BL O/221/06

9 August 2006

PATENTS ACT 1977

APPLICANT Anthony Ofori-Atta

ISSUE Whether patent application numbers GB 0419819.8, GB 0419821.4 and GB 0419822.2 comply with section 1

HEARING OFFICER D J Barford

DECISION

Introduction

1 Patent application numbers GB 0419819.8, GB 0419821.4 and GB 0419822.2 were filed on 3 September 2004 in the name of Anthony Ofori-Atta, claiming no earlier priority. All three applications remain unpublished.

2 In respect of GB 0419819.8, the applicant was informed in an examination report under section 18(3) dated 22 December 2004 that in the examiner's view, search would serve no useful purpose since the invention as claimed related to a scientific theory and as such was not patentable. The applicant was offered a refund of his search fee if he withdrew his application, and was invited to respond by 22 June 2005. No response having been received by that date, the examiner issued a further letter offering a hearing. The applicant replied in a letter dated 8 December 2005 in which he stated that this application is "a combination of theory and practical. It is a technical contribution to the teaching and manufacturing of air conditioning systems". No amendments to the claims have been filed however.

3 In respect of GB 0419821.4, the applicant was informed in an examination report under section 18(3) dated 22 December 2004 that in the examiner's view, search would serve no useful purpose since the invention as claimed related to a scientific theory or mathematical method and as such was not patentable. The applicant was offered a refund of his search fee if he withdrew his application, and was invited to respond by 22 June 2005. No response having been received by that date, the examiner issued a further letter offering a hearing. In the letter dated 8 December 2005 referred to above, the applicant stated that he had not received "a single letter" in respect of application number GB 0419821.8.

4 In respect of GB 0419822.2, the applicant was informed in an examination report under section 18(3) dated 22 December 2004 that in the examiner's view, search would serve no useful purpose since the invention as claimed related to a scientific theory or discovery and as such was not patentable. The applicant was offered a refund of his search fee if he withdrew his application, and was invited to respond by 22 June 2005. On this application there have been a number of exchanges of correspondence between the applicant and the examiner culminating in the applicant's filing amended claims received on 17 October 2005. In a letter dated 21 November 2005, the examiner maintained the objection that the invention claimed was not patentable. A response date of 22 December 2005 was specified, but no reply has been received.

5 The applicant lives in Ghana and has provided an address for service in the United Kingdom. However given the applicant's complaints about not receiving correspondence, the examiner issued further letters dated 14 June 2006 on all three applications, repeating the objection that the inventions claimed are not patentable and again offering the opportunity for a refund upon withdrawal.

6 In addition the examiner has succeeded in contacting the applicant by email, repeating the objections and again offering refunds; or in the alternative a hearing. The applicant has responded by email, from which it is clear that he does not wish to withdraw the applications - maintaining that each has "practical application" – and understands that a decision will now be made on the papers.

The law

7 The relevant provisions of section 1 are:

> *1.-(1) A patent may be granted only for an invention in respect of which the following conditions are satisfied, that is to say -*
>
> *(a) ….*
>
> *(b) ….*
>
> *(c) .....*
>
> *(d) the grant of a patent for it is not excluded by subsections (2) and (3) below;*
>
> *and references in this Act to a patentable invention shall be construed accordingly.*
>
> *(2) It is hereby declared that the following (among other things) are not inventions for the purposes of this Act, that is to say, anything which consists of -*
>
> *(a) a discovery, scientific theory or mathematical method*
>
> *(b) ...*
>
> *(c) …;*
>
> *(d) ...*

but the foregoing provision shall prevent anything from being treated as an invention for the purposes of this Act only to the extent that a patent or application for a patent relates to that thing as such.

8 Also applicable is section 18, the relevant parts of which read:

18.-(1)..

(1A) ..

(2) On a substantive examination of an application the examiner shall investigate …whether the application complies with the requirements of this Act and rules and shall determine that question ..

(3) If the examiner reports that any of those requirements are not complied with, the comptroller shall give the applicant an opportunity within a specified period to make observations on the report and to amend the application so as to comply with those requirements .. , and if the applicant fails to satisfy the comptroller that those requirements are complied with, or to amend the application so as to comply with them, the comptroller may refuse the application.

(4) ..

(5) ..

The applications

GB 0419819.8

9 This application is entitled “Refrigeration Cycle”. It comprises two pages of description and a diagram. There is a page headed “Claims” which reads:

> It is claimed here that Isentropic (Reversible Adiabatic) Compression takes place at constant entropy and it can damage the compressor due to the high discharge pressure that could be achieved although not practicable. Point 2 is therefore only imaginary point that has a high pressure than the practical discharge pressure but a lower enthalpy change or energy input. It is an ideal compression process that allows for change in temperature of the vapour and assumes the compressor is perfect. This means there is no windage, or throttling and no heat transfer through the compressor shell.
>
> A process with internal losses due to friction, windage, and throttling are considered characterizes irreversible adiabatic compression Process 1-2’.
>
> Polytropic compression is characterized in that this includes thermal losses through the compressor casing to that of irreversible adiabatic compression. This is the actual compression process. 1-3

10 The application appears to be directed to explaining the energy losses experienced in a practical compression refrigeration cycle as compared to an ideal cycle. To the extent that I understand it, the invention as claimed appears

to relate wholly to a scientific theory as such. It does not make any contribution outside this field, which is excluded under section 1(2)(a). Moreover it is not clear to me that there is anything in the application that would support an allowable claim.

GB 0419821.4

11 This application is entitled “Control engineering – a new direction”. It comprises two pages of description and four sheets of drawings. There are two pages headed “Claims” which read:

i. It is claimed here that Proportional Control Signal H(s) = Error x gain constant

= error x l/Kp

Gain constant is expressed as 1/Kp and could be expressed also as Output throttling range/units of process variable or
Time constant of the heated/room divided by time constant of room/outside.

ii. Wherein the improvement comprises,
1 = 100% valve opening
Kp = units of process variables
If the heater is in the room then $C_1 + C_2 = 0$
$C_1 = - C_2$ = Capacitance of the room

iii. R_1 = resistance of heater wall.
R_2 = resistance of room wall.
T_1 = Time constant of heater.
T_2 = Time Constant of room/wall.
$Kp = T_2/T_1$

iv. It is characterized by Kp = 1 is a two position or on-off/ digital control. Kp = say 20 is a proportional control with a constant valve gain of 1/20 per unit error. Kp very large is a floating control. The valve moves infinitesimally to the infinitesimal error or change in temperature. Example, if the valve has to move for every minute temperature change.

v. It is characterized in that,
The effective transfer function is a combined transfer function of both room and plant in the Laplace domain.

$$G_{(s)} = \frac{1/(1+ Kp)}{1+sT^*}$$

Effective Time constant T* should be that of the heater or
$T^* = T/ 1 + Kp$ $T = T_1 + T_2$
Express the time constant of the room as a function of that of the heater
$s_2 = Kp \times s_1$ and the closed loop function would become

12 Although the claim mentions certain hardware (eg a valve and a heater) and the drawings include schematic diagrams of control systems with feedback loops, it is stated in the application that “The invention is basically on how to

design a system which would provide comfort in buildings without wasting energy and a proper selection of materials for both buildings and plants to give the engineer a good understanding of control principles"; and there is a reference to "our initial theory".

13 To the extent that I understand it, the invention as claimed appears to relate wholly to a scientific theory or mathematical method as such. It does not make any contribution outside these fields, which are excluded under section 1(2)(a). Moreover it is not clear to me that there is anything in the application that would support an allowable claim.

GB 0419822.2

14 This application is entitled "Atmospheric air enthalpy and specific capacities, a new method". It comprises three pages of description. As filed there are three pages headed "Claims" which read:

i. It is claimed that the enthalpy of air-vapour mixture given below as in the example below,
Air-vapour mixture at 30 °C and relative humidity of 20%. At that point, the given and determined points are -1 kg of dry air, 0.0054 kg of water vapour, dew point 5.1°C
Where specific humidity w is derived from $w = \frac{0.622 \times Ps}{Patm - Ps}$

ii. 1. Enthalpy of air @ 0°C = 0
Specific heat = 1.005 kJ/kg K.
ha = 1.005 x (30-0) = 30.15 kJ/kg
2. Specific heat capacity of water is 4.1868 kJ/kg K
Specific heat capacity of water/superheated vapour is 1.8422 kJ/kg K

iii. Specific heat capacity of ice vapour is 2.093 kJ/kg K
At the partial pressure corresponding to the mass of water vapour the saturation temperature is 5.1°C. This can be obtained from the steam table or the psychometric chart. Enthalpy of water vapour: from thermo properties of water at saturation. 5.1°C

iv. Sensible heat of the water vapour
hf = 0.0054 x 4.1868 x 5.1= 0.0054 x 21.216 = 0.1153kJ/,
Latent heat 5.1 degrees is 2488.9 kJ/kg
hfg = 0.0054 x 2488.9 = 13.44 kJ/kg,
hg=0.0054 x (21.216 +2488.9)= 13.5546264kJ/kg

v. Heat content due to the super-heated vapour
hs = 0.0054 x 1.8422 x (30 - 5.1)
= 0.0054 x 1.8422 x (24.9) = 0.0054 x 45.87 = 0.2477 kJ/kg.
Enthalpy of the air - water vapour mixture =
(30.15 + 0.1153 + 13.44 + 0.2477) kJ/kg = 43.953 kJ/kg dry air.

vi. This is characterized by this fact that the total enthalpy of the mixture is

the sum of the enthalpies of each constituent at its partial pressure.
$h_T = [Cpa(t2) + rn_wCp_w(t_s) + m_shfg + m_sCp_s(t2 - t_s)]$ /kg dry air.
If the mixture is below 0°C, the specific heat of ice vapour of 2.093 kJ/kg K should be applied in addition to the values given in table of the steam table.

vii. Therefore a change in enthalpy at any two points is a change in the values above at the two positions. Sensible heat factor is the ratio of the sensible heat change to the total heat change. The vapour always has both latent and sensible heat in the atmosphere. The specific heat Change in latent heat on partial pressure lines, say 1 and 2 would be

viii. $QL = [m_{s2}h_{fg2} - m_{s1}h_{fg1}]$ /kg dry air.
Where h_{fg} would be read at the saturation temperature at the given partial pressures. Constant temperature process with addition/loss of steam is both latent and sensible process but the dry air does not change in enthalpy.

ix. Change in sensible heat / kg dry air at points 1 and 2.
$Q_s = [Cp_{a2}(t2) + m_{w2}Cp_{w2}(t_{s2}) + m_{s2}\ Cp_{s2}(t2 - t_{s2}) - [Cp_{a1}(t1) + m_{w1}Cp_{w1}(t_{s1}) + m_{s1}Cp_{s1}(t1 - t_{s1})]$
Sensible heat factor =

$$\frac{[Cpa_2(t2) + m_{w2}Cp_{w2}(t_{s2}) + m_{s2}\ Cp_{s2}(t2 - t_{s2}) - [Cp_{a1}(t1) + m_{w1}Cp_{w1}(t_{s1}) + m_{s1}Cp_{s1}(t1 - t_{s1})]}{[Cpa_2(t2) + m_{w2}Cp_{w2}(t_{s2}) + m_{s2}\ Cp_{s2}(t2 - t_{s2}) - [Cp_{a1}(t1) + m_{w1}Cp_{w1}(t_{s1}) + m_{s1}Cp_{s1}(t1 - t_{s1})] + [m_{s2}h_{fg2} - m_{s1}h_{fg1}.]}$$

x. It is characterized in that enthalpy change,
$\Delta h_{12} = [Cpa(t_2) + m_{w2}Cp_{w2}(t_{s2}) + m_{s2}h_{fg2} + m_sCp_s(t2 - t_{s2})] - [Cp_a(t_1) + m_{w1}Cp_w(t_{s1}) + m_{s1}h_{fg1} + m_sCp_s(t_1 - t_{s1})]$ /kg dry air.
To assumed specific heat of atmospheric air on any constant partial pressure line(i) $Cp_i = (Cp_{ai} + m_{si}Cp_{si})$ / kg dry air.

15 In response to the examiner's objections, amended claims were filed, as noted above, on 17 October 2005. These read:

1. $h_T = [(C_{pa}(t_2) + m_w\ C_{pw}\ (t_s) + m_sh_{fg} + m_sC_{ps}(t_2\text{-}t_s)]^{1}$ / kg dry air

2. $h_{T2}–h_{T1} = ([Cp_a(t2) + m_{w2}\ Cp_w(t_{s2}) + m_{s2}hfg2 + m_{s2}Cp_s(t2\text{-}t_{s2})]^*$
- $[Cp_a(t1) + m_{w1}Cp_w(t_{s1}) + m_{s1}hfg1 + m_{s1}Cps(t1\text{-}t_{s1})]^*)$/kg dry air.

3. $Q_L = [m_{s2}h_{fg2} — m_{s1}h_{fg1}]^{ii}$ / kg dry air

4. $Qs =[C_{ps2}(t2) + m_{w2}\ C_{pw2}\ (t_{s2}) + m_{s2}C_{ps2}\ (t2\text{-}t_{s2})]^{iii} — [C_{pa1}(tl\ ) +$
$M_{w1}C_{pw1}(t_{s1})+m_{s1}C_{ps1}\ (t1\text{-}t_{s1})^{iv}$ / kg dry air

5. SHF =

$$\frac{[CP_{a2}\ (t2) + m_{w2}\ Cp_{w2}\ (ts2) + m_{s2}\ C_{ps2}\ (t2\text{-}t_{s2})]_{v} - [Cp_{a1}(tl) + m_{w1}Cp_{w1}(t_{s1}) + m_{s1}C_{ps1}\ (t1\text{-}t_{s1})]^{vi}}{[CP_{a2}\ \{t2) + m_{w2}\ Cp_{w2}\ (ts2) + m_{s2}\ C_{ps2}\ (t2\text{-}t_{s2})]^{vi} - [Cp_{a1}(tl) + m_{w1}C_{pw1}(t_{s1}) + m_{s1}C_{ps1}\ (t1\text{-}t_{s1})] + [m_{s2}h_{fg2}\text{-}m_{s1}h_{fg1}]^{viii}}$$

6. $\Delta h_{12} = [C_{pa}\ (t_2) + m_{w2}\ Cpw2\ (t_{s2}) + m_{s2}h_{fg2} + m_s\ C_{ps}\ (t_2\text{-}t_{s2})]^* - [C_{pa}(t1) +$
$m_{w1}\ C_{pw}(t_{s1}) + m_{s1}h_{fg1} + m_sc_{ps}(t_1\text{-}\ t_{si})]^{**}$/kg dry air.

Where

C_{ps}	-	specific heat capacity of superheated steam
C_{pa}	-	specific heat capacity of dry air
C_{pw}	-	specific heat capacity of water vapour
h_{f9}	-	latent heat of steam
h_f	-	enthalpy of water vapour,
h_T	-	total enthalpy
h_g/h_s	-	enthalpy of steam/superheated
ha	-	Enthalpy of dry air
t	-	Temperature
m_w	-	Specific mass of water
m_s	-	Specific mass of steam
Q_L	-	Latent heating
Q_S	-	Sensible heating
SHF	-	Sensible Heat factor

16 The application appears to be directed to the applicant's stated discovery that the enthalpies of air and water mixtures differ from accepted values. In his words "it disproves all written text books on atmospheric air". He argues in a letter accompanying the amended claims that "This application is not a theory but is applicable to all air-conditioning processes. It is a new method and an improvement. It is also not mathematical but empirical".

17 However to the extent that I understand it, the invention as claimed in each of these amended claims appears to relate wholly to a mathematical method - or to a representation in mathematical form of a discovery or scientific theory. It does not make any contribution outside these fields, which are excluded under section 1(2)(a). In my view a similar objection applies to the claims as originally filed. Moreover it is not clear to me that there is anything in the application that would support an allowable claim.

Conclusions

18 I have found that the invention as claimed in each of application numbers GB 0419819.8, GB 0419821.4 and GB 0419822.2 is excluded from patentability under section 1(2)(a); and that there is nothing in any of these applications that would support an allowable claim. I therefore refuse these applications under section 18(3).

Appeal

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

DAVID BARFORD
Deputy Director acting for the Comptroller