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Case No: HP-2021-000029

IN THE HIGH COURT OF JUSTICE
BUSINESS AND PROPERTY COURTS OF ENGLAND AND WALES
INTELLECTUAL PROPERTY LIST
PATENTS COURT

Royal Courts of Justice, Rolls Building
Fetter Lane, London, EC4A 1NL

Date: 25 October 2023

Before :

HIS HONOUR JUDGE HACON
(Sitting as a High Court Judge)

- -

Between :

(1) PHILIP MORRIS PRODUCTS S.A. **(2) PHILIP MORRIS LIMITED**	**Claimants**
- and -	
(1) NICOVENTURES TRADING LIMITED **(2) BRITISH AMERICAN TOBACCO (INVESTMENTS) LIMITED**	**Defendants**

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- -

Andrew Lykiardopoulos KC and **Tom Alkin** (instructed by **& Powell Gilbert LLP**) for the **Claimants**
Nicholas Saunders KC and **Kathryn Pickard** (instructed by **Kirkland & Ellis International LLP**) for the **Defendants**

Hearing dates: 21-23 and 27-28 September 2022

- -

Approved Judgment

This judgment was handed down remotely at 10.30am on [date] by circulation to the parties or their representatives by e-mail and by release to the National Archives.

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Judge Hacon :

Introduction

1. The idea of an electronic cigarette in which tobacco compounds are heated, vaporised and inhaled by the user dates back at least to the 1960s. By the 1990s increasing public awareness of the dangers of smoking and the search for alternatives had greatly boosted research into what had become known as vaping.

2. This litigation is between two large tobacco businesses, the Philip Morris group and the British American Tobacco group. It concerns what are known in the industry as "heat not burn" or "HNB" products. As the name suggests, the tobacco they contain is heated to vaporise nicotine and other compounds without burning the tobacco, the point being that the user does not inhale smoke, only the aerosol containing the nicotine and other compounds. The damaging effect of smoke entering the lungs is avoided.

3. The patent in suit is EP (UK) No. 3 367 830 B1 ("EP 830"), which has the title "Article for use with apparatus for heating smokable material" and an unchallenged priority date of 30 October 2015.

4. The first defendant is the proprietor of EP 830; the second defendant is the former owner of the patent. I will refer to the defendants as "BAT".

5. The claimants (collectively "PMI") seek revocation of EP 830. BAT counterclaims for infringement of EP 830 by the sale of an HNB product called the IQOS ILUMA, marketed by PMI.

6. BAT has conditionally applied to amend EP 830.

7. PMI has also applied for *Arrow* declaratory relief in respect of a defined HNB system.

8. BAT were represented by Nicholas Saunders KC and Kathryn Pickard. Andrew Lykiardopoulos KC and Tom Alkin appeared for PMI.

The witnesses

9. PMI fielded two experts, BAT one. PMI also relied on three witnesses of fact whose evidence was not challenged.

10. BAT's expert was Martin Wensley. Mr Wensley is the founder and CEO of Airja, Inc, a medical device company based in San Francisco. Over the last 20 years Mr Wensley has worked in the field of drug delivery systems. Between 2000 and 2009 he was Head of Device Technology at Alexza Pharmaceuticals where his work involved the designing of a device to create pharmaceutical aerosols, later adapted for nicotine delivery. At the priority date Mr Wensley was Director of Engineering at Fontem Ventures where he took the lead in developing nicotine replacement therapy in the UK.

11. PMI's first expert was David McLaughlin, who is a director of Elucid8 Holdings Limited, which provides consultancy services on e-cigarettes. Dr McLaughlin is a pharmaceutical chemist by training. From 2000 to 2013 he worked at Gallaher Limited, a UK manufacturer of tobacco products. At the priority date he was the Emerging

Product Director there, leading their technical evaluation of products such as e-cigarettes.

12. PMI's second expert was Andrew Bleloch. After completing his PhD at Cambridge University in 1989, Dr Bleloch continued as an academic at Cambridge University until 2007, thereafter becoming Professor of Materials Science at Liverpool University. Since the beginning of 2011 Dr Bleloch has worked in industry in the San Francisco Bay Area. In 2014 he co-founded Loto Labs, Inc to develop a new generation of vaping devices for both nicotine and cannabis. At the priority date he also worked as Chief Scientific Officer at ColdLogix, Inc on the development of superconducting logic for computer processors. Since 2019 Dr Bleloch has worked full time at Loto Labs.

13. All three experts were excellent witnesses, knowledgeable in their respective fields, who gave clear and helpful answers. Criticisms of them by counsel were largely limited to their over-qualification and the order in which they became aware of documents, neither of which was any reflection on the experts.

The skilled team

14. By common consent EP 830 is addressed to those in a tobacco company interested in developing HNB products. One member of the team would be a person working in the marketing of tobacco consumables who would know about consumer preferences in that market. There would be another, more technical person, working in the development of new products, a graduate with a degree in engineering or physics.

15. There was a dispute regarding the extent of the team's knowledge of induction heating. Dr McLaughlin's evidence suggested that the skilled person would refer to a specialist in the field when it came to the "hard sums part", as he put it. It was not made entirely clear what Dr McLaughlin had in mind when he spoke of hard sums, but I think it is a fair inference that the skilled team would have obtained specialist expertise if they felt that a better understanding of induction heating would help.

Common general knowledge

Common ground

16. The technical background set out in this section was part of the common general knowledge ("CGK") of the skilled team at the priority date.

17. HNB products heat tobacco to a temperature of a few hundred degrees Celsius. Agents are added to the tobacco to assist in the formation of the desired aerosol, such as glycerin and propylene glycol. The goal is to provide the inhaler with an experience as close as possible to that of smoking a conventional cigarette.

18. In some of the prior art HNB products heat was generated by chemical means, in others an electrical heater was used.

19. Speaking generally, it was known that electrical heaters were either resistive (sometimes "resistance") or inductive. In a resistive heater, such as the bar of an electric fire, an electric current passes through a material which generates resistance to the current so some of the energy of the current is converted into thermal energy. The

thermal energy is transferred to the object to be heated by conduction, radiation or convection, or a combination of one or more of them. Resistive heating is sometimes called Joule or Ohmic heating after the demonstration by James Joule in 1840 that the relationship between a given current and the amount of heat generated is analogous to Ohm's law.

20. Inductive heaters rely on the application of an oscillating magnetic field to an electrically conducting material – the "susceptor". This field is created by applying an alternating electric current to a coil of a conductor placed close to the susceptor. It was known that eddy currents thereby generated in the susceptor cause Joule heating.

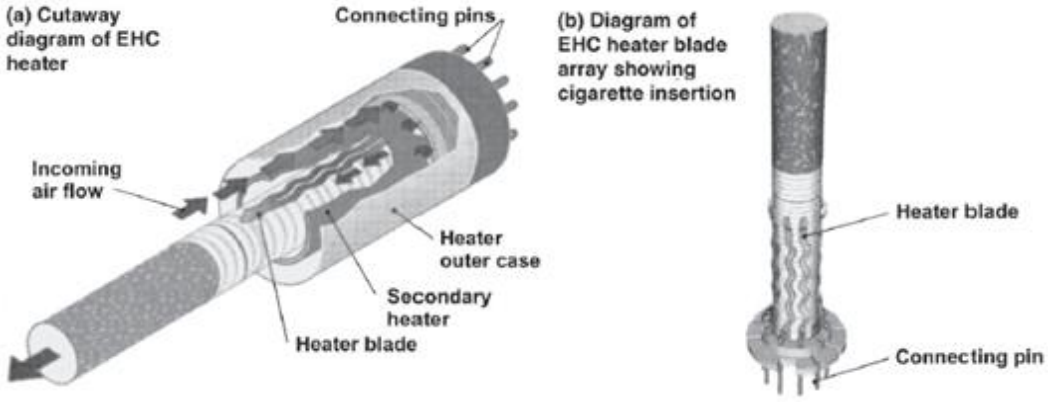
21. A common example of inductive heating in the home is the heating of a saucepan on an induction hob. A characteristic of induction hobs is that the object to be heated is the susceptor itself; there is no need for transference of heat by conduction or other means. This significantly reduces the wastage of heat.

22. In HNB products the tobacco is heated using a heating element. Where resistive heating is used, a current is passed through the heating element. If inductive heating were to be used, the heating element would be a susceptor to which an oscillating electrical field is applied.

23. The electric heaters used in prior art HNB products were either external, wrapped around the tobacco, or internal with a heater blade, or probe, penetrating the tobacco. Each had pros and cons.

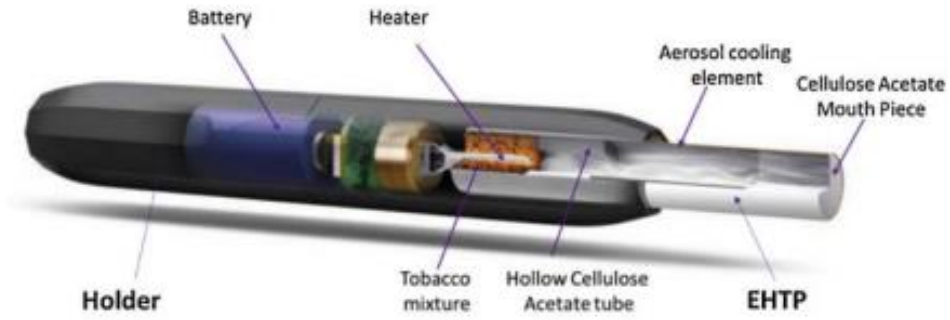
24. By the priority date two groups of HNB products had been marketed using chemical heating (carbon or butane), neither of which were a commercial success. Three groups of manufacturers sold resistive heating products which were more successful but they had drawbacks, namely a poor battery life, the need to clean the product and a risk of blade breakage.

25. The evidence discussed prior art HNB products which would have formed part of the CGK of the skilled team. One example was the first product which used electric resistive heating, the Accord model launched by PMI in 1998. Dr McLaughlin illustrated it in his evidence:



26. Another example was the PMI IQOS system launched in 2014. It was a rechargeable device into which a consumable containing tobacco was inserted. A blade within the

device penetrated the tobacco upon insertion. The blade was resistively heated. This is an illustration:



27. No HNB product using inductive heating had been marketed by the priority date.

CGK in dispute

28. I have referred above to the generation of induction heating by eddy currents, Joule heating of the susceptor. In fact, the susceptor is also heated by an important second means which has relevance to the present case. It is called magnetic hysteresis.

29. The significant points of dispute regarding the CGK fell into three parts:

    (1) Whether the skilled person had a preference at the priority date for a resistive heater over an induction heater for HNB products.

    (2) Whether the skilled person was aware that induction heating was generated in large part (or at all) by magnetic hysteresis.

    (3) Knowledge of certain details of the design of HNB products.

Preference for types of heater

30. The experts were agreed that at the priority date induction heating required components and control systems that were more sophisticated than those used for resistive heating and that it was more challenging to design an inductive heater which efficiently transferred power from the battery to the heating element.

31. Mr Wensley's view was that accordingly the skilled person had a preference for resistive heaters as the first choice in the development of HNB products. But this was not to the exclusion of exploring inductive heating.

32. Dr McLaughin's evidence was much the same, although he thought that there was a move towards the use of inductive heaters. This was partly driven by management who were aware of the growing use of inductive heaters in a domestic context. Dr McLaughlin also said that difficulties experienced with resistive heaters, what he called "pain points", provided more technical reasons to look at inductive heating. A particular difficulty highlighted by Dr McLaughlin was the build-up of tobacco deposits

on a heater if it is used multiple times. The solution was to have single-use heaters, either resistive or inductive. Resistive heaters, though, required contacts to connect with the power source, creating a problem of wear of contacts successively being connected to and removed from the heater. Inductive heaters would not need contacts.

33. Dr Bleloch said that technical teams of the type he understood to approximate to the skilled team of the present case came to see him to discuss induction HNB products at around the priority date, though he guessed that they were also looking into resistive heating products.

34. I find that the skilled team engaged in the development of an HNB product at the priority date would have considered both resistive and inductive heating as alternatives. Each had technical pros and cons. The former would be given preference because of greater familiarity and simplicity, but not an overwhelming preference. The skilled team would have been aware that an inductive heater could offer advantages if made to work in a commercially viable product and would have wished to explore that route too.

35. To the extent that there was pressure from management to investigate inductive heaters in the real world, it seems to me that this should be assumed for the skilled team. The hypothetical team of patent law does not consider possible developments of the prior art as if isolated in a laboratory. Motive is relevant, see *Actavis Group PTC EHF v ICOS Group* [2019] UKSC 15, at [70] and an incentive that would have existed at the priority date to pursue a particular alternative should be given appropriate weight even if it is not a technical incentive. In the present case I give pressure from management some weight.

Magnetic hysteresis

36. When electrons are shared unequally between atoms in the same molecule due to a difference in the electronegativity of those atoms, this creates a "dipole", a molecule with a separation of charges.

37. An external magnetic field applied to a ferromagnetic material such as iron causes dipoles in the material to align themselves with the field. If the field is removed this alignment is retained at least to some extent – called "remnant magnetism". This retention of magnetism is known as magnetic hysteresis.

38. When a ferromagnetic material is subjected to an oscillating magnetic field, the alignment of dipoles switches direction accordingly. Each alternating cycle reverses the alignment and each time the remnant magnetism must be overcome. The energy required to do this is in part dissipated as heat. Thus, an oscillating magnetic field applied to a susceptor generates not only Joule heating through eddy currents in the susceptor but also heating as a product of magnetic hysteresis.

39. In his written evidence Dr Bleloch said that heating caused by both eddy currents and magnetic hysteresis would have been part of the skilled team's CGK. He maintained this view in cross-examination, stating that a skilled heating engineer would have been familiar with induction hobs and induction-heated soldering irons and would have been aware of their use of magnetic hysteresis heating. It was pointed out to him that none of the undergraduate text books to which he had referred as evidence of the CGK

mentioned exploitation of magnetic hysteresis as a practical means of heating. Dr Bleloch's answer was that these text books explained the fundamentals of physics, not practical applications of the fundamentals such as in induction heating systems.

40. Mr Wensley in his written evidence said that magnetic hysteresis as a cause of induction heating was not part of the CGK. He was taken in cross-examination to several articles published before the priority date, each of which explained how induction heating works in largely household goods such as a rice cooker, which explanation included reference to magnetic hysteresis heating. These articles did not of themselves either individually or collectively prove that magnetic hysteresis was part of the CGK. But Mr Wensley's position in the end was that it would been known or obvious to the skilled person at the priority date that the induction heating of a ferromagnetic susceptor would be caused by both eddy currents and magnetic hysteresis, although he or she would not have known which cause was dominant. He agreed that a further part of the CGK was that the relative strength of Joule and magnetic hysteresis heating might depend on the composition of the susceptor. Despite re-examination he did not change this evidence.

41. It is possible that Mr Wensley was over-impressed by the articles he was shown in cross-examination. But in the end his final evidence was clearly stated and I do not believe that he had abandoned what seems otherwise to have been a good understanding of the concept of common general knowledge; it was not suggested that he had. His final evidence was also consistent with that of Dr Bleloch.

42. I find that it was part of the skilled team's CGK that two phenomena were in play during induction heating, an increase in temperature of the susceptor due to Joule heating and simultaneously a rise in temperature as a product of magnetic hysteresis. The skilled team would have understood the physics underlying both phenomena, would not have known which had the dominant heating effect but it would have been part of their CGK that this could depend on the composition of the susceptor. The context that the skilled team would have had in mind in this regard was that of consumer products such as induction hobs and soldering irons, but there was no reason for the team to believe that the position was any different in other induction heating contexts.

The Curie point

43. Materials with permanent magnetic properties lose those properties if heated above a certain temperature, becoming paramagnetic. This temperature is known as the Curie point, named after Pierre Curie, husband of Marie. The Curie point varies between different materials. Both experts said that the foregoing was within the CGK.

44. The experts were also agreed that it was not part of the CGK to have the maximum temperature of a material "self-regulated" by its Curie point. By this they meant that where the material is a susceptor, when its Curie point is reached the magnetic field to which the material is exposed can have no further effect and for that reason alone its temperature will rise no further.

45. In his written evidence, Mr Wensley did not discuss a variation on self-regulation in which the heater is a susceptor and a sensor detects its change in state from magnetic to paramagnetic. This is an arrangement discussed at paragraph [0068] of EP 830 (quoted below) and which falls within the invention as claimed. In cross-examination

Mr Wensley said that such an arrangement was within the CGK. This was consistent with Dr Bleloch's evidence and I accept it.

EP 830

46. The background section of EP 830 acknowledges that HNB products were known at the priority date and refers to an item of prior art in which inductive heating was used in an HNB product.

47. The detailed description states that the smokable material of the invention may or may not contain tobacco. It explains induction heating, first by reference to Joule heating. (The specification talks of resistive heating as an alternative term for Joule heating. In this judgment, as in the evidence and argument during the trial, "resistive heating" will mean only non-inductive resistive heating.) The specification goes on to outline magnetic hysteresis heating, indicating that subjecting an electrically conductive and magnetic material to a varying magnetic field can cause both Joule and magnetic hysteresis heating. The Curie point is explained.

48. Paragraph [0035] states that the Curie point of a material is determined by its chemical composition. Tables 1 to 3 list various materials, giving each its Curie point temperature.

49. Paragraph [0039] identifies a particular material which (among others) would be suitable as a susceptor in one construction of the invention claimed. Paragraphs [0040]-[0044] continue (omitting reference numbers):

> "[0040] In this construction, the chemical composition of the heating material of the heater has been carefully and intentionally set, selected or provided so that the heating material has a Curie point temperature that is less than the combustion temperature of the smokable material. ...
>
> [0041] Accordingly, when the temperature of the heater in use reaches the Curie point temperature, the ability to further heat the heater by penetration with a varying magnetic field is reduced or removed. For example, as noted above, when the heating material is electrically-conductive, Joule heating may still be effected by penetrating the heating material with a varying magnetic field. Alternatively, when the heating material is non-electrically-conductive, depending on the chemical composition of the heating material, such further heating by penetration with a varying magnetic field may be impossible.
>
> [0042] Thus, in use, this inherent mechanism of the heating material of the heater may be used to limit or prevent further heating of the heater, so as to help avoid the temperature of the adjacent smokable material from reaching a magnitude at which the smokable material burns or combusts. ...
>
> ...
>
> [0044] In some constructions, the ability of the heating material to be heated by penetration with a varying magnetic field by magnetic hysteresis heating may return when the temperature of the heating material has dropped below the Curie point temperature."

50. The phenomenon there described is at the core of the invention claimed. The chemical composition of the heating material – the susceptor – may be selected such that its Curie point is below the combustion temperature of the smokable material. This creates a self-regulating upper limit to the temperature of the heating material irrespective of the intensity of and period over which the alternating magnetic field is applied. Inductive heating may resume once the temperature of the material has dropped below the Curie point.

51. Paragraph [0062] explains the idea in this way:

> "[0062] A maximum temperature to which the heater is heatable by penetration with the varying magnetic field in use is exclusively determined by a Curie point temperature of the heating material of the heater. That is, the apparatus may be free of any other system for limiting the temperature to which the heater is heatable to below the maximum temperature. …
>
> [0063] Thus, in use, this inherent mechanism of the hearing material of the heater may be used to limit or prevent further heating of the heater, so as to help avoid the temperature of the heating zone and an article located therein from reaching a magnitude at which the smokable material of the article burns or combusts. … In some embodiments, this may also help to prevent overheating of the apparatus or damage to the components of the apparatus, such as the magnetic field generator."

52. EP 830 applies the self-regulating idea in products and methods discussed in the specification. The first type of product disclosed in the specification and illustrated in figures 1 and 2 does not feature in the claims. In this type the susceptor is within the tobacco and so it forms part of the replaceable consumable as opposed to the HNB apparatus.

53. An embodiment of the product as claimed is shown in figure 3, here annotated:

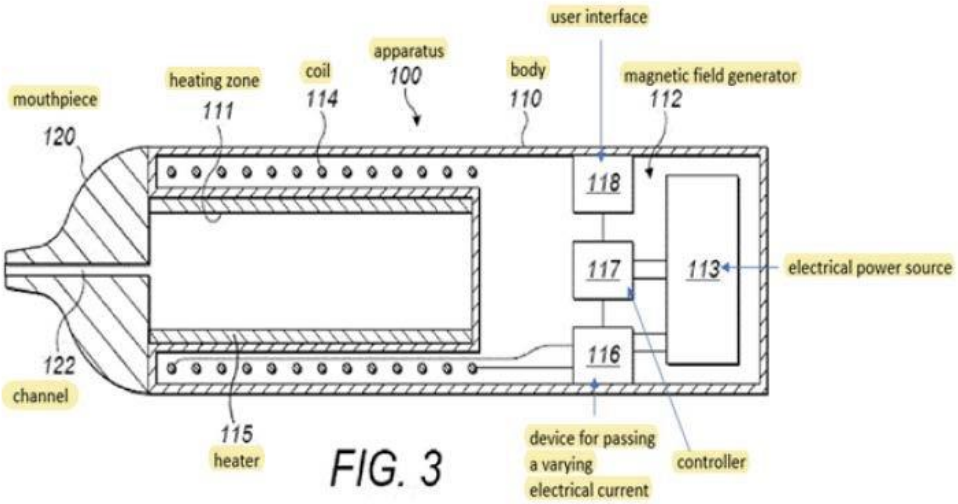


FIG. 3

54. The heating zone 111 receives the consumable, not shown, i.e. an article containing smokable material. The electrical power source, a battery, via device 116 creates an alternating magnetic field in the coil 114. The heater 115 is of a material such that its maximum temperature is exclusively determined by its Curie point, that temperature

being enough to volatilise the desired components of the tobacco but not high enough to burn the tobacco.

The claims

55. Claims 1-3, 6, 8, 11 and 13 are alleged by BAT to be independently valid and infringed. Of these, 1-3 and 6 are method claims, 8 and 11 are claims to products of the type shown above, with variations. Claim 13 is to a system comprising such a product plus a consumable containing the smokable material.

56. BAT has applied for a conditional amendment of the claims. It is sufficient for me to refer to claim 13, shown here with the conditionally proposed amendments underlined and in red:

> "(1) A system, comprising:
>
> (2) Apparatus (100) for heating smokable material comprising tobacco to volatilise at least one component of the smokable material; and
>
> (3) an article for use with the apparatus, wherein the article comprises smokable material;
>
> (4) wherein the apparatus comprises: a heating zone (111) for receiving the article,
>
> (5) a heater (115) for heating the smokable material when the article is in the heating zone,
>
> (6) wherein the heater extends to opposite longitudinal ends of the mass of smokable material and is formed of heating material that is heatable by penetration with a varying magnetic field, and
>
> (7) a magnetic field generator (112) for generating a varying magnetic field that penetrates the heating material;
>
> (8) characterised in that a maximum temperature to which the heater is heatable by penetration with the varying magnetic field in use is exclusively determined by a Curie point temperature of the heating material that comprises an alloy comprising iron and nickel; and
>
> (9) wherein the magnetic field generator comprises an electrical power source, a coil, a device for passing a varying electrical current through the coil, a controller, and a user interface for user-operation of the controller, wherein the coil is a helical coil of electrically-conductive material."

Construction

57. There is just one point of construction. It comes in integer (8) and concerns the meaning of the maximum temperature of the heater being "exclusively determined" by the Curie point of the material of which the heater is made.

58. PMI had the simpler argument: it means that the Curie point of the material, and only that Curie point, determines the maximum temperature to which the heater may be raised. Put another way, the only factor which governs the maximum temperature of the heater is an inherent property of the material of which it is made: its Curie point.

59. BAT argued that "exclusively determined" means that there must be a defined relationship between the maximum temperature of the heater and its Curie point. The patent specification expressly contemplates that the Curie point may be lower than the maximum temperature of the heater and teaches that there may be a sensor, a control mechanism for the maximum temperature other than the Curie point.

60. Beginning with the sensor, this is discussed in paragraph [0068]:

> "[0068] In some embodiments, the apparatus may have a sensor for detecting a Curie-related change in magnetism of the heater. The sensor may be communicatively-connected to the controller. The controller may be configured to control the device to cause the generation of the varying magnetic field to be halted or changed, on the basis of a signal received at the controller from the sensor."

61. Using such a sensor is an option within the invention. The sensor detects a change in magnetism of the heater, a change which is (necessarily) related to the Curie point. The system may be configured so that the detected change halts or alters the oscillating magnetic field being applied to the heater.

62. Figure 3 is discussed in paragraph [0052]. It is the first occasion on which the words exclusively determined are used:

> "A maximum temperature to which the heater is heatable by penetration with the varying magnetic field in use is exclusively determined by a Curie point temperature of the heating material of the heater."

63. BAT rely on "may" in paragraph [0073]. It comes during a passage in the specification discussing Figure 5:

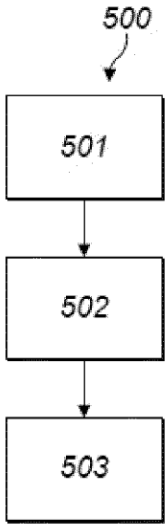


FIG. 5

64. This is the discussion, omitting reference numbers from figures other than Figure 5:

> "[0070] Referring to Figure 5, there is shown a flow diagram showing an example of a method of manufacturing a product for use in heating smokable material, according to an embodiment of the invention. The apparatus of Figure 3 may be made according to this method.
>
> [0071] The method 500 comprising determining 501 a maximum temperature to which a heater is to be heated in use. The determining 501 may comprise, for example, determining the combustion temperature of smokable material to be heated by the heater in use, and then determining the maximum temperature on the basis of that combustion temperature. For example, in some embodiments, the maximum temperature may be less than the combustion temperature of the smokable material, for the reasons discussed above. In other embodiments, the step of determining 501 may additionally or alternatively comprise determining a maximum comfortable temperature to which the exterior of the apparatus is to be permitted to reach in use while still being comfortable to hold by a user, and then determining the maximum temperature on the basis of that temperature. In still further embodiments, the step of determining 501 may additionally or alternatively comprise determining a maximum temperature to which components, such as electrical components, of the apparatus may be subjected in use without incurring damage, and then determining the maximum temperature on the basis of that temperature.
>
> [0072] The method further comprises providing 502 a heater comprising heating material, wherein the heating material is heatable by penetration with a varying magnetic field, and wherein the heating material has a Curie point temperature selected or determined on the basis of, or in dependence on, the maximum temperature determined at 501. The step of providing 502 may comprise, for example, manufacturing the heater from suitable heating material. The method may comprise adjusting the composition of the heating material during

> manufacture of the heater. Alternatively or additionally, the step of providing 502 may comprise selecting the heater from a plurality of heaters, wherein the plurality of heaters are made of heating material having respective different Curie point temperatures.
>
> [0073] The Curie point temperature of the heating material of the heater provided in step 502 may, for example, be equal to the maximum temperature determined in step 501, or may be less than the maximum temperature determined in step 501. The heater provided in step 502 may consists entirely, or substantially entirely, of the heating material. The heating material may comprise or consist of any one or more of the available heating materials discussed above, for example.
>
> [0074] The method then comprises forming 503 apparatus, such as the apparatus of Figure 3, that comprises a heating zone for receiving an article comprising smokable material, the heater for heating the heating zone, and a magnetic field generator for generating a varying magnetic field that penetrates the heating material, wherein a maximum temperature to which the heater is heatable by penetration with the varying magnetic field in use is exclusively determined by the Curie point temperature of the heating material."

65. In summary, the maximum temperature of the heater may be set by reference to the combustion temperature of tobacco or something else, such as a temperature of the product which is comfortable for the user to hold. This maximum temperature having been decided, the heating material is selected or adjusted so that it has a Curie point which is "selected or determined on the basis of, or in dependence on, the maximum temperature" earlier decided. It is in that sense, as stated in [0074], that the maximum temperature of the heater is "exclusively determined" by the Curie point of the material from which it is made. The Curie point may be equal to the maximum temperature decided upon but need not be.

66. Further, as already discussed, optionally there may be a sensor which controls the magnetic field by reference to the change in the magnetism of the heating material which in turn will depend on a Curie point. There need not be self-regulation in the strict sense.

67. I find that "exclusively determined" means that there must at all times be a fixed relationship between a Curie point of the heater material and the maximum temperature of the heater. It could be decided that the maximum temperature will always be, for instance, 10 degrees Celsius lower than a Curie point. That fixed relationship will still mean that the maximum temperature is exclusively determined by a Curie point within the meaning of the claim. On the other hand, a relationship between the two which is flexible, where the maximum temperature of the heater at any time is at least in part determined by one or more factors other than a Curie point of the heater material, will not comply with the claim on a normal construction.

The IQOS ILUMA System

68. The product alleged to infringe is the IQOS ILUMA System. I will describe it in general terms, omitting confidential details.

69. The system has two parts. The first part, the "device", generates an alternating magnetic field. It has an induction coil, rechargeable batteries, associated electronics and user interface. The second part, insertable into the device, is the "stick". It is a consumable containing tobacco (with glycerin), a heater, a filter and a mouthpiece filter.

70. As just indicated, the susceptor/heater is in the stick, surrounded by tobacco. It has three layers: a nickel iron alloy layer sandwiched between two stainless steel layers. The alloy layer has a Curie point of about 380^{o}C; the Curie point of the stainless steel layers is over 600^{0}C. The induction coil in the device surrounds a cavity into which the stick is inserted. When the device is turned on an alternating current is generated in the coil which causes the susceptor to heat by reason of both Joule heating and magnetic hysteresis heating.

71. There are two phases. The first is an initial calibration period lasting about 20 seconds. There follows an in-use heating period during which the nicotine and other elements of the tobacco are vaporised and inhaled by the user.

72. The operation of the system is discussed in more detail in the confidential annex to this judgment.

Infringement on a normal construction of the claims

73. BAT conceded that the IQOS ILUMA System does not infringe EP 830 on a normal construction of its claims. The heater of the claimed invention is in the apparatus which accommodates the consumable containing tobacco. The heater of the system is part of the consumable, surrounded by the tobacco.

74. For the reasons given in the confidential annex, I take the view that there is no infringement on a normal construction of the claims for the further reason that the maximum temperature to which the heater of the IQOS ILUMA System can be heated is not exclusively determined by a Curie point of the heating material.

The inventive concept

75. BAT defined the inventive concept of EP 830 in this way (I quote from the closing written submissions with original emphasis):

> "… 'magnetic hysteresis' can be harnessed as a practical manner of *heating* the tobacco in an HNB product and that the maximum temperature of the heater of the HNB product may be controlled by use of the Curie point temperature of the heating material, such that there is a defined functional relationship between the maximum temperature of the heater and the Curie point temperature."

76. PMI's version of the inventive concept is:

> "The use of the Curie point of the heating material in the apparatus inherently to self-regulate the maximum temperature to which the heater is heatable, in order to prevent over heating or combustion of the heated material, so that [the] system is able to be free of any other means to limit the temperature to which the heater is heatable."

77. PMI's use of the word "apparatus" implies that the inventive concept is (like the claims) confined to a system in which the "article" – the consumable containing the smokable material – does not contain the heater. BAT expressly accepted that the IQOS ILUMA System is a variant on the inventive concept in part because its heater is in the consumable. Therefore, even though BAT's formulation of the inventive concept does not confine the heater to the apparatus, it was in fact common ground that the inventive concept is confined in the manner implied by PMI.

78. Taking first BAT's formulation, I do not believe that the principle of harnessing magnetic hysteresis as a means of generating heat forms part of the inventive concept. BAT's expert, Mr Wensley, said that the principle was within the CGK and I see no reason to include it in the inventive concept since use of inductive heating will inevitably involve that principle. I also find the term "defined functional relationship" in BAT's formulation difficult to pin down.

79. With regard to PMI's inventive concept, "self-regulated" implies that the concept is confined to a system in which the maximum temperature of the heater is limited solely because as a matter of physics it is not possible for inductive heating to raise the maximum temperature beyond a Curie point. Yet the invention as claimed encompasses the use of a sensor as described above and a system in which the maximum temperature is below any Curie point. It seems to me that the inventive concept must accommodate those possibilities.

80. I would define the inventive concept in this way:

> "An HNB system in which (i) an article containing smokeable material is inserted into the heating zone of a heating apparatus, (ii) the smokable material is heated by inductive heating and (iii) the maximum temperature of the heater in the apparatus is exclusively determined by a Curie point of the heating material. 'Exclusively determined' means that the maximum temperature is at all times fixed by reference to a Curie point and dependent on no other factor."

Infringement as an equivalent

81. The variant in the present case is an HNB system as identified in the inventive concept save that (a) the heater is in the consumable and (b) the maximum temperature of the heater is not at all times fixed by reference to a Curie point of the heating material, in that it depends in part on whether the system is calibrating.

82. I have previously expressed the view that when the variant embodies more than one difference from the inventive concept, its status as an equivalent falls to be considered in one step taking into account all differences, see *Regen Lab SA v Estar Medical Ltd* [2019] EWHC 63 (Pat), at [210]-[211].

83. I will consider each of the revised *Improver* questions set out by Lord Neuberger in *Actavis UK Ltd v Eli Lilly & Co* [2017] UKSC 48, at [66].

Q1: Does the variant achieve substantially the same result in substantially the same way as the invention, ie the inventive concept revealed by the patent?

84. The result to which the inventive concept aims is the induction heating of smokable material in an HNB system such that the smokable material is heated sufficiently to volatilise nicotine and other compounds without burning the smokable material. The inventive concept achieves this result by using a Curie point of the heater material, exclusively, to determine the maximum temperature of the heater which is located in the main apparatus.

85. The variant relies on a Curie point, but during calibration the relationship between maximum temperature and Curie point changes. Also, the heater is in the consumable.

86. There was evidence that it makes a practical difference whether the heater is in the consumable or in what the claims call the apparatus. Having the heater in the apparatus may reduce the need for a safety mechanism, difficulties due to the consumable being inserted incorrectly or becoming damaged, or problems due to tobacco residue. It seems to me that practical pros and cons between an aspect of the inventive concept and an aspect of the variant are not necessarily relevant to the first *Actavis* question. A variant may work less well but still achieve exactly the same result in exactly the same way as the inventive concept.

87. Bald assertion aside, I was given no reason why the IQOS ILUMA System's way of using the Curie point in relation to the maximum temperature of the heater, or its having the heater in the consumable, or both in combination, substantially changes the way in which the relevant result is achieved. The key idea of using induction heating in an HNB system and relying on a Curie point of the heater material to cap the temperature of the heater is fully exploited in the IQOS ILUMA System. In my view that answer to the first question is yes.

Q2: Would it be obvious to the person skilled in the art, reading the patent at the priority date, but knowing that the variant achieves substantially the same result as the invention, that it does so in substantially the same way as the invention?

88. Similarly, I was given no reason why the skilled team at the priority date would have thought that the same result is not achieved in the same way by this variant. The answer to the second question is yes.

Q3. Would such a reader of the patent have concluded that the patentee nonetheless intended that strict compliance with the literal meaning of the relevant claim(s) of the patent was an essential requirement of the invention?

89. Since the *Actavis* judgment courts at first instance have had regard to a principle well established in the German Federal Court of Justice, considered and endorsed by Arnold J in *Akebia Therapeutics Inc v Fibrogen, Inc* [2020] EWHC 866 (Pat), at [464]:

> "If the description discloses a plurality of possibilities for achieving a specific technical effect, but only one of those possibilities is catered for in the patent claim, the utilisation of any other possibilities properly does not constitute infringement of the patent with equivalent means."

90. This "disclosed but not claimed" principle has since been relied on at least twice, see *Facebook Ireland Limited v Voxer IP LLC* [2021] EWHC 1377 (Pat) at [201] and

Shenzhen Carku Technology Co., Ltd v The Noco Company [2022] EWHC 2034 (Pat) at [106]-[112].

91. As I have indicated, the specification of EP 830 discloses and even illustrates an HNB system in which the heater is in the consumable. These are Figures 1 and 2 with annotations:

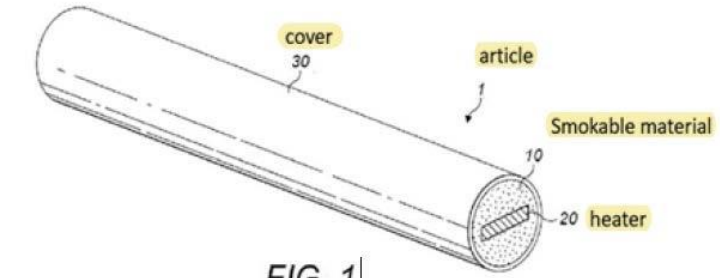


FIG. 1

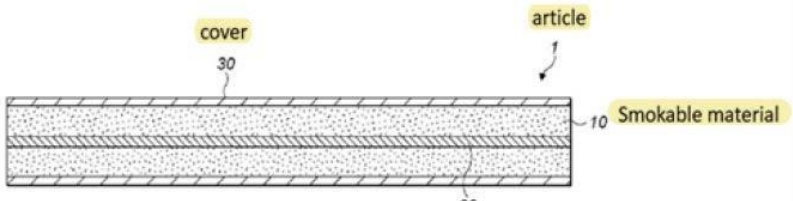


FIG. 2

92. This form of an HNB product is not expressly identified as a comparative example but I think that the skilled reader of EP 830 would take it to be such. It is not claimed.

93. BAT's answer was to emphasise that the patent claims the system as whole, not the article and apparatus separately, and that a skilled reader would understand that it is immaterial whether the heater is in the consumable or the apparatus. BAT argued that the "disclosed and not claimed" principle, if applied in a case such as the present one, would mean that a patentee must claim every possible configuration even when the reader would understand that selecting this or that configuration would be immaterial to the inventive concept.

94. I am not persuaded. Not all the claims relate to the system as a whole: claims 8 to 12 are to the apparatus only, though this is a minor point. Without exception, the method, apparatus and system claims require the heater to be in the apparatus, not in the consumable. It could be said that BAT's complaint that a patentee would have to claim every configuration disclosed if it wished to protect every such combination is correct. But that is the patentee's option. Where instead the patentee says in the description that the technical effect identified can be achieved either by means A or B but goes on to claim only means B, this is a clear indication from the patentee that means A does not fall within the scope of the claims, whether as a matter of normal construction or equivalence. Any other approach to construction would sanction patents likely seriously to mislead the public.

95. The answer to the third *Actavis* question is yes. The IQOS ILUMA System does not fall within any of the claims of EP 830.

Validity

96. PMI relies on two items of prior art:

    (1) A thread of posts with the subject head "Induction Vaporizer (based on 'Curie' alloys)" dated on or before 2 December 2011 by several individuals including one posting under the pseudonym "Egzoset" on the Fuck Combustion online forum ("Egzoset").

    (2) PCT Application No. WO 2014/023965 A1 ("Duffield").

97. Egzoset is alleged to deprive the invention claimed in EP 830 of novelty and inventive step. Duffield is alleged to deprive the invention of inventive step only.

Egzoset

98. PMI relied on the entirety of the thread and in addition the content of a website ("the NeoMax website") to which there is a link in the first of the thread's posts.

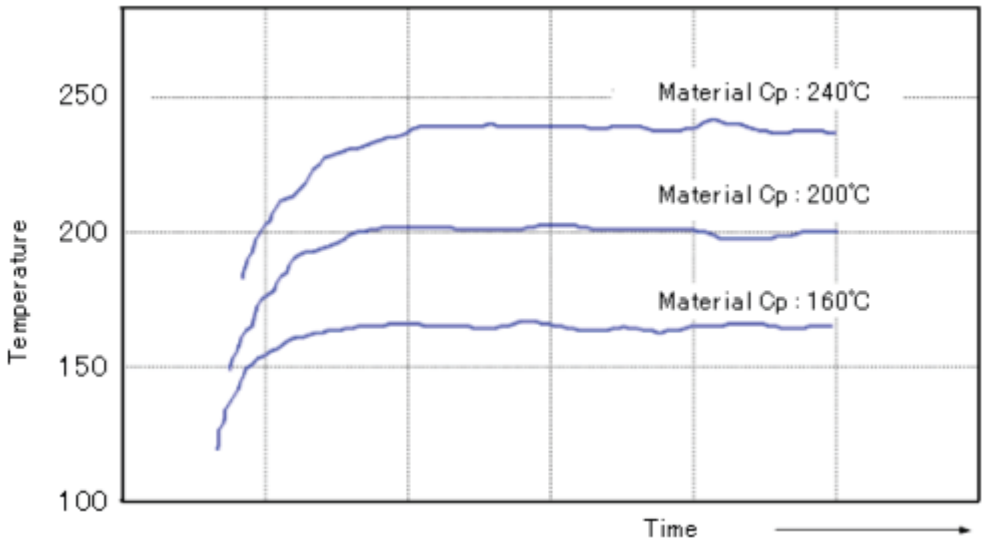
99. The thread consists of a discussion initiated by Egzoset on 13 November 2011 under the title "Induction Vaporizer (based on 'Curie' alloys)". It begins with Egzoset addressing an individual calling him- or herself "MagicFlight". MagicFlight was presumably an officer or employee of a company with that name. Dr Bleloch knew of the corporate MagicFlight, identifying it as a company based in San Diego which, at the priority date of EP 830, was seeking to develop and commercialise HNB technology, principally directed to use with cannabis.

100. Egzoset started [Post 1 in the sequence] by quoting an earlier post by MagicFlight who had said:

> "Incidentally, we did actually build an induction system vaporizer as a lab prototype once. It worked ok, but was extremely expensive and hard to make – not at all portable."

101. Egzoset then provided a link to a YouTube video made by Egzoset showing an experiment of his own in which the base of a tin has been put on a small domestic induction cooker hob. Induction heating of the tin's base causes solder on it to melt.

102. Egzoset also reproduced a graph from the NeoMax website illustrating how the Curie points of three different alloys each limits the temperature to which the relevant alloy may be heated by induction:



103. There is a link to the NeoMax website. Egzoset then asked MagicFlight:

> "I mean, you selected an alloy with an appropriate Curie point for a vaporizer application, right?"

104. Following some digression, someone called Frederick McGuire gave a short summary of his understanding from the previous posts of how induction heating could be used for vaping and asks whether this is feasible. Egzoset's reply included this [Post 11]:

> "So, to summarize, implementation might possibly take place in this manner:
>
> 1) Have an induction cooker handy
>
> 2) Select a metal sheet with its Curie point set between 160 C and 204 C
>
> 3) Cut a plain disc the size of a CD-ROM into that sheet (~4″)
>
> 4) Turn the metal disc into a heat exchanger by stacking ceramic maze on top of it:
>
> …
>
> It would make sense to use a ceramic maze with multiple trenches in order to maximize airflow, metal pins emerging from the metal disc could help to thermalize the air entering the sides. A 3rd layer covering the ceramic maze would seal the air circuits and collect hot air at the center point where an opening would match a suitably designed vaporizing bowl. Put briefly, a vaporist would place his CD-ROM case-like heat exchanger on the induction cooker with its complementary vaporizing bowl sitting over the central hole. A flexible silicone tube would collect the cannabis vapor on the other side of that bowl or perhaps it should be feasible/desirable to add a water toy on top of the rest...
>
> Now, the beauty of this concept would reside in the absence of a Closed-Loop Control System: automatic heat regulation would result from the metal becoming magnetically transparent once it reaches its Curie point, which in turn

> would cause it to stop absorbing electromagnetic energy... Once the disc would start cooling below its Curie point it would start heating up again and so on, effectively working like a servomechanism. The difference from conventional vaporizers consists in the fact that the alloy would always behave the same way, this implies that the heat exchanger would be rendered 100 % reliable as there would be no parts exposed to potential failure - unless one destroys the induction cooker and/or the ceramic maze (the later could as well be made of silicone instead, by the way)!"

105. Dr Bleloch drew Egzoset's ceramic maze for holding the cannabis, as Dr Bleloch understood it to be and later produced a revised version. In cross-examination he said that Egzoset had set out his idea on this clearly enough to build and that it was a kind of skillet for putting on the kitchen inductor hob.

106. MagicFlight responded [Post 12] to Egzoset:

> "The concept is an interesting one. One practical detail you might want to keep in mind is that most (probably all) of these induction heaters have an automatic shutoff in the event that there is no pot on the surface. They sense the existence of the pot by detecting increases in the magnetic permeability of the local field near the resonance coil. Without sufficient local permeability, tank circuit resonance is not obtained, and the unit does not operate. Therefore, your custom metal plate would need to have sufficient permeability and energy adsorption characteristics at all operating temperature ranges despite its curie point transition. Unfortunately, this largely defeats the point of using the curie point as a regulating mechanism. As soon as the set-point temperature is reached, the delivery coil shuts off and regulation is lost.
>
> Note that attempting to bypass the feedback ring in the induction unit itself, or to build a custom inductor, does not help. This is because that the resonance conditions required in the tank circuit assume a certain local field permeability to be present at start-up. While some variations of the energy adsorption characteristics in the magnetically coupled system are possible, the range required by curie point regulation tends to be too large. The Q coefficient of the resonator tends to be too low in such systems to be practical (very not energy efficient).
>
> In short, it can be done, but it usually requires a custom induction system (with active loop feedback). We gave up on the concept not because it was not possible, but because it was not energy (and cost!) efficient enough to make it worth it. Because such systems tend to be very complex to build and are somewhat "fussy", they are usually only applied in special circumstances."

107. Egzoset replied [Post 13]:

> "Thank you for this 1st-hand testimony, also the very 1st i ever had a chance to read about on this board - or anywhere else for that matter!
>
> …

> I was hoping that the induction cooker would be slow to detect an 'insufficient load' condition, allowing the vaporist to get his 'hit' before the device's timeout delay is over. On my YouTube video we can see that the melting temperature of Sn/Pb solder (183 C - 188 C) was reached in 7 seconds or so, e.g. before the appliance turned itself off. Now that i think of it, the machine did power down indeed but not before my small metal disc became red-hot.
>
> ...
>
> In any case, it seems you've experimented with alloys characterized by the Curie effect. Under these circumstances i find myself satisfied to know that induction was given a try, at the very least...
>
> That's good enough for me, thanks again."

108. Egzoset then summarised to another individual, Biojuggernaut, what he had learned from his experiment shown in the YouTube video [Post 15]:

> "Finally, at least three lessons were learned on that day:
>
> 1) Even a small disc only 4 inches in diameter might work well
>
> 2) It could be made sufficiently hot for vaporizer applications
>
> 3) The machine was able to support a minimum of 1 inhalation
>
> In conclusion, the Curie point would still be a major asset for this type of experiment. It's true commercially available induction cookers stop generating electromagnetic energy after a 'no load' delay but using a proper alloy would still garantee (100 %!) that the metal's temperature never raises beyond the Curie point ever!... Which should translate as 'SAFE' for vaporizer applications i believe."

Novelty

109. PMI's Statement of Case on Validity asserted that each of the integers of the claims of EP 830, including claim 13, were found in Egzoset. BAT's pleaded response was to make no admission in relation to every integer of every claim, unhelpfully providing no reasons why it was entitled not to admit disclosure of every integer.

110. Dr Bleloch supported PMI's integer mapping in his evidence, setting out where in Egzoset each was to be found. Mr Wensley made only the point that Egzoset does not disclose a means for making an HNB product for tobacco. Certainly there is nothing in Egzoset which provides any information regarding the practical manufacture of a portable tobacco HNB product of the type with which this litigation is primarily concerned. But neither portability nor tobacco are elements of the claims.

111. In argument BAT did not directly address the claims mapping that Dr Bleloch had done. Instead, it heavily emphasised that the post must be taken as a whole, including those parts which may be said to lead away from the invention claimed in EP 830.

112. This is generally a point which has relevance to inventive step rather than novelty. If an item of prior art sufficiently discloses an invention as claimed, it may make no difference that the prior art goes on to point out this or that shortcoming in the invention, especially commercial drawbacks. The invention has still been disclosed.

113. On the other hand, it is long established that to anticipate an invention the prior publication must contain "clear and unmistakable directions to do what the patentee claims to have invented", see *General Tire & Rubber Co v Firestone Tyre & Rubber Co Ltd* [1972] RPC 457, at 444. The same passage of the judgment of the Court of Appeal in *General Tire* put the test of anticipation in this way (at 444):

> "… if carrying out the directions contained in the prior inventor's publication will inevitably result in something being made or done which, if the patentee's patent were valid, would constitute an infringement of the patentee's claim, this circumstance demonstrates that the patentee's claim has in fact been anticipated."

114. The relevant passage from *General Tire* was more fully quoted (there seems to have been a typo regarding the page reference) and approved by Lord Hoffman in *SmithKline Beecham plc's (Paroxetine Methanesulfonate) Patent* [2005] UKHL 59, at [21]. Lord Hoffmann continued:

> "… the matter relied upon as prior art must disclose subject-matter which, if performed, would necessarily result in infringement of the patent."

115. In Post 12 Magic Flight makes it clear that the induction heater of Post 11 is liable to cut out before the temperature required is reached. He says, unequivocally, that attempting to bypass the feedback ring of the heater or to build a custom induction heater "does not help", giving detailed reasons why this is not practical. MagicFlight goes on to say it "can be done", but his company "gave up on the concept" because such systems tend to be "very complex to build" and somewhat "fussy". It is not clear from Post 12 whether MagicFlight the company gave up before making such a system because of the problems or whether, having made one, its fussy performance led to the project being abandoned. In other words, it is not clear whether MagicFlight was speculating as to whether it was possible to work around the problem of the induction hob's cutout.

116. In Post 1 MagicFlight had said that his company had built an induction system vaporizer as a lab prototype once, that it worked ok, but was extremely expensive and hard to make and not at all portable. MagicFlight does not say whether this was the system referred to in Post 12. If the company gave up the Post 12 project before making a prototype, the Post 1 system must have been different. It could therefore have been some other system which did not attempt to exploit the Curie point of the heating material.

117. In Post 13 Egzoset appears to have understood MagicFlight to mean that Egzoset's proposal was unworkable. Egzoset's summary of the YouTube experiments to Biojuggernaut in Post 15 repeats that a "proper alloy" would ensure that the temperature of his heating metal would never rise above its Curie point. But he or she appears to accept that the "no load" cutout of commercially available induction cookers will operate before the Curie point of the heater material is reached. His or her point seems

to have been that because the temperature of the heater could never rise above the Curie point, this provides a safety feature, presumably in the event that the cutout were to fail.

118. The notional reader of Egzoset would conclude that in a system made according to Egzoset's idea in Post 11, the maximum temperature of the heater would not be determined by the Curie point of the heating material. The no-load cutout of the domestic hob would be the determining factor.

119. There are theoretical workarounds – bypassing the feedback ring of the heater or building a custom induction heater. But MagicFlight says that these do not help, explaining why. At best making an induction heat vaporizer this way would be "very complex to build" and no guidance is given to deal with those complexities. Also, it would be fussy, implying it may not work.

120. In my view Egzoset (the document) would not have informed the skilled reader how to make a system for heating and volatilising smokable material using induction heating and using the Curie point of the heater material to maximise the temperature of the heater. That is because an attempt by the skilled team to follow the idea of Egzoset would not have inevitably resulted in something that fell within the claims of EP 830. Very likely it would not have done.

121. The claims of EP 830 do not lack novelty over Egzoset, whether as granted or as proposed to be amended.

Inventive step

122. BAT's evidence and argument on inventive step emphasised the difficulties identified in Egzoset. Mr Wensley described Egzoset as being "both obscure and confusing", "a stream of consciousness where ideas … in some cases [are] conflicting and internally inconsistent."

123. These are the steps for the assessment of inventive step set out in *Pozzoli SpA v BDMO SA* [2007] Civ 588, at [23]:

> "(1) (a) Identify the notional "person skilled in the art";
>
> (b) Identify the relevant common general knowledge of that person;
>
> (2) Identify the inventive concept of the claim in question or if that cannot readily be done, construe it;
>
> (3) Identify what, if any, differences exist between the matter cited as forming part of the 'state of the art' and the inventive concept of the claim or the claim as construed;
>
> (4) Viewed without any knowledge of the alleged invention as claimed, do those differences constitute steps which would have been obvious to the person skilled in the art or do they require any degree of invention?"

124. I have discussed steps (1) and (2). BAT's argument regarding (3) and (4) was as follows. The matter cited as part of the state of the art according to step (3) is Egzoset. The skilled team reading that document would have been actively discouraged from

making something falling within the claims because of problems which are characterised as being very complex, to which no workable solution is provided. Therefore claim 13 cannot lack inventive step over Egzoset.

125. I agree that the skilled team, having read Egzoset, would not have taken forward the idea of creating a vaping device based on a home induction hob. But it does not inevitably follow that claim 13 lacks inventive step. That would require too narrow an approach to the concept of inventive step.

126. The skilled team would have been interested in developing HNB tobacco products. A team like that would have had no interest whatever in making a product based on an induction hob. The hypothesis is that they would have wanted to make a product that looks as much as possible like a cigarette. I have found that the team would have regarded the ideas in Egzoset as unworkable. But within that disclosure there is the idea of using the Curie point of the heating material to determine the maximum temperature of the heater. The question is whether that idea would have been communicated to the skilled team which had read Egzoset with care and if so whether it would have led the skilled team to contemplate a system within claim 13 of EP 380.

127. A positive answer rests on three propositions. First, that the CGK of the skilled team included everything within claim 13 bar the Curie point idea. The second is that the skilled team, having read Egzoset, would have understood that the idea was not tied and necessarily confined to the Egzoset arrangement using an induction hob; it was a free-standing idea in the sense that it could be applied in a different context, specifically that of an HNB product resembling a cigarette. The third is that it would have been obvious to take the idea from Egzoset and to apply it in the latter context with a reasonable expectation of success – a reasonable expectation that it would work in an HNB product notwithstanding the difficulties identified in Egzoset.

128. As EP 830 acknowledges, HNB cigarette substitutes were known at the priority date. Neither the experts nor counsel in argument suggested that there was anything new or inventive about any integers of claim 13 except the characterising portion:

> "characterised in that a maximum temperature to which the heater is heatable by penetration with the varying magnetic field in use is exclusively determined by a Curie point temperature of the heating material."

129. Given that this includes the arrangement discussed in paragraph [0068] of the Patent and Mr Wensley's concession in cross-examination that this formed part of the CGK, there is an argument that claim 13 covers a system that would have been obvious over the CGK alone. But this was not pleaded and attention was directed to the principal embodiment of the invention, clearly not part of the CGK, in which no sensor is required.

130. With regard to the second and third propositions, which I will take together, Mr Wensley's evidence can be summarised as stating that the skilled team would have dismissed the contents of Egzoset because (a) the team would not have been interested in inductive heating, (b) Egzoset is concerned with cannabis vaping and (c) the skilled team would not take seriously a stream of consciousness.

131. I have found that the skilled team would be interested in inductive heating, albeit not to the exclusion of resistive heating.

132. Cannabis is a smokable material. If it were technically obvious to make an HNB cannabis vaping product in conformity with claim 13, it would not be relevant that for sound legal and therefore commercial reasons, the skilled team would not have wanted to make such a thing. In any event, it was the evidence of Dr McLaughlin that a similar level of temperature control is required for both cannabis and tobacco vaping, so a team interested in the latter would take inspiration from a credible disclosure regarding the former.

133. Next, it must be assumed that the skilled team would have read Egzoset with interest in the relevant sense: it would have been read carefully so as to understand, to the extent possible, the meaning communicated by the words and graphical information in the document. I have discussed that meaning above.

134. Dr Bleloch said in his written evidence that the idea of using a ferromagnetic heater which is selected according to its Curie point so that the Curie point dictates – which I take to be exclusively determines – the temperature of the heater is explicitly clear from Egzoset. Dr Bleloch maintained this evidence in cross-examination. I understand Dr Bleloch to have meant by this that the idea would not have been understood by the skilled team to be confined or tied to the induction hob arrangements of Egzoset and no reason was given by Mr Wensley why it would be.

135. BAT argued that the use of the Curie point to determine the maximum temperature of the heater would only have been understood from Egzoset if the skilled team, as part of their CGK, knew about magnetic hysteresis. Only then would the flattening out of the three curves in the graph in Post 1 have made sense, or at least been correctly understood.

136. I have found that part of the CGK was the understanding of the phenomenon of magnetic hysteresis, that it played at least a part in induction heating, and the extent of that part depended on the composition of the susceptor. But it seems to me that this knowledge was anyway not necessary for an understanding of the key idea disclosed in Egzoset – namely that by selecting a particular alloy as the heater material, one could select the maximum temperature which the heater could reach by induction heating – its Curie point – and by extension one could choose that to be a temperature suitable for an HNB product without the need for any other temperature control. It would not have been necessary to understand magnetic hysteresis to take that idea on board.

137. There was a further argument that while the link to the NeoMax website page in Post 1 can be treated as a cross-reference to another document, it was not legitimate to assume, as part of the Egzoset disclosure, the whole of the NeoMax catalogue which lists a variety of materials and their Curie points from which the skilled person might select one that is appropriate.

138. The extent to which links in a document on the internet, and possibly further links, can expand the disclosure of a single item of prior art will always be a question of fact and degree and may require evidence, see by analogy *Regen Lab SA v Estar Medical Ltd* [2019] EWHC 63 (Pat), at [158] to [163]. However, the CGK of the skilled person will include material in the relevant field which the skilled person knows to exist and which

would be consulted as a matter of course if it is regarded as sufficiently reliable to help in the understanding of the prior art, see *Raychem Corporation's Patent* [1998] RPC 31, at 40; quoted and approved on appeal at [1999] RPC 497, at 503-504. Dr Bleloch was not challenged on his unsurprising evidence that the skilled team, having been told by Egzoset that NeoMax could provide suitable alloys, would as a matter of course look up the NeoMax product guide.

139. Finally, BAT advanced an argument often raised by patentees: it cannot have been obvious to use inductive heating for a tobacco HNB product at the priority date in October 2015 because no such product was launched until the IQOS ILUMA product launch in 2021. The strength of such an argument will always depend on the facts. The point was put to Dr McLaughlin who said that the timeline from conducting the relevant research (and presumably deciding on the way in which the product will work) to the launch of a commercial product, via stages such as product development and factory tooling, was seven years or more. I have no reason to doubt that this was an accurate estimate.

140. I agree with Dr Bleloch that the idea of exploiting the Curie point of the heater material to be the sole means of maximising the temperature of the heater would have been taken by the skilled team from Egzoset and understood. His view of what the team would have done with the idea makes sense.

141. In cross-examination Mr Wensley conceded that if the skilled team had decided to try inductive heating, Egzoset would have informed the team of the idea of using the Curie point of the heating material to exclusively determine the maximum temperature of the heater and they would do it – in other words it was obvious to try.

142. There was evidence from the experts as to whether the skilled person would have perceived any technical reason why the induction hob idea in Egzoset would be likely to work if used for tobacco. Dr Bleloch said that there was no technical reason why it would not work, although I think he was assuming that the induction hob idea could be made to function in the first place. Mr Wensley thought that the discussions in Egzoset presented a roller-coaster ride of encouragement and discouragement, more the latter.

143. The issue on obviousness was not that. Neither expert expressly addressed the question whether the skilled person would have had a reasonable expectation that the idea of using the Curie point of the heater material to be the sole means of maximising the temperature of an induction heater in an HNB product of the type known in the prior art would succeed. My impression is that this was taken for granted. When the experts gave their evidence that this idea would have been communicated by Egzoset to a skilled team interested in developing tobacco HNB products, I think it is almost certain that they would have qualified this by pointing out perceived difficulties in applying the idea to known tobacco HNB products if that is what they thought. Nothing in the way of an obstacle to the idea working in such a product was raised in evidence or argument or hinted at. Starting with a prior art HNB tobacco product, a product within claim 13 would have been obvious.

144. On the facts of the present case I think it is appropriate to approach the question of inventive step as I have done above. But I will also address the *Pozzoli* steps in a more conventional manner.

145. The key difference between the matter disclosed in Egzoset and that of claim 13 is that claim 13 dispenses with an induction hob as the heater – a system excluded from the scope of claim 13 since, as I have found, the maximum temperature of the heater is not determined by the Curie point of the heating material when a commercial induction hob is used. The obvious way for the skilled team to go – in fact a good deal more obvious than using an induction hob – was to structure the product in a manner something like that of the HNB tobacco products of the prior art, see for example the PMI Accord or IQOS system illustrated above, but using an inductive heater. Mr Wensley accepted as much in cross-examination. A product in that sort of form was what the market wanted. No difficulty in making such a thing was identified in the evidence such that it would have prevented or discouraged the skilled team from creating such a product. It would have been a system within claim 13.

146. In my judgment claim 13 as granted lacks inventive step over Egzoset.

147. Claim 13 as conditionally proposed to be amended limits the system to a HNB tobacco device and incorporates specific features of a tobacco device. Had I found that Egzoset anticipated claim 13, the amendment would have overcome that objection.

148. The added features are:

(i) the heater extends to opposite longitudinal ends of the mass of the tobacco;

(ii) the magnetic field generator comprises an electrical power source, a coil, a device for passing a varying electrical current through the coil, a controller and a user interface for operation of the controller;

(iii) the coil is a helical coil of electrically-conductive material; and

(iv) the heating material comprises an alloy comprising iron and nickel.

149. The third of these excludes the use of an induction hob as a heater.

150. BAT did not argue in closing that the added features, either individually or collectively, would not have been part of the old IQOS system or obvious to use for that system and this was consistent with the evidence. Since claim 13 as granted is obvious over Egzoset, so is claim 13 as proposed to be amended.

151. As stated above, claim 13 is a convenient proxy for all the claims. All the claims of EP 830 lack inventive step over Egzoset.

Duffield

152. Duffield is a PCT Application with the title "Device for evaporating a volatile material". The examples of the volatile material which the patentee had in mind are stated at the start of the specification and are a fragrance, pesticide or medicament.

153. The characteristic product disclosed is a device for delivering fragrance to a room. Annotated Figures 4C and 5A show an embodiment:

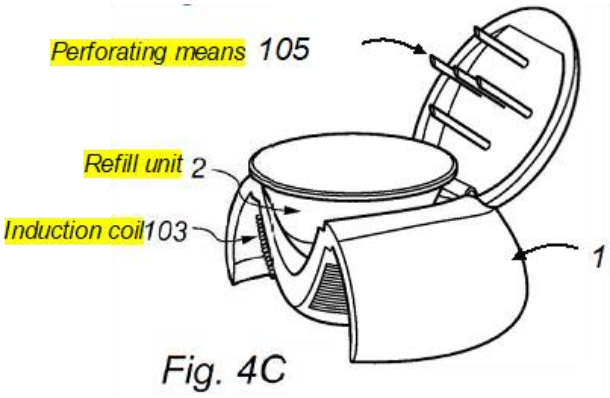


Fig. 4C

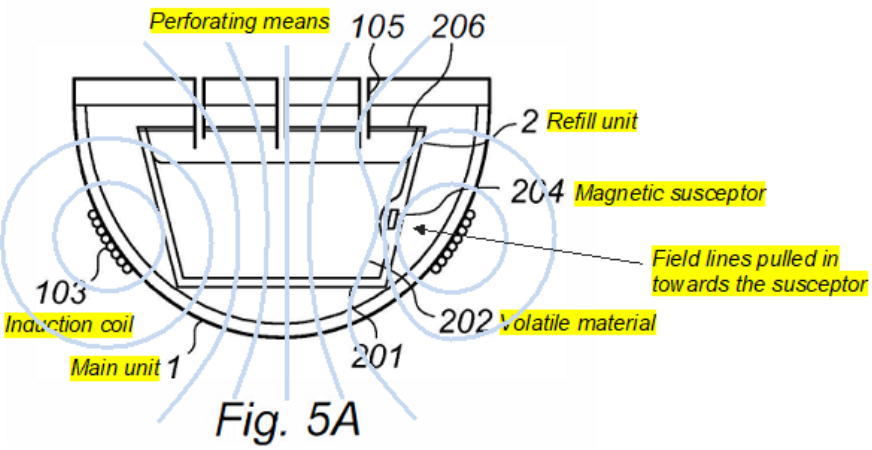


Fig. 5A

154. The refill unit contains the volatile liquid and a susceptor. It is placed into the main unit which is fitted with an induction coil. Power is supplied to the coil which then applies a magnetic field to the susceptor. The susceptor heats, primarily by magnetic hysteresis, causing the volatile liquid to evaporate through perforation holes created by piercing devices in the lid of the main unit. Examples are given of materials which can be used for the susceptor, namely iron, nickel and cobalt, and alloys of those metals.

155. On page 8 the specification says:

> "To provide the device with a stable maximum operating temperature the susceptor(s), may comprise a material with a stable Curie temperature, preferably less than 150°C. When the magnetic susceptor(s) is heated beyond this temperature, the susceptor(s) will become paramagnetic and no longer be susceptible to hysteresis heating until such time it cools down back below its Curie temperature. By selecting a magnetic susceptor(s) with a low and stable Curie temperature, it is possible to prevent the temperature of the volatile liquid in the volatile material transport means exceeding a predetermined level, even if for some reason excess power is supplied to the induction coil."

156. Duffield also explains that where inductive heating is used, exploiting magnetic hysteresis is more efficient than the Joule heating caused by eddy currents. An example given is using copper as a non-magnetic susceptor in the refill. Being non-magnetic it will heat solely by reason of eddy currents. Its temperature will rise by only 4°C. If an appropriate magnetic susceptor is used, the same inductor coil will cause the temperature of the susceptor to rise by ten times that amount.

157. There is no discussion of an HNB product. Mr Wensley identified three principal differences between the sort of product disclosed in Duffield, which I think really amounted to two. First, the temperature for heating the volatile materials of Duffield is lower than the temperature required to volatilise tobacco compounds. Duffield speaks of a temperature less than 150°C, whereas tobacco HNB products heat the tobacco to a maximum in the range 200-400°C. Secondly, Duffield devices are relatively large, static and powered by a mains electricity or a large battery, as opposed to the HNB tobacco products which must be small, portable and powered by a small battery. In his written evidence Mr Wensley said that the skilled team of the present case would not find anything in Duffield of interest.

158. The second of these does not apply to claim 13 as granted. There is, in fact, a further difference between Duffield and claim 13. In Duffield the susceptor heater is in the refill unit, the equivalent of claim 13's consumable article, as opposed to the main unit or "apparatus" of claim 13.

159. In cross-examination Mr Wensley's differences fell away in that he could suggest no technical barrier at the priority date that would prevent a skilled team from making a system with a maximum temperature in the 200-400°C range or a system which was portable and powered by a small battery. He agreed with Dr Bleloch that Duffield illustrates the potential for magnetic hysteresis heating and the potential for having a susceptor which self-regulates its maximum temperature by reason of its Curie point. Mr Wensley's cross examination on this topic concluded in this way:

> "Q. All right. Let us assume that [the skilled team is] interested in taking Duffield forward, if you are interested in taking Duffield forward and you are interested in making a heat-not-burn product, then an obvious thing to try is a susceptor made from one of the nickel alloy materials with a Curie point, relevant [to] tobacco, with or without a sensor?
>
> A. Yes."

160. As with Egzoset, I think that the realistic way to view the perspective of a skilled team interested in HNB tobacco products in October 2015, a team which would consider inductive heating to be a possibility, is that the team would have in mind one of the electrically heated HNB tobacco products known in the CGK as a starting point.

161. Those products had the features of claim 13 except for the characterising portion of the claim. The experts were agreed that Duffield would have communicated to the team the idea of selecting a susceptor with a Curie point such that the Curie point exclusively determines a maximum temperature.

162. Mr Wensley said in his written report that Duffield would not have been of interest to the skilled team, being nothing like an HNB product. Evidence from a witness that an item of prior art would have been of no interest must sometimes be treated with caution. It may imply an expert's view that the skilled person would have dismissed the prior art having cursorily considered its content. What matters is the view of the skilled person after they have diligently read and taken on board the content no matter how unpromising the content at first appears.

163. In cross-examination Mr Wensley said that the skilled team trying to implement an HNB product would see concrete challenges in implementing the ideas of Duffield in an HNB product but they could be overcome. In that more relevant sense Duffield would have been of interest. Mr Wensley accepted more specifically that the skilled team would have been interested in the ideas of magnetic hysteresis heating and use of the Curie point as a self-limiting cap on the temperature of the heater. He said that to a skilled team wishing to make an HNB product it would have been obvious to try using a susceptor made from one of the nickel alloys mentioned in Duffield, one with a Curie point suitable for an HNB tobacco product.

164. Dr Bleloch, who was working in the field at the relevant time, said that Duffield would have been of interest to the skilled team and that he would have loved to have seen Duffield. In cross-examination he maintained his view that it would have been obvious to modify Duffield to create a claim 13 product.

165. In short, Duffield has in common with Egzoset that the disclosure of this idea is in a manner such that it would have been perceived by the skilled team as being one which is not tied to the context of Duffield and could be applied to a tobacco HNB product with a reasonable expectation that it would work. Consequently claim 13 lacks inventive step over Duffield.

166. As with Egzoset, BAT did not suggest in closing that the conditionally proposed amendments would make any difference.

Added Matter

The law

167. The proposed amendments to the claims of EP 830 would not save the patent from being obvious over the prior art. For that reason alone permission to amend should not be granted. I will deal with the more substantive argument briefly.

168. The relevant legal principles were set out by Floyd LJ in *Conversant Wireless Licensing Sarl v Huawei Technologies Co., Limited* [2020] EWCA Civ 1292 at [55] to [60]. This included a passage from *AP Racing Ltd v Alcon Components* Ltd [2014] EWCA Civ 40. It is sufficient here to quote two of the paragraphs from *AP Racing*:

> "[8] The issue of added matter falls to be determined by reference to a comparison of the application for the patent as filed and the granted patent. As Aldous L.J. said in *Bonzel v Intervention Ltd (No 3)* [1991] R.P.C. 553 at p.574:
>
> > 'The task of the Court is threefold:
> >
> > (1) To ascertain through the eyes of the skilled addressee what is disclosed, both explicitly and implicitly in the application.
> >
> > (2) To do the same in respect of the patent as granted.
> >
> > (3) To compare the two disclosures and decide whether any subject matter relevant to the invention has been added whether by deletion or addition. The comparison is strict in the sense that subject matter will be

> added unless such matter is clearly and unambiguously disclosed in the application either explicitly or implicitly.'

> [9] In the end the question is the simple one posed by Jacob J. (as he then was) in *Richardson-Vick Inc's Patent* [1995] R.P.C. 568 at p.576 (approved by him as Jacob L.J. in *Vector Corp v Glatt Air Techniques Ltd* [2007] EWCA Civ 805, [2008] R.P.C. 10 at [4]):

> > 'I think the test of added matter is whether a skilled man would, upon looking at the amended specification, learn anything about the invention which he could not learn from the unamended specification.'"

169. The substantive argument turns on the addition in claim 13 as granted of the requirement that the heater:

> "… extends to opposite longitudinal ends of the mass of smokable material."

170. This feature is expressly disclosed in the application, but only in the context of an embodiment illustrated in figures 1 and 2 in which the heater is part of the consumable or "article" inserted into the main part of the product, the "apparatus". The application states (omitting reference numerals):

> "In this embodiment, the heater extends to opposite longitudinal ends of the mass of smokable material. … However, in other embodiments, the heater may not extend to either of the opposite longitudinal ends of the mass of smokable material, or may extend to only one of the longitudinal ends of the mass of smokable material and be spaced from the other of the longitudinal ends of the mass of smokable material."

171. In all the claims of EP 830 the heater is part of the "apparatus". BAT pointed out that the application teaches that it is beneficial for the heater to extend to opposite longitudinal ends of the mass of smokable material because that can help provide more uniform heating of the smokable material. Therefore, BAT argued, the skilled team would understand that the benefit of the feature would apply whether the susceptor is within the article or within the apparatus.

172. PMI submitted that while the patent application would have made it obvious to the skilled team to use the longitudinal ends feature in the claimed embodiments, it was not disclosed. I agree. The longitudinal ends feature is not clearly and unambiguously disclosed in the application either explicitly or implicitly. There is added matter in the claims as proposed to be amended.

The Arrow Declaration

173. PMI seek a declaration that the marketing and sale in the UK of certain products would have been acts in respect of products that on 31 August 2015 were not new and/or were obvious over cited prior art. The products are defined as each having the following features:

> "A heat-not-burn system consisting of a heating device and single-use tobacco-containing sticks:

1. The device comprises:

    a. a helical coil module, which generates an alternating magnetic field, the module surrounding a cavity at the mouth end of the device into which the stick is inserted;

    b. control electronics and a microcontroller;

    c. a rechargeable battery, which supplies power for the electronics and helical coil module; and

    d. user interface components, such as a user-operated switch.

2. The sticks are elongate and cylindrical and include:

    a. a tobacco plug, which comprises homogenised tobacco material and glycerin, and a metallic susceptor that is surrounded by and in contact with the tobacco material; and

    b. a mouthpiece filter at the proximal end of the stick.

3. The tobacco plug is wrapped in a plug wrapper made of paper. The tobacco plug is further wrapped by an outer paper wrapper. Both the plug wrapper and the outer paper wrapper are wrapped in such a way that the longitudinal edges of the wrapper overlap, and an adhesive is applied to one of the longitudinal edges of the wrapper so that when edges overlap, they are glued together.

4. The metallic susceptor in the stick is a flat strip that is impermeable to air. The susceptor comprises metallic material that is electrically conductive and magnetic. The susceptor is uniform in shape and has a substantially rectangular cross-section perpendicular to its length. The susceptor is approximately 4mm in width, less than 0.6 mm thick and approximately 12 mm long. The susceptor extends longitudinally from one end of the tobacco plug to the opposite end of the tobacco plug and is positioned within the tobacco plug such that it is not in contact with the plug wrapper (or outer paper wrapper).

5. To use the system, the stick is inserted into the cavity at the mouth end of the device. When the user turns the device on using the user-operated switch, the helical coil module is activated, generating an alternating magnetic field that causes the susceptor in the stick to heat up. The device heats, but does not burn, tobacco in the sticks to generate a nicotine-containing aerosol that is inhaled by the user when the user draws on the mouthpiece filter of the stick."

174. The cited prior art is:

(1) PCT Application No. WO2015/177294 A1 ("Mironov") claiming a priority date of 21 May 2014; and

(2) Chinese Utility Model No. CN204519365U ("Wu") which has an application date 7 February 2015. There was an agreed translation.

175. PMI allege that the system as defined lacked novelty over Mironov and lacked inventive step over Wu on 31 August 2015.

176. PMI's position is that it requires the declarations because of two groups of patent applications currently before the European Patent Office ("EPO"), identified as the Blandino and Kaufman families.

BAT's procedural objections to the declaration

177. BAT have three procedural objections. The first is that the declaration sought is unclear. Integer 4 requires that the metal susceptor is impermeable to air which, BAT contends, is not sufficiently certain in its meaning. There is a second concerning PMI's case for a declaration based on lack of novelty. BAT's third and principal objection is that the there is no useful purpose to the declaration.

Clarity of "impermeable to air"

178. The argument that "impermeable to air" is unclear did not emerge until BAT's closing submissions. It was based on a passage in the cross-examination of Dr McLaughlin in which he was asked to explain his understanding of the term. I would be reluctant to accept an unpleaded argument of this nature since PMI did not have the opportunity to lead evidence on the point. In any event, as I understood Dr McLaughlin, he was of the view that the metallic susceptor of integer 4 will be impermeable to air unless it has holes in it. I have no good reason to believe that the term would cause the skilled team any real difficulty.

A declaration arising from a lack of novelty

179. Part of PMI's case is that its defined system lacked novelty over Mironov as of 31 August 2015. It is common ground that Mironov was part of the state of the art on that date within the meaning of s.2(3) of the Patents Act 1977.

180. BAT argued that if PMI were to do no more than implement Mironov, it would undoubtedly be safe from allegations of infringement of patents granted pursuant to any of the Blandino and Kaufman applications. No declaration is needed from the court in that regard. But the subject-matter of the declaration as pleaded is a generalisation of Mironov. Therefore, BAT submitted, PMI is seeking to expand the scope of the declaration of lack of novelty to stretch beyond the bounds of what Mironov discloses.

181. I do not accept this. If the proposed declaration were drafted so that its effect would be to declare that the subject-matter of Mironov was old as of 31 August 2015, no more, the application would be dismissed as pointless. It is to be expected therefore that the subject-matter of the declaration is different.

182. The position is similar to that discussed in *Mexichem UK Ltd v Honeywell International Inc* [2020] EWCA Civ 473. The subject-matter of the proposed declaration covers a subset of the features of Mironov. If that subset were found to lack novelty in relation to Mironov, PMI would be free to use the subset. The declaration would say nothing

about whether the subset plus any other feature or features lacks novelty, but if it would serve a useful purpose this is no procedural reason to refuse it.

Whether a declaration serves a useful purpose – the law

183. In *Fujifilm Kyowa Kirin Biologics Co., Ltd v Abbvie Biotechnology Ltd* [2017] EWCA 1, the Court of Appeal confirmed that a court could properly grant a declaration that stated matter was old or obvious at a particular date. There were qualifications:

> "[93] The eventual existence of the statutory remedy of revocation is, in our judgment, of relevance to the question of whether a declaration should be granted in the exercise of the court's discretion. A claimant cannot seek *an* Arrow declaration simply because it would like to know whether a patent application in the course of prosecution will result in a valid patent. The course envisaged by the statute is that he should wait and see what, if any, patent is granted. The statutory remedy does not constitute a bar in principle to the granting of declaratory relief in appropriate cases, however. Where, for example, it appears that the statutory remedy is being frustrated by shielding subject matter from scrutiny in the national court, it should be open to the court to intervene. Just as in Nokia , the statutory remedy does not provide, in practical terms, the relief which the claimant needs.
>
> …
>
> [98] We have said enough to explain why we do not consider that there is any issue of principle which prevents the granting of Arrow declarations in appropriate cases. Drawing the threads together:
>
> (i) A declaration that a product, process or use was old or obvious at a particular date does not necessarily offend against s.74 of the Act.
>
> (ii) Such a declaration may offend against the Act where it is a disguised attack on the validity of a granted patent.
>
> (iii) Such declarations do not offend against the scheme of the EPC or the Act simply because the declaration is sought against the background of pending divisional applications by the counter-party.
>
> (iv) On the other hand the existence of pending applications cannot itself be a sufficient justification for granting a declaration.
>
> (v) Whether such a declaration is justified depends on whether a sufficient case can be made for the exercise of the court's discretion in accordance with established principles.
>
> [99] Given that a discretionary power exists, it is for the Patents Court to develop the principles for its exercise in more detail. It will be apparent from the above, however, that we consider an important factor to be borne in mind in the exercise of the discretion is the existence of the statutory proceedings for revocation, which should be regarded as the normal vehicle for obtaining any desired findings of invalidity."

184. The warning against a declaration which is a disguised attack on the validity of a granted patent at [98(ii)] had earlier been explained more fully:

> "[81] The fact that the declaration does not, on its face, ask for a declaration that a granted patent is invalid does not, of course, establish that the Arrow declarations sought are not merely covert attacks on the validity of a patent, in breach of s. 74. If a patent has a claim to a product with features A, B and C, a claim for a declaration that such a product with features A, B and C was old or obvious would, in substance, be a claim for a declaration of invalidity of the patent. Such a claim would offend against s.74(2) and the common law principle derived from *Traction v Bennett* unless combined with a claim for revocation. If such a declaration is sought, then the court must be put in the position to revoke the particular patent in question by having proceedings within s.74 before it.
>
> [82] The pursuit of a claim such as that outlined in the previous paragraph would also offend against the *Barraclough* principle. The claimant should take the available remedy offered by Parliament to obtain the determination that a product with those features was old or obvious: revocation."

185. In *Glaxo Group Ltd v Vectura Ltd* [2018] EWCA Civ 1496 the Court of Appeal expanded on what had been said in *Fujifilm*:

> "[25] The jurisdiction to grant an *Arrow* declaration is by contrast [to the jurisdictions under ss.71 and 72 of the Patents Act 1977, respectively to grant a declaration of non-infringement and to revoke a patent] is discretionary. Identification of a relevant application is a necessary but not sufficient condition for an application for such relief. It is necessary to go further and examine whether it would serve a useful purpose. The point being made by [98(iv)] and [98(v)] in *Fujifilm* is the contrast between a remedy which depends only on the existence of a patent (or application) and one whose availability turns on a critical examination of the purpose which its grant would serve.
>
> [26] GSK's case for the grant of *Arrow* relief does not depend on the mere existence of further applications. They contend that resolution of the issues which arise in relation to the granted patents may not give them, in the circumstances of this case, the commercial certainty they require. Vectura has shown a propensity over many years to describe what is essentially a single inventive concept in a variety of ways. Vectura has the potential to continue to reformulate the inventive concept using applications which are still on file, even if GSK are successful in revoking each of the five Patents."

186. In *Glaxo* Floyd LJ made the further point that the declaration sought must be drafted with clarity:

> "[30] There is no dispute that the declaration must be formulated with clarity. The facts ultimately declared by the court must be clear, otherwise the declaration will simply give rise to further dispute and defeat the purpose for which it is granted. The declaration must also be clear so that the court can know what technical issues it has to decide. The declaration must therefore identify

> the combination of features of the products and processes in question on which the assessment of obviousness is to take place."

187. The matter in respect of which a declaration is sought need not be a product or process fully defined. It could be limited to one or more features of a product or process. If a declaration in limited form in that sense is made by the court, it will say nothing definitive about any product or process incorporating the relevant feature or features. The product or process in issue, necessarily having further features, may or may not be old or obvious. The Court of Appeal discussed this in *Mexichem UK Ltd v Honeywell International Inc* [2020] EWCA Civ 473:

> "[18] There is no threshold requirement for the grant of an *Arrow* declaration that the party seeking it must have a fully formulated product description, far less that it must have a product in actual production. What must be established at trial is that it would be useful for specified features of a product which the party wishes to sell to be declared old or obvious. The extent of generality or particularity of the declaration may affect the utility of the declaration. That, however, is plainly a matter of degree which it will be for the trial judge to assess. At this stage, namely that of striking out or summary judgment, it is enough for the party seeking the declaration to show that there is a real prospect of its being able to establish those matters at a trial.
>
> [19] Some of Mr Speck's submissions, in his skeleton argument at least, treated the declarations sought here as if they were patent claims. In the conventional approach to interpretation of patent claims, the claimed features are treated as the limit of what is required in order to infringe, in the absence of some express indication to the contrary. Additional features in the defendant's product will not avoid infringement. Thus, argued Mr Speck, the declarations in the present case covered a vast array of different products, such as the combination of ze or yf with every known lubricant, or additional refrigerant. It was quite wrong to pre-judge the obviousness of such combinations. Alternatively, if that was not the effect of the declaration, then it lacked clarity.
>
> [20] I do not think it is correct to construe declarations such as those sought by Mexichem as if they were patent claims, so that every conceivable product which could fall within the declaration is being declared to be obvious. Sensibly understood, what Mexichem is seeking is a declaration that the mere idea of using Inagaki's disclosure of ze and yf as a refrigerant in a MAC is obvious. The declaration, being silent on lubricants and other refrigerants, says nothing about whether combinations of the cited refrigerants with such materials are obvious or not."

188. It may sometimes be appropriate to take into account, if it is the case, that a declaration may be relied on solely for the purpose of future arguments on obviousness in which the declaration is deployed as one step in the sort of a step-by-step analysis of obviousness deprecated by Lord Diplock in *Mills & Rockley (Electronics) Limited v Technograph Printed Circuits Limited* [1971] FSR 188, at 203. However, it may be difficult to know that this is likely to be a real objection in due course. In *Mexichem* Floyd LJ said:

> "[22] … It is enough, however, for the purposes of the present appeal, if Mexichem can show that there is a real prospect of the circumstances being such that a declaration would be useful.
>
> [23] In that connection, I would make two points. First, whilst the step-by-step analysis of obviousness has been held to be unfair in many cases, there is a class of case in which it is, at the very least, relevant to consider each step in a putative series of steps to be taken by the skilled person and consider whether any of them individually, and in the end cumulatively, is obvious. Thus, in *Actavis Group PTC EHF v ICOS Corp* [2019] UKSC 15; [2020] 1 All ER 213; [2019] R.P.C. 9, Lord Hodge explained at [72] that notwithstanding the warnings against step-by-step analysis:
>
> > 'Where the pattern of the research programme which the notional skilled person would undertake can clearly be foreseen, it may be legitimate to take a step by step analysis …the *Technograph* warning has no bearing in a case in which the steps which the notional skilled person would take can readily be ascertained without the taint of hindsight.'
>
> [24] At this stage it is impossible to say what the evidence will show about the normal course of an enquiry directed to testing a new refrigerant for applications in air- conditioning. It is at least open to Mexichem to argue that a declaration about the step of deciding to use ze and yf for this purpose would serve a useful purpose.
>
> [25] Secondly, it is impossible to conclude at this stage that the court, looking forward from the judgment at trial, will consider that the declaration could only be deployed in the context of more complex combination inventions, where the identified step would only represent part of the gap between the prior art and the invention. In other words, the declaration would have utility because Honeywell is seeking to protect an inventive concept which is in similarly broad terms. In such a case no step-by-step analysis would be necessary. …"

189. Earlier in *Mexichem* the Court of Appeal had returned to the nature of the court's jurisdiction to grant Arrow relief and had emphasised the importance of having the issue underlying the application for relief made sufficiently clear:

> "[13] The court enjoys a broad and flexible discretion to grant declaratory relief where it would serve a useful purpose to do so. A declaration should not be made where it serves no useful purpose, but, subject to that, the approach is one of discretion rather than jurisdiction: see *Messier-Dowty Ltd v. Sabena SA* [2001] 1 All ER 275 ; [2007] 1 WLR 2040. Before a court can properly make a declaration, the underlying issue must be sufficiently clearly defined to render it properly justiciable: *Nokia Corp v InterDigital Technology Corp* [2006] EWHC 802 (Pat) at [20 (iii)]."

190. The following principles can be drawn from those three judgments:

(1) The court has a broad and flexible discretion to grant Arrow declaratory relief, *Mexichem* at [13].

(2) The circumstances in which an Arrow declaration will be justified are likely to be uncommon, *Fujifilm* at [95].

(3) The discretion should be exercised only where the declaration will serve a useful purpose, which requires critical examination by the court, *Glaxo* at [25]; *Mexichem* at [13].

(4) The requirement of a useful purpose will not be fulfilled solely because the respondent has pending patent applications and the applicant would like to know whether it will infringe any patents which may be granted pursuant to those applications, *Fujifilm* at [93] and [94(iv)) and (v)]; *Glaxo* at [25].

(5) The usual course envisaged by the statute is that the applicant should wait and see what, if any, patents are granted and where necessary use the remedy of revocation, *Fujifilm* at [93].

(6) Where it appears that the statutory remedy of revocation is being frustrated by shielding the subject-matter from scrutiny by the national court, this may be a reason for the court to intervene with a declaration, *Fujifilm* at [93].

(7) The court must guard against the application being used as a disguised attack on the validity of a granted patent, *Fujifilm* at [81]-[82] and [98(ii)].

(8) A declaration may be sought in relation to one or more features of a product or process, as opposed to a product or process in its entirety, *Mexichem* at [18]-[20].

(9) Where a declaration is sought in respect of only one feature or some features of a product or process, the level of generality of the proposed declaration may be relevant to whether it serves a useful purpose, *Mexichem* at [18].

(10) The court may take into account the possibility that a declaration is likely to be useful solely in arguments on obviousness in which it is deployed in an illegitimate step-by-step analysis of obviousness, although it may be difficult to know that this is likely to arise, *Mexichem* [22]-[25].

(11) The features in respect of which the declaration is sought must be defined with sufficient clarity, *Glaxo* at [30].

(12) Equally, the useful purpose said to justify the declaration must be clearly identified, *Mexichem* at [13].

191. PMI pointed to the Court of Appeal's rulings that the exercise of the discretion to grant an Arrow injunction depends solely on whether there would be a useful purpose to the declaration. It was characterised as "the only touchstone". PMI laid particular emphasis on what Floyd LJ said in *Mexichem* (at [18]):

> "What must be established at trial is that it would be useful for specified features of a product which the party wishes to sell to be declared old or obvious."

192. On one view, an Arrow declaration is almost always going to be useful to the party applying for it. There will be a prospect of future litigation based on one or more patents

that may emerge from the ongoing prosecution of applications and a resolution or part resolution in advance of issues likely to arise in English courts can only be useful. But something more is certainly required. The Court of Appeal has indicated that an Arrow declaration will not be granted simply because a party would like to know whether one or more patent applications will result in a valid patent that would threaten a business it wishes to pursue.

193. What sort of purpose is useful enough to warrant an Arrow declaration? It could at first glance be said that in the three judgments of the Court of Appeal there is a flavour of curtailing lawful but sharp practice on the part of the patentee. But neither party took that line and I think that they were correct not to. I do not read the judgments as intending to convey the idea that unattractive behaviour on the part of the patentee is to be punished by the grant of an Arrow declaration.

194. In my view the Court of Appeal had it in mind that in some instances, which are likely to be unusual, a party will be in a position to rely on its portfolio of patent applications to prevent for some time the final resolution of whether an aspect of the relevant technology is old or obvious. Use of that aspect may be of commercial value to a potential infringer. The potential infringer may take the view that no patent preventing its use could properly be granted, but there can be no certainty. In those circumstances an Arrow declaration, if granted, would cut through the tangle and give the potential infringer the reassurance that come what may it will not be prevented from using the relevant aspect of the technology.

195. In *Fujifilm* the defendants had enjoyed a period of patent protection for its monoclonal antibody specific for human necrosis factor a, an antibody marketed under the trade name "Humira". It had become the largest selling prescription drug in the world. Basic patent protection had been extended by a supplementary patent certificate (SPC) which was shortly due to expire. Over 50 European patent applications had been filed in 17 families in an attempt by the defendants to extend further the protection for its highly lucrative product. Floyd LJ described this as the defendants' having "sought to protect their market for Humira after expiry of the SPC in any way they can." This included shielding patent applications from scrutiny by abandoning applications in the EPO. The Chairman and CEO of the group had publicly stated that the defendants would enforce vigorously their patent estate against any biosimilar version of Humira. The claimant wanted to launch just such a product. Notwithstanding the imminent expiry of the SPC protecting Humira, the claimant faced years of litigation if it were to launch its rival product.

196. In *Glaxo* the Court of Appeal appeared to accept the submission that the defendant patentee, Vectura, had pursued a strategy of filing multiple patent applications to create a thicket of patents potentially covering the inhalation product which the claimant wanted to make and that the strategy had been pursued over many years. The Court also apparently accepted this contention at [20]:

> "… Vectura has shown a propensity over many years to describe what is essentially a single inventive concept in a variety of ways. Vectura has the potential to continue to reformulate the inventive concept using applications which are still on file, even if [the applicants for the declaration] are successful in revoking each of the five [patents in suit]."

197. In *Mexichem* the claimant had a business in mobile air-conditioning systems, typically used in vehicles. It wished to be free to use two particular refrigerants in its systems, which it believed had been at all relevant times an obvious idea. The Court of Appeal found that the claimant had a real prospect of showing at trial that it was, indeed, obvious. However, the defendant's patent strategy had been based on seeking to protect that broad idea or to have the potential to do so. This was made particularly clear by the strategy it had pursued in in Germany.

198. I would therefore add this to the principles I have listed:

(13) Subject always to the qualifications referred to in (7), (11) and (12) above, an Arrow declaration is likely to serve a useful purpose if the applicant can show that (a) the respondent's portfolio of patent applications and/or patents creates real doubt, likely to continue for a significant period, as to whether technical subject-matter which the applicant wishes to exploit can lawfully be used, (b) the applicant's reasonable intention to exploit that subject-matter would be of significant commercial advantage to it and (c) the declaration sought would, if granted, eliminate or significantly reduce the delay.

In this context "significant" means cumulatively sufficient to warrant the intervention of the court.

(14) The court will more readily find that there is a useful purpose where the respondent's behaviour has been consistent with an intent to prolong the doubt.

Useful purpose – the arguments

199. PMI referred to five patent applications by BAT and stated that they have "absurdly wide claims". PMI said that these applications pose a threat to the commercial certainty of the IQOS ILUMA system in the UK and that the declaration would give PMI the comfort that no patents emerging from the five applications cited would disrupt their system.

200. As to BAT's behaviour, PMI relied on BAT having relied on a patent to disrupt sales of an earlier IQOS product, its willingness to amend the claims of its applications during prosecution and BAT's refusal to give PMI comfort in respect of any of the pending members of these families. PMI further pointed to European Patent (UK) 3 344 080 ("EP 080"), which was originally pleaded in these proceedings as having been infringed by PMI, but which was abandoned in March 2022 when BAT consented to its revocation. PMI said that this was an example of shielding on BAT's part.

201. BAT argued that its prosecution of the applications in the Kaufman and Blandino families has been exactly in line with what any reasonable party would do. It has consented to amendments in the claims of those applications, as is usual. If, as PMI alleges, the claims are absurdly broad, they will inevitably be narrowed before grant. BAT's consent to the revocation of EP 080 came 6 months before the trial. That was a pragmatic decision, not shielding. There were oral proceedings before the EPO regarding the validity of EP 080, which shows that BAT was not shielding that application from scrutiny.

202. PMI's real complaint, according to BAT, is that BAT refused to confirm that it would not enforce any patent granted pursuant to the Kaufman and Blandino families against PMI. "Why would any reasonable party do that?" was BAT's rhetorical question.

203. BAT criticised the proposed declaration as drafted. It lists only some of the features of the IQOS ILUMA System. The materials from which the susceptor is made, its dimensions and the method of temperature control have been omitted. The declaration does not read on to any of the claims sought by BAT around the world, save one granted in Australia. If that claim is of concern to PMI, PMI should apply to revoke it in Australia. Otherwise, the declaration could only be used as one step in an illegitimate step-by-step analysis of obviousness.

Useful purpose – discussion

204. I agree with BAT that its conduct in relation to the Kaufman and Blandino families is not self-evidently symptomatic of an intent to prolong PMI's commercial uncertainty for as long as it can. It is usual for parties who apply for a patent to begin with optimistically broad claims and then make such concessions on breadth as may be shown to be necessary during prosecution. Some patent attorneys may regard it as arguably negligent not to do this on behalf of their clients.

205. I do not believe that I can interpret BAT's decision to abandon EP 080 as probable shielding. It may have been a pragmatic move given how the case was progressing. I would also be reluctant to discourage parties from consenting to the revocation of their patents pleaded in an action where it is prudent to do so; it saves court time and costs.

206. I can also see that BAT may have been justified in refusing to undertake that it would not rely on any patent granted out of the Kaufman and Blandino families to restrict the marketing of PMI's IQOS ILUMA system. It could be that even though (as I have found) PMI's system does not fall within any of the claims of EP 830, one or more of the Kaufman and Blandino patents will have valid claims to some aspect of the technology that is used in the IQOS ILUMA system.

207. In short, I do not find it established that BAT has intentionally behaved in a manner analogous to that of the defendants in *Fujifilm*, *Glaxo* and *Mexichem*. That is not an end of the matter. In principle, it could still be that despite reasonable intentions on the part of BAT, the existence of the Kaufman and Blandino families has had and will for some time continue to have the effect of preventing PMI from pursuing a reasonable and valuable commercial goal. If so, and assuming the declaration would be justified by the prior art and would clear the path to that goal, I could see the possibility of a sound case for characterising it as serving a useful purpose within the meaning I think intended by the Court of Appeal.

208. The difficulty I have in accepting PMI's application is that it is not clear what the commercial goal is. As I have indicated, it is a precondition for the grant of an Arrow injunction that its alleged useful purpose is clearly identified.

209. If it had been PMI's concern to ensure that a finding of non-infringement of EP 830 is a green light to marketing the IQOS ILUMA system in the UK, notwithstanding what may emerge from the Kaufman and Blandino families, it could have drafted its

proposed declaration accordingly. It did not. Instead the declaration is in terms of just some of the features of that system.

210. I am not persuaded by BAT's submission that the declaration would provide PMI with the opportunity to advance a step-by-step argument on obviousness. I am entitled to assume that the court before which such an argument were to be raised would be as astute as in any other context to guard against an illegitimate use of a step-by-step argument. And as Floyd LJ said (see above), it is entirely possible that in the circumstances such an argument would be appropriate.

211. On the other hand, I am also not persuaded that PMI has established what it is that it would gain from the declaration. In *Mexichem* it was plain: the applicant wanted to use two identified refrigerants in its air-conditioning systems and this was important to its business. In the present case PMI chose to file evidence from Christian Woolfenden who is Managing Director of Philip Morris Limited, the Second Part 20 Defendant. He discussed the launch of the IQOS ILUMA System but said nothing about the effect of the declaration being sought or its commercial value in relation to the launch.

212. I am left with the impression that PMI has decided that in the course of developing new products it would be useful in a general sort of way to have the court declare that their stated combination of features is old or obvious. Yet I know nothing about such new products or why, or the degree to which, the declaration would be commercially helpful in their development. Nor do I know why it would assist in the marketing of the IQOS ILUMA system. I cannot conclude that the declaration is likely to be of any significant commercial value to PMI in reality.

213. That is not good enough. It does not comply with one of the requirements of clarity prescribed by the Court of Appeal. I decline to exercise the court's discretion to grant the declaration sought.

Technical objections to the declaration

214. Given my finding on the court's discretion it is not necessary for me to make a finding on novelty and inventive step in relation to the cited prior art. And I think it is better that I do not. If I were to conclude that the subject-matter of the declaration is neither old nor obvious, it would make no difference to the grant of the declaration. If I were to find that the subject-matter lacks either novelty or inventive step, it would still make no difference but it would in practice provide by the back door the finding that PMI wants even though it is not entitled to the declaration.

215. I do not believe that it would be a good idea to encourage litigants to fill the court diary with applications for Arrow declarations confident in the knowledge that provided the application overcomes any attempt to strike it out, it is bound to lead to a finding on the issue which the applicant would like the court to address irrespective of whether in the circumstances the court's discretion should be exercised to grant a declaration. The important issues arising on discretion would be sidelined.

Conclusion

216. The IQOS ILUMA system does not fall within the claims of EP 830 either on a normal construction or as an equivalent.

217. EP 830 does not lack novelty over Egzoset, but it lacks inventive step over both Egzoset and Duffield.

218. The conditionally proposed amendments to EP 830 would make no difference to the result on inventive step and would also result in added matter. Permission to amend is refused.

219. PMI is not entitled to the Arrow declaration it seeks.