is not new and does not involve an inventive step as required by Sections 1(1) (a) and (b), and that the claim before me is not a claim to a patentable invention within the meaning of Section 1(2)(a). I am prepared to give the applicant a further opportunity to amend to overcome this finding. Such amendments should be submitted within the period prescribed by Section 20(2) for appealing the decision, issued orally at the first hearing which, being a substantive issue, is six weeks from the date of that decision, namely 11th March 1992. If no satisfactory amendment is submitted in that period, I shall refuse to allow the application to proceed.

Dated this 29 day of April 1992



P M Back
Principal Examiner, acting for the Comptroller