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Neutral Citation Number: [2020] EWHC 1968 (Pat)

Claim Nos: HP-2017-000085 & HP-2019-000019

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

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

Date: 22/07/2020

Before:

MR JUSTICE MORGAN

- -

Between:

LUFTHANSA TECHNIK AG **(a company incorporated under the laws of the Federal Republic of Germany)**	**Claimant**
- and -	
(1) ASTRONICS ADVANCED ELECTRONIC SYSTEMS **(a company incorporated under the laws of the state of Washington, USA)** **(2) SAFRAN SEATS GB LIMITED**	**Defendants**

And between:

LUFTHANSA TECHNIK AG **(a company incorporated under the laws of the Federal Republic of Germany)**	Claimant
- and -	
PANASONIC AVIONICS CORPORATION **(a company incorporated under the laws of the state of Delaware, USA)**	**Defendant**

- -
- -

Hugo Cuddigan QC and **Christopher Hall** (instructed by **Jones Day**) for the **Claimant** in both actions
Piers Acland QC and **Stuart Baran** (instructed by **Hogan Lovells International LLP** and **Pinsent Masons LLP**) for the **Defendants** in both actions

Hearing dates: 22 – 26 June and 1 July 2020

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Approved Judgment

I direct that pursuant to CPR PD 39A para 6.1 no official shorthand note shall be taken of this Judgment and that copies of this version as handed down may be treated as authentic.

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MR JUSTICE MORGAN:

Contents

Introduction

1. This is an action for patent infringement. The patent in suit is EP (UK) 0 881 145 B1 ("the Patent"). The Patent was granted on 26 November 2003 with a priority date of 31 May 1997. The Claimant was the original patentee. The Patent expired on 22 May 2018.

2. Claim 1 of the Patent described the invention as a voltage supply apparatus for providing a supply voltage for electric devices in an aeroplane cabin. The invention was intended to enable an aeroplane passenger to plug his personal electronic device directly into a socket at his seat. The power supply to the socket was to be high voltage AC and the aim of the invention was to ensure a high level of safety in relation to such a supply to a socket in the seat. Before the invention, some aeroplane seats did have a socket into which a passenger could plug his personal electronic device but the power supply was low voltage DC and it was necessary to use an adapter to plug the device into the socket.

3. In this judgment, I will refer to an in-seat power supply as an ISPS and an in-seat power supply system as an ISPSS.

4. There are two actions which have been heard together The Claimant is the same in both actions. In the first action, the Defendants are Astronics Advanced Electronic Systems ("Astronics") and Safran Seats GB Ltd ("Safran"). In the second action, the Defendant is Panasonic Avionics Corporation ("Panasonic"). All the Defendants were represented by the same counsel at the trial.

5. The Defendants contend that the relevant claims in the Patent were invalid as the alleged invention or inventions were not new and, further, lacked an inventive step. These issues require the court to construe the claims in the Patent and also to interpret the prior art, which comprises two earlier patents. If I hold that the Patent was valid, then there are issues as to the alleged infringement by the various Defendants, in relation to which the relevant circumstances are not identical.

6. Mr Cuddigan QC and Mr Hall appeared on behalf of the Claimant and Mr Acland QC and Mr Baran appeared on behalf of the Defendants. I am grateful to them all for their considerable assistance.

The witnesses

7. I heard evidence from two experts. The Claimant called Professor Patrick Wheeler of Nottingham University. His discipline is electrical and electronic engineering. The Defendants called Mr Douglas Jay Barovsky, a senior consultant at Engineering Systems Inc., an engineering and scientific investigation and analysis firm with its headquarters in Illinois, USA. Mr Barovsky is based in Seattle and, for many years, worked for The Boeing Company. He has therefore had experience in the aerospace sector and he was a Federal Aviation Authority ("FAA") Designated Engineering Investigator ("DER"). The background and experience of the two experts was not the same. There was much on which they disagreed. Where they disagreed, the reasoning they relied upon was thoroughly examined in cross-examination. Whether I accept their evidence on any topic depends on whether I am persuaded by the reasoning they

relied upon. I have found that I accept part of, but not all of, the evidence of each of them.

8. The experts disagreed as to who the skilled person would be in relation to the issues which arise in this case. With one possible exception, it was accepted that whatever skilled person was identified for one issue would be the same skilled person on all issues. As the identity of the skilled person is potentially material to a number of issues in this case, I will seek to resolve this issue at this stage before dealing with the other matters which arise.

The skilled person

9. It is necessary to know the identity of the notional skilled person for various reasons in this case but particularly in relation to the issue as to obviousness; section 3 of the Patents Act 1977, dealing with obviousness, specifically refers to "a person skilled in the art".

10. The Claimant's skilled person, identified by Professor Wheeler in his first report, is a general electrical or electronic engineer. He would be a graduate with technical knowledge and experience of the design and implementation of power supply technology, together with the general safety considerations applicable to electrical devices. The skilled person would not be a new graduate acting alone. He would either have experience of power supply design and application in an industrial context from working for a couple of years in or with industry or would rely on another member of the team with corresponding experience. This skilled person would need an understanding of the relevant regulations and requirements applicable to power in an aerospace context. Although the skilled person may already have such an understanding, it was more likely that he would acquire that knowledge when he was asked to involve himself in designing an aircraft power supply. At that time, he could obtain relevant documents from the relevant regulatory body.

11. When cross-examined, Professor Wheeler accepted that his skilled person and any other member of his team would probably not have any experience of working in the aerospace sector. At times during his evidence, his idea of the skilled person was the person who would be asked to make the invention claimed in the Patent but without needing to design an ISPSS without the benefit of the Patent.

12. The Defendants' skilled person, described by Mr Barovsky in his first report, was an electrical engineer with an interest in power supply systems on an aeroplane, including those in the cabin. He would have a degree or equivalent qualification in electrical engineering and three to five years' experience working in the aeroplane business, either for an aircraft manufacturer or component manufacturer. He would be assisted by other individuals, for example, a representative from the aeroplane manufacturer (if he was working for a component manufacturer) or a representative from a component manufacturer (if he was working for an aeroplane manufacturer). If the skilled person were in the United States, he would seek the assistance of a FAA DER who would be responsible for ensuring compliance with the relevant FAA regulations and guidelines. If the skilled person were in the United Kingdom, he would make direct contact with the Civil Aviation Authority ("CAA") or the Joint Aviation Authority ("JAA").

13. It was common ground that the relevant skilled person was the person to whom the claims in the Patent were addressed and that would be a person with a practical interest in the subject matter of the claims in the Patent and with practical knowledge and experience of the kind of work in which the invention was intended to be used: see *Catnic Components Ltd v Hill & Smith Ltd* [1982] RPC 183 at 242-243 and *Teva UK Ltd v AstraZeneca AB* [2012] EWHC (Pat) at [2]. Where there were specialists with a focus on the kind of work with which a patent is concerned, they were the relevant addressees of the patent and their specialist skills were attributed to the notional skilled person, even if the patent might also be of broader application and of interest to non-specialists also: see *Medimmune Ltd v Novartis Pharmaceuticals UK Ltd* [2013] RPC 27 at [73]-[77].

14. Claim 1 of the Patent referred to a voltage supply apparatus for providing a voltage for electrical devices in an aeroplane cabin. The reference to an aeroplane cabin was a significant feature of the claim. The Patent did not relate to a power supply apparatus for use in a home or an office or a car or a boat. I consider that the relevant art was the art of designing and installing a power supply apparatus in an aeroplane cabin and that the relevant skilled person was a person with a practical interest in the subject matter of the claims in the Patent, with practical knowledge and experience of the kind of work in which the invention was intended to be used. The description of the skilled person put forward by Mr Barovsky seems to me to capture what was required. The description put forward by Professor Wheeler seems to me to be much too general and his skilled person would not have the specialist skill set for the area of art involved.

15. The validity of the Patent has already been litigated in Germany in the Bundespatentgericht (the Federal Patent Court). That court considered many of the issues which I will also have to address. I was referred to the part of the decision of the German court which defined the average skilled person in a way different from my definition and closer to that put forward by Professor Wheeler. However, I do not know what submissions were addressed to the German court or even if there was any dispute on the point. Further, the decision of the German court does not refer to the evidence, if any, which was relied on before it. I have to decide this case on the evidence and the argument before me and, in the end, I am not assisted by the decision of the German court on this point.

16. Certain features of the notional skilled person are well established. He has the common general knowledge of a person with his skills. He shares the common prejudices or conservatism which prevails in the art concerned. He is incapable of a scintilla of invention. For these propositions, see *Technip France SA's Patent* [2004] RPC 46 at [7]-[10]. Further, as regards the prejudices or the mindset of the skilled person, a technical prejudice must be a general one. It is not enough that some persons actually engaged in the art at the material time laboured under a particular prejudice if a substantial number of others did not: see *Re Glaxo Group Ltd's Patent* [2004] RPC 43 at [30].

17. It may be the case that, having identified the type of skilled person which is relevant, some persons who answer that description would be more skilled than others or would have more knowledge than others. The relevant skilled person is the person who has the typical skill of that class of persons and who has the general knowledge common to that class of persons. One does not identify the skilled person as someone who has

the highest level of skill in that class: see *Koninklijke Philips NV v Asustek Computer Incorporation* [2018] EWHC 1224 (Pat).

18. There was no dispute as to the legal principles which apply to define the scope of the common general knowledge of the skilled person. If there is a skilled team, the relevant general knowledge will be that which is common in the area of expertise of any member of the team. It is not necessary for the general knowledge to be common to all of the members of the team. As explained when considering the attributes of the skilled person, a prejudice or mindset which is insufficiently widespread for it properly to be regarded as commonly shared will not be attributed to the skilled person. I will have to consider, later in this judgment, the extent of the common general knowledge which is relevant in this case.

The Patent

19. The Patent described the invention as "Electrical power supply device". Paragraph [0001] of the specification in the Patent stated that the invention related to a voltage supply apparatus for providing a supply voltage for electrical devices in an aeroplane cabin.

20. The Patent cited two earlier references, patent EP-A 0 498 056 and FR-A 2 653 944. At the hearing, no reference was made to the first of these cited patents. The second cited patent was referred to as “Quintel” and I will describe it below.

21. It is relevant to refer to a number of further statements made in the specification. In paragraph [0002], it was stated that voltage supply apparatuses in aeroplane cabins primarily provided the passenger with a power supply for the operation of electrical equipment such as computers, consumer electronic devices and chargers. For this purpose, sockets were located primarily in the area of a passenger seat.

22. Paragraph [0003] described two safety aspects which were to be considered. The first was that the safety of passengers must be ensured. The second was that there should be no interference with the aeroplane's on-board electric system. The Patent noted that, by reason of passenger safety, existing supply apparatuses had an upper supply voltage of limit of 30V DC, but also noted that some devices could not be operated with a low DC voltage, and that such power supplies required a special connection lead to connect the passenger’s device to the socket.

23. Paragraph [0004] further noted that supply apparatuses existed that provided mains power (i.e. high voltage) so that nearly every electrical device could be connected with its mains plug and where the power supply could be switched on and off by a switch operated by a key provided by the flight crew. However, these systems were said to provide lower levels of safety and poor protection against interference.

24. Paragraph [0005] referred to Quintel and stated as follows:

> “In [Quintel], on which the introductory clause of claim 1 is based, a voltage supply apparatus is described that comprises a socket and a supply device that is arranged away from the socket. The socket and the supply device are connected to each other via signal lines for the transfer of signals and power

> supply cables for the transfer of power. The socket has a plug detector that detects the presence of the plug casing at the socket. The detection supply voltage via the supply cables to the socket, if the presence of the plug is signalled to the supply device via the signal lines."

25. Paragraph [0006] described the task of the invention as the creation of a voltage supply system for aeroplane cabins with increased safety against incorrect application of the power supply voltage to the socket and paragraph [0007] stated that the task was solved inventively by the features of claim 1.

26. Paragraphs [0008] to [0010] explained that the supply device was located separately, and remotely, from the socket. Paragraph [0010] referred to the different locations of the supply device and socket in these terms:

> "Due to separate and remote locating of supply device and socket, the supply device, which may be carrying mains voltage, is kept away from the actual power drawing point, namely the socket. The supply device can then be arranged in such a way that there is no source of danger for the passenger."

27. Paragraphs [0008] to [0010] went on to explain the conditions under which high voltage was supplied to the socket. The supply device was connected to the socket via a signal line and a power cable. When the socket was not being used, only the signal line carried a voltage (which was small) and the power cable was not connected and there was no high voltage at the socket. The socket had a detector that detected the presence of a plug in the socket. When a plug was detected, a signal was sent via the signal lines from the socket to the supply device, which caused the supply device to switch the power on and supply high voltage to the socket. The Patent noted that this combination effectively guarded against the risks resulting from tampering with the socket by children using paper clips, knitting needles etc. The Description did not refer to the possibility of a risk arising where a liquid was spilt and entered the socket.

28. Paragraphs [0011] to [0012] described the basic operation of the socket detector as follows:

> "**[0011]** The socket detector is designed in such a way that it detects the presence of a contact pin of the plug in the socket. This ensures that a plug inserted in the socket is reliably detected.
>
> **[0012]** The supply device only applies the supply voltage, if the presence of two plug contact pins is detected simultaneously. If both contact pins are detected simultaneously, it can be assumed with a high degree of probability that the socket has not been tampered with, rather that a plug has been actually been plugged in. In this way a high level of security against tampering and unwanted application of the supply voltage to the socket is achieved."

29. Paragraph [0013] described a preferred embodiment in these terms:

> "**[0013]** In a preferred embodiment, the supply device only applies the supply voltage if a maximum contact time is not exceeded between the detection of the first and the second contact pin of the plug. In this way, it is checked whether both contact pins are plugged in at the same time in the socket. If there is too great a time difference between insertion of the two contact pins, it is assumed that the socket is being tampered with. In this case, no supply voltage is applied to the socket, so that endangerment of a person is excluded."

30. Paragraph [0014] identified a further preferred embodiment in these terms:

> "**[0014]** In a preferred embodiment, the plug detector comprises mechanical switches activated by the inserted contact pins of the plug. This ensures a simple and reliable detection of the contact pins."

31. Paragraphs [0015] and [0016] went on to describe two other preferred embodiments. Paragraph [0015] referred to the plug comprising a casing detector detecting the presence of the plug casing at the socket. Detection of the plug occurred when the plug casing was closer than a distance, to be pre-defined, from the socket so that the plug was "present at the socket". The Patent does not contain any definition of this distance. Paragraph [0016] specified a preference for a casing detector which was an optical reflection sensor. Paragraph [0017] then expressed a preference for there being, at the same time, both detection of the plug as described in paragraphs [0011] and [0012], with or without the further refinement of paragraph [0013], and detection of the plug being present at the casing, as described in paragraphs [0015] and [0016].

32. Paragraph [0018] referred to a further preferred embodiment where a central voltage supply was provided for the voltage supply of the supply devices so that it would be possible to deactivate the voltage source via a control signal.

33. The specification then referred to five Figures to explain one embodiment of the invention. Paragraphs [0021] to [0047] contained a detailed explanation of what was shown in the five Figures.

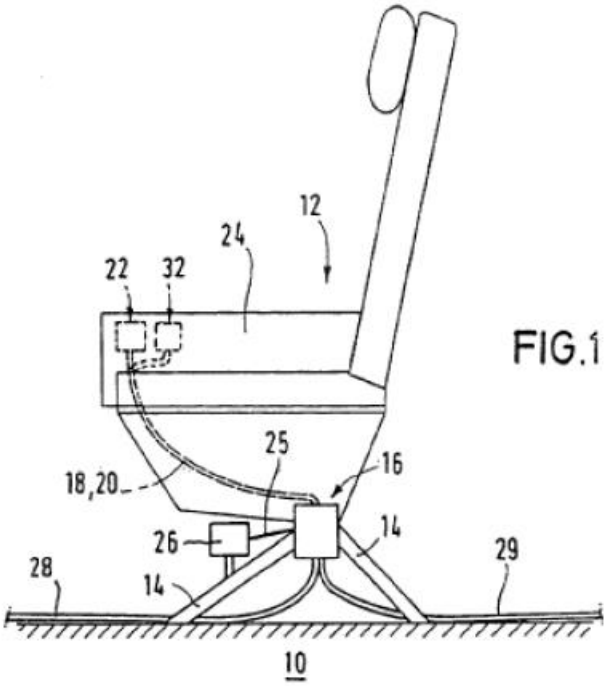


FIG.1

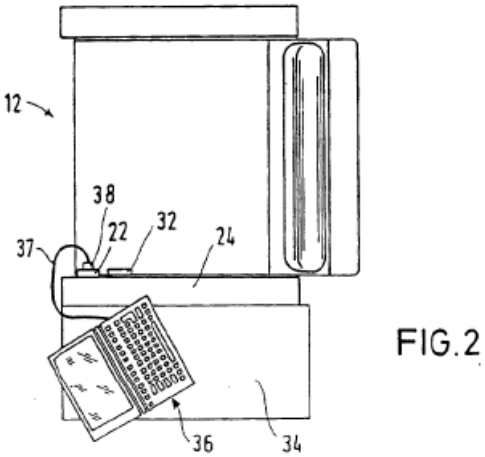
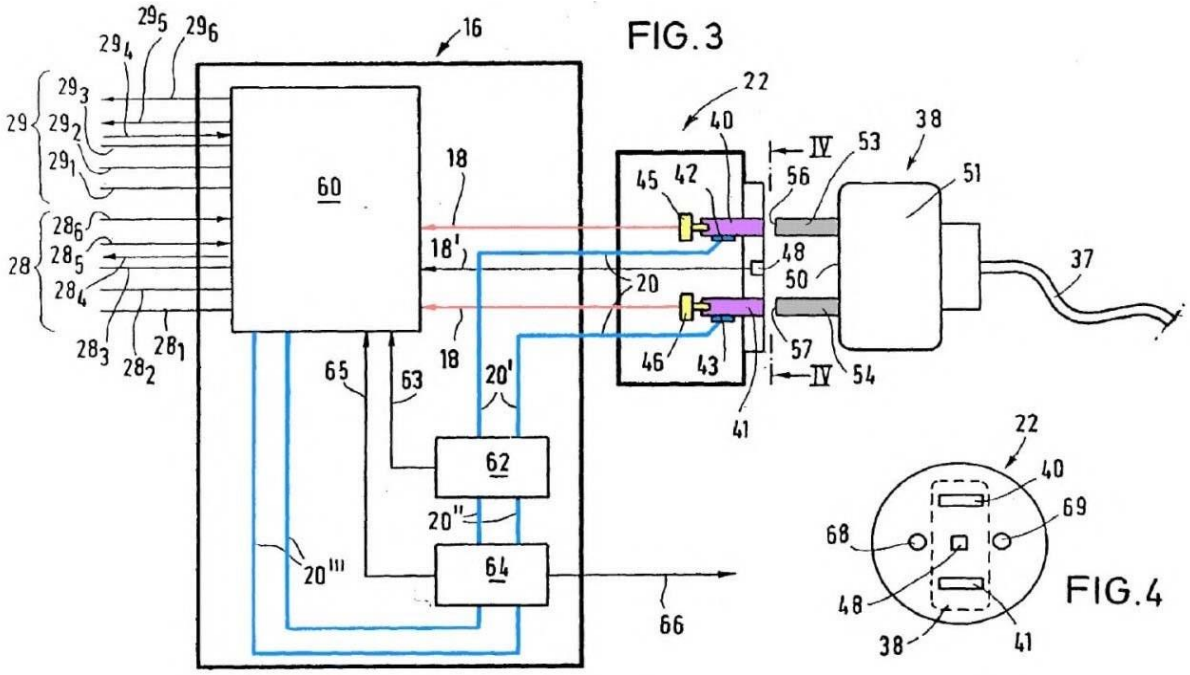


FIG.2

34. Figures 1 and 2 (above) showed side views and plan views of the voltage supply arrangements. Figure 1 showed a supply device (16) under the seat, connected by a signal line (18) and a supply cable (20) to a socket (22) in the armrest of the passenger seat. Figure 2 showed a connected device (specifically, a laptop) (36). The armrest also had a display device (32) to indicate the operating state of the supply device.



35. Figure 3 (above) showed electronic block diagrams of the remote supply device (16), the socket (22), and the plug (38) of the device being inserted into the socket.

36. The recessed contact terminals in the socket (shown in purple, 40, 41) were each designed to receive a pin, and at the end of each recess there was a microswitch (in yellow, 45 and 46). As the plug was pushed in, each pin travelled to the bottom of its recess and on reaching the end it triggered its corresponding microswitch, detecting that the pin was inserted.

37. On the front face of the socket (22) there was an optical infrared reflection sensor (48), which sensed the body of the plug. It comprised an infrared emitting LED and a receiver diode. If the distance between the socket and the plug fell below a certain minimum separation, the radiation emitted from the LED was reflected from the plug and received by the receiver diode.

38. Each of the microswitches was connected via a signal line (18) to the voltage supply device (specifically, to a control and monitoring unit – 60). Each microswitch, when activated, sent a signal from the socket to the voltage supply device. When all signal inputs were triggered (i.e. when both contact pins are inserted far enough to push the microswitches), the supply device detected that a plug has been inserted. The optical sensor was similarly connected to the supply device via a signal line (18'), and when the plug was close enough to reflect the light from the LED, that too could send a signal to the supply device.

39. The control and monitoring unit was connected to the 110V, 60Hz mains supply (29, 28), and had a voltage switch that could apply the high voltage (via supply cables 20).

40. The control and monitoring unit of the supply device also took inputs from a short circuit detector (62) to detect current leakage and provide power limiting of the power supply to approximately 100W to prevent overload of the supply device, and from a

line monitoring detector (64) that worked together with the control and monitoring unit to filter interference out of the supply lines.

41. In this way, when the supply device received an input from all the associated sensors and detectors, indicating that each sensing condition was satisfied, it could switch the supply on, allowing high voltage power to flow, via the supply lines (20) to the pins of the plug.

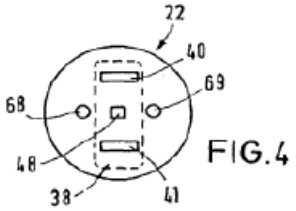


FIG.4

42. Figure 4 (above) showed the face of a socket designed to receive the 2 pins of a US plug (40, 41) or of a European plug (68, 69). The optical sensor (48) was shown at the centre of the socket. There was no hole for the earth pin of a UK plug.

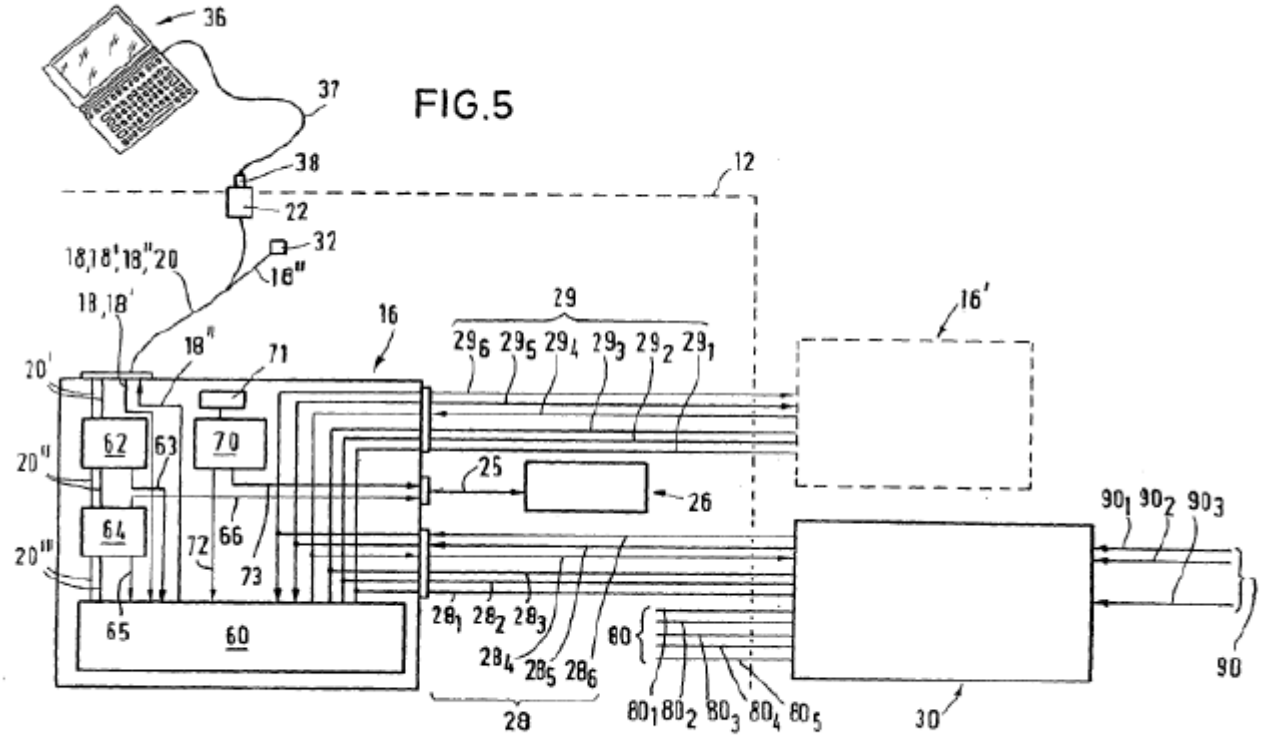


FIG.5

43. Figure 5 (above) showed an arrangement in which a central voltage source (30) was connected to several supply devices (16, 16'). The short circuit detector (62) and the

line monitoring detector (64) were shown, and there was an additional receiver detector and aerial (70,71) for detecting electromagnetic waves of frequencies prohibited by the standard RTCA DO-160. If a malfunction were detected due to electromagnetic interference, short circuit, leakage of current etc. then the signal could be received by the central voltage source, and the power could be cut to all supply devices. Other inputs, such as from the 'flashing seat belts' sign, could also cause the power to be turned off. There was an LED indicator that could indicate to the passenger whether power was on (green), soon to be turned off (flashing green), off (unlit), or whether there was a fault (flashing red).

44. Paragraph [0044] gave more detail about the 'maximum contact time' embodiment introduced in paragraph [0013]. It explained that the control and monitoring unit determined a contact time between the first activation of a contact switch (i.e. the first pin having been inserted) and the other contact switch (i.e. the second pin having been inserted). Only if this contact time was below the maximum value was the signal sent to the control and monitoring unit. Similarly, the optical sensor only sent a signal if the plug casing was close enough to the socket. Only if all sensors were triggered was the voltage supply device turned on. There was no definition of the maximum contact time. The description and the Figures did not disclose the circuitry which would need to be designed to implement the timing element of this embodiment. Professor Wheeler said that the specific design of the circuity would be within the common general knowledge of the skilled person who would be an electronics engineer.

The claims in the Patent

45. The Patent contained the following claims:

> "**1.** A voltage supply apparatus for providing a supply voltage for electric devices (36) in an aeroplane cabin, comprising
>
> a socket (22) to which the device (36) is connectable by means of a plug (38) and to which the supply voltage can be applied, the socket (22) comprising a socket detector (45, 46, 48) detecting the presence of a plug (38) inserted in the socket (22), and a supply device (16) being provided remotely from the socket (22) and being connected to the socket (22) via a signal line (18) and via a supply line (20) for the supply voltage, the supply device (16) applying the supply voltage to the socket (22) when the plug detectors (45, 46, 48) indicate the presence of the plug (38) via the signal line (18) to the supply device (16).
>
> **characterized in that**
>
> the plug detector (45, 46) is formed such as to detect the presence of two contact pins (53, 54) of the plug (38) in the socket (22), and
>
> the supply device (16) only applies the supply voltage to the socket (22) if the presence of two contact pins (53, 54) of the plug (38) is detected simultaneously.

> **2.** The voltage supply apparatus according to claim 1, wherein the supply device (16) only applies the supply voltage if a maximum contact time is not exceeded between the detection of the first and the second contact pin (53, 54) of the plug (38).
>
> **3.** The voltage supply apparatus according to claim 1 or 2, wherein the plug detector comprises mechanical switches (45, 46) activated by the inserted contact pins (53, 54) of the plug (38).
>
> **4.** The voltage supply apparatus according to one of claims 1 - 3, wherein the plug (22) comprises a casing detector (48) detecting the presence of the plug casing (51) of the plug (38) at the socket (22).
>
> **5.** The voltage supply apparatus according to claim 4, wherein the casing detector (48) is an optical reflection sensor detecting a minimum distance of the plug casing (51) to the socket (22).
>
> **6.** The voltage supply apparatus according to claim 4 or 5, wherein the supply device (16) applies the supply voltage to the socket (22) only if the plug detector (45, 46) indicates the presence of the contact pins (53, 54) and the casing detector (48) indicates the presence of the plug casing (51).
>
> **7.** The voltage supply apparatus according to one of claims 1-6, wherein a plurality of supply devices (16) and a central voltage source (30) are provided for the voltage supply of the supply devices (16), the voltage source (30) being able to be deactivated by a control signal."

Quintel

46. Before considering the issues in relation to the construction of the claims in the Patent, it is necessary to refer in more detail to Quintel. As has been seen, Quintel was specifically cited in the Patent and was described in paragraph [0005] of the specification. In relation to two of the issues as to construction of the claims in the Patent, the Claimant relied on what was said to have been disclosed by Quintel. The Defendants accepted that, for the purpose of construing the claims of the Patent, it was permissible to have regard to what was said in paragraph [0005] of the Patent but that it was not appropriate to refer to the full patent specification in Quintel as an aid to construction of the claims in the Patent. As will be seen, I make my findings in relation to the construction of the claims in the Patent without finding it necessary to consider the full patent specification in Quintel. Nonetheless, for completeness, I ought to refer in more detail to what was disclosed by Quintel in order that one might understand the arguments as to the potential relevance of the full patent specification in Quintel.

47. Quintel described its invention as an "electrical safety socket" with intended uses which included safety sockets, especially childproof outlets, and watertight submarine outlets. The design was intended to avoid any socket short circuit and any

electrocution. The description in Quintel referred to the risk involved in young children inserting diverse items into a socket. The description then referred to the known method of preventing unwanted insertion by the use of foldable shutters but suggested that while the risk involved was significantly reduced by the use of shutters, it was not ruled out. The description also referred to the risk of sparking and heating when the contact pins of a plug did not make a good mechanical contact with the power supply. The description then stated that the first object of the invention was to enhance safety and required the plug to be "properly inserted" in the socket. The description also said that a young child could insert a foreign body into the socket without any danger and could even remove the socket, again without danger. A second object of the invention was a socket which established a watertight contact even under water, without the risk of a short circuit.

48. Quintel disclosed a bespoke socket, plug, and switching arrangement. The socket had an optical sensor on the front which incorporated some form of reed switch. The optical sensor was connected to two optical fibres. The socket also had conventional recesses with contact terminals. The recesses received the pins of a plug, and the contact terminals were connected to power leads.

49. The bespoke switching arrangement consisted of three main parts. First, there was the optical part, in which the other ends of the two optical fibres from the optical sensor in the socket were connected to a light emitter and a light receiver respectively. Second, there was a switching part; this consisted of a relay switch that was triggered by an electrical signal from the light receiver, which was sent when a light beam was incident on the light receiver. Third, there was the mains supply part. The relay sat somewhere between the mains supply and the socket and was designed to be remote from the socket.

50. Finally, there was the bespoke plug. This had a magnet on the front that co-operated with the reed switch in the socket.

51. This arrangement was designed to ensure that unless the bespoke magnetic plug was inserted, there would be no mains power at the bespoke socket. That was because without a plug, there was no magnetic field across the optical reed switch. The reed switch would stay open and the path from the light emitter to the light receiver was broken. Since the light receiver was not receiving any signal, the relay was not triggered and therefore remained open. The result was that the mains voltage supply was disconnected from the socket.

52. However, when the bespoke plug was being inserted into the bespoke socket, the magnet on the face of the plug approached the reed switch of the optical sensor on the face of the socket, and when the magnet was close enough (when the plug was very nearly the whole way in), the magnetic field would close the reed switch. Closing the switch opened the optical path between the light emitter and receiver, which caused a signal to be generated by the receiver which in turn closed the relay and allowed mains power to flow to the socket.

53. Quintel included two drawings. Figure 1 was described as showing an electrical socket intended for domestic purposes. Figure 1 showed the bespoke plug with a magnet on the casing, a socket with an optical switch and wiring which led from the

socket to the switching logic which was arranged remotely inside its own housing. What was shown in Figure 1 was described on page 5 of the specification at lines 1 to 13. Figure 2 was described as a second embodiment intended to establish a "floating" electrical connection.

54. In summary, Quintel disclosed an apparatus where the supply device was remote from the socket and the socket contained a plug detector which was activated when the plug was properly inserted into the socket. However, the mode of detection of the presence of the plug was different from the mode of detection in the apparatus the subject of the Patent.

55. I was referred to what the German court had decided in relation to Quintel. The German court considered the full patent specification in Quintel. It relied on the full disclosure in Quintel when construing the claims in the Patent. It held that the disclosure in Quintel did not anticipate the invention claimed in claim 1 of the Patent but that claim lacked an inventive step over Quintel when considered together with the disclosure in the other patent cited in the Patent (namely, EP 0 498 056 A1).

56. In the argument before me, the parties did not agree as to whether the full patent specification in Quintel could be relied upon as an aid to the construction of the claims in the Patent. I will resolve that issue in due course in this judgment. In view of the later arguments which I will consider as to whether the claims in the Patent were anticipated by prior art in the form of Neuenschwander or Sellati or as to whether the claims in the Patent were obvious over Sellati, I ought to emphasise that the Defendants did not contend that any of the claims in the Patent were anticipated by the disclosure in Quintel nor did they argue that any of the claims in the Patent were obvious over Quintel; however, as I now explain, the Defendants pleaded that certain matters described in Quintel were themselves obvious.

57. The Defendants pleaded in their Grounds of Invalidity that claims 1, 2, 3 and 7 in the Patent were obvious over Neuenschwander or Sellati, each read with the common general knowledge. They then pleaded that the common general knowledge was illustrated by, but not limited to, two matters in particular. The first of these matters was Figure 1 of Quintel together with the description on page 5 lines 1 to 13 in the Quintel patent.

58. In view of the reference to part of Quintel in the Defendants' pleaded case as to common general knowledge, Professor Wheeler dealt with that case in his first report. He said that very little of the specifics in Quintel would have been common general knowledge. In particular, he said that the concept of a switch at the point of delivery which controlled a second switch remote from the point of delivery was not known. Further, he said that the idea of switching power off and on by reference to the satisfaction of some external condition was not known. He commented on Figure 1 of Quintel and page 5 lines 1 to 13 from the Quintel specification. He suggested that the primary concern of that part of the description was with the avoidance of sparking while the plug was being inserted or withdrawn.

59. Although the Defendants referred to Quintel in their Grounds of Invalidity, Mr Barovsky did not put forward any evidence in his first report to advance that part of the pleading. Effectively, he did not discuss Quintel at all (apart from referring to

paragraph [0005] of the description in the Patent). In his second report, he commented on Professor Wheeler's first report and said that a switch at the point of delivery which controlled a second switch remote from the supply was well known. He also disagreed with Professor Wheeler's suggestion that switching off and on by reference to the satisfaction of some external condition was not known; Mr Barovsky said that it was very well known. He added that sparking was not perceived to be a problem in an aeroplane cabin.

60. Professor Wheeler was not cross-examined in relation to his evidence as to Quintel. Mr Barovsky was cross-examined in relation to the evidence in his second report about Quintel and remote switching. He had given an example in his second report about the concept of switching off and on by reference to the satisfaction of some external condition. He appeared to accept when cross-examined that the specific example he had given did not disclose the concept of switching off and on by reference to an external condition. Nonetheless, as I understood him, he continued to say that the concept was well known at the priority date. He also stated, when cross-examined, that everything in Quintel would have been obvious to the skilled person and that the only unique aspect of Quintel was the use of the magnet in the plug.

61. I will refer to this evidence as to obviousness later in this judgment when I consider the submissions made as to the claims in the Patent being obvious over Neuenschwander or Sellati.

62. At this point, it is convenient to deal with the issues as to the construction of the claims in the Patent.

The construction of the claims in the Patent

63. There are four issues about the construction of the claims in the Patent. The issues are:

    i) in Claim 1, do the words "the plug in the socket" refer only to a plug which has been fully inserted, or can they refer also to a plug which has been partially inserted, in the socket?

    ii) in Claim 1, what is meant by "remotely" in the phrase "a supply device being provided remotely from the socket"?

    iii) in Claim 1, does "a voltage supply apparatus" which comprises the following components, a supply device, a socket, a signal line and a supply line, refer only to the position when the components are connected to each other?

    iv) in Claim 7, what is meant by "a central voltage supply"?

64. The basic legal principles as to claims construction are not in dispute. I will apply Article 69 of the EPC and Article 1 of the Protocol as to the interpretation of Article 69 of the EPC. The extent of the protection conferred by the Patent is determined by the claims. The description and the drawings in the Patent are to be used to interpret the claims. The purpose of using the description and the drawings in this way is to arrive at a position which combines a fair protection for the patentee with a reasonable degree of legal certainty for third parties.

65. There are many judicial statements of high authority as to the correct approach in relation to claims construction. It is sufficient to refer to *Virgin Atlantic v Premium Aircraft* [2010] RPC 8 per Jacob LJ at [5] for the proposition that the claims are to be construed purposively. In addition, it must be remembered that the purposes of the description and the drawings on the one hand and the claims on the other are different. There is no rule that the claims must be construed precisely to match the embodiments in the description. The claims may be narrower than, or wider than, those embodiments: see *Adaptive Spectrum and Signal Alignment Inc v BT* [2014] EWCA Civ 1462 at [45].

66. The law as to equivalents is now as stated in *Actavis (UK) Ltd v Eli Lilly* [2017] RPC 21 which was considered and applied in *Icescape Ltd v Ice-World International BV* [2019] FSR 108. In this part of the judgment, I will seek to arrive at what has been called the "normal" interpretation of the claims and I will not consider the law as to equivalents. I heard submissions on the law as to equivalents in relation to one issue only. That was the issue as to whether, if Claim 1 was to be construed as referring to an apparatus where the components were connected to each other, it could be said that the supply of the unconnected components amounted to an infringement of Claim 1 by applying the law as to equivalents. As will be seen, it transpires that I do not need to consider that matter in any detail.

The first construction issue

67. Mr Cuddigan submitted that claim 1 required the apparatus to test for the full insertion of a plug. He put his case in three ways. His first submission was that the Patent stated in terms that this part of the claims was based on Quintel and the invention in Quintel clearly depended upon there being full insertion of a plug in a socket. His second submission was that the language of the description, taken with the drawings, required the plug to be fully inserted in the socket. His third submission was that the words "plug inserted in the socket" in Claim 1 meant that there had to be full insertion of the plug. He supported these submissions by referring to the decision of the German court which had considered similar arguments and had held that the plug must be inserted "almost completely" in the socket.

68. Mr Acland submitted that claim 1 did not require the plug to be fully inserted in the socket so that partial insertion of the plug would come within the wording of the claim. He submitted that the description and drawings did not require the full insertion of the plug; he relied on the implications of Figure 4 in particular. As to Quintel, Mr Acland said that there was no reason to find that the skilled addressee of the Patent would search for the full patent specification in Quintel but would rely on what the Patent said about Quintel, which did not include a statement requiring full insertion of the plug. As to the decision of the German court, that court had relied heavily on the full patent specification in Quintel but that was not the right approach in this jurisdiction in the circumstances of the present case.

69. Before I deal with the submissions as to the relevance of the full patent specification in Quintel, I will consider the submissions based on the language used in the Patent itself. I will start with the wording of claim 1. This describes a socket and a plug. It refers to "the presence of a plug inserted in the socket". The presence of the plug is detected by the socket detector. Claim 1 says that the socket detector includes that

which is numbered 45 and 46. The numbers are obviously references to the drawings and, in particular, Figure 3. Accordingly, simply to understand what is referred to in claim 1, it is necessary to refer to the drawings which show the location of the detectors numbered 45 and 46. Figure 3 shows the detectors numbered 45 and 46 at the bottom of the holes which receive the pins of the plug. Claim 1 goes on to provide that the plug detectors (45 and 46) are formed so as to detect the presence of "two contact pins" (53 and 54) of the plug in the socket. The contact pins, 53 and 54, are simply the pins of the plug. The natural reading of claim 1 is that it is describing detection which occurs when the contact pins make contact with the detectors at 45 and 46. That means that the pins of the plug must be inserted so that they make contact with the detectors. There was no technical evidence to the effect that the detectors detect the pins of the plug as they approach the detectors as distinct from when they touch the detectors. In this way, the words "inserted in the socket" and "the plug in the socket" are referring to a state of affairs where the pins of the plug are in contact with the detectors of the pins of the plug and that requires a degree of insertion which brings the pins into contact with the plug detectors. In addition, the natural meaning of the words "inserted in the socket", using the past participle, suggests that the plug has been fully inserted rather than partially inserted although that sense might not have been the only possible reading if there were other wording to contradict the natural meaning.

70. This reading of claim 1 is consistent with the language of the other claims. The claims contain a number of references to "the contact pins". Claim 5 refers to another form of detection of a plug. Claim 5 involves the use of an optical reflection sensor which detects the casing of a plug at the socket when it is within a minimum distance from the socket. The Patent does not define what this minimum distance is. It could be said that if the plug casing is being detected when it is still at a distance from the socket then at that point the plug might not be fully inserted. It could then be argued that this tends to show that other claims do not require the plug to be fully inserted. I do not accept that argument. The Patent refers to two different methods of detection of a plug in the socket. Claim 1 appears clearly to require the pins of the plug to make contact with detectors at the bottom of the holes which receive the pins. Claim 5 refers to the plug being detected when it is within a minimum distance from the socket. I do not regard the additional detection process described in claim 5 as detracting from the clear requirements of claim 1.

71. The description in the Patent contains numerous references to the plug being "plugged in" or "inserted". Again, the natural meaning of these words is that the plug is fully plugged in or inserted but, again, that natural meaning might yield to an alternative reading if there were other wording to contradict it. More relevantly, the description explains the way in which the detectors 45 and 46 (referred to in claim 1) work. These detectors are "at the bottom of each plug hole": paragraph [0024]. Further, paragraphs [0026] and [0027] refer to the free ends (56 and 57) of the contact pins activating the microswitches at 45 and 46. Figure 3 shows 56 and 57 at the tips of the contact pins.

72. Mr Acland drew attention to Figure 4. Figure 4 is described in paragraph [0032] of the description in the Patent. That paragraph refers to the location of the microswitches for the plug detector in a way which is consistent with the other parts of the description whereby the microswitches are at the bottom of the holes for receiving the pins of the plug. However, paragraph [0032] goes on to refer to the possibility that the

pairs of plug holes (US and European) might be arranged so that they are not at right angles to each other (as shown in Figure 4) but overlay each other. With that possibility, paragraph [0032] states that the microswitches are to be arranged to the sides of the plug holes. There is no drawing dealing with this possibility which shows where precisely the microswitches should be placed.

73. Mr Acland suggested that if, for the purposes of this possibility, the microswitches were placed on the sides of the plug holes but not at the bottom of the plug holes, then a plug would be detected when it was not fully inserted. The suggestion then seemed to be that when I come to construe claim 1, which refers to an arrangement which appears to require full plug insertion, I should reconsider what it means in order to accommodate the possibility referred to in paragraph [0032], but not illustrated, which might involve switches which are not at the bottoms of the plug holes. It then appears to be said that I should then hold that claim 1 permits the microswitches to be at the bottom of the plug holes or somewhere else on the sides of the plug holes.

74. Mr Acland's submission based on paragraph [0032] involves reading claim 1 in a way which is wider than the language in which it is apparently expressed and which dispenses with the requirement apparently expressed in claim 1 which is that the plug is detected when the pins make contact with microswitches at the bottom of the plug holes. I accept that the possibility which is identified in paragraph [0032] is part of the material which I should consider when I come to construe claim 1 but it is not the only material. I consider that taking the wording of claim 1, with its express cross references to the drawings and taking the other parts of the description and drawings altogether, claim 1 does identify a requirement that the plug is fully inserted in the socket and that is how it should be construed. On that basis, claim 1 and, indeed, the other claims do not appear expressly to deal with the possibility referred to in paragraph [0032]. I was not addressed on the implications of that position as regards that possibility and I will not deal with it further.

75. Based on the above considerations, I conclude that claim 1 requires the insertion of a plug in a socket to such an extent that the tips of the pins of the socket make contact with the plug detectors at 45 and 46. I do not think that state of affairs is satisfied by any partial insertion of a plug short of that. This was the conclusion reached by the German court in relation to the same issue. I reach my conclusion independently of the German decision but I note that my reasoning overlaps with some of the reasoning in that decision.

76. The above considerations do not involve a need to consider the potential significance of Quintel in this context. Paragraph [0005] of the description refers to Quintel and I have already set out that paragraph. That reference to Quintel states that the introductory clause of claim 1 is based on Quintel. Paragraph [0005] refers to Quintel as comprising a supply device which is arranged away from the socket and a plug detector which detects the presence of the plug casing "at the socket". Whilst this wording is consistent with the plug being fully inserted in the socket, paragraph [0005] does not spell out the mode of detection adopted in Quintel and it could not be said with complete confidence from reading paragraph [0005] alone that Quintel required full insertion of the plug. At any rate, whatever inferences one might draw from reading paragraph [0005] with its description of Quintel, they are not as

powerful as the assistance one gets from the other parts of the description and the drawings to which I have referred.

77. Mr Cuddigan submitted that the court should consider the full patent specification in Quintel and if it did so it would find that Quintel did require the plug to be fully inserted. He then submitted that the full patent specification in Quintel would assist the court to conclude that claim 1 in the Patent also required full plug insertion. Mr Acland objected that it was not appropriate in the circumstances of this case for the court to have regard to the full patent specification in Quintel, even though Quintel was referred to in paragraph [0005] of the Patent.

78. In support of his submission, Mr Acland cited *Ultraframe (UK) Ltd v Eurocell Building Plastics Ltd* [2005] RPC 7 per Lewison J at [73] (not affected by anything said on appeal in that case at [2005] EWCA Civ 761), *Adaptive Spectrum and Signal Alignment Inc v BT* [2014] EWCA Civ 1462 at [110] (which cited the relevant statement of Lewison J in *Ultraframe*) and *Akebia Therapeutics Inc v Fibrogen Inc* [2020] EWHC 866 (Pat) per Arnold LJ (sitting at first instance) at [218]. I was also shown the discussion in *Virgin Atlantic v Premium Aircraft* [2010] RPC 8 at [21] as to the treatment of prior art which is specifically referred to in a later patent specification which falls to be construed but I do not think that discussion is in point.

79. The authorities relied on by Mr Acland show that there is no principle of law which requires a finding that the skilled addressee of the Patent would obtain and consider the full patent specification in Quintel and then take it into account when construing the Patent. Neither Professor Wheeler nor Mr Barovsky gave evidence that the skilled addressee of the Patent would obtain and consider the full patent specification in Quintel. On the point which I am at present considering, I do not see that a skilled addressee would see a need to obtain and consider the full patent specification in Quintel in order to work out whether claim 1 of the Patent did or did not require full plug insertion. I consider that the skilled addressee would take the view, as I do, that claim 1 of the Patent did require full plug insertion and he would not feel a need to support that conclusion nor, indeed, to question whether it might be contradicted by Quintel, when paragraph [0005] refers to Quintel as being relevant as regards the separation of the supply device from the socket and does not highlight the possibility that Quintel might be relevant on the question of what the Patent requires as to full plug insertion.

The second construction issue

80. Claim 1 refers to "a supply device being provided remotely from the socket". There is an issue as to what is meant by "remotely" in this phrase. The Claimant says that there must be "a sufficient separation as between socket and supply for there to be a material effect on the proximity of that supply to the passenger". The Defendants say that all that is required is that "the supply device is physically separate from the socket".

81. Mr Cuddigan made a number of submissions in support of his construction of "remotely". He said:

    i) Claim 1 should be construed in the light of the disclosure in Quintel; Quintel showed a considerable degree of separation of the socket from the supply

device; Quintel also disclosed that the plug made a watertight contact with the socket which prevented a short-circuit even when the socket (but not, of course, the power supply) was underwater and that disclosure implicitly disclosed a significant separation of the socket from the supply device;

ii) Claim 1 should be construed in the light of paragraphs [0008], [0009] and [0010] of the description in the Patent;

iii) the German court considered this issue and held that the supply device was to be set up "at a distance" from the socket;

iv) Professor Wheeler said that it was common general knowledge that it would be necessary to design an ISPSS in a way which avoided the safety risk which would arise if the supply device was drenched as a result of, for example, a passenger spilling a drink into the socket.

82. Mr Acland made the following submissions:

i) Professor Wheeler's written evidence put forward a variety of interpretations as to his understanding of what was meant by "remotely" and Mr Cuddigan's submissions were different again;

ii) the Claimant's construction made no sense; the reference to remoteness was to do with the location of the supply device with respect to the socket and not with respect to the passenger;

iii) the supply device would need to be in a tamper-proof or at least robust housing, inaccessible to liquid in which case proximity to the passenger would be of little consequence;

iv) in any case, the language of the Claimant's formulation was hopelessly vague;

v) Claim 1 was to be construed against the background of paragraphs [0006] to [0010] of the description in the Patent which required the supply device to be physically separate from the socket;

vi) there was no other minimum condition as to the degree of separation of the supply device from the socket; the Patent gave no hint as to what any such minimum condition might be and if there were such a condition the claim would be insufficient because a skilled person could not know what was permitted and what was an infringement;

vii) all the requirements of Claim 1 were satisfied irrespective of the length of the cables joining the supply device to the socket;

viii) although a shorter cable would limit the design options for locating the supply device, the Patent was not concerned with increasing design freedom.

83. Claim 1 refers to the supply device being provided "remotely" from the socket. The Defendants' case is that the requirement of remote provision is satisfied by the supply device and the socket being separate but they can be near to each other. I consider that

this interpretation is inconsistent with the ordinary meaning of "remote". A supply device cannot be said to be remote from the socket when it is near to the socket.

84. Various paragraphs of the description assist with the meaning of "remotely" in Claim 1. Paragraph [0005] refers to Quintel, states that the introductory clause of Claim 1 is based on Quintel and describes Quintel as involving a socket and a supply device which is "arranged away from the socket". As will be seen, the words "away from" are repeated in paragraphs [0008] and [0010] of the description in the Patent so paragraph [0005] perhaps does not add anything but does serve to emphasise that feature of Quintel and of the Patent. Mr Cuddigan referred to parts of Quintel which were not described in paragraph [0005] of the description in the Patent and I will refer to his submission again later. For the present, I will take the information about Quintel from what was said about Quintel in the Patent itself.

85. Paragraph [0006] of the description in the Patent described the invention as one which ensured greater safety, as compared with Quintel. Paragraph [0008] referred to the supply device being "located away from the socket". Paragraph [0009] referred to the risk of tampering with the socket but did not refer to a risk from drenching the socket. Paragraph [0010] referred to "separate and remote locating of supply device and socket" and the supply device being "kept away" from the power drawing point. Paragraph [0010] then referred to the supply device being "arranged in such a way that there is no source of danger for the passenger".

86. These passages in the description in the Patent make it clear that the supply device and the socket are to be not only separate but, in addition, they are to be "remote". The Defendants' submission impermissibly seeks to equate "remote" with "separate" and gives no distinct meaning to the word "remote". In fact, "remote" means something different from "separate" and ought to be given its ordinary meaning in this respect.

87. The Patent specification includes the drawings. Figure 1 is described in paragraph [0021]. Figure 1 shows the supply device being fitted below the seat and remote from the socket. Figure 1 is not to be interpreted as showing the only possible place where the supply device could be fitted but it does illustrate something which is in accordance with the ordinary meaning of "remotely" in Claim 1.

88. Based on the wording of the Patent, I consider that the meaning of "remotely" in Claim 1 means more than "separate" and requires the supply device to be "kept away" from the socket and, in particular, "arranged in such a way that there is no source of danger to the passenger". This interpretation of remotely is similar to the interpretation contended for by the Claimant but, in so far as it is different, I prefer this formulation to that of the Claimant. For present purposes, the differences may not matter as the result is that I do not accept the interpretation put forward by the Defendants.

89. This conclusion means that it is not necessary to consider the other arguments put forward by Mr Cuddigan. As to Quintel, it does not seem to me to matter whether the skilled addressee reads the entire specification in Quintel. If he did so, he would see a disclosure of a degree of separation which was consistent with my reading of "remotely" in Claim 1 of the Patent. If he did not read the entire specification in

Quintel, he would still have sufficient in the Patent itself to arrive at the conclusion I have arrived at as to Claim 1 of the Patent.

90. Further, I do not need to decide at this stage whether it was common general knowledge that a designer of an ISPSS would need to avoid the risk of drenching of the supply device which therefore needed to be kept away from the passenger. It is somewhat striking that when the Patent referred to the risks to be guarded against, it did not refer to drenching. However, I will later refer to certain documents which are revealing as to the common general knowledge around the priority date and they do refer to the risk arising from the socket being drenched. I have reached my conclusion independently of the decision of the German court which appears to have been based on the disclosure in Quintel whereas, in that respect, I have reached my conclusion based on what was said about Quintel in paragraph [0005] of the Patent.

91. Mr Acland submitted that if I were to interpret Claim 1 of the Patent in the way in which I have done, the Patent would be insufficient. Mr Acland developed that submission separately from his submissions as to the construction of the claims, but it is convenient for me to deal with the insufficiency submission at this stage.

92. Mr Acland submitted that this reading of the Patent meant that it was insufficient contrary to what was referred to in section 72(1)(c) of the Patents Act 1977 as a ground for revoking a patent. Section 72(1)(c) imposes the requirement that the patent disclose the invention clearly enough and completely enough for it to be performed by a person skilled in the art. If one were to take that requirement entirely literally, I do not consider that there would be any difficulty in the skilled person understanding, from the Patent, clearly and completely how to perform the invention the subject of Claim 1. However, Mr Acland's point was that Claim 1 was too uncertain in its use of the concept of "remoteness" to be a valid claim to a monopoly. Mr Acland cited what was said by Lewison LJ in *Anan Kasei Co Ltd v Neo Chemicals and Oxides (Europe) Ltd* [2020] FSR 8 per Lewison LJ at [101]. Mr Acland submitted that in the present case one could not know where the boundary was between what was permitted and what would be an infringement.

93. The issue of insufficiency by reason of uncertainty was considered by both Floyd LJ and Lewison LJ in *Anan Kasei*. Patent lawyers used to refer to "ambiguity" rather than "uncertainty" but the court in *Anan Kasei* explained that the relevant term should be "uncertainty".

94. In the present case, I do not consider that there is any conceptual uncertainty in the references to remoteness in the Patent. The concept involved is in fact quite clear. The concept is that the supply device must be kept away from the socket and, as a result, the supply device will be kept away from the passenger who is intended to have access to the socket. The purpose of keeping the supply device away from the passenger is so that there will not be a risk of something happening to the supply device which would cause a problem, such as a short circuit or an electric shock being administered to the passenger. What the Patent does not spell out, I think deliberately, is what design option should be chosen to advance the achievement of the object. However, it is permissible for the Patent to leave that choice to the individual skilled person implementing the Patent. As explained in *Anan Kasei*, referring to earlier cases, a patent is not insufficient for uncertainty just because the boundary of the

monopoly claimed is a "fuzzy boundary". In this case, I do not regard the boundary as being particularly "fuzzy" and it is much less fuzzy than some earlier cases where the boundary was demarcated in the patent by language which involved matters of degree.

The third construction issue

95. The third construction issue in respect of claim 1 related to one of the ways in which the Claimant put its case that the supply of the components referred to in the Patent was a direct infringement of claim 1, contrary to section 60(1)(a) of the Patents Act 1977. Claim 1 referred to "a voltage supply apparatus" but it also explained that that apparatus was made up of certain components. The three components were the supply device, the connecting lines (the signal line and the supply line) and the socket. The Claimant's case is that the supply of these components was a direct infringement of claim 1. One of the ways in which this case was put was the contention that, on the true construction of claim 1, the product therein described was the collection of the components which together made up the voltage supply apparatus, whether or not they were connected together at the time of supply.

96. I am not able to accept the Claimant's contention in this respect. Claim 1 refers to "a supply device being provided remotely from the socket and being *connected* to the socket via a signal line and via a supply line for the supply voltage" (italics added). The word "connected" should be given its ordinary meaning which requires the components to be connected to form the apparatus. The word "connected" in that phrase is to be contrasted with the word "connectable" which is used, appropriately, elsewhere in claim 1 to describe the possibility of the passenger's electric device being connected to the socket by means of a plug.

The fourth construction issue

97. The fourth construction issue related to Claim 7. Claim 7 referred to "a central voltage source". This issue did not receive much attention in the course of the trial but I was provided with written submissions in relation to it.

98. Claim 7 identified the central voltage source by reference to number 30 which is shown in Figure 5 and which was referred to in various places in the description in the Patent. The relevant paragraphs in the specification include paragraphs [0018], [0036] to [0043] and [0045] to [0046].

99. Paragraph [0018] referred to a preferred embodiment where "a central voltage source is provided for the voltage supply of the supply devices, it being possible to deactivate the voltage source via a control signal".

100. Figure 5 was described as showing a top view of several supply devices with a voltage source. Paragraphs [0033] to [0046] described what was shown in Figure 5. Paragraphs [0036] to [0043] and [0045] to [0046] referred to the voltage source shown marked 30 in Figure 5. In particular, paragraph [0039] referred to the typical on-board voltage of 115 V, 400 Hz being supplied to a voltage source (30) and then being converted by the voltage source (30) into a mains voltage of 110V, 60Hz and applied via a voltage switch to supply wires which lead to the supply device. The description went on to refer to signal lines which led into the voltage source (30)

which could send a signal which shut down the supply to the supply device which was referred to elsewhere in the Patent.

101. Having regard to the way in which matters were explained in the description in the Patent, the reference to "a central voltage source (30)" in Claim 7 is to be interpreted as a reference to a voltage source which received the on-board voltage of 115V, 400Hz and converted it to a mains voltage of 110V, 40Hz which it supplied to the supply devices referred to in the Patent. Claim 7 of the Patent did not specify where the voltage source was to be located nor what form it was to take. Claim 7 related to an invention which involved a voltage supply apparatus according to one of claims 1 to 6 which included a central voltage source of that kind and which central voltage source was capable of being deactivated by a control signal sent to it.

102. This interpretation of claim 7 gives rise to an issue as to whether the apparatus, or the components, supplied by one or other of the Defendants infringed claim 7. To understand the arguments, it is necessary to refer to the Product and Process Description ("the PPD") of what was supplied by the Defendants. The PPD describes the basic components and also refers to an optional Master Control Unit ("MCU"). The basic components comprised a supply device referred to by various names, including an ISPS. The ISPS was connectable by a supply line and a signal line to a socket with a plug detector. The on-board voltage of 115V, 400Hz was converted to the supply voltage of 110V, 60Hz in the ISPS. In a case where the option of an MCU was not used, the possibility of deactivating the supply of the on-board voltage to the ISPS was achieved by the use of a remote on/off switch which allowed the flight crew to switch off the system, for example, during taxi, take-off and landing of the aircraft. Where the option of an MCU was added, the MCU had a number of functions one of which was that it could operate as an on/off switch to allow the flight crew to switch off the system as described above. I should add that whereas Astronics supplied both the basic components and the MCU, it supplied the various items to different customers. It supplied the basic components (but not the MCU) to a company which provided the IFE (such as Panasonic) which in turn provided the basic components to the seat manufacturer (such as Safran). Astronics separately provided the MCU to the company which carried out the original aircraft fit-out.

103. With the basic system, not including an MCU, there was no central voltage source as referred to in Claim 7, and as described in the Patent. There was no central voltage source which converted the on-board voltage to the supply voltage for the socket. That conversion did not occur centrally but in the individual ISPSs. Further, there was no central voltage source of this kind which deactivated the power supply.

104. When the basic components were combined with an MCU, the position remained that there was no central voltage source which converted the on-board supply to the supply voltage for the socket. The MCU did provide the function of deactivating the power supply as referred to in claim 7 but it was not a central voltage source.

105. Accordingly, the components provided by one or other of the Defendants, as describe above, even when all connected together, did not include a central voltage source as referred to in claim 7.

106. For the avoidance of doubt, I note that it was not argued that if the components supplied by one or other of the Defendants fell outside the normal meaning of claim 7, that those components amounted to the equivalent of the invention described in claim 7 in accordance with the legal principles as to equivalents.

Novelty: the legal principles

107. There is no dispute as to the legal principles to be applied for the purpose of determining whether the alleged invention in the Patent was new over the prior art.

108. In *Synthon BV v SmithKline Beecham plc (No 2)* [2006] RPC 10, Lord Hoffmann (with whom the other members of the House of Lords agreed), at [21], described the following passage from *General Tire and Rubber Co v Firestone Tyre and Rubber Co* [1972] RPC 457 at 485-486 as authoritative:

> "To determine whether a patentee's claim has been anticipated by an earlier publication it is necessary to compare the earlier publication with the patentee's claim … If the earlier publication … discloses the same device as the device which the patentee by his claim … asserts that he has invented, the patentee's claim has been anticipated, but not otherwise. …
>
> When the prior inventor's publication and the patentee's claim have respectively been construed by the court in the light of all properly admissible evidence as to technical matters, the meaning of words and expressions used in the art and so forth, the question whether the patentee's claim is new … falls to be decided as a question of fact. If the prior inventor's publication contains a clear description of, or clear instructions to do or make, something that would infringe the patentee's claim if carried out after the grant of the patentee's patent, the patentee's claim will have been shown to lack the necessary novelty … The prior inventor, however, and the patentee may have approached the same device from different starting points and may for this reason, or it may be for other reasons, have so described their devices that it cannot be immediately discerned from a reading of the language which they have respectively used that they have discovered in truth the same device; but 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 claim were valid, would constitute an infringement of the patentee's claim, this circumstance demonstrates that the patentee's claim has in fact been anticipated.
>
> If, on the other hand, the prior publication contains a direction which is capable of being carried out in a manner which would infringe the patentee's claim, but would be at least as likely to be carried out in a way which would not do so, the patentee's claim will not have been anticipated, although it may fail on the

> ground of obviousness. To anticipate the patentee's claim the prior publication must contain clear and unmistakeable directions to do what the patentee claims to have invented … A signpost, however clear, upon the road to the patentee's invention will not suffice. The prior inventor must be clearly shown to have planted his flag at the precise destination before the patentee."

109. Mr Acland submitted that for the purpose of assessing novelty over prior art, what was disclosed by the prior art includes what was implicit in the prior art. I accept that. So if, as a matter of normal practice, the invention disclosed by the prior art would necessarily be performed in a way which would fall within the scope of the claim under consideration, then the matter defined by the claim was not new: see the UKIPO's Manual of Patent Practice at paragraph 2-07, citing *H. Lundbeck A/S v Norpharma SpA* [2011] RPC 23.

110. In *Synthon*, Lord Hoffmann added at [22]:

> "22. … the matter relied upon as prior art must disclose subject-matter which, if performed, would necessarily result in an infringement of the patent. That may be because the prior art discloses the same invention. In that case there will be no question that performance of the earlier invention would infringe and usually it will be apparent to someone who is aware of both the prior art and the patent that it will do so. But patent infringement does not require that one should be aware that one is infringing: "whether or not a person is working [an] … invention is an objective fact independent of what he knows or thinks about what he is doing": *Merrell Dow Pharmaceuticals Inc v H N Norton & Co Ltd [1996] R.P.C. 76*, 90. It follows that, whether or not it would be apparent to anyone at the time, whenever subject-matter described in the prior disclosure is capable of being performed and is such that, if performed, it must result in the patent being infringed, the disclosure condition is satisfied. The flag has been planted, even though the author or maker of the prior art was not aware that he was doing so."

111. I will now consider what was disclosed by Neuenschwander and separately by Sellati.

The disclosure in Neuenschwander

112. Neuenschwander was a US patent for an invention described as "Safety Receptacle". The patent application was filed in February 1985 and published in May 1986, about 11 years before the priority date for the Patent. The abstract explained that the invention in Neuenschwander was a safety receptacle or contact system for use at the outlet end of an electric supply line, intended for connection of a plug with at least two contact pins, and that the receptacle comprised, amongst other things: at least two connector ends; two openings for receiving the plug pins and for guiding them into contact with the connector ends/contact terminals; an electrical circuit associated with

the receptacle to control connection with the electric supply line, including "a relay for breaking contact between the connector ends and the supply line when the two plug pins are withdrawn from the receptacle"; and "a light barrier connected with the relay for control thereof and arranged for operation in response to connection or non-connection of the plug".

113. The section in the patent specification entitled "Background of the Invention" explained that the invention related to a contact system installed at an outlet of electricity for connection of a plug with at least two contact pins of the general type used to supply electricity at 110V or 220V to portable electronic equipment (column 1, lines 6-14). The description in Neuenschwander explained that conventional receptacles such as wall sockets and flush sockets represented a constant source of danger, and that the art was replete with safety devices or safety receptacles designed to prevent accidental contact with the live part of the socket (column 1, lines 16-23).

114. Neuenschwander referred to two dangers in particular (column 1, lines 30-38): that a child might hold a small metal piece, e.g. a nail or a needle, and push it into the socket; and that when a plug is pulled from a socket there is some danger that the hand which holds the plug while pulling it out will accidentally touch a part of a live contact pin. Neuenschwander then stated that there were two groups of safety receptacles aimed at dealing with these problems.

115. The first group was categorised by the inclusion of an entirely mechanical moveable barrier, which was held by a spring in a rest position such that the barrier covered the openings to the recesses (thereby preventing something being pushed into the recesses). The barrier was designed in such a way (with a wedge cross-section, or with a bevelled edge or taper) that when pushing in a plug the pins of the plug physically forced the barrier to move upwards against the spring and out of the way such that the pins of the plug could be pushed into the recesses and could connect with the contact terminals (column 1, lines 38-60).

116. Neuenschwander stated that a main disadvantage of these purely mechanical devices was that they presented a "substantial hindrance" to normal plug insertion. That was because the barrier covered the entire opening and therefore had to move a distance of at least 5mm before the pins of the plug could enter the recesses, and because the movement of the barrier was at a 90º angle to the line along which the pins were inserted. The consequence was that users might push with excessive force, thereby damaging the receptacle (column 2, lines 6-21).

117. The second group of receptacles included a mechanical barrier in combination with an electrical safety device incorporating the basic features of a relay. The movement of the mechanical barrier activated a switch which triggered the relay to connect the electric supply line with at least one of the contact terminals (column 1, line 61 – column 2, line 5). Neuenschwander acknowledged that the barrier did not need to cover the entire opening to the recess but suggested that these devices still suffered from the 'substantial hindrance' problem to some extent, because there was still a barrier that needs to be moved (column 2, lines 22-28).

118. Neuenschwander also referred to a further problem with this second group of devices, which was that the space requirement for the relay switch and the relay itself meant

that these receptacles tended to take up more space than a standard receptacle (column 2, lines 28-32).

119. Under the section "Summary of the Invention", the description in Neuenschwander explained that the primary object of the invention was to provide a new and improved construction of a safety receptacle or contact system which did not suffer from the identified disadvantages. Neuenschwander stated that the invention should achieve three aims:

    i) providing a design in which the live contact terminal of the receptacle was not in contact with the electric supply line unless and until both, or all, the pins of the plug had been introduced into the receptacle (column 2, lines 40-45);

    ii) the insertion of the plug should be substantially unencumbered by the safety features (column 2, lines 46-59);

    iii) the features needed for safe and simple operation should not require more space than was available within a receptacle of conventional construction (column 2, lines 50-54).

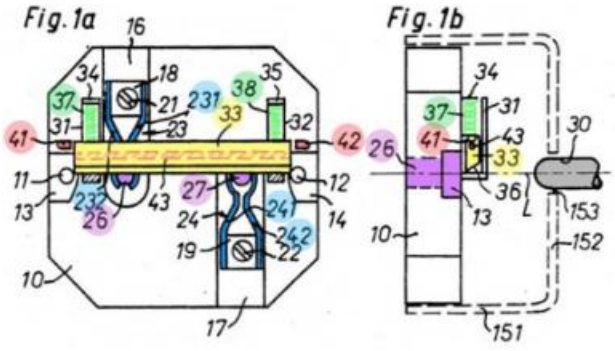
120. There was then a short section (column 2, line 57 – column 3, line 18) summarising the technical aspects of the design, which again explained that the receptacle or contact system comprised: a physical arrangement for receiving the plug; an associated electrical circuit for controlled connection of the electric supply with the contact terminals which included a relay set to break contact between the contact terminals and the mains supply when the pins of the plug were withdrawn; and a "light barrier means" connected to the relay that can control the switching of the relay in response to the insertion of a plug into the receptacle. When there was no plug, the light barrier would keep the contact terminals turned 'off', and when a plug was connected, the light barrier means triggered the relay which connected the mains supply, and therefore turned the contact terminals 'on'. That was explained in column 3, lines 19-28.

121. The light barrier and the associated optical and electronic circuitry were discussed in more detail in column 3, lines 29-56. Specifically, there was a light source/emitter, and a light sensor/receptor, with a predetermined optical path between the emitter and the receptor (column 3, lines 38-44). The optical path included a light gate or barrier of some description, which when moved from an open to a closed position, or vice versa ("when established or when breached") would cause an electric current to be either generated or interrupted at the receptor. That electric signal was amplified and used to operate the relay to make or break the connection to the mains supply (column 3, lines 44-56).

122. Neuenschwander made clear in the remainder of column 3 and in column 4 that the precise configuration of the optical circuit and the orientation of the emitters and receptors was not important (see e.g. column 4, lines 18-24). Nor was the precise design of the light barrier – it might be "free of any moveable mechanical elements" (column 3, lines 29-31), but might also be a "physical structure" made up of a bar or bridge (column 4, lines 36-38), or "a plurality of barrier portions" (column 4, lines 8-10).

123. Overall, the disclosure in Neuenschwander appeared to be focused on satisfying the first of the three aims referred to in the Summary of the Invention.

124. Neuenschwander then disclosed two specific receptacles intended to achieve the three aims. The first was discussed at length from column 5 line 28 – column 8 line 59. The mechanical parts of the receptacle are shown in Figures 1(a), 1(b), and the electronic and optical circuitry is shown in Figures 2 and 3.



125. Figures 1(a) and 1(b) (above) of Neuenschwander are reproduced but with colours which have been added to assist in exposition. Figure l (a) was a top-view, and Figure 1(b) a side-view, of the base plate of a safety receptacle. Neuenschwander made it clear the arrangement should be suitable for conventional 220V AC 2- or 3-wire lines (column 5, lines 52-55), although the receptacle in Figures 1(a) and 1(b) was designed for a 2-pin (live and neutral) plug, and Neuenschwander did not disclose anywhere how to build a receptacle for a 3-pin plug.

126. In column 5, line 28 to column 6, line 10, the description in Neuenschwander focused on the physical design of the receptacle housing rather than the light barrier means. Beginning with Figure 1(a), the recessed contact terminals which receive the pins of the plug were shown in purple (26, 27). Those terminals were connected via metal arms or prongs shown in blue (231, 232, 241, 242), to blocks (18,19) into which were screwed the live and neutral wires (not shown). If the 2-pin plug was inserted, there was therefore a path for electric current to flow out of one terminal, say the left one (18), along the blue metal arms (231, 232), into the left pin of the plug (26), through the device and back out of the right pin of the plug (27), along the right hand metal arms (241, 242) and out of the right terminal (19).

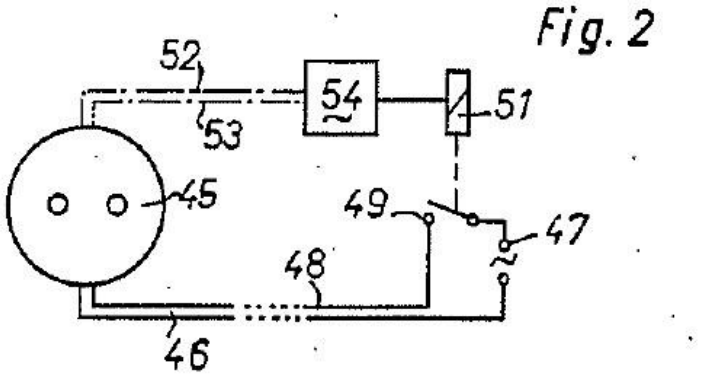
127. The physical operation of the displaceable optical bridge shown in yellow (33) is discussed in column 6, lines 11 to 34. The optical bridge (33) could move up and down in guides (31,32) and when there was no plug, as shown, the optical bridge was held in its lowest resting position by two springs shown in green (37, 38). The optical bridge was designed with a bevelled edge so that it could be displaced smoothly.

128. The optical circuitry was discussed in column 6, lines 35-49. There were two optical conductors shown in red (41, 42), between which was the optical bridge. The optical bridge included a channel through its centre (43), which was a light conductor. In the resting position shown in Figure 1(a), the light channel (43) was not aligned with the optical conductors (41, 42), so the optical path was broken.

129. Figure 1(b) showed a single pin (30) approaching the plug. The skilled person would understand that, as the pin (30) approached the optical bridge (33), it hit it at an oblique angle (because the optical bridge has a bevelled edge – column 6, lines 30-32), which forced the optical bridge to move out of the resting position, upwards in the guide (31), compressing the spring (34). Going back to Figure 1(a), if the optical bridge (33) was displaced upwards far enough, then the optical channel (43) would align with the optical conductors (41,42), creating an uninterrupted light path. That light path triggered the relay which connected the mains supply, which is referred to below in the context of Figures 2 and 3.

130. It was clear from Figure 1(a) that if only one pin was introduced (say, the left one), then the optical bridge would only be forced up at the left side, leaving the right side in or near its rest position and the light path broken. The light path was only completed when both pins were present. It was also clear from Figure 1(b) that the pin must have the correct diameter. If it was too thin, it would be insufficient to push up the optical bridge far enough. If it was too large then it would not fit into the recess. Neuenschwander made both of these points in column 7 line 49 to column 8 line 2.

131. Figures 1(a) and 1(b) showed the mechanical parts of the safety receptacle. Figures 2 and 3 (and column 6, line 50 – column 7, line 34) explained the optical and electrical circuitry.



132. Figure 2 (above) explained the operation of the safety receptacle or safety contact system. It showed the receptacle (45) diagrammatically together with the mains electrical circuitry (46, 48, 47, 49, 51, 54), and the optical control circuitry (52, 53, 54).

133. Beginning with the mains electrical part, the mains supply was shown on the bottom right (47). There was a relay in the top right, which included a main switch (49) and a trigger switch (51). The relay (49) broke the connection with the mains supply, and since the relay was normally open, in the resting position there was no power available to the pins of the plug.

134. Turning to the optical control part, there were two optical conductors (52, 53), which were connected at one end to the optical conductors of Figure 1(a) (41,42) either side of the optical bridge, and at the other end to an electronic amplifier circuit (54). That

circuit was shown in Figure 4. It included a light source and a light sensor, such that when the optical bridge was in its resting position the sensor was 'in the dark', and when the optical bridge was raised and the optical path was completed, the sensor was illuminated. When the sensor was illuminated, a signal was sent from the amplifier circuit (54) to the trigger switch (51) of the relay, which closed the main relay switch (49) thereby making the connection to mains power.

135. In this way, when there was no plug, the contact terminals were 'off'. If a knitting needle were to be pushed into one of the recesses, nothing would happen, because the light path would remain broken and the contact terminals would still be 'dead'. However, if a plug with two pins of the correct diameter were introduced, the light bridge would be raised to complete the optical circuit and activate the relay. Thus, the act of inserting a plug would have the effect of turning the contact terminals 'on'.

136. A second variant was shown in Figure 5 and was discussed from column 8, line 60 to column 9 line 55. Figure 5 is reproduced below, with colours added.

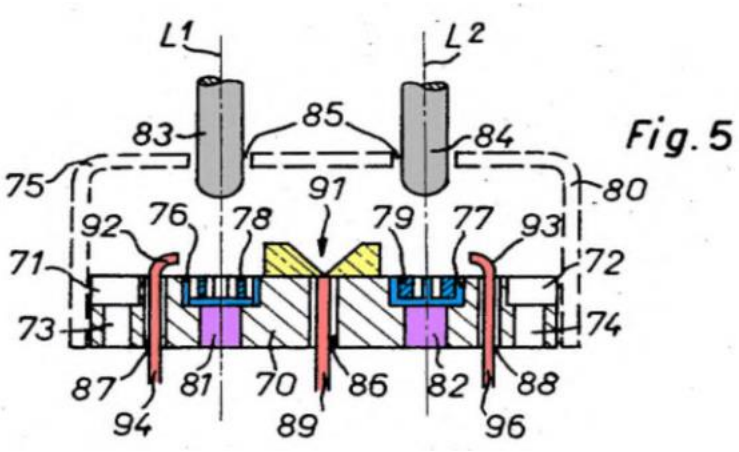


Fig. 5

137. The second variant had no mechanical light barrier. In this variant, optical conductors (in red – 94, 92, 89, 93, 96) were arranged together with a prism (in yellow – 91) such that, in the rest state (without a plug) there were two uninterrupted light paths. The first, from the left, was from conductor 94 through emitter 92 across the recess 81 through the prism 91 and down through conductor 89. The second, from the right, was from conductor 96 through emitter 93 through the prism 91 and down through conductor 89. These features can be arranged so the light originates from conductor 89 in which case 92 and 93 act as light receivers. The particular arrangement was said to be unimportant in this respect.

138. The arrangement in Figure 5 was also used with the amplifier circuits of Figures 2 and 3 (see column 9, lines 37-55), which were modified in an appropriate manner. Neuenschwander explained that these and other modifications to the circuity were within the ordinary skill of the reader so that no further explanation was required.

139. Thus, in the second variant, when there was no plug (and hence no pins), there were two uninterrupted light paths, the relay was open, and the mains supply was not connected. If an object were to be pushed far enough into one of the recesses, it would break one of the light paths, but that would not be enough to trigger the relay. It was only if both light paths were broken, which would occur when a plug with two

pins was pushed in, that the relay was triggered and the contact terminals were made 'live'.

140. In summary, both variants provided for a situation in which the contact terminals were dead unless and until a plug was introduced, at which point they were made live. Both variants satisfy Neuenschwander's first aim. Both variants also turned the contact terminals off as the plug was removed.

141. The first variant had the additional advantage that the pins had to be of the right size in order to lift the light barrier sufficiently. That came however at the expense of the inclusion of the mechanical element, which could possibly hinder the introduction of a plug, contrary to the second aim. The physical barrier arrangement in the first variant was also likely to require more space, potentially contravening the third aim.

142. The second variant on the other hand had no bulky or 'hindering' mechanical element, and therefore better satisfied both the second and third aims. But it did not have the additional benefit of requiring the right size diameter pins as the second variant could be turned on by the insertion of two separate probes.

The issues as to the disclosure in Neuenschwander

143. The parties agree that Neuenschwander did not disclose any requirement for complete insertion of the plug into the socket before power was supplied to the socket. The Defendants argued that the position was the same in relation to the Patent but I have not accepted that argument.

144. The parties disagreed as to whether Neuenschwander disclosed a requirement for the power supply to be remote from the socket (as I have held is required by claim 1 of the Patent).

145. On the issue as to Neuenschwander and remoteness, Mr Cuddigan submitted:

i) Mr Barovsky had put forward reasons for his contention that the power supply had to be separate from the socket;

ii) Mr Barovsky had confirmed in cross-examination that, in his four reports, he had identified all of the parts of Neuenschwander which were relevant to all of the points he wished to make;

iii) although Mr Acland submitted that other parts of the Neuenschwander were relevant to this issue of remoteness, those parts had not been identified by Mr Barovsky;

iv) Mr Barovsky relied on a passage in the description in Neuenschwander which referred to two optical conductors (52 and 53) extending from the socket (the receptacle) to an electronic amplifier circuit (54), and the illustration of this point in Figure 2, in support of his contention that the amplifier was not in the socket and was therefore “remote”, by which Mr Barovsky meant “separate”;

v) Mr Barovsky also relied on Figure 2 which showed the supply lines from the receptacle to 47 and 49 as discontinuous supply lines which were said to show that the power supply was separate from the socket;

vi) Figure 2 was a schematic diagram and did not show the physical location of the components;

vii) whilst it was accepted that the lines from the receptacle to 47 and 49 did show a discontinuity, the lines from the receptacle to the amplifier (54) did not, as the dots and dashes were used to show an optical, rather than an electrical, connection;

viii) the description in Neuenschwander did not draw attention to any issue as to remoteness or any perceived benefit as to remoteness;

ix) for there to be a relevant disclosure, there must be a clear and unmistakeable direction in that respect.

146. On this issue, Mr Acland submitted:

i) Figure 2 shows the power supply at a distance from the socket as explained by Mr Barovsky;

ii) Figures 1b and 5 do not show the power supply within the socket;

iii) Figure 5 shows the optical circuit extending out the back of the socket;

iv) column 3, lines 66 to 68, referred to the possibility of the emitter and receptor not being within the receptacle but being "at a distance" from the respective opposite ends of the barrier portion; it was suggested that, for this possibility, the emitter and reception would be at the ends of the optical conductors which emerged from the back of the socket as shown in Figure 5.

147. There is considerable room for argument as to what Neuenschwander did disclose in relation to the separation of the power supply from the socket. Figure 2 suggested a degree of separation but it was not clear that Figure 2 was intended to show the location of components as distinct from being a schematic diagram. The drawings did not show a power supply within the socket which did suggest an intention to locate it separately from the socket. I am not wholly persuaded that the reference to "at a distance" relied upon by Mr Acland is to be interpreted as indicating that the receiver and emitter are to be outside the socket but if it is to be so interpreted then that would not add anything to the possibility of separation of the optical circuit as shown in Figure 2.

148. If Neuenschwander did intend the power supply to be separate from the socket, it did not contain any clear and unmistakeable direction in that respect. In any event, on my construction of the requirement of remoteness in claim 1 of the Patent, the supply device must be provided "remotely" from the socket and this required that that the two components were more than "separate" so that the supply device must be "kept away" from the socket and, in particular, "arranged in such a way that there is no source of danger to the passenger". The description in Neuenschwander did not draw

attention to any issue as to remoteness or any perceived benefit as to remoteness and cannot be said to contain a clear and unmistakeable direction in the respect required by claim 1 of the Patent. I consider that this requirement of claim 1 of the Patent is not disclosed by Neuenschwander.

149. Next, I need to consider whether Neuenschwander disclosed the timing feature in claim 2 of the Patent. Claim 2 of the Patent referred to a feature which produced the result that the supply voltage was only supplied to the socket if a maximum contact time was not exceeded between the detection of the first and second contact pin. This was referred to as "the timing feature".

150. The closing submissions on this question produced the remarkable state of affairs that Mr Cuddigan submitted that, at the end of the trial, it had become common ground that Neuenschwander did not disclose the timing feature whereas Mr Acland submitted that the Claimant had conceded that the timing feature had been disclosed by Neuenschwander. I therefore have to examine the evidence and the arguments on this issue.

151. In the description in Neuenschwander, column 3 lines 19 to 20, there was a reference to a preferred embodiment of the invention which was said to involve connection of the connector ends with the supply line "only when the contact pins are moved simultaneously along the theoretical line of pin movement into contact with the connector end". It was not said that anything else in the description (which extends to nine columns) bore on the present issue. It was not said that any of the figures shows a feature which would restrict the supply of voltage to a case where the contact pins moved simultaneously into the socket. In particular, it was not said that such a feature was shown by Figure 5.

152. Claims 2 and 3 in Neuenschwander used similar language to the language I have quoted from column 3 of the description but the wording had been slightly altered to refer to the voltage being supplied only when all the pins of the plug were moved "substantially simultaneously" along the lines of pin movement.

153. In his first report, at paragraph 83, Mr Barovsky referred to the above-mentioned statements in Neuenschwander and said that the manner in which the concept referred to was achieved was not explicitly disclosed but would have been straightforward for a skilled person to implement, although he did not describe precisely how it would be implemented. In the same report, Mr Barovsky stated that the skilled person would understand the statements in Neuenschwander to mean that there could only be a very short time between the detection of the first pin and the detection of the second pin. He added that the skilled person would understand that there had to be something to measure and analyse the time between the detection of the pins. He then said that this "implied" to the skilled person that timing circuitry should be included.

154. Professor Wheeler served a second report and in that report he responded to this part of Mr Barovsky's evidence. Professor Wheeler said that no timing feature was disclosed in Neuenschwander. Professor Wheeler was cross-examined on this subject but the cross-examination did not establish anything which could be relied upon by the Defendants in this respect.

155. Mr Barovsky was cross-examined on his evidence that a timing feature was implicitly disclosed in Neuenschwander. He agreed that the timing feature in claim 2 of the Patent added a level of safety to the system. He agreed that Neuenschwander did not contain any express disclosure of a timing feature. He regarded that as a shortcoming of the design. He agreed that the safety level produced by Neuenschwander was less than the safety produced by the use of shutters to close the apertures of the socket because it would be possible with Neuenschwander to insert two knitting needles sequentially into the apertures and access a live contact. He said that Neuenschwander did not offer anything in the way of safety improvement over the common general knowledge but it could be modified to improve safety. One of the modifications would be to add a timing feature. He agreed that Neuenschwander did not disclose a timing feature. He said that adding a timing feature would not be an inventive step.

156. Mr Cuddigan relied on Mr Barovsky's evidence in cross-examination and submitted that Neuenschwander did not disclose the timing feature in claim 2 of the Patent. He also relied on the decision of the German court to the like effect.

157. Mr Acland relied on the wording in Neuenschwander to which I have referred and also on what Mr Barovsky had said on this point in his first report. He submitted that Mr Cuddigan had not cross-examined Mr Barovsky on the wording in Neuenschwander and that this was fatal to Mr Cuddigan's submissions.

158. It is clear that this issue has not been conceded by either side and that I have to decide it. I consider that Mr Cuddigan did cross-examine in a way which explored Mr Barovsky's views on this point.

159. Although Mr Barovsky appeared to accept that Neuenschwander did not explicitly disclose a timing feature, that did not appear to be accepted by Mr Acland who seemed to suggest that the wording in Neuenschwander to which I have referred should be understood as an explicit disclosure of a timing device. However, it is not a promising start for Mr Acland that his own expert did not see it that way when cross-examined.

160. I can see how it might be said that the statement in column 3 lines 19 to 28 could signify that there would be some feature of the invention which would not allow the supply of voltage unless the pins of the plug moved simultaneously (or substantially simultaneously as stated in claims 2 and 3) into the socket. However, given the normal configuration and geometry of a plug, the pins of a plug will move substantially simultaneously when inserted into a socket. It is entirely possible that what Neuenschwander was attempting to describe in the relevant text was what would happen in the ordinary case with the ordinary plug rather than attempting to refer to a feature of which there was no other hint which would require further thought and design.

161. Accordingly, I do not consider that Neuenschwander contained clear and unmistakeable directions that it contained the invention of a timing feature.

162. Mr Barovsky did contend that the addition of a timing feature to Neuenschwander would not be an inventive step but he may also have intended to say that the disclosure of a timing feature was implicit, even if not explicit, in Neuenschwander. I have referred earlier to the possibility of implicit disclosure. There can be an implicit

disclosure where a skilled person seeking to implement Neuenschwander, applying normal practice, would necessarily carry out certain steps. In the present case, what a skilled person would necessarily do to implement Neuenschwander very much depends on what Neuenschwander describes. If, as I have held, the relevant text in Neuenschwander did not refer to a timing feature, then it would not be necessary for the skilled person to create a timing feature to implement Neuenschwander. Accordingly, it did not disclose a timing feature.

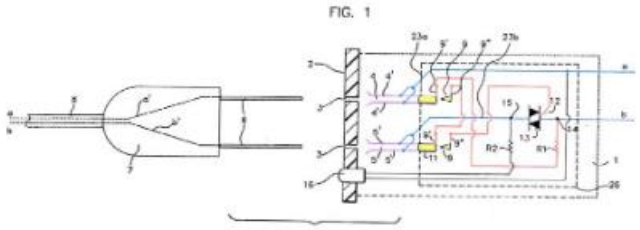
The disclosure in Sellati

163. Sellati was a US patent where the invention was described as "Safety Power Receptacle with Hot Wire Switch-through". The patent application was filed in December 1987 and published in October 1989, about 8 years before the priority date of the Patent. The abstract explained that the invention was a safety power outlet arranged such that, upon complete insertion of all prongs of a plug, the arrangement generated a "connect signal which activates a power connection" to supply power to the prongs of the plug.

164. The "Background and Prior Art" section of the description explained the known dangers of fires or injuries associated with metallic objects being inserted into the socket and fires and explosions caused when the plug and outlet were joined, with the power connected. Sellati identified two disadvantages of the prior art devices. The first was that they did not prevent the accidental insertion of wires or metals from causing injury or fires because power was present before the plug was inserted into the outlet (column 1, lines 25-30). The invention however ensured that power was supplied only when a plug was "fully inserted" into the socket (column 1, lines 7-10) or the plug and outlet were “completely joined together” (column 1, lines 29-30). The second disadvantage was that the prior art devices required specially constructed mating plugs and outlets (column 1, lines 30 to 36).

165. The "Summary of the Invention" explained that Sellati provided an outlet that was "safely disconnected from the high potential power lines, until a standard electrical power plug has been fully inserted" (column 1, lines 39-44). The outlet was connected to high potential power lines, and was typically contained in a housing, mounted to a wall or connected to a flexible power cord (column 1, lines 45-61). The housing had a receive terminal to receive each prong of a plug, where each recessed contact terminal of the socket had a normally-open mechanical switch, which was closed only when the corresponding prong of the plug was completely inserted into the recess (column 1, lines 61-65). When all the switches were closed the socket generated a "connect signal" which had the effect of closing a switch, such as a triac or a relay, thereby making a connection between the mains supply line and the contact terminals (column 1, line 61 – column 2, line 12). There was a light that indicated whether the power was on or off (column 2, lines 13-23). Sellati explained that if one of the prongs was 'missing', the person was protected from shock (column 2, lines 24-29).

166. An alternative safety power outlet was taught in column 2 lines 30 to 38 in which the power outlet could be configured to plug into an existing wall socket.



167. Figure 1 (above) showed how the invention worked. Figure 1 was described as "a schematic circuit diagram". Figure 1 is reproduced above with some colour mark-up. Sellati described Figure 1 in column 3, lines 4-55.

168. The dotted line around the edge was the housing of the device (1). At the front (i.e. left) of the housing there was a front plate (2) which had receiving holes (3) aligned with contact terminals (shown in purple) (4) and (5) to receive the prongs (6) on the plug (7). At the back (i.e. the right) there were two power lines (in blue, (a) and (b)) to transmit mains power to the contact terminals (4) and (5). Power line (b) was live, but its path to the live contact terminal (5) was interrupted by a normally-open switch (in this case, a triac – 13).

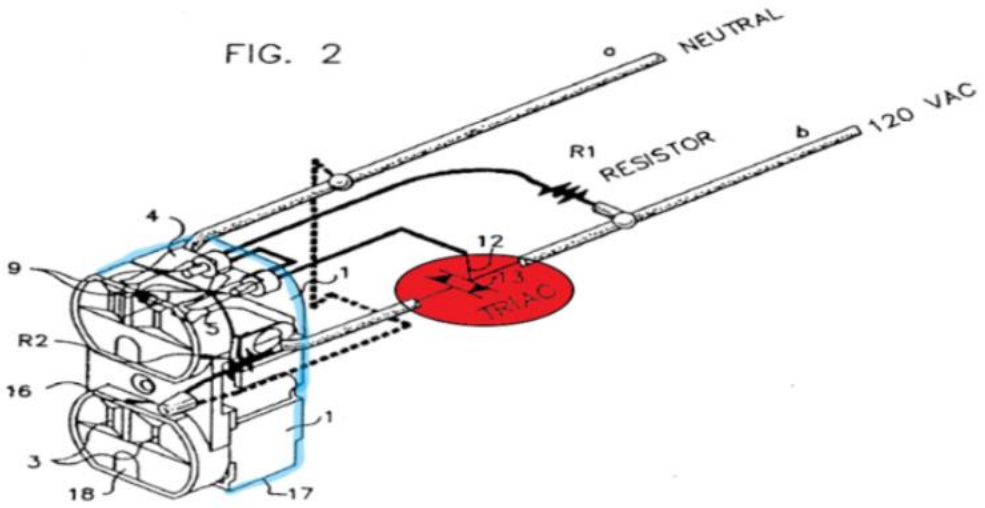
169. There was a control circuit, shown in red. It included two microswitches (in yellow (9)) at the end of each contact terminal, which were connected in series through a resistor (R1) between the live power line (14) and the control terminal (12) of the triac. The resistor R1 dissipated much of the energy from the high voltage supply, meaning that the control circuit had only a low voltage at the contact terminals.

170. The live contact terminal was linked (via a resistor R2) to an LED (16) so that the LED would shine when the triac was closed, but would be dark when the triac was open.

171. When the microswitches were open, the control circuit was incomplete, the triac was open, there was no mains power to the contact terminals, and the LED was off. However, when both microswitches were closed, the control circuit was complete, which sent a low voltage signal to trigger the triac, which in turn closed the main switch allowing high voltage supply to flow to the live terminal, and the LED turned on. Accordingly, Sellati considered that depressing both microswitches at the same time was a reliable indicator of the presence of a fully inserted plug, and that power could then safely be supplied. Power was not supplied whilst the plug was being pushed into the socket, the contact terminals would not be live, so there would be no sparking.

172. As soon as the plug was removed, the high voltage supply to the contact terminal was cut and the power was turned 'off'.

173. Figure 2 of Sellati is reproduced below, with colouring added. It was described in Sellati as "a diagrammatic perspective detailed wiring diagram". It shows a dual socket arrangement.



174. Figures 3 and 6 showed Sellati's invention in a flexible power cord arrangement, and in a retrofit receptacle, respectively.

The issue as to the disclosure in Sellati

175. The parties agree that Sellati discloses the requirement of complete insertion of the plug in the socket in order to turn on the power supply.

176. The parties disagree as to whether Sellati disclosed a requirement for the power supply to be remote from the socket (as I have held is required by claim 1 of the Patent).

177. As to the issue of disclosure of remoteness in Sellati, Mr Cuddigan submitted:

i) the Defendants' argument that Sellati disclosed a power supply which was remote from the socket was based on Figure 2 in Sellati;

ii) as with the other arguments from the Defendants, when the Defendants used the term "remote", they meant "separate";

iii) in the light of Mr Barovsky's evidence, there was a question as to the identity of the skilled addressee of Sellati;

iv) Mr Barovsky accepted that if the relevant skilled person was a general electrical engineer, Figure 2 would not be understood to disclose a power supply which was separate from the socket; it was only if the skilled person had expertise in relation to aviation design that Mr Barovsky contended that Figure 2 would be understood to disclose a power supply separate from the socket;

v) the court should hold that the relevant skilled person in this case was a general electrical engineer so that it followed the Defendants case as to disclosure of the separation of a power supply must fail;

vi) in any event, even if for other purposes in this case, the relevant skilled person had expertise in aviation design, Sellati was addressed to the skilled addressee

of that patent; there was no reason to hold that the skilled addressee of Sellati was anything other than a general electrical engineer;

vii) therefore, on Mr Barovsky's own evidence, Sellati did not disclose the separation of a power supply;

viii) the Defendants did not adopt the correct approach to the question of disclosure in Sellati; they did not ask what Sellati disclosed but instead they asked whether a designer of a voltage supply apparatus in an aeroplane would be prompted by Sellati to separate the power supply from the socket; that was wrong in law;

ix) Figure 2 was not intended to show the location of the various components; if Figure 2 were understood as showing the triac outside the socket, then Figure would also have to be read as showing that the wire between the two microswitches and the connection between the neutral and the LED were also outside the socket; that did not make any sense to an electrician; further, where the Sellati invention was installed in a junction box for a wall socket, the junction box would be live which cannot have been intended;

x) Sellati did not disclose any connection between the separation of the power supply from the socket and safety.

178. On the issue of disclosure of remoteness in Sellati, Mr Acland submitted:

i) Figure 2 in Sellati was not merely a wiring diagram; it also contained spatial information as to the location of the components;

ii) in relation to the spatial information in Figure 2, the triac was clearly outside the socket;

iii) putting the triac outside the socket (and also the other matters shown in Figure 2 as outside the socket) would not be suitable in a domestic context but would suggest to a skilled person in an aviation context the possibility of separating the power supply from the socket and then designing a box to contain the power supply.

179. One of the submissions made by Cuddigan depended on the identity of the skilled person. I have already held that the skilled person in this case was, as contended by the Defendants, a skilled person with expertise in aviation design. Accordingly, the fact that Mr Barovsky accepted that Figure 2 in Sellati would not disclose to a general electrical engineer a power supply which was separate from the socket is not conclusive on the present issue. I still have to decide whether Figure 2 would be understood to disclose a power supply separate from the socket to a person skilled in aviation design.

180. The parties' submissions differed in another respect as to the skilled person who was to be assumed for the purpose of determining the scope of the disclosure in Sellati. Was the relevant skilled person for this purpose the skilled addressee of Sellati or was it the same skilled person as I have identified earlier for the purpose of the task of designing an ISPSS for an aeroplane cabin? Mr Cuddigan cited a statement in

Gemstar-TV Guide International Inc v Virgin Media Ltd [2010] RPC 10 at [154] as to what was disclosed by an article aimed at a consumer or an installer and suggested that this statement should persuade me to hold that the relevant skilled person, when identifying the disclosure in Sellati, was the skilled addressee of Sellati. However, I do not consider that the statement in that case can be taken to be a statement of general principle of the kind contended for by Mr Cuddigan. I will assume for the sake of argument that Mr Acland is right that I should ask: what would Sellati disclose to a skilled person charged with the task of designing an ISPSS for an aeroplane cabin? However, I comment that it is not a good start for Mr Acland's argument that Mr Barovsky accepted that a diagram which is claimed to contain spatial information as to the location of components for a domestic power supply would not disclose to a general electrical engineer the separation of the power supply from the socket.

181. There is considerable room for argument as to what Sellati did disclose in relation to the separation of the power supply from the socket. Figure 2 showed the triac as being outside the socket but it did not show any enclosure for the triac. Further, if Figure 2 is to be understood as showing the location of components, it is rather puzzling that it shows the wire between the two microswitches and the connection between the neutral and the LED as also being outside the socket. That makes one question whether Figure 2 is to be read as showing the location of components at all.

182. If Sellati did intend the power supply to be separate from the socket, it did not contain any clear and unmistakeable direction in that respect. In any event, on my construction of the requirement of remoteness in claim 1 of the Patent, the supply device must be provided "remotely" from the socket and this requires that that the two components are more than "separate" so that the supply device must be "kept away" from the socket and, in particular, "arranged in such a way that there is no source of danger to the passenger". The description in Sellati did not draw attention to any issue as to remoteness or any perceived benefit as to remoteness and cannot be said to contain a clear and unmistakeable direction in the respect required by claim 1 of the Patent. I consider that this requirement of claim 1 of the Patent is not disclosed by Sellati.

Conclusions on novelty

183. The Claimant says that claim 1 of the Patent was novel over Neuenschwander in relation to the requirement of full insertion of the plug and the requirement of remoteness of the power supply from the socket.

184. The Defendants say that claim 1 of the Patent was not novel because, on its true construction, the Patent did not require full insertion of the plug and all that it required in relation to remoteness was separation of the power supply from the plug. They went on to submit that Neuenschwander also did not require full insertion of the plug and it did require separation of the power supply from the socket.

185. The fate of these various submissions really turns on my earlier findings as to the construction of the claims in the Patent and as to what was disclosed by Neuenschwander. I have also considered whether the Defendants could advance their

case by relying on any implicit disclosure in Neuenschwander but I do not see any scope for them to do so.

186. In the result, claim 1 of the Patent was novel over Neuenschwander in relation to two features in particular, namely, the requirement of full insertion of the plug and the remoteness of the power supply from the socket. Neuenschwander did not have either of those features.

187. For the reasons given earlier, I hold that claim 2 of the Patent was not anticipated by Neuenschwander.

188. It is not in dispute that claim 3 of the Patent was not anticipated by Neuenschwander.

189. Sellati did disclose the requirement of full insertion of the plug but the Claimant contends that Patent was novel over Sellati in that it required remoteness of the power supply from the socket. The Defendants' argument to the contrary was based on an interpretation of Sellati as disclosing the possibility of remoteness of the power supply from the socket. I have not accepted that interpretation.

190. It follows that claim 1 of the Patent was novel over Sellati.

191. Further, it is not in dispute that Sellati did not disclose the timing device in claim 2 of the Patent. It is agreed between the parties that Sellati did disclose the microswitches in claim 3 of the Patent.

Inventive step

192. The next question is whether the claims in the Patent involved an inventive step: see sections 1(1)(b) and 3 of the Patents Act 1977. The Defendants say that the claims in the Patent were obvious over Neuenschwander alternatively obvious over Sellati.

193. When considering the issue of obviousness, it is often considered helpful to adopt the approach identified in *Windsurfing/Pozzoli* which was recently considered by the Supreme Court in *Actavis Group PTC EHF v ICOS Corpn* [2019] Bus LR 1318. This approach involves the court in identifying:

    i) the notional skilled person;

    ii) the relevant common general knowledge of that person;

    iii) the inventive concept of the claim or, perhaps more directly, the true construction of the claim;

    iv) the differences between the matter cited as part of the state of the art and the inventive concept of the claim.

194. Having identified the matters referred to in the last paragraph, the ultimate question is: do the differences which have been identified constitute steps which would have been obvious to the skilled person or do they require any degree of invention? When answering that question, it is of paramount importance that one leaves out of consideration the existence of the patent and one does not use hindsight; this is easier said than done.

195. The skilled person is deemed to have read and assimilated the particular piece of prior art which is said to be relevant. Not all prior art will be equally interesting to the skilled person. Before he reads the piece of prior art, the skilled person cannot tell whether it will be of interest to him. He has to read it in order to find out if it helps him and, having read it, he forms his own view as to whether it helps and, if so, in what way.

196. The issue is whether the matter which is said to involve an inventive concept was technically or practically obvious not whether it was obvious that it could be exploited commercially.

197. The ultimate question as to obviousness must be considered on the particular facts of the case. It has been described as a jury question.

198. I have made my findings as to the identity of the skilled person earlier in this judgment.

The common general knowledge

199. It was not said by the Defendants that the concepts in the claims which were said to be inventive were obvious over the common general knowledge although I have noted the assertions made by Mr Barovsky that certain features of Quintel were common general knowledge. However, both sides addressed me in detail on the question of what would have been common general knowledge. In particular, the Claimant relied on what was described by Jacob J, the trial judge, in *Dyson Appliances Ltd v Hoover Ltd* [2001] RPC 26 at [156] as a negative aspect of common general knowledge represented by a negative mindset, or prejudice, against taking a particular course.

The EmPower system

200. Before the priority date in this case, there were ISPSSs which had been designed for use in aeroplanes. There were three systems in particular. One was provided by Olin Aerospace Company ("OAC"), later called Primex; the system was known as the EmPower system. A second system was available from Ergo Mechanical Systems and a third system was available from Powerport. All three systems involved a low voltage DC current provided to a socket at the seat. The passenger's personal electronic device could be plugged into the DC socket but only by using a special adapter to take the plug of the device which had been designed for insertion into a high voltage AC socket.

201. There is a data sheet from 1996 which described the EmPower system at that time. This showed that the system included an optional Master Control Unit, an ISPS and a socket, called an outlet unit. The power supply to the ISPS was high voltage AC. The ISPS and the socket were plainly separate but the data sheet did not say where the ISPS was to be located. The data sheet stated that there was an "enable switch" at the socket.

202. Mr Barovsky was cross-examined about the data sheet with a view to establishing whether the data sheet would disclose to a skilled person that the EmPower system involved the use of a socket which detected the presence of a connector in the socket and sent a signal to the ISPS to turn on the power when, and only when, the connector

was detected. Mr Barovsky readily accepted that there was no express statement in the data sheet which referred to such a feature. He was less ready to accept that there was nothing in the data sheet which implied the possibility of such a feature although I think that he did accept that in the end.

203. Mr Barovsky was re-examined in relation to the data sheet and his attention was specifically drawn to the fact that it referred to an "enable switch" at the socket. He was asked what a skilled person would understand by this reference to an "enable switch". He answered that it indicated that the outlet had some means to detect when it was being used or when power was required from it so that it sent a signal to the ISPS which would then turn on the power to the outlet. Mr Cuddigan objected to what he said was the leading nature of the re-examination but that question had already been asked and answered.

204. Mr Cuddigan returned to this topic following the re-examination. He pressed Mr Barovsky on what was meant by an "enable switch". It was put to Mr Barovsky that an "enable switch" was simply a switch which turned the power in the socket off and on. Mr Barovsky did not agree.

205. Based on this evidence, I find that the data sheet for the EmPower system would not disclose to the skilled person that the EmPower system involved the use of a socket which detected the presence of a connector in the socket and sent a signal to the ISPS to turn on the power when, and only when, the connector was detected. Mr Barovsky initially readily conceded that the data sheet did not contain any explicit disclosure of such a feature. The reference to the "enable switch" was brought to his attention in re-examination and he then suggested that that phrase did disclose the relevant feature. I have to consider carefully whether that evidence in re-examination was influenced by the suggestion which was put to him and, in any event, whether it was reliable. I consider that Mr Barovsky was prompted to give this evidence which was different from his earlier evidence and I therefore have concerns as to its reliability. I consider that I should accept the evidence he gave in cross-examination rather than the evidence in re-examination on this point. I will myself adopt the mantle of the skilled person and ask myself whether the reference to "enable switch" in the data sheet disclosed the relevant feature. I conclude that it did not.

206. Before I leave the evidence about the EmPower system, I note that there is a reference to a feature of that system in another document and that reference might have been relevant. The document is an article by OAC which referred to this system. The Claimant referred to this article in relation to the mindset of the skilled person and I will refer to it later in this judgment. However, I note that the article contained a statement that there was no power at the socket until the correct mating connector was inserted. The article then went on to describe other features of the system. Left to myself, I would have wondered whether that statement might have disclosed to the skilled person that the EmPower system involved the use of a socket which detected the presence of a connector in the socket and sent a signal to the ISPS to turn on the power when, and only when, the connector was detected. However, at the trial, nobody suggested that and Mr Acland did not rely on this statement in his closing submissions. Accordingly, I consider that I would not be justified in relying upon this statement in the possible way I have identified when this case was not put forward and, in particular, the Claimant did not have the opportunity to deal with it.

The ARINC specification

207. Professor Wheeler was cross-examined on the subject of the ARINC specification which dealt with cabin equipment interfaces, specifically cabin management and entertainment systems, more specifically at the passenger's seat. The specification dealt with specific design guidance for the installation and interface of various items of cabin equipment. In particular, it dealt with an inflight entertainment system and seat controls. It described a seat electronics box and a seat actuator controller. The seat electronic box was to be placed under the seat and installed so that liquids could not come into contact with the electrical parts. The seat actuator controller was to be installed under the seat area. All components were to be installed so that they could not be damaged and no liquids could contact the electrical parts. As to power, all units associated with the interfaces were to be at 115V AC, 400 Hz and control functions were to use 28V DC.

208. Professor Wheeler accepted that his skilled person would be able to obtain the ARINC specification if he was asked to design an in-flight entertainment system but he appeared to say that the designer of an ISPSS would not need this specification. Mr Barovsky did not give evidence about the ARINC specification. I do not think that I need to make a specific finding as to whether the skilled person whom I have identified in this case would specifically obtain a copy of the ARINC specification. I consider that the ARINC specification would not tell that type of skilled person anything particularly unusual. It establishes the desirability of placing an electronics box out of the way under the seat but that is apparently for reasons of cabin design and convenience. It also establishes the need to avoid liquids coming into contact with the electrical supply but that should have been obvious.

The safety problems

209. Professor Wheeler gave evidence that there would have been concerns raised at the suggestion of a new design of a socket installed in the seat which would provide a high voltage AC supply. The concerns would have been due to:

    i) the risk that a metal object, not a plug, might be inserted into the socket which might deliver an electric shock to a passenger; this risk was said to exist in particular in relation to a child poking something into the socket; this was referred to as "the knitting needle problem"; the problem was not confined to the use of a knitting needle but the phrase was intended to describe a general problem of an object being inserted into the socket so as to deliver an electric shock to the passenger;

    ii) the risk of liquid entering the socket causing a short circuit or possibly an electric shock to a passenger; the liquid might come from a spilt drink or from a cleaning product; this was referred to as "the drenching problem".

210. In addition to these problems identified by Professor Wheeler, there was considerable discussion at the hearing as to what was described as "the double knitting needle problem". This involved the risk of electrocution caused by inserting metal objects into two apertures of the socket (where there was no risk of electrocution caused by inserting a single metal object into the socket);

211. It was not disputed that the risks identified above would exist with a socket in the seat which received a high voltage AC supply.

212. It is relevant to refer to the common general knowledge as to the methods of addressing these problems. There was common general knowledge in relation to conventional sockets with shutters and shaving points with shutters. There were two designs for shutters in conventional sockets. The first was the three aperture socket for a three pin plug. The insertion of the earth pin opened the shutter for the live and neutral pins to enter. If one inserted a metal object into the aperture for the earth pin, then the shutter would open and one could insert a second metal object into the aperture for the live pin and receive an electric shock. An alternative design of a socket involved a shutter for the apertures for the live and neutral pins which shutter opened when there was appropriate pressure on the shutters. Pressure at one aperture would not open the shutter; there had to be pressure at both apertures. This solved the single knitting needle problem but not the double knitting needle problem. However, as regards the possibility of, for example, a child tampering with a plug, there was less risk of a child managing to open the shutter by using appropriate pressure at both apertures at the same time. A shaver point had two apertures and a shutter over each and the shutter was opened by applying appropriate pressure at both apertures at the same time.

213. As regards the drenching problem, the shutter solution would keep liquids from coming into contact with the live connector unless by chance the shutters were opened at the time the liquid was applied to the socket.

214. Neuenschwander dealt with the single knitting needle problem in that the insertion of one metal object did not turn on the power supply. However, Neuenschwander did not deal with the double knitting needle problem. Neuenschwander would assist with the drenching problem.

215. Sellati dealt with the single knitting needle problem but did not deal with the double knitting needle problem. Mr Acland submitted that Professor Wheeler gave conflicting evidence as to whether Sellati dealt with the drenching problem and that I should disregard his evidence. However, if I disregard his evidence, it was not submitted to me that I had other technical evidence to the effect that Sellati did deal with the drenching problem.

216. By way of comparison, the position with the claims in the Patent is as follows. Claim 1 dealt with the single knitting needle problem but not the double knitting needle problem. Claim 2 dealt with the double knitting needle problem. Claim 1 also dealt with the drenching problem.

The mindset of the skilled person

217. I was referred to a number of documents which were said to show the established thinking as to the design of an ISPSS before or at the priority date. I will consider these documents in turn.

218. In 1996, OAC, the provider of one of the low voltage DC systems (EmPower) wrote an article about its system. The article stated that the low voltage DC system was very safe compared with AC. OAC referred to the steps being taken to provide a readily

available standard adapter for use with its system. I note that the article also referred to the ISPS being fitted to the seat and the socket being fitted into the seat arm, thus referring to some separation between the two components. I have referred to this article earlier in this judgment where I explained that no reliance was placed on a particular statement in it to which I drew attention.

219. Before the priority date the FAA had issued a memorandum for the purpose of giving guidance as to the installation of an ISPSS in an aircraft. The first version of this memorandum which I was shown was dated 6 June 1996. The memorandum referred to the hazards involved in children inserting thin metal objects into the socket or liquids being spilt into the socket. This version stated that occupants should be protected against electric shock. An applicant for FAA approval for an ISPSS had to submit proof of the absence of such a hazard. The guidance also provided that the voltage at a passenger accessible socket should not exceed 24 volts. There was also a limitation on the power supplied.

220. On 3 October 1996, the FAA issued a revised memorandum containing guidance on the installation of an ISPSS. It referred to the same hazards as did the first version. Paragraph 4) of the memorandum required an applicant for FAA approval to show a lack of hazard "for all proposed voltages". The memorandum did not specify a maximum voltage. Paragraph 5) required there to be a special adapter from the passenger's device to the socket. The requirements in relation to this special adapter were badly expressed but seemed to require that the adapter had a mating connector which would plug into the socket provided, that the socket would be a unique connector which could not be mistaken for a conventional AC socket. Thus, although the Memorandum did not say in terms that the supply to the socket had to be low voltage DC, it did require an adapter to be used and provided that the socket would not be a conventional AC socket. Mr Barovsky accepted that this Memorandum showed that the FAA would be resistant to the installation of a high voltage AC socket. However, he also said that this Memorandum contained guidance which was not the same as a mandatory regulation. He suggested that the skilled person would regard the Memorandum as a starting point for negotiations with the FAA in relation to any alternative system which did not conform to the guidance, such as a socket which received a high voltage AC supply.

221. A third version of the FAA memorandum was issued on 24 June 1997 just after the priority date. The relevant parts of this memorandum essentially repeated the memorandum of 3 October 1996. This shows that the memorandum of 3 October 1996 was the current version as at the priority date of 31 May 1997.

222. An article in the Chicago Tribune for 8 December 1996 referred to the EmPower and Ergo systems and described them as involving safe low-voltage outlets.

223. I was also given evidence as to the position of the aviation authorities and others after the priority date.

224. In February 1998, an article by Mr Potega in Electronic Design discussed ISPSSs in aeroplanes. This was a detailed article which discussed three systems, which were all low voltage DC systems. The article argued for a better specification for the ISPSS but did not suggest the use of a socket which received high voltage AC power. There

was one comment in the article suggesting that use of AC power would be dangerous but the suggestion did not in terms relate to AC power at the socket.

225. On 13 May 1998, the JAA issued a draft policy providing guidance as to the installation of ISPSSs. It stated that it was based on the FAA memorandum of 24 June 1997, to which I referred above. The JAA draft policy contained some revisions to the FAA memorandum. The JAA amended what had been paragraph 4) of the FAA memorandum to provide a strong recommendation for low DC voltage, below 50 volts. The JAA stated that it believed that the use of standard voltages was not appropriate due to potential passenger safety risks and the possibility of the use of non-conforming passenger devices.

226. In January 1999, the JAA held a meeting of interested parties to discuss its draft policy. I was not shown any minute of what was discussed at this meeting but the meeting was referred to in the minutes of a second such meeting in June 1999, to which I refer below.

227. In 1999, there were references to the possibility of a high voltage AC ISPSS. In around April 1999, it seems that a licensee of the Claimant, KID Systeme, was taking steps to obtain certification from the German aviation authority for the apparatus which was subsequently the subject of the Patent. By this point, OAC had changed its name to Primex. A Mr Briski of Primex had a meeting with the Head of Electrical Systems Group at the CAA to discuss such a high voltage AC system. Mr Briski represented the company which was promoting a low voltage AC system and was obviously concerned to continue that promotion and not face competition from the proposed new high voltage AC system. Nonetheless, his meeting with the CAA was a technical meeting concerned with safety rather than a marketing meeting. It seems that the CAA were not fully aware of the extent of the installation of ISPSSs in the aeroplane cabin. Mr Briski recorded some impressions as to the reaction of the CAA which he thought were not favourable to a high voltage AC system. However, these were really only impressions of a preliminary reaction.

228. An internal email of Primex of 4 May 1999 showed that Primex was concerned about the commercial consequences for its product of the arrival of a high voltage AC system. The email stated that the FAA was reluctant to put its position in writing in relation to such a system. The email also identified a strategy of Primex contacting airlines to tell them that the new system was not yet certified.

229. On 5 May 1999, pursuant to this strategy, Mr Briski wrote to a Mr Gim at Boeing and he replied that Boeing would not offer a high voltage AC system and had no basis for making one available based on Boeing's interpretation of the FAA position. There was no evidence as to Mr Gim's role at Boeing but it is more likely than not that Mr Briski had carefully chosen Mr Gim as the relevant person at Boeing to deal with this subject.

230. In June 1999, the JAA held a second meeting of interested parties to discuss its draft policy on ISPSSs. The JAA stated that safety was its top priority. There was a reference to the risk of arcing at the connector. Mr Barovsky gave evidence that he did not regard arcing as a concern but he was prepared to recognise that it might have been a concern to some others.

231. At the meeting in June 1999, there was discussion of Mr Briski's suggested amendments to the JAA draft policy. This led to agreement that there should be a separate section dealing with safety issues in relation to a high voltage AC system. KID Systeme provided a presentation of its high voltage AC system and stated its belief that such a system was a safe option. It also expressed its concerns of adapters being used with the low voltage DC system. At that stage, KID Systeme may have been expressing a minority point of view as to a high voltage AC system.

232. The work on a re-draft of the JAA policy to permit the use of a high voltage AC system subject to additional safeguards continued. In July 1999, there was a further meeting of interested parties and the release of a revised draft policy in relation to a high voltage AC system with additional safeguards. At around the same time, Airbus applied for JAA certification of a high voltage AC system which I understand was the KID Systeme apparatus which was later the subject of the Patent. In September 1999, the JAA considered that this system was acceptable as regards safety and in or around October 1999 it was certified.

233. It appears from an article in an industry publication in July 2000 that by that date the FAA had not yet certified a high voltage AC system but an application by KID Systeme for certification was being considered.

234. Mr Barovsky was taken in detail to the various documents to which I have referred which deal with the attitude of the aviation authorities and others in the industry before and after the priority date. It was put to him that, in May 1997, the skilled person thought that a high voltage AC power supply in a passenger seat was too dangerous and would not gain regulatory approval so that any ISPSS would have to be a DC system. Mr Barovsky answered that the skilled person may have had that opinion. As there was a difference between the cross-examiner and Mr Barovsky as to who the skilled person was, I have to consider which skilled person Mr Barovsky had in mind when he gave his answers. I think it is clear from his answers as a whole that Mr Barovsky accepted that Professor Wheeler's skilled person, a general electrical engineer, would have regarded the FAA memorandum of October 1996 as mandatory and as ruling out a high voltage AC system. It follows that when Mr Barovsky said that a skilled person may have had the opinions in question, he was referring to his skilled person, someone with relevant aviation experience.

235. Mr Barovsky also said that his skilled person would not regard the FAA memorandum as a complete barrier to seeking certification of a high voltage AC system. In other words, the memorandum contained guidance and did not impose a mandatory requirement. I agree that the memorandum was not mandatory but it was firm guidance. At the priority date, the FAA could be expected to resist an application for certification of a high voltage AC system. The attitude of the FAA was all of a piece with the mindset of the skilled person which was that an ISPSS in an aeroplane cabin would be low voltage DC. I accept that the FAA and the JAA did not themselves design ISPSSs and so they were not concerned to innovate but rather to respond to the type of apparatus which was likely to come forward for certification. They were not required to show an inventive capacity but then neither was the skilled person who did not have a scintilla of inventive capacity. I consider that the attitude of the FAA and the JAA does tell one a great deal about the state of the common general

knowledge of, and the mindset and prejudices of, the skilled person without any inventive capacity.

236. My finding, based on the contemporaneous documents, and the oral evidence is as follows. In May 1997, the mindset of skilled persons of the kind identified by Mr Barovsky was that:

i) a high voltage AC system was significantly more dangerous than a low voltage DC system;

ii) the aviation authorities, led by the FAA, would resist a proposal to install a high voltage AC system;

iii) the reasons for that resistance were well understood by the skilled person; and

iv) the design of an ISPSS ought to be a low voltage DC system.

237. I find that this was the mindset of skilled persons of the relevant kind, taken as a whole, and not just the mindset of some of them.

238. Mr Acland asked: if the use of a high voltage AC supply was out of the question, why did the JAA spend time providing for extra safeguards for such a system and why was Mr Briski sent out to try to persuade the FAA and others not to certify such a system? The answer to that question is that these things did not happen before the priority date and they happened after that date when it became known that there was a proposal to create a high voltage AC system.

Cross-examination as to the FAA memorandum

239. At this point I will deal with a specific matter which was raised as to the FAA memorandum of October 1996 in the course of the cross-examination of Professor Wheeler. Mr Acland cross-examined Professor Wheeler on the subject of how Professor Wheeler's skilled person would obtain the FAA memorandum. The intention behind the questions was to demonstrate that Professor Wheeler's skilled person would not obtain the FAA memorandum.

240. Mr Cuddigan objected to this line of questioning on the ground that the Defendants had pleaded that the memorandum was common general knowledge. The Defendants had not pleaded that whether the memorandum was common general knowledge depended on the identity of the skilled person so that the memorandum would only be common general knowledge if the skilled person was as submitted by the Defendants. Further, in all of the expert evidence, it was accepted that the memorandum was common general knowledge and no point was raised that it was only common general knowledge to Mr Barovsky's skilled person and not to Professor Wheeler's skilled person. Mr Cuddigan submitted that the Claimant had not prepared evidence to support a finding that the memorandum would be common general knowledge for Professor Wheeler's skilled person in the light of the pleading and the expert evidence.

241. Mr Acland accepted that the Defendants had pleaded, without qualification, that the memorandum was common general knowledge for the skilled person. He also

accepted that, in view of that pleading, at the end of the trial, it would not be open to me to make a finding that the memorandum was not common general knowledge. However, he wanted to demonstrate through the evidence of Professor Wheeler that it would not be common general knowledge for his skilled person and Mr Acland would then submit that that would enable him to show that Professor Wheeler had not correctly identified the skilled person.

242. In the course of the trial, I ruled that this line of questioning was not open to Mr Acland in the absence of an amendment to the Defendants' pleading and he did not seek permission to make such an amendment. My reasons were as follows. Whether something was common general knowledge was a matter of fact. On the pleadings, the Defendants accepted, indeed positively asserted, that the memorandum was common general knowledge. They did not assert that it was only common general knowledge to some skilled persons and not to other persons. It follows that they were not able to attempt to get Professor Wheeler to agree that the memorandum was not common general knowledge to his skilled person. At the end of the trial, it would not be open to me to find that the memorandum was not common general knowledge. Professor Wheeler had to be cross-examined by reference to the agreed facts and not by reference to findings of fact which I would not be invited to make at the end of the trial.

243. In any case, I do not see how the question of whether a document would be available to Professor Wheeler's skilled person really helps to determine who is the skilled person in this case. The position is really the other way round. It is first necessary to identify the skilled person. Having done so, one can then identify what would be that person's common general knowledge.

244. In the event, I have decided that the skilled person is as described by Mr Barovsky but that finding did not depend in any way on whether Professor Wheeler's skilled person would have had access to the FAA memorandum.

The inventive concept

245. The features in the claims which are said by the Defendants to have been obvious are the features described in claims 1 and 2. I have already held that claims 1 and 2 are novel over both Neuenschwander and Sellati. The Defendants say that claims 1 and 2 are obvious over Neuenschwander and, separately, that they are obvious over Sellati. Mr Acland started with the case based on Sellati and I will do the same.

Is claim 1 of the Patent obvious over Sellati?

246. Having construed claim 1 and having considered Sellati, I now proceed on the basis that the concept in claim 1, which is said to be inventive, is that the voltage supply is remote from the socket. That means, in particular that there is a switch in the supply device which turns the power on and off by reference to a condition detected in the socket and the supply device is located so as to be remote from the socket.

247. Mr Cuddigan submitted:

i) the design in claim 1 was not obvious over Sellati;

ii) at the priority date, the skilled person would be antipathetic to the installation of a high voltage AC power supply;

iii) Sellati did not demonstrate significant advantages over the common general knowledge; and

iv) the skilled person would not regard the prior art as a reason to design a high voltage AC ISPSS;

v) the skilled person would see that paragraph 5) of the FAA memorandum ruled out the only advantage to the passenger of a high voltage AC supply, because it required an adapter;

vi) the skilled person would know that if his design was not a significant improvement on existing systems, it would not be certified by the CAA;

vii) the FAA memorandum did not include a requirement as to remoteness; although the FAA was not designing a system, its views did show what was not obvious as part of the common general knowledge;

viii) Sellati did not disclose, and did not suggest, a remote switch which was turned on and off by a condition detected in the socket;

ix) neither the ARINC specification nor the EmPower system disclosed or suggested a remote switch which was turned on and off by a condition detected in the socket.

248. Mr Acland submitted:

i) claim 1 of the Patent was obvious over Sellati;

ii) the only difference between claim 1 and Sellati was the concept of remoteness;

iii) even if, as I have held, Sellati did not require the supply device to be remote from the socket, Figure 2 in Sellati would suggest the possibility of remoteness to the skilled person who would find it interesting for the design of a high voltage AC ISPSS;

iv) the idea of putting a supply device in a box under the seat was obvious from the ARINC specification;

v) the idea of separating the supply device and the socket was obvious from the EmPower system.

249. I will begin by discussing what might have been technically obvious if the uninventive skilled person had had the idea of installing a high voltage AC ISPSS.

250. I will first consider Sellati itself. I have explained that Sellati did not disclose remoteness. It did not provide for remote separation of the switch which turned on the power from the socket. Further, I do not think that Figure 2 in Sellati would suggest that thought to the skilled person given that Figure 2 was included to describe something different.

251. Further, as to Sellati, it dealt with the knitting needle problem in a way which was different from the well known use of shutters in a conventional socket or a shaver point but did not deal with the double knitting needle problem and did not really deal with the drenching problem.

252. As to the ARINC specification, that did show separation of a bulky component from accessible controls. But it did not suggest that there was a switch which was remote from the control which was turned on and off by a condition detected at the control.

253. I have considered the EmPower system earlier in this judgment. Based on my earlier findings, although there was a separation between the ISPSS and the socket, I am not able to find on the evidence that what was known about the EmPower system disclosed to the skilled person that the system had a switch in a remote unit which turned the power on and off by reference to conditions detected at the socket.

254. Accordingly, the separation of components in the ARINC specification and in the EmPower system did not make it obvious to introduce a safety feature which involved a remote switch which turned on and off the power to a socket by reference to a condition being detected within the socket. If one combined Sellati with the knowledge of the ARINC specification and the EmPower system, I am not persuaded that claim 1 of the Patent was technically obvious at the priority date.

255. I referred earlier to the assertions made by Mr Barovsky that the switching system in Quintel was part of the common general knowledge of the skilled person. Mr Barovsky did not support those assertions with any evidence and I am not persuaded by anything I have seen in this case that I should make such a finding.

256. This conclusion is enough to deal with the contention that claim 1 of the Patent was obvious over Sellati.

257. As to the other submissions which were made under this head, based on my earlier findings, I am able to conclude that at the priority date:

    i) the mindset of the skilled person would not lead him to consider the installation of a high voltage AC power supply at an aeroplane seat;

    ii) the skilled person would not regard Sellati as a reason to design a high voltage AC ISPSS;

    iii) the skilled person would know that if his design was not a significant improvement on existing systems, it would not be certified by the CAA.

258. I have considered the question of technical obviousness separately from the question whether claim 1 involved an inventive step by reason of it overcoming the mindset or prejudice involved in the common general knowledge. As I have considered that the design in claim 1 was not technically obvious, it is not necessary to consider what the position would have been if it had been technically obvious. In this case, the mindset or prejudice involved in the common general knowledge is an additional reason why the design in claim 1 would not have been obvious to the uninventive skilled person.

259. As I have explained, the Claimant's submissions stressed, and I accept, that, at the priority date, the regulators would have been resistant to the certification of an ISPSS which used high voltage AC. That fact is relevant because I consider that the attitude of the regulators is indicative of the mindset of the relevant skilled persons at the priority date. This is not a case where the use of high voltage AC was technically obvious but it is being said it involved an inventive step because there was a perceived difficulty in obtaining regulatory approval. This is not a case like *Re Richardson-Vicks Inc's Patent* [1997] RPC 888.

260. I conclude that claim 1 of the Patent was not obvious over Sellati.

Is claim 1 of the Patent obvious over Neuenschwander?

261. Having construed claim 1 and Neuenschwander, I now proceed on the basis that the concept in claim 1, which is said to be inventive, is the requirement that the plug is fully inserted into the socket and that the voltage supply is remote from the socket.

262. As to the feature of remoteness, the parties made essentially the same submissions as they made in relation to the similar point in respect of Sellati. I reach the same conclusion that the design in claim 1 of the Patent was not obvious over Neuenschwander.

263. Mr Acland did not submit that the feature of claim 1 of the Patent which required full insertion of the plug was obvious over Neuenschwander.

264. I conclude that claim 1 of the Patent was not obvious over Neuenschwander.

Is claim 2 of the Patent obvious over Sellati?

265. The further concept in claim 2, which is said to be inventive, is the timing feature.

266. Mr Cuddigan submitted:

i) Claim 2 of the Patent was not obvious over Sellati;

ii) the Defendants have pleaded that the timing feature did not contribute to safety;

iii) the inconsistent case advanced by Mr Acland at the hearing was that because the timing feature contributed to safety, it was an obvious step to take;

iv) if the timing feature contributed to safety and was an advantage, merely being an advantage does not make it obvious;

v) Sellati wanted to improve safety but did not introduce a timing feature which suggested a timing feature was not obvious.

267. Mr Acland submitted:

i) claim 2 of the Patent was obvious over Sellati;

ii) claim 1 of the Patent did not solve the double knitting needle problem but claim 2 of the Patent did;

iii) the skilled person would want to improve safety over earlier designs and would want to solve the double knitting needle problem;

iv) the skilled person would want to improve on the shutters used in a conventional plug or a shaver point;

v) the skilled person could without difficulty design circuity to introduce a timing feature.

268. The Claimant has pleaded that the timing feature contributed to safety. Mr Acland said that the Defendants' pleading did not dispute that but made a different point, namely, that a series of modifications made by Astronics including but not limited to removing the timing device had not had a material effect on safety.

269. The evidence at the trial was that the timing device contributed to safety. I will rely on that evidence and I do not need to consider the pleading point which has been raised.

270. Mr Acland's case comes down to the assertion that the timing feature was beneficial and was not difficult to design so it was obvious. I am not persuaded by that general assertion. I am not persuaded that the technical evidence shows that a designer of an ISPSS would introduce this entirely novel feature when it did not appear in Sellati which was a design intended to enhance safety.

271. I conclude that claim 2 of the Patent was not obvious over Sellati.

Is claim 2 of the Patent obvious over Neuenschwander?

272. As to the timing feature, the parties made essentially the same submissions as they made in relation to the similar point in respect of Sellati. I reach the same conclusion that the design in claim 2 of the Patent was not obvious over Neuenschwander.

Infringement

273. As I have held that the claims of the Patent are valid, I now need to consider the position in relation to the alleged infringement of the Patent.

274. The infringement which is alleged relates to a system which is called the EmPower system but which I will call "the System" to distinguish it from the earlier DC system which I have already referred to as the EmPower system.

275. The System has five components but two of them may be optionally omitted. The three essential components are: (1) the ISPS, (2) the socket and (3) power and signal cables. The two optional items are a Master Control Unit (there are two different versions of this) and in-use indicators.

276. Each of the three Defendants has been dealing in different ways with the components of the System.

277. Astronics manufactures the components for the System in the United States. It advertises the components for sale internationally. It contracts to sell the System. It distributes the components for the system to airlines, seat manufacturers and manufacturers of IFE systems. It intends that the components will be installed in aircraft cabin to produce a System within claim 1 of the Patent. It is not in dispute before me that Astronics' acts of supply to UK customers took place in the UK.

278. Astronics supplies components which are not, at the time of supply, connected together to form the System. However, the components constitute the means, relating to an essential element of the invention in claim 1, for putting that invention into effect, within section 60(2) of the Patents Act 1977, dealing with indirect or contributory infringement. Astronics admits that at the time of its supplies, it had the knowledge required for indirect or contributory infringement within section 60(2). That being the case, it is not necessary in this case to consider whether Astronics was also liable for direct infringement pursuant to section 60(1)(a) whether as a sole tortfeasor in respect of its own actions or pursuant to a common design to commit a direct infringement.

279. Safran is a seat manufacturer and uses the components of the System by connecting them together and forming them into a System in a seat supplied by it. Safran accepts that it thereby commits a direct infringement of claim 1.

280. The position of Panasonic requires further elaboration. Panasonic is a supplier of IFE systems. It advertises for sale its own IFE systems. These IFE systems incorporate a bespoke implementation of the System. Panasonic then supplies the components of the System with the knowledge and intent that they will be assembled into the System in the UK. The components as supplied by Panasonic are an almost finished version of the System. The interconnect cable has different connection hardware at either end so that it cannot be incorrectly attached to the ISPS or the socket. There is only one way to assemble the components. The connections are colour coded to assist the installer who is provided with assembly instructions and the components are connected in the same way regardless of the type of seat into which they are installed.

281. Panasonic submits that it is not liable for direct infringement under section 60(1)(a) because it does not assemble the components into the System. That assembly is done by its customers. Panasonic further submits that it is not liable for indirect infringement under section 60(2) because it did not have the knowledge required for liability under section 60(2). Plainly, Panasonic knew a great deal as to what was intended to be done with the components it supplied but it says that it was unaware from a technical standpoint of the operation of the System and that means that it did not have the knowledge requisite for section 60(2).

282. The position of Panasonic has led the Claimant to put its case against Panasonic in a number of ways:

    i) it is said that, on the true construction of claim 1 of the Patent, the product there referred to comprises the components of the System; I have already rejected that argument;

ii) it is said that there is a doctrine of "a kit of parts" which makes a supplier of the kit of parts liable for infringement of a patent relating to a product which consists of the kit of parts formed into the product

iii) it is said that if claim 1 of the Patent refers to the System as the product, the components are an equivalent of the System and so are also covered by claim 1;

iv) it is said that the knowledge admitted by Panasonic is sufficient for liability under section 60(2); as a result of case management directions which have been made, I am not asked to make findings of fact at this trial as to whether Panasonic did lack the technical knowledge about the System which it says it lacked.

283. In addition to these arguments, the Claimant also submits that it has pleaded against Panasonic a case of common design of direct infringement within section 60(1)(a). The principles as to liability for a common design to commit a tort were recently considered by the Supreme Court in *Fish & Fish Ltd v Sea Shepherd UK* [2015] AC 1229. Lord Toulson summarised the position at [21] as follows:

> "21. To establish accessory liability in tort it is not enough to show that D did acts which facilitated P's commission of the tort. D will be jointly liable with P if they combined to do or secure the doing of acts which constituted a tort. This requires proof of two elements. D must have acted in a way which furthered the commission of the tort by P; and D must have done so in pursuance of a common design to do or secure the doing of the acts which constituted the tort. I do not consider it necessary or desirable to gloss the principle further."

284. I was referred to earlier cases which specifically dealt with patent infringement. In *Rotocrop International Ltd v Genbourne Ltd* [1982] FSR 241, Graham J held that a supplier of a kit of parts to make up a compost bin, together with full instructions to the customer to assemble the parts into the compost bin, was liable with the customer who assembled the parts into the compost bin, which infringed the patent. That case was analysed in detail by Arnold J in *Virgin Atlantic Airways Ltd v Delta Airways Inc* [2011] RPC 242 and he added at [131]:

> "Furthermore, if the defendant not only supplies a kit of parts to its customer, but also provides instructions for assembly of the kit into the claimed product, then I anticipate that under most systems of law the defendant will be liable as an accessory for the infringement committed by the customer when it assembles the kit. Under English law the defendant would be liable as a joint tortfeasor, as the decision of Graham J. in *Rotocrop* demonstrates."

285. This part of the decision of Arnold J is not affected by the decision of the Court of Appeal in that case: see [2011] RPC 18.

286. In the present case, there does not appear to be any dispute as to the facts, summarised above, as to what Panasonic did and what it said to its customers. On those facts, there was a common design involving Panasonic and its customers to connect the components to form the System. When the customers did form the System from the components, pursuant to the common design, they infringed claim 1 of the Patent pursuant to section 60(1)(a). Liability under section 60(1)(a) did not depend on the customers', or Panasonic's, knowledge of the technical workings of the System.

287. Accordingly, I conclude that Panasonic is liable by reason of its common design to do acts which amount to an infringement within section 60(1)(a). This conclusion means that it is not necessary in this case to consider the further arguments which the Claimant has put forward. In his closing submissions, Mr Cuddigan invited me to decide the case against Panasonic on this basis and not to deal with the other arguments. I agree that I ought not to deal with the other arguments. A decision on those points is not necessary in this case. Some of the points raised are not straightforward and are better left for decision in a case where they need to be addressed.

288. Thus far, I have only referred to infringement of claim 1. The position in relation to claim 2 is that after a certain date, the components which were supplied were modified so as to remove the timing feature referred to in claim 2. I understand that it is common ground that claim 2 was not infringed from that time but before that it had been infringed. I did not receive any specific submissions as to infringement of claim 3.

289. Finally, I have already dealt with submissions as to infringement of claim 7 which turned on the meaning of "central voltage source".

The overall result

290. I have held that the Patent was valid and was infringed by all three Defendants.