

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

Rolls Building
New Fetter Lane
London

Neutral Citation Number: [2020] EWHC 3089 (IPEC)

Date: 17 November 2020

Before:

HER HONOUR JUDGE MELISSA CLARKE
sitting as a Judge of the High Court

B E T W E E N :

Claim No: IP-2018-000029

COMMUNISIS PLC

Claimant

- and -

**(1) THE TALL GROUP OF COMPANIES
LIMITED**
(2) CHECKPRINT LIMITED
(3) DLRT LIMITED

Defendants

Dr Heather Lawrence (instructed by **Appleyard Lees IP LLP**) for the **Claimant**
Mr Henry Ward (instructed by **Brabners LLP**) for the **Defendants**

Hearing dates: 14 and 15 July 2020

JUDGMENT

Covid-19 Protocol: This judgment was handed down remotely by circulation to the parties' representatives by email. The date and time for hand-down is deemed to be 10.00am on 17 November 2020.

Her Honour Judge Melissa Clarke:

A. INTRODUCTION

1. The Claimant and Defendants are competitor manufacturers of cheques, chequebooks and cheque fraud prevention systems. Each of them provides, *inter alia*, secure cheque solutions to major banks and financial institutions. The Defendants are part of The Tall Group of Companies. The 2nd Defendant and 3rd Defendant are wholly-owned subsidiaries of the 1st Defendant.
2. The Claimant is the registered proprietor of UK Patent No. GB2512450B for “A method of generating a payment/credit instrument” (“**the Patent**”). The priority date of the Patent is 1 February 2013. The Patent concerns the use of a printed code as a security feature on a cheque (or other credit slip) to prevent fraud by the fraudulent alteration of personal details and the addition of new, fraudulent details relating to a different account.
3. The Claimant alleges that the Defendants have infringed Claim 1 (a method claim) and Claim 6 (a product claim) of the Patent by doing, authorising, directing or procuring various acts in the UK in relation to the invention without the consent of the claimant.
4. The Claimant pleads examples of the acts complained of at paragraph 6 of the Particulars of Claim. It pleads infringement of the Patent on a natural interpretation of the Claims or alternatively by equivalence.
5. The Defendants admit the acts complained of and admit for the purposes of these proceedings only that they are jointly and severally liable for those acts. They deny infringement, alleging that the acts complained of do not fall within the scope of the Patent. They counterclaim for invalidity, alleging obviousness over three pieces of prior art (“**Prior Art**”) in conjunction with the common general

knowledge, and excluded subject matter in differences in the way the code the subject of the Claims is calculated or presented as between the Patent and the Prior Art.

6. Dr Heather Lawrence appeared for the Claimant and Mr Henry Ward appeared for the Defendants by remote trial in open court over Cloud Video Platform. I am grateful to them for their assistance.

B. THE PROCEEDINGS

7. At a case management conference, His Honour Judge Hacon directed each of the parties to file a supplemental statement of case on the alleged inventive concept of the Patent and directed the Defendants to make and serve on the Claimant a confidential Product/Process Description (“**Confidential PPD**”) in lieu of disclosure. The Claimant did not require this to be formally proved by a witness at trial.
8. Neither party sought to rely on any witness of fact. Each rely on a single expert witness. The Claimant relies on the expert report of Mr Charles William Brewer dated 14 May 2020. The Defendants rely on the expert report of Professor Peter Landrock dated 5 May 2020, and a further report of Professor Landrock, in reply to that of Mr Brewer, dated 5 June 2020. Mr Brewer might fairly be described as a banking expert with some cryptography experience and Professor Landrock might fairly be described as a cryptography expert with some banking experience. Both experts attended the remote trial and were cross-examined.

Mr Charles Brewer

9. Mr Brewer is a Systems Analyst/Developer with experience of working in and for the banking industry. He is managing director of NaMax Limited which provides systems architecture, project management and expert witness services to the banking industry. He

confirmed that is a management consultancy of which he is the only permanent management consultant, although he takes on other contractors on occasion.

10. The Defendants submit that Mr Brewer took an incorrect approach to many of the key elements of this claim. These include:

i) **What was in the skilled person's common general knowledge.**

Mr Brewer stated in cross-examination that he believed the common general knowledge was what the skilled person needed to compare the Patent with the Confidential PPD. In fact, as is common ground, the common general knowledge is the entire stock of knowledge that the skilled addressee would have had at the priority date;

ii) **Construction.** There are two criticisms of Mr Brewer's approach:

(a) he disclosed in cross-examination that his evidence on the meaning of Claim 1 and the claim integers was his understanding of what the terms meant in the context of both the Patent and the Defendants' Confidential PPD. In fact, it is common ground that it is impermissible to construe the claims by reference to the alleged infringement; (b) Mr Brewer's report discloses that he addressed construction issues in a manner which sought to distinguish between the Prior Art and the claims of the Patent. It is, again, common ground that this is an impermissible approach (per *Beloit Technologies v Valmet* [1995] RPC 705).

iii) **Who the skilled person is and what they do.** I deal with in this in more detail in paragraphs 35-37 below.

11. I accept that he did deal with these matters incorrectly. The Defendants do not criticise Mr Brewer personally for these mistakes.

Mr Ward for the Defendants described him in closing submissions as a good expert, trying fairly to help the court in the way he gave his oral evidence. I agree that he did give fair and independent oral evidence and, in my judgment, came to court to assist it to the best of his abilities, and did assist the court. In his oral evidence, Mr Brewer made a large number of concessions amending the opinions set out in his report and/or accepting propositions derived from Professor Landrock's evidence. For that reason, I give greater weight to his oral evidence than his written evidence. The Defendants contend that Mr Brewer, who is not a patent expert, should have been given much greater assistance by the Claimant's solicitors, who should have ensured that his written evidence was soundly based on the proper approach to issues of the skilled person, the common general knowledge, construction, etc. It would be wrong of me to criticise the Claimant's solicitors when they have not had the opportunity to respond to this criticism and I have no evidence about the instructions given or clarifications provided by them.

Professor Peter Landrock

12. Professor Landrock is a cryptographer and mathematician with expertise in cryptography and electronic security as an academic and professional cryptographer. He obtained his PhD in mathematics from the University of Chicago in 1974 and his academic career has included Professor of Mathematics at Aarhus University and visiting Professor at Princeton, Oxford and Leuven Universities. Since 1997 he has been a senior member of Wolfson College, Cambridge. In 1986 he founded a Danish limited company, Cryptomathic, and shifted focus from mathematics to cryptography. He has acted as a member of the Danish IT Security Council from 1999 to 2007, the Technical Advisory Board of Microsoft from 1997 to 2010 and the Technical Advisory Board of the Turing Gateway of Mathematics at Cambridge

University from 2014 to date. He was nominated by the EPO as a finalist for a lifetime achievement award in European Inventor 2010 and was awarded the degree of Doctor of Science Honoris causa by the University of Bristol for his lifetime achievement in cryptographic technology.

13. Dr Lawrence submits that Professor Landrock is looking at the patent as a cryptographer, and an inventive and clever one at that, and his perspective has coloured his entire evidence and the reasons why he has arrived at the conclusions in the report. I do not consider that is fair criticism. I consider that he approached the key elements upon which he opined in the correct way, and gave neutral, professional, informed and clear evidence to the Court. She made other specific criticisms of his handling of Martens which I reject later in this judgment. I found him to be a good witness who provided significant assistance to the Court.

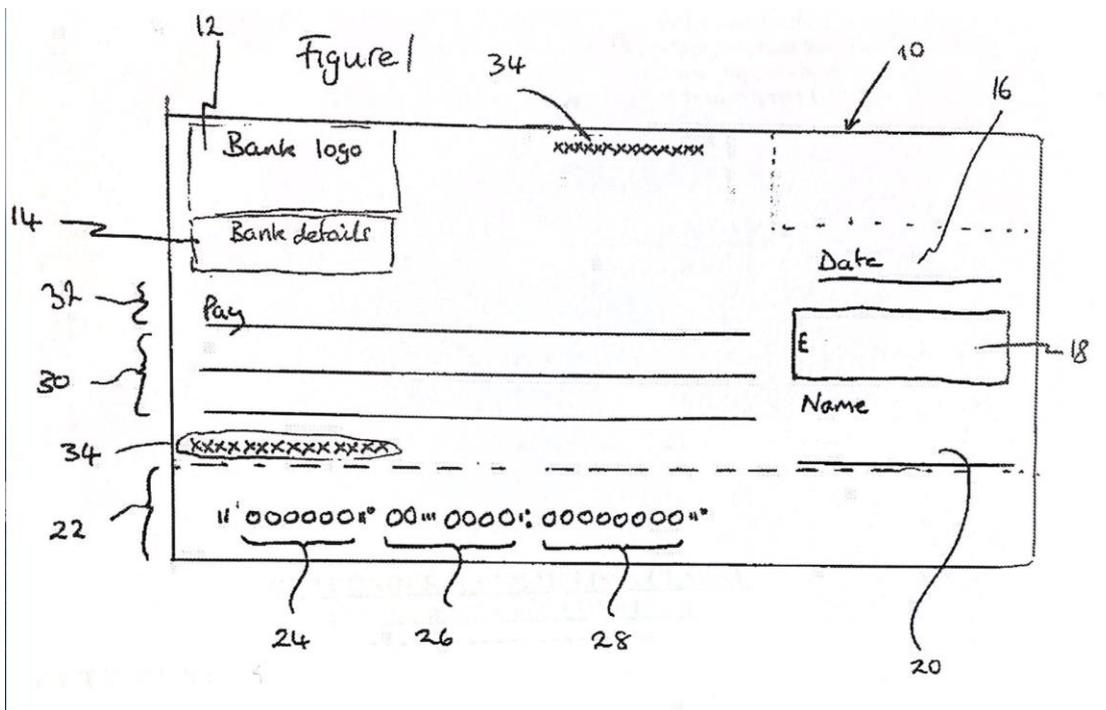
C. THE PATENT

14. The Patent is directed at payment/credit instruments, but the claims are limited to cheques and credit slips. For convenience, as the experts did, I will generally refer from now on only to cheques, but this will encompass credit slips except where the context requires otherwise.
15. The object of the invention is to address the *“fraudulent alteration of personal details”* (page 1 lines 6-9). on a payment instrument such as a cheque, so as to refer to a different account. The specification describes (page 1 lines 6-11) that:

“The personal details are first included on a cheque by a manufacturer using a laser printing technique. A fraudster may scrape away, remove or amend the personal details and add new fraudulent details relating to a different account. The altered cheque can then be presented as payment and the amount to which it relates

is debited from a different account as fraudulently detailed on the cheque”.

- 16. The personal details referred to are the sort code, the account number and the individual serial number of the cheque (page 1 lines 13-14) that, taken together, uniquely identify each cheque (“**Personalisation Data**”). These data can be distinguished from the data added by the drawer of the cheque, such as the date, the payee and the amount of the cheque (“**Drawer Data**”).
- 17. The solution proposed by the Patent is to generate a code based on at least one or more (and preferably all three), pieces of Personalisation Data on the cheque to produce a data string. This data string is “converted to a code by conversion to a higher base” (page 1 line 31, and Claims 1 and 6). The code so generated (also referred to as a “UCN” in the Patent) is applied to at least one place on that cheque.
- 18. The Patent provides, at Figure 1, a schematic diagram of a cheque as an example:



19. The UCN can be seen in Figure 1 represented as a line of crosses applied to the cheque in two places, each marked as 34, however the specification envisages that the position may change depending on the cheque type (page 7 line 2).
20. As stated on page 3, lines 20-34 of the Patent specification:

“The UCN 34 is created by means of an algorithm that links together the sort code, account number and serial number on a cheque/credit. The UCN 34 is personalised onto the document in order to provide a means to identify instances where the personalised details have been changed.

Within the cheque and credit clearing process the main clearing houses that provide cheque processing services... use software and systems... to identify cheque fraud as part of the clearing cycle. These systems are used to verify that the sort code, account number and serial number details have not been amended and to reject any items during the cheque clearing process that do not match the correct UCN 34. The UCN 34 is generated using the account number, sort code, and serial number on a cheque or credit. Therefore it will be unique to each individual cheque. The UCN 34 consists of 14 alphanumeric characters/symbols.”

21. In the section entitled “3. Overview of Algorithm Process” it provides at page 4 lines 1 – 6:

A cheque/credit manufacturer generates a UCN 34 to be laser printed in two positions on the cheque document when the cheque document is being personalised. This will link the sort code, serial number and account number that is printed within the MICR [Magnetic Ink Character Recognition] line 22 of the document”.

22. “Conversion to a higher base” is described in this section under the subheading ‘Algorithm Calculation’ on pages 4 – 7. The method described uses conversion of a decimal number to a base 43 number and provides a worked example on pages 4 and 5:

“The effect of conversion to base 43 is to render a 7 digit number into 5 characters and a 6 digit number into 4 characters. Base 43 is a positional numeral system using 43 as the radix. The choice of 43 is convenient in that the digits can be represented using selected ASCII Characters. Base 43 is therefore the most compact case-insensitive alphanumeric numeral system using ASCII characters.

As the Account Number is 8 characters, the method moves the last character of this to be at the front of the serial number; giving three separate numbers of a maximum of 6, 7 and 7, instead of 6, 8 and 6.

For example, Sort Code 20-20-20, Account Number 12345678, Serial Number 100000 would become:

202020

1234567

8100000

These three separate values can then be converted to base 43 using any of the well known conversions. The conversion provides three sets of alphanumeric values, one of which will be represented as 4 characters and the other two of 5 characters, giving a total of 14 characters.

Conversion of the above three sets of numeric values to base 43, using the character set defined in section above [selected ASCII characters] would be as follows:

4QE9

2IPW#

4I#Z7

The natural string of code would be personalised as such: 4QE92IPW#4I#Z7”

23. Accordingly the invention as described appears to involve retaining the input number values, but representing those values in a different number system, or base, thereby obscuring them to anyone who does not know the base used and/or any character set used to represent

that base. In fact, there is a dispute about this which I will come back to.

24. The Patent has a single embodiment which teaches the possibility of scrambling the base output number with a re-ordering algorithm in order to increase the security of the UCN generated and thus the solution (page 6 lines 24-25), but this is not a necessary aspect of the invention.
25. Once generated, the UCN is printed on the cheque (page 6 line 29) so it can be read by the receiving bank. The Patent's single embodiment also teaches the possibility of printing it in two places on the cheque to reduce the risk of the UCN failing to be read accurately during the cheque clearing process (page 6 lines 32-34), but this is also not a necessary aspect of the invention.
26. In relation to the clearing process, the specification describes at page 7 lines 14-20:

"The producer of the cheques described herein will provide a .dll file to the clearing company to decrypt the UCN 34. The sort code, account number, serial number and UCN 34 are scanned and recorded as part of the cheque scanning process by the processing system. These details are passed to the .dll, which will then decrypt the UCN 34, review the information and return a value of True (a match) or False (a mis-match). Acceptance or rejection will be based on whether an exact match is found or not. If the two codes do not match this indicates the potential fraudulent alteration of some of the details on the cheque."

27. I understand from this that the issuing bank (or a clearing company acting on an issuing bank's behalf) decrypts the UCN and uses the decrypted UCN to check for a match with the relevant Personalisation Data printed on the cheque, to ensure that they have not been altered. If there is no match, that suggests at least one of the pieces of Personalisation Data used to create the UCN has been altered. The

experts agree that an alteration to the sort code or account number is an attempt to have the cheque satisfied out of a different account to that to which the cheque is intended to relate, and as such is a fraud against the issuing bank rather than the drawer. It is only if there is a match that the issuing bank can be satisfied of the integrity of the Personalisation Data. However, it does not provide any verification as to whether the Drawer Data have been fraudulently altered since they were inserted into the cheque: this type of fraud is likely to be a fraud against the drawer rather than the issuing bank.

28. As set out above, the Patent teaches the possibility of using a .dll file to enable verification of the UCN against the relevant Personalisation Data, but this is not a necessary aspect of the invention. The specification explicitly states at page 7 lines 22-24 that, *“The use of the .dll file... can be replaced with other suitable means of reviewing the scanned UCN 34 and sort code, account number and serial number”*.

THE CLAIMS

29. Claim 1 is a method claim and Claim 6 is a product claim, but they are otherwise not materially different. It is common ground that they can be treated together for the purposes of the action. The parties have split Claim 1 into integers for ease of reference, as follows:
- 1.1. A method of generating a payment/credit instrument comprising:
 - 1.2. Generating a code based on at least one string of information to be applied to the payment/credit instrument during generation thereof;
 - 1.3. Applying at least one string of information to the payment/credit instrument; and

- 1.4. Applying the generated code to the payment/credit instrument in at least one location of the payment/credit instrument during generation thereof by a printing technique,
- 1.5. Wherein the or each string of information is converted to a code by conversion to a higher base; and
- 1.6. Wherein the payment/credit instrument is a cheque or credit slip, and
- 1.7. Wherein the at least one string of information is one or more of a bank sort code, a payment/credit instrument serial number and an account number for the payment/credit instrument.

THE SKILLED PERSON

30. There is no dispute about the correct approach to the skilled person, the principles applicable to which were summarised by Henry Carr J in *Hospira UK Limited v Cubist Pharmaceuticals LLC* [2016] EWHC 1285 (Pat). It is common ground that a patent specification is addressed to those likely to have a real and practical interest in the subject matter of the invention (which includes making it as well as putting it into practice); such persons are those with practical knowledge and experience of the field in which the invention is intended to be used. The skilled addressee of the Patent reads the specification with the common general knowledge of persons skilled in the relevant art at the application date of the patent (here, 1 February 2013), and knowing that its purpose is to disclose and demarcate an invention. The skilled person reads prior art documents with interest but is unimaginative and has no inventive capacity. He may be a team of persons with differing expertise, or a single person with all the practical knowledge and experience needed. Although the skilled person is a hypothetical construct, his or her composition and mind-set is founded in reality.

31. There remains a dispute between the parties about the characterisation of the skilled person/team, although they have moved closer because of a measure of agreement between their experts. The Claimant pleads in the Reply and Defence to Counterclaim at paragraph 6 that the addressee of the Patent *“would be someone skilled in banking and... generation, processing and use of payment and credit instruments [and] security issues that attach to such a field such as the various ways in which cheque fraud can be perpetrated... The skilled addressee of the Patent would not include a cryptographer or digital security expert”*.
32. The Defendants plead at paragraph 13 of the Defence and Counterclaim that the skilled addressee of the Patent *“is a team comprising at least:*
- (a) someone skilled in banking and particularly the generation, processing and use of payment and credit instruments including cheques, as well as the security issues that attach to such a field such as the various ways in which cheque fraud can be perpetrated; and*
- (b) a cryptographer or a digital security expert who will be familiar with common principles of cryptography...”*.
33. The dispute in the pleaded cases is, therefore, the extent to which the skilled person/team has cryptography expertise.
34. Professor Landrock believes that the skilled person would have knowledge and interest of both (i) financial or banking expertise relating to the generation and processing of cheques, including security issues such as fraud that arise in relation to them; and (ii) security and cryptography expertise relating to security measures which would be appropriate to address those issues; whether embodied in a single person or a team comprising people bringing together each area of expertise. In his written report, he opined that the skilled addressee would have a working knowledge of

cryptography and its application, with a computer science degree or similar and several years of practical security applications of cryptographic principles in the field of banking. He moved away from this a little in oral evidence, stating that the patent would be of little interest to a cryptographer and that the cryptography techniques it contained were of a very basic nature.

35. Mr Brewer identifies the skilled person as a Systems Analyst or, if they had programming skills, a Systems Developer, whether employed by a bank or by a consulting firm specialising in banking, or by a security printing firm which, as part of its service as a cheque printer, includes a security features offering. He regards himself as such a person, being a consultant with a consulting firm specialising in banking. In Mr Brewer's opinion, although the skilled addressee would know of the existence, use and strength of various cryptographic functions and their use in banking security applications, and be capable of employing cryptography and cryptographic hash functions in a business context, he or she would have no knowledge or significant understanding of how they worked.
36. Mr Brewer discloses his reasons for this opinion at paragraph 67 of his report, where he says:

"In assessing a commercial IT system, it is virtually never the case that the analyst responsible for the selection of competing systems goes deeply into the design, architecture or detailed method of operation of those systems. The analyst no more needs to understand the manner in which an algorithm has been implemented than the purchaser of a car needs to understand the software which regulated the supply of fuel to the engine." (my emphasis).

37. Mr Brewer confirmed in cross-examination that he approached the skilled person as being someone who is assessing completing solutions to see which one of them adequately fits the requirements. As previously stated, I am satisfied this discloses an incorrect approach. Taking Mr Brewer's own example, the skilled addressee of a patent for a fuel injection system for a car is not the purchaser of the car, but a notional person who fulfils the *Hospira* principles: this is likely to be an engine management specialist, or perhaps a team comprising an engine management specialist and a software engineer if that injection system is computer-controlled.
38. Mr Brewer also denies that the skilled person should have any deeper expertise in cryptography or be a cryptographer, because:
- i) the Patent does not require a new implementation of a cryptographic technique or algorithm which needs to be assessed by the skilled addressee, and if it did, that would be contrary to generally accepted principles of good security implementation that a well-known, well tested solution (and in the case of algorithms, one which is well-reviewed by professional cryptographers) is far better than a new one;
 - ii) the Patent also does not require a professional cryptographer to implement cryptographic processing of data, as the algorithm to be implemented should be sourced from those which have undergone such professional review so that they are suitable for consideration for implementation. One such source may be the UK National Institute of Standards and Technology (NIST).
39. However, as I will address later in relation to claim construction, it is the Claimant's case that the Patent should be construed to cover all cryptographic functions, so long as they are presented in a higher base, including new implementations of cryptographic techniques or

algorithms. That would require a higher level of cryptographic knowledge than that envisaged by Mr Brewer for the skilled addressee to make the invention across the scope of its claims, as well as use it. Even if I do not accept the Claimant's wide construction on this point, I accept the Defendants' submission that the Patent postulates the use of a re-ordering algorithm which would need to be chosen and assessed by a cryptographer in order to make and use the invention.

40. I also accept that in the field of data security, the banking industry had been working with cryptographers for decades, including in the area of particular concern to the inventors of the Patent, i.e. improving the security of financial instruments and documents, and so a team comprising both financial and cryptographic experts is not some hypothetical construct, but reflects the reality that real teams of that nature were working on exactly the kind of problems addressed by the Patent.
41. I do not really know whether it makes a great deal of difference in this case, given the degree of agreement between the experts about the common general knowledge of the skilled person, but I consider that Mr Brewer puts the cryptography knowledge required too low, perhaps because of the incorrect approach he took to assessing the identity of the skilled addressee. Accordingly, I accept Professor Landrock's opinion that the patent would be read by those with both financial/banking and cryptographic expertise, with the cryptographic expertise at the level which Professor Landrock describes in oral evidence. I further accept that expertise may reside in the same person. For that reason, I will refer to the skilled person and not a skilled team for the purposes of this judgment, although the construct encompasses both possibilities.

D. THE COMMON GENERAL KNOWLEDGE

42. The relevant law as to the common general knowledge was set out by Arnold J (as he then was) in *KCI Licensing Inc v Smith & Nephew Plc* [2010] EHC 1487 (Pat), [2010] FSR 31 at [105]-[115] (as approved by the Court of Appeal at [2010] EWCA Civ 1260; [2011] FSR 8 at [6]), including the frequently-cited passage from the judgment of Laddie J in *Raychem Corp's Patents* [1998] RPC 21 at [40]. I will not repeat that here.
43. As I have already noted, it became apparent in cross-examination that Mr Brewer had adopted an incorrect approach to the question of what was the common general knowledge when writing his report.
44. The Defendants' position on the common general knowledge of the skilled addressee is pleaded at paragraph 14 of the Defence and Counterclaim. Although the Claimant in its pleadings denied some of the principles set out in sub-paragraph x) below are within the common general knowledge, Mr Brewer accepted partly in his report and partly in cross-examination that they are. Once the experts had given evidence, I was left with no real discernible disputes about the common general knowledge to determine. I accept the experts' agreement that the common general knowledge of the skilled addressee includes:
- i) the use of various identifying data on cheques including the sort code, account number and cheque serial number;
 - ii) the concatenation of the above information into data strings, and the printing and display of the same on cheques;
 - iii) the requirement for and use of machine-readable data and symbols on cheques;
 - iv) that physical security measures are used on cheques;

- v) the inadequacy of physical security measures for digitised systems and digitally transmitted cheque systems, and the requirement for “image-survivable” security features;
 - vi) some understanding of the forms of cheque fraud, specifically those relating to tampering with personalisation data;
 - vii) the use of cryptography in security applications;
 - viii) the existence, use and strength of cryptographic techniques;
 - ix) a basic knowledge of mathematics and implementation of mathematical methods of programming;
 - x) simple principles of digital security such as:
 - The principles and use of digital signatures;
 - Private and public key encryption including the use of commonly known protocols such as RSA;
 - The use of reversible and irreversible cryptographic functions;
 - The use of hashing functions including commonly known hashing functions such as SHA-1 and SHA-2 including SHA-256, message authentication codes and checksums;
 - The use of different bases for the display of outputs of cryptographic functions such as encryption algorithms and hashing functions etc, including the use of hexadecimal display of the outputs of common hashing functions such as SHA-1;
 - xi) sufficient understanding of the application of algorithms to numeric strings to appreciate that this is a suitable method of encoding.
45. In cross-examination, Mr Brewer also agreed that the common general knowledge would include Professor Landrock’s statements about the use of cryptography in the banking industry at paragraphs 5.32 to 5.39 of Professor Landrock’s first report, which I will not repeat here.

46. Finally, Mr Brewer also accepted in cross-examination that the common general knowledge would include that cheques and credit slips could be printed with Personalisation Data and Drawer Data simultaneously: for example, company cheques and travellers' cheques.

E. CONSTRUCTION OF THE PATENT

The Law

47. There is no dispute between the parties on the relevant law. Both counsel agree that the principles to be applied are set out by Jacob LJ in *Virgin Atlantic Airways v Premium Aircraft Interiors* [2010] RPC 8, summarising the effect of the House of Lords' decision in *Kirin-Amgen v Hoechst Marion Roussel* [2005] RPC 9. The task of the court in construing the claims of a patent is to determine what the person skilled in the art would have understood the patentee to intend the language of the claim to mean in the light of his or her common general knowledge. It is impermissible to use the infringement as an aid to construction of the Patent, and it is also impermissible to use cited prior art as an aid to construction except where the prior art is itself in the common general knowledge or is expressly referred to in the patent being construed. Neither party claims that either of those exceptions apply in this case.
48. It is also common ground that, per Kitchin LJ (as he then was) in *Icescape Ltd v Ice-World International BV & Ors* [2018] EWCA Civ 2219 at paragraph 60, the purposive approach to construction remains the correct approach, despite the changes to the approach of infringement by equivalents following the Supreme Court's decision in *Actavis UK Ltd v Eli Lilly & Co* [2017] UKSC 48, [2017] RPC 21 and Lord Neuberger's reference to a literal interpretation. Kitchin LJ noted this was also the view of Arnold J in *Myland v Yeda* [2017] EWHC 2629

and of Carr J in *Illumina Inc and Ors v Premaitha Health Plc and Anor* [2017] EWHC 2930 at [201].

49. Jacob LJ at [182] of *Virgin* makes clear the task of construction is for the court. The Claimant submits that expert evidence is admissible on the subject of construction, but the Defendants submit, and I accept, that expert evidence has only a limited role to play. As Laddie J (as he then was) put it in *Brugger and Others v Medic-Aid Ltd* [1996] RPC 635 at page 642, “Construction is a matter for the court unless the claims and specification contain technical expressions which need to be explained by suitable evidence”. That is a limited role, and the court will not generally be assisted by the evidence of experts which goes beyond this.
50. Dr Lawrence for the Claimant submits that despite the need to construe purposively, it has never been legitimate either to cut down or to extend the clear meaning of the language of a claim by references to the body, as that would be not to construe but to amend the claims. So just as purposive construction does not mean that an integer can be treated as ignored, it also does not permit an additional limitation (or, I would add, an extension) to be implied into the claim, even if connected with the way in which the invention works, if that does not arise from a proper construction of the language of the claim itself. I accept her submission which relies on the reasoning of Floyd J (as he then was) in *Nokia v Ipcom* [2009] EWHC 3482 (Pat) at paragraph 41:

“Where a patentee has used general language in a claim, but has described the invention by reference to a specific embodiment, it is not normally legitimate to write limitations into the claim corresponding to details of the specific embodiment, if the patentee has chosen not to do so. The specific embodiments are merely examples of what is claimed as the invention, and are often expressly, although superfluously, stated not to be “limiting”.

There is no general principle which requires the court to assume that the patentee intended to claim the most sophisticated embodiment of the invention. The skilled person understands that, in the claim, the patentee is stating the limits of the monopoly which it claims, not seeking to describe every detail of the manifold ways in which the invention may be put into effect”.

The Issues

51. The parties have identified the following issues on construction:
- i) The meaning of “*code/generating a code*” in integer 1.2;
 - ii) The meaning of “*by conversion to a higher base*” in integer 1.5; and
 - iii) The meanings of “*applying the generated code*” and “*during generation thereof*” in integer 1.4.

Code/Generating a Code

52. It is common ground between the experts that “*code*” in ordinary usage can refer to a reversible or irreversible/one-way code, i.e. it encompasses a code which can be decrypted and one which cannot. The Claimant contends the Patent should be construed purposively using this wide, everyday meaning and so the skilled addressee would understand the wording of the claim to mean that it encompassed both decryptable and irreversible codes.
53. The Defendants contend that “*code*” in the Patent means ‘decryptable code’, i.e. something which is capable of being decoded. They contend that the Patent requires decoding in order to check the security, and the only mechanism which the Patent discloses and teaches (generation of a code by conversion to a higher base) is capable of being decoded. The Defendants’ contention appears to be grounded in the fact that the example in the Patent uses decryption as part of the validation process. However, I accept the Claimant’s submission that Claims 1 and 6 do not specify the method of

validation and are not limited to the example. Alternatively, the Claimant submits that the Defendants are attempting to construe the meaning of “code” with hindsight, by reference to the alleged infringement, which claims to use a non-decryptable or irreversible code in the form of a one-way hashing function. As I have stated, as a matter of law it is impermissible to construe the Patent by reference to the alleged infringement.

54. Mr Brewer sets out in his report two possible methods of validation: ‘backwards’, which requires decrypting the UCN to compare it to the Personalisation Data as described in the example in the Patent (see p7 lines 14-20), and ‘forwards’, which does not require decrypting the UCN, but rather encrypts the same Personalisation Data used to produce the UCN printed on the cheque using exactly the same method as that used to produce the UCN, to see if the result is the same as the UCN. Professor Landrock referred to these ‘backwards’ and ‘forwards’ methods as utilising either ‘reversible’ or ‘one way’ cryptography respectively, and in his first report and in oral evidence he accepted that both methods were being used ubiquitously within the banking industry at the priority date of the Patent.
55. The Patent specification at page 7, line 14, sets out in the example that the producer of the cheque will provide a .dll file to decrypt the code, but makes clear at page 7, lines 22-24 that *“the use of the .dll file to provide reconciliation can be replaced with other suitable means of reviewing the UCN and sort code, account number and serial number”*. I accept the Claimant’s submission that this is an explicit recognition that other methods exist for validation and are of equal utility to decryption by means of a computer program such as a .dll file.
56. I am satisfied that the result produced by working the invention is the same whichever method is used: whether that is ‘backwards’

decryption of the UCN and comparison of the result with the Personalisation Data; or 'forwards' encryption of the Personalisation Data by the same method and steps used to produce the UCN, and comparison of the result with the UCN. Either way, there is a binary result where the only two possibilities are 'match' or 'no match'. If there is a match, the bank is assured of the integrity of the Personalisation Data: if there is no match, it is not. Accordingly, I am satisfied that decryption is not an essential feature of the validation process element of the invention.

57. Since the use of reversible and irreversible cryptographic functions are within the common general knowledge of the skilled person and were ubiquitous at the time, in my judgment the skilled person reading the Patent at the relevant date would understand that decryption is not an essential feature of the validation process.
58. Accordingly, I reject the Defendants' contention that "code" should be construed to mean 'decryptable code'. I construe it as having the everyday meaning which encompasses both reversible/decryptable and irreversible code.

By Conversion to a Higher Base

59. Integer 1.5 of Claim 1 provides that *"the or each string of information is converted to a code by conversion to a higher base"*.
60. The Claimant pleads that this integer should be construed as meaning the Personalisation Data is converted to a code **that is in** a higher base. This construction would, in my judgment, cause the claim to encompass the generation of a code by any means, if presented in a higher base than the input data. That appears to be the Claimant's case: Dr Lawrence in her skeleton argument at para 61 argues that *"the Patent in this case describes the creation of a code which is a*

*manipulated representation of the output of a mathematical process **but which is not dependent on any specific mathematical transformation to achieve its purpose.** This code is printed on a cheque and subsequently used for authentication of the cheque as a process of validation of the source of the cheque.” (my emphasis).*

61. The Defendants submit that, irrespective of what the Patent means by the word “code”, (and I have determined that encompasses both decryptable and irreversible code), that code must **be generated by** conversion to a higher base. They submit that this is what the Patent teaches in the wording of the claims, and its description and sole embodiment describes converting the numbers making up the Personalisation Data, or chosen subset of the Personalisation Data, into a higher base. The Defendants submit that is also the meaning that the Claimant relied on in a letter to the UKIPO of 5 October 2016, obtained from the patent prosecution file. In this, the Claimant defined the inventive concept of the Patent as converting a string of information into a code **by conversion to** a higher base.
62. The higher base used in the example contained in the Patent is base 43, but the Defendants do not seek to limit the claim to conversion to base 43. They accept that it could be any base higher than base 10, or decimal, which is the base in which the Personalisation Data is conventionally expressed on the cheque or other credit instrument.
63. Mr Ward for the Defendants submits the construction for which the Claimant contends is devoid of support from the language of the Patent or the specification. Neither the Claims nor the description, he submits, even hint at the possibility of using mathematical functions other than traditional base conversion to generate the code, and nor is there anything in the Patent to suggest there would be technical benefits in using such functions for these purposes.

64. I note that that the construction for which the Claimant contends is not consistent with how the Claimant's expert explained the meaning of this integer in his report. I remind myself that Mr Brewer does not stand in the shoes of the skilled addressee and I also keep in mind the errors in approach that I have found Mr Brewer has taken to construction. However, Mr Brewer at paragraph 79 of his report explains that "*the or each string of information is converted to a code by conversion to a higher base*" means "***this is the process of disguising the Personalisation Data, or a subset of it by converting it from base 10 to a higher base which, of necessity, will involve use of non-numeric characters.***" (my emphasis). I take from this that when Mr Brewer read the Patent, he understood the encryption element, which is what "*disguises*" the Personalisation Data, to be the act of conversion to a higher base.
65. Mr Brewer makes this understanding explicit at paragraph 75 of his report, where he provides a tabular commentary to each of the integers to Claim 1. Against integer 1.5 he opines that the meaning of the integer is as follows: "*The Personalisation Data is considered to be decimal data and is rendered into one of [should be 'or'] more strings. These are converted to a different, higher base*". He comments: "***The purpose of this conversion is to obscure the actual digits of the Personalisation Data. In part, this is for practical reasons; the area available for printing on a cheque is limited by industry standards so that only relatively short strings can be conveniently printed and raising the base of a number usually results in a shorter string***" (my emphasis). Once again, Mr Brewer identifies the encryption, or 'disguising', or 'obscuring' element of Claim 1 as being provided by the conversion to a higher base. In neither description does he identify the possibility of another meaning, namely that that the skilled person might understand the Claim to cover encryption by another cryptographic

process, followed by presentation of the output in a higher base, as the Claimant contends it should be construed.

66. Of course, construction is for the court, and not for the experts. In my judgment, the Defendants' construction is the correct one, for the following reasons:

- i) the Claimant's construction requires the skilled addressee to ignore words which are present in Claim 1 ("by conversion to") and read-in words ("that is in") which are not present in Claim 1, and in doing so fundamentally alter its meaning.
- ii) I remind myself that the skilled person understands that, in the claim, the patentee is stating the limits of the monopoly which it claims. The Claimant has chosen the wording of the claims, including in integer 1.5 of Claim 1. I do not consider there is anything in the Patent to justify ignoring the wording that the Claimant has chosen in articulating the claims: there is no general teaching in the Patent, only a single embodiment, and Claims 1 and 6 use language which is apt to capture that single embodiment. The Patent teaches only how to generate a code by base conversion, and accordingly that should be the limit of the scope of monopoly.
- iii) Putting to one side for the moment any consideration of the Defendants' counterclaim in invalidity for obviousness over the Prior Art and excluded subject matter, I accept the Defendants' submission that if the Court were to prefer the Claimant's construction, the Claimant would obtain a monopoly to the encryption of Personalisation Data by every single cryptographic function invented or yet to be invented, as long as the result of that cryptographic function was presented in a higher base and applied to a cheque or credit slip. Mr Ward submits that would be a monopoly which exceeds by a very great way the Claimant's contribution to the art. I accept that submission. I remind myself that a patent is a social contract between the inventor and the public. The inventor teaches a new product or process, and in doing so adds to the sum of the public's knowledge, receiving as a reward a monopoly of that product or process for a period. The extent of the monopoly

conferred by the patent must correspond with the extent of the contribution which it makes to the art, as the Supreme Court reminded us very recently in its discussion of sufficiency at paragraphs 23 and 24 of the judgment of Lord Briggs (with whom Lord Reed, Lord Hodge and Lord Sales agreed) in *Regeneron Pharmaceuticals Inc v Kymab Ltd* [2020] UKSC 27.

- iv) I have no difficulty in finding that, cryptographically speaking, conversion of numerical input to a higher base is not at all sophisticated, and that the skilled addressee would understand that. Mr Brewer, the Claimant's own expert, described the security that it provided in oral evidence as "*frankly pretty awful*" which appears to accord with Professor Landrock's opinion that the invention disclosed by the Patent would not be considered as a practical method of fraud prevention by the person skilled in the art. Professor Landrock stated in his first report that it was "*very basic indeed... the sort of thing I would anticipate my first-year students might try for fun before they became familiar with good principles of cryptography... amateurish*". Given this contribution to the art (if it is a contribution to the art at all, which I will retUCN to), to construe the Patent as providing a monopoly of the width contended for by the Claimant would be, in my judgment, outwith the social contract and unjustifiable, even before looking at legitimate arguments which could be raised about the sufficiency of the Patent's teaching across that width.
67. For those reasons, I consider that the skilled reader of the Patent, armed with the common general knowledge and reading it as a whole, and giving it a purposive construction, would understand the wording of Claim 1 to mean that the code was generated **by converting** the string of Personalisation Data, or a subset of it, to a higher base, and not that the Patent was intended to cover codes generated by the application of any cryptographic technique as long as the output was **in** a higher base.
68. I have reached that conclusion without needing to take into account the 5 October 2016 letter from the patent prosecution file upon which

the Defendants sought to rely, and so I will consider that no further in relation to construction.

Applying the Generated Code

69. The final dispute relates to integer 1.4 of Claim 1: “Applying **the generated code** to the payment/credit instrument in at least one location of the payment/credit instrument **during generation thereof** by a printing technique”. There are two disputes in the construction of this integer.

Printing the whole of the code or only part of it?

70. The first is that the Defendants submit that the application of “*the generated code*” to the cheque is limited to the whole of the generated code, and not merely a part of it, whereas the Claimant submits there is nothing to so limit the claim. The Defendants’ primary argument is both literal and purposive: the literal argument is that the plain language of the claim states that it is “*the generated code*” that must be applied, not ‘the whole or part of the generated code’; the purposive argument is founded in part on the Defendants’ argument that “*code*” is limited to ‘decryptable code’, and so the whole of the generated code must be printed in order for it to be decrypted. I have already found that the Claim should be construed in a way that does not limit “*code*” to ‘decryptable code’, so I reject this latter submission.

71. However, the Defendants further argue that the reason the Patent does not contemplate applying only part of the code is because the generation of a code “*by conversion to a higher base*” necessarily produces a code of *fewer* characters than that of the data string encoded. Indeed, the Patent specification identifies this as an advantage of presenting the coded output in a higher base at page 6, lines 15-20, as space on a cheque for the printing of additional

information in machine-readable form is limited. Accordingly, the Defendants submit that the skilled addressee of the Patent, aware that the Patent teaches generation of a code by conversion to a higher base, and aware both from the Patent description and the common general knowledge that conversion to a higher base would result in a code of fewer characters than the Personalisation Data or subset thereof forming the input, would understand the reference to "*application of the generated code*" on the cheque as meaning the whole code so generated, as there is no purpose disclosed by the Patent to printing only part of it.

72. I note that the description teaches the possibility of scrambling the base output number with a re-ordering algorithm in order to increase the security of the UCN generated, but it does not teach the possibility of printing only part of the code to increase the security of the UCN generated. Of course, that is not determinative, but it is part of the context against which the court must determine what the skilled person would understand the integer to mean.
73. In my judgment the skilled addressee of the patent would not understand this integer to mean that the whole of the generated code must be printed on the cheque, for the following reasons:
 - i) that construction requires the Court to read-in words limiting the Claim ("*the whole of*") which the patentee has chosen not to insert;
 - ii) although the Patent teaches, in the worked algorithm, application of the whole code to the cheque, that is merely an example of what is claimed as the invention, per *Nokia v Ipcor*. The Defendants accept that the example contained in the Patent is merely an example, and the Claimant as patentee is not required to identify every possible way of implementing the invention;

- iii) I accept the Claimant's submission that if, as I have found, the skilled addressee can understand that the invention can be worked using 'forwards' as well as 'backwards' decryption, the skilled addressee can also understand that the invention can be worked whether the whole code is printed or only a sufficient part of it to safely verify the match (say, for example, the 1st, 2nd, 4th and 5th characters);
- iv) I do not consider that this requires the unimaginative skilled addressee to use his imagination in circumstances where the Patent discloses the possibility of a re-ordering algorithm. That discloses that although the code produced by conversion to a higher base may be varied before printing, as long as the validation process subjects the same input data string to the same variations, the match will be achieved and the invention will work; and
- v) the skilled reader would also understand that printing part and not the whole code will further assist in fulfilling the practical purpose identified by the Defendants of reducing the code to a size which will fit legibly on the limited spaces available on the cheque.

The meaning of "generation of a cheque"

- 74. The second dispute relates to the meaning of "*generation of a cheque*" or payment/credit instrument, in the context of printing the generated code upon it. This goes only to validity and not infringement.
- 75. The Claimant submits that the skilled reader of the Patent will understand "*during generation*" of the cheque or other payment/credit instrument to mean during the process of the issuing bank (or its agent) printing the blank instrument ready to be later filled in and endorsed by the drawer, i.e. the printing of the code/UCN on the cheque must be carried out by or on behalf of the issuing bank, not by the customer drawer.

76. The Defendants submit that the Claimant's argument takes into account only the printing of "normal" cheques, such as those found in a blank chequebook provided by a bank to a customer. It is the customer who then draws those by the addition of Drawer Data and endorses them by a signature. However, it submits, the Patent covers all sorts of cheques and credit instruments, including those that are printed with Drawer Data included, such as some company cheques and travellers' cheques. Mr Brewer in cross-examination accepted this, and that this fact would be part of the skilled addressee's common general knowledge. The Defendants submit, therefore, that the generation of a cheque is the whole process of tUCNing a blank piece of paper into a credit instrument which is capable of being deposited, i.e. up to and including the insertion of Drawer Details and endorsement by signature of the drawer upon it. Accordingly, they submit that printing the code "*during generation*" of the cheque would be understood by the skilled addressee as printing of the code at any point in that process, and that this step could be carried out by or on behalf of the issuing bank or by the customer drawer, albeit as agent for the issuing bank.

77. In closing, Dr Lawrence for the Claimant criticised Professor Landrock for "*defining cheque as a drawn cheque based on the 1882 [Bills of Exchange] Act, when there is a clear picture of a customer cheque in the patent which is said to be a cheque within the patent. So there is a difference there between what is in the patent and what is limiting the patent and what the scope of the patent is but he chose, rather than to say "Here is a cheque within the patent not limiting the claim", he would rather look to a piece of legislation and say that the meaning of "cheque" is limited to drawn cheque when in fact that the example that the patent itself says is within the patent is not a drawn cheque*". However, she submitted in the next breath "*You cannot limit the scope of the claim by reference to the example. The claims can be wider or narrower but you look at the claims to determine the*

scope". I agree with this latter submission, but it contradicts her earlier criticism, if that criticism was intended to support an argument that the diagram of a printed, undrawn cheque limits the scope of the claim in the manner in which the Claimant contends. Alternatively her earlier criticism may have been based on a misunderstanding by Dr Lawrence that Professor Landrock was opining that the word "*cheque*" as used in the patent did not include such a pre-printed 'normal' cheque as seen in the example, but I did not understand him to hold this opinion and Mr Ward clarified in closing that was not Professor Landrock's opinion and not the Defendants' case. In which case the criticism must also fall away.

78. I accept the Defendants' submissions. I am satisfied that the Patent covers all sorts of credit instruments, including travellers' cheques, company cheques, long joint giros, and credit slips and that the skilled addressee within the common general knowledge would understand that those include cheques and slips which are printed 'in blank' for Drawer Data to be added and those which are printed at the time they are needed with Drawer Data included. I do not accept the Defendants' submission that by doing so I am construing the Patent "*by reference to the margins, rather than the central thrust of what the patent is telling you that you can do*", because I am satisfied in reading the Patent as a whole that Claim 1 is wider in scope than merely the example in the diagram, not least because it encompasses other credit instruments than just cheques. I am further satisfied that the skilled addressee would understand that the generation process is only completed when that cheque or credit instrument contains all the information necessary, including endorsement, to present it to a bank for deposit (whether physically or digitally). As such, the skilled addressee would understand that printing the code "*during*

generation” means that it could be printed at any time during that process.

F. INVALIDITY - OBVIOUSNESS OVER THE PRIOR ART

79. It is common ground that the invention is novel. The Defendants allege lack of inventive step. Section 3 of the Patents Act 1977 provides that “*An invention shall be taken to involve an inventive step if it is not obvious to a person skilled in the art, having regard to any matter which formed part of the state of the art...*”.
80. It is convenient to assess inventive step using the structured approach set out by Oliver LJ in *Windsurfing International Inc v Tabur Marine (Great Britain) Ltd* [1985] RPC 59 and restated by Jacob LJ in *Pozzoli SPA v BDMO SA* [2007] FSR 37:
- i)
 - (a) Identify the notional ‘person skilled in the art’;
 - (b) Identify the relevant common general knowledge of that person;
 - ii) Identify the inventive concept of the claim in question or, if that cannot readily be done, construe it;
 - iii) Identify what, if any, differences exist between the matter cited as forming part of the state of the art and the inventive concept of the claim, or the claim as construed;
 - iv) Ask whether, when viewed without any knowledge of the alleged invention as claimed: do those differences constitute steps which would have been obvious to the person skilled in the art or do they require any degree of invention?

81. As Dr Lawrence reminds me, it is important to remember the statutory question which still applies, per *Zipher v Markem* [2008] EWCA 1379 (Pat) [284]:

“This approach assists the fact-finding tribunal, but is not a substitute for the statutory question: “is it obvious?” In applying it, as elsewhere, hindsight is impermissible. It has to be remembered that the skilled person is not in a position to perform his own *Pozzoli* analysis. It is particularly important to remember that the first three stages are merely those which the court needs to go through in order to equip itself with the tools to answer the statutory question, which is the fourth one. The first three steps involve knowledge of the invention, which must then be forgotten for the purposes of step 4. What one is seeking to establish is whether the claim extends to methods or objects which are, without knowledge of the invention and without inventive capacity, obvious.”

82. I have identified the skilled person and the common general knowledge, and construed Claim 1, so steps (iii) and (iv) remain for me to carry out.
83. Mr Ward submits that although Professor Landrock has followed that approach, Mr Brewer has not: although he refers to the test in *Pozzoli*, he has made no attempt to identify the difference between the disclosure of the Prior Art and the inventive concept or scope of the claims. I accept: (i) that Mr Brewer has made comparisons of the whole of the Prior Art documents with the Patent at a general level in his report in a way which does not assist me and which, to a large part, he resiled from in cross-examination (see page 29/B30 of his report); and (ii) his evidence does not accord with the Claimant’s pleaded case. He seeks to rely on distinctions in integers that the Claimant has admitted are present. This was a matter raised by the Defendants at trial and Mr Ward’s skeleton argument, and I believe I

made clear at trial that I would keep the Claimant to its pleaded case in the absence of an application to amend it.

84. Many of the parties' submissions in relation to obviousness were directed to the wide construction of integer 1.5 for which the Claimant contended and which I have not accepted: that the invention covered the generation of a code by any cryptographic means if presented in a higher base. Accordingly I will not address those submissions. As I have construed it, the question of obviousness becomes much simpler.
85. There is another consideration in this case, which is whether the inventive contribution of the Patent is patentable at all or whether, as the Defendants contend, it is unpatentable as excluded subject matter under section 1(2) Patents Act 1977. I will consider that in the next section.

Martens

86. The Claimant accepts that Martens discloses all of the integers of claim 1 of the Patent except, in relation to integer 1.5, generation of the code by conversion to a higher base.
87. The title of the invention claimed in Martens is 'Method and apparatus for depositing paper checks from home or office'. The summary of invention makes clear that it allows for the secure deposit of paper cheques (or 'checks', using Martens' American spelling) from home or office, in other words at a location other than the bank or ATM:

"The apparatus can be implemented at the payee's home or office with a Personal Computer (PC) which has a scanner attached to it and connected to... the Internet. The process of depositing paper checks begins by the payee endorsing a check having printed thereon encryptions in at least selected

locations where information is written by a payer. The act of writing by the payee obscuring some of the encryptions. The payee then scans the endorsed check with a scanner to generate a digitized version of the check. The computer extracts from the digitized version of the check a concatenated branch number, account number and check number and a corresponding digital signature. The payee then transmits the extracted information together with the digitized version of the check for deposit. The checks are specially designed to prevent fraud such as alterations of the payee, amount and multiple deposits. In addition to the encryptions imprinted on the check, a secret key and a plurality of digital signatures are generated based on the concatenated branch number, account number and check number. Furthermore the new kind of checks described in this invention will also make fraud much harder when traditional methods of depositing are used”.

88. Martens describes the invention as building on two technologies: (i) a piece of hardware called a secure cryptography generator or SCG (it provides the IBM 4758 PCI Cryptographic Coprocessor as an example, but states that any similar device could be used), and (ii) the art of cryptography [0032]. Martens discloses printing “*encryptions of the unique identifier of the check such as the usual data X*” ([0067]), where X is a number made by concatenating the bank sort code, account number and cheque number ([0061]), i.e. a string made up of the Personalisation Data. The codes may be produced by number of methods: [0037] states “*The use of secret keys as a means to encrypt or digitally sign a file or document, of secret encoding keys, and of secure hash functions (such as SHA-1, as fully specified in the Federal Information Processing Standard Publication 180-1) are now well known. A description of these techniques with directions on how to use several of their implementations can be found in Handbook of Applied Cryptography, by Alfred J. Menezes, Paul C. van Oorschot and Scott A. Vanstone, CRC Press, 1997*”. Accordingly, it refers to decryptable, or reversible methods such as secret encoding keys as well as irreversible ones

such as secure hash functions. In [0039] it describes how the RSA protocol can be used as a method to generate a digital signature, but other methods can be used.

89. Martens teaches generating at least three encrypted versions of X, being a family of different signatures or encryption functions, in order to produce a lengthy code which can be printed in fine print in lines to completely cover various "*critical fields*" on the cheque where the drawer will insert Drawer Data, i.e. the spaces left for the date, payee's name, amount of the cheque in words and figures, and signature. It explains that parts of the pattern produced by printing these codes in the critical fields will be obscured by the drawer writing and signing the cheque. This aspect of the invention addresses the problem of fraud by alteration of the Drawer Data on the cheque, which is further protection to that in the Patent. I will refer to this for convenience as the first part of the invention.
90. However Martens also identifies at [0016] one of the problems to be solved by the invention as being multiple deposit of any cheque, and it teaches that an encrypted version of X is also printed at the top and on the back of the cheque (see figure 9 of Martens), in much more limited spaces on the cheque which are not spaces into which the drawer is expected to write. Indeed, one of those spaces is in the area marked "*Do not write below this line*". I will refer to this as the second part of the invention.
91. The Claimant argues that the purposes of the Patent and the Prior Art, including Martens, are completely different because the prior art citations have the purpose of ensuring, inter alia, that the amount of the cheque is part of the validation, improving the security of the Drawer Data by facilitating fraudulent attempts to change the Drawer Data, whereas the purpose of the Patent is to ensure the integrity of

the Personalisation Data and so validate the origin of the cheque. I do not accept this as a difference between the Patent and Martens, as the second part of the invention in Martens discloses the same purpose of ensuring the integrity of the Personalisation Data, as accepted by Mr Brewer in oral evidence. The Claimant also argues that all the Prior Art including Martens involves the use of Drawer Data and involve steps which may only be carried out in full or in part by the drawer of the cheque. Again, I do not accept this as a valid difference between the Patent and Martens as I am satisfied that no Drawer Data is required to be used for the second part of the invention in Martens, and the code generated could be printed on the cheque without any involvement of the drawer. In my judgment these points did not survive the cross-examination of Mr Brewer in respect of Ehrat and Martin, either.

92. Dr Lawrence criticises Professor Landrock for not addressing the second part of the invention in his report. He said in oral evidence that he did not do so because he did not “pick it up” or “realise that it was important”. She submits that if Professor Landrock did not appreciate its importance, as an expert whose job it is to inform the court what the skilled person would get out of reading Martens, this demonstrates that the second part of the invention is not something a skilled person would understand or focus on. I disagree with that submission. The skilled reader is reliably careful, reading prior art assiduously (per Jacob LJ in *Rockwater v Technip* [2004] R.P.C. 46 at [79]) with interest and understanding (per Lord Reid in *Technograph Printed Circuits Ltd v Mills & Rockley (Electronics) Ltd* [1972] R.P.C. 346 at p.355), and what is important is what the prior art says. What it says is what it discloses, and the skilled person can be taken to have understood it in the absence of obvious error and subject to the Court determining any ambiguities in the wording. As I think I made

apparent to Counsel before this submission was made, I had identified the two parts to the invention in Martens when carrying out my own pre-trial reading of that patent: it is in no way hidden or ambiguous, and I have no doubt the notional skilled person would understand that is what it discloses.

93. For those reasons, since Martens does not specify the methods of encryption of the Personalisation Data X, the only real difference between Martens and Claims 1 and 6 is that there is no express disclosure in Martens that the codes can be generated by conversion to a higher base.
94. The question is then, donning the mantle of the skilled person reading Martens on 1 February 2013 without the benefit of hindsight, i.e. forgetting that the skilled person has any knowledge of the Patent, is it obvious that a code could be generated by converting the Personalisation Data or X to a higher base?
95. The Claimant submits that it is not. It relies on the experts' evidence that conversion to a higher base provides poor security from a cryptographic point of view, and Professor Landrock's evidence that the invention disclosed by the Patent would not be considered as a practical method of fraud prevention by the person skilled in the art. Dr Lawrence submits that, logically on this analysis, it cannot be obvious to the skilled person. I do not agree that this follows. It seems to conflate two questions posed to the skilled person: (i) "is it obvious?" and (ii) "would you use it?". It is only the former which is relevant to the question of inventive step.
96. In my judgment, it is obvious to the skilled person that the code could be generated by conversion to a higher base. Mr Brewer conceded in relation to the first part of the invention that any encryption method would work, including conversion to a higher or lower base and I am

satisfied that the skilled person, with his wide common general knowledge including of cryptographic and mathematical processes such as base conversion, would understand that. In relation to the second part of the invention, Mr Brewer accepted in cross-examination that the skilled reader would understand that there was limited space in the cheque, and so it would not be appropriate to present the code in binary, which would be too long to print in that space in a way that was legible. Accordingly, the code would need to be presented in a more compact form, and this would require conversion to a higher base, as I am satisfied the skilled reader would understand. Mr Brewer accepted it did not matter in what higher base it was presented, conceding in answer to a question of my own that it would be obvious to the skilled person, reading Martens at the priority date of the Patent, to present that code in hexadecimal.

97. However, if you asked the skilled reader whether he **would** generate the code by conversion to a higher base, I expect he would respond, as these experts have suggested, "Well, you could, but that wouldn't produce very good security and I wouldn't do it. I would use better cryptography." As I have stated, that doesn't detract from my finding of obviousness.
98. For all of those reasons, I find that Claims 1 and 6 are obvious over Martens.

Ehrat

99. Ehrat is a US Patent no 3,990,558 filed on 7 October 1974, entitled "Method and Apparatus for Preparing and Assessing Payment Documents". It discloses the use of a machine to print cheques. The user types in the serial number of the cheque and the amount that the cheque is for, which is enciphered with a "*secret code*". The result is called a "*crypto number*", which is then applied to the payment

document, together with the amount and the serial number of the cheque. The genuineness of the cheque can be checked by the use of another machine into which the amount and serial number printed on the cheque is again enciphered with the same "*secret code*" to produce another "*crypto number*". If the crypto number so produced is identical to that printed on the cheque, the cheque is authenticated. If not, then either the serial number of the cheque or the cheque amount or both have been tampered with.

100. The Claimant acknowledges that Ehrat discloses all of the integers of the Claim except it disputes that

- i) In relation to integer 1.2, it discloses that the code is applied to the payment/credit instrument "*during generation thereof*"; and
- ii) In relation to integer 1.5, that the information is converted to a code "*by conversion to a higher base*".

101. In relation to the first of these disputes, Ehrat in column 3, lines 18-36 describes the operation of the machine as follows:

"A client wishing to prepare a document for paying in or paying out introduces an unprinted document form into the apparatus by sliding it in through a slot. The required amount is then typed onto the document by means of the keyboard **3**. The amount is printed by the printing mechanism **4** in the panel **5** of the document and applied to the second input of the code pulse calculator **9**. Serial number producer **2** produces a serial number which the mechanism **4** prints in panel **6** of the document and which is applied to the third input of calculator **9**. Preset at the first input of the calculator **9** is the secret code information from the store **8**, such information being logically associated in the calculator **9** with the data information items representing the amount and the serial number. This association leads to the crypto number being obtainable at the output of the calculator **9**. **The mechanism 4 prints the crypto number in the panel 7 to complete the preparation of the document.**" (my emphasis)

102. The Claimant argues that the crypto number is dependent upon the amount and is therefore not applied during the generation of the payment document. However, the last sentence I have emboldened above makes explicit, in my judgment, that the code is applied to the payment/credit instrument *“during generation thereof”* as I have construed it and so I am satisfied that Ehrat discloses integer 1.2 of the Claim.
103. In relation to the second dispute, Ehrat does not limit what the secret code is. The claims merely refer to a *“means for enciphering”* which gives rise to a *“crypto number”*. Professor Landrock’s evidence is that the skilled reader would understand at the time Ehrat was published (in 1976) the means of enciphering would likely be either DES (Data Encryption Standard) or Triple DES to ensure that the data could be encrypted and then printed to be read by a machine, since these were standard banking encryption standards at the time. Professor Landrock described the use of DES/triple DES at paragraphs 5.32 to 5.39 in his first report and I have already noted that in oral evidence Mr Brewer agreed with what he wrote. However, it would be obvious to the skilled person reading Ehrat at the priority date, that the crypto number could be produced by use of one of a number of common cryptographic methods such as RSA or SHA-1. Equally, it is obvious that it could be produced by conversion to a higher base, although once again it is likely that the skilled reader would consider that was poor security.
104. It is notable that in cross-examining Mr Brewer about Ehrat, Mr Ward put to him that the skilled reader would understand that the invention disclosed in Ehrat *“works with whatever information you want. If you encode information that is printed on the cheque, and print the encryption on the cheque, if someone alters the information, then the code printed will no longer match it”*. Mr Brewer replied *“Yes, that is the whole*

essence of both methods, the Patent and [the Defendants'] method". As Mr Ward submits, that appeared to be an admission that the essence of both the Patent and the Defendants' product were disclosed by Ehrat. In my judgment, it is also the essence of the second part of the invention in Martens and, as I will go on to discuss, the essence of Martin. The only real difference between them is the encryption method. I will consider that shortly in relation to excluded subject matter.

105. For those reasons I find that Claims 1 and 6 are obvious over Ehrat.

Martin

106. Given my findings in relation to Martens and Ehrat, I will deal with Martin shortly. Martin is a granted US Patent, filed on 14 September 1999, which teaches a method of authenticating a cheque through a software program. The drawer of the cheque inputs their details into the program, which provides a barcode for the cheque. The program is *"linked to an apparatus that can print the check as well as a barcode on the check"* or alternatively prints the barcode on an adhesive sticker, which can then be stuck onto a cheque which may already printed with Personalisation Data: *"If the adhesive sticker bar code is used, then the check does not need to be generated by a software program"*. The barcode is then used to authenticate the cheque (column 7, line 31 – column 8, line 56).

107. The Claimant accepts most of the integers of Claim 1 are present, denying the same two integers as Ehrat: integer 1.2 and 1.5.

108. In relation to the application of the code to the cheque *"during generation thereof"* (integer 1.2), as I have set out, it is clear that Martins discloses an alternative whereby the bar code is printed at the same

time, and in the same process, as the cheque is generated and so I am satisfied that Martin discloses integer 1.2 of Claim 1.

109. As to integer 1.5, Mr Brewer in oral evidence accepted that a bar code does not provide any real security, as it was able to be 'read' by those, like Mr Brewer, who can 'read' barcode (in much the same way that others can read Cyrillic script). He also accepted that it would be obvious to the skilled person that, rather than the bar code which does not provide any real security, he could use a different method of encryption. The common general knowledge of the skilled person includes knowledge of all sorts of cryptographic techniques. For the same reasons that I have given before, I am satisfied that it would be obvious to the skilled reader of Martin at the priority date that one method of encryption which could be used would be conversion to a higher base, although he would be likely to reject that for a cryptographic process that provided greater security such as a hashing function.
110. For those reasons I am satisfied that Claims 1 and 6 are obvious over Martin.

G. EXCLUDED SUBJECT MATTER

111. Section 1(2) of the Patents Act 1977 lists subject matter that are not inventions and so are excluded from patentability to the extent the patent relates to that thing "as such". This includes a mathematical method (section 1(2)(a)) and the presentation of information (section 1(2)(d)).
112. The Court of Appeal in *Aerotel Ltd v Telco Holdings Ltd* [2007] R.P.C. 7 set out a four-stage test to be applied when considering excluded subject matter. They are: (i) properly construe the claim; (ii) identify the actual contribution (which it says can be done by asking what the

inventor has really added to human knowledge, looking at substance and not form); (iii) ask whether it falls solely within the excluded subject matter; and (iv) check whether the actual or alleged contribution is actually technical in nature. The Court of Appeal noted that the fourth step may be covered by carrying out the third step.

113. The Claimant submits in Dr Lawrence's skeleton argument that *"The contribution of the invention is generating a secure cheque or credit slip by generating a code based on at least one string of information, and applying the at least one string of information and the generated code to the cheque or credit slip by a printing technique"*. This wording is tracked from the Claimant's letter to the UKIPO of 5 October 2016 which Dr Lawrence directed my attention to in closing submissions, saying that it explained the Claimant's case on excluded subject matter. In fact, Ehrat told us this in 1974, Martin told us again in 1999 and Martens told us for a third time in 2001. I am satisfied this is not the contribution of the invention.
114. Dr Lawrence goes on to say in her skeleton argument, *"The invention is related to the practical application of the mathematical method of disguising the source data to create a verification code. A number of different mathematical methods would work with equal effectiveness to increase cheque security"*. I agree, which is the point I have made a number of times in relation to obviousness over the Prior Art, but it does not assist the Claimant. Finally, the Claimant submits *"The invention provides a technical solution to the problem of fraud prevention; accordingly the subject-matter of the Patent does not fall within excluded subject matter related to presentation of information"*. The Claimant in the 5 October 2016 UKIPO letter states that the contribution is *"more than merely a mathematical method and the presentation of information"* but once the first submission set out in the paragraph above is stripped away, it

seems to me that there is nothing left of the invention but encryption by the mathematical method of converting to a higher base. It is no party's case that this was inventive at the priority date of the Patent. Accordingly, I cannot identify an **actual** contribution to human knowledge for the purposes of the second step, and for the third/fourth step, I am satisfied that the **alleged** contribution is excluded as a mathematical method under section 1(2)(a) of the Patents Act.

115. For those reasons I am satisfied that the Patent is invalid for excluded subject matter.

H. INFRINGEMENT

116. Given my findings on invalidity it is not necessary for me to deal with infringement, but in case it assists, I will do so shortly.

Normal interpretation

117. The facts of the Defendants' product and process (which for convenience I will refer to as the Defendants' product), as they relate to infringement, are set out in the Confidential PPD and the parties have each produced an integer table on infringement in which their cases are set out. The Claimant's case on normal interpretation is based, primarily, on a construction of the Claims that the code does not need to be generated by conversion to a higher base, but may merely be displayed or presented in a higher base. I have rejected that construction.
118. Of the Defendants' case as set out in the confidential integer chart on infringement, all that survives my findings on construction is the contention that its product does not generate a code by conversion to a higher base.

119. I am satisfied that the cryptographic, or ‘obscuring’, or ‘disguising’ element of generation of the Defendants’ code is the secure hashing function described in the Confidential PPD, and so that code is not generated “*by conversion to a higher base*”. The invention generates the code by conversion to a higher base, and in doing so the input numerical value and output numerical value are maintained the same, although they are presented differently. It is akin to a translation of a word from one language to another, and that is why both experts consider it to provide such poor security.
120. The Defendants’ product achieves the generation of a code applying quite a different, much more secure and effective cryptographic process, namely applying a standard secure hash function to the information string, in which the input numerical value and output numerical value are different. The information string is first converted to a lower base (binary), the hash function is applied, and the output in binary is then converted to a higher base for display in hexadecimal. It became clear in cross-examination that the experts agree that the output of a hash is conventionally displayed in hexadecimal (because displaying the output in a smaller base, such as binary, would produce a lengthy string which is inefficient and lead to errors in transcription) and I am satisfied that is a presentational choice and is not the result of the hashing function. Mr Brewer accepted, in the context of Mr Ward’s cross-examination on Martens, that such a code printed on a cheque or credit instrument could be presented in binary, octal, hexadecimal, or anything else, although it would be both conventional and obvious to present it in hexadecimal. In my judgment it is the hashing function, not the presentational conversion to a higher base, which provides the cryptographic element by obscuring the underlying string of information derived from the Personalisation Data.

121. For those reasons I am satisfied that the Defendants' product does not infringe the Claims on a normal construction.

Doctrine of Equivalents

122. There can be no infringement by equivalents given my findings that: (i) Mr Brewer's evidence of the "essence" of the invention, being "if you encode information that is printed on the cheque, and print the encryption on the cheque, if someone alters the information then the code printed will no longer match it", is not inventive over the Prior Art (and so cannot be an inventive concept for the purposes of the *Actavis* analysis); and (ii) the Patent provides no actual contribution to the art as the only difference remaining between the Prior Art and the Patent is the generation of a code "*by conversion to a higher base*", which is an unpatentable mathematical method. Accordingly, I will not consider this further.

I. SUMMARY

123. To summarise:

- i) Claims 1 and 6 of the Patent are invalid for obviousness over the Prior Art: Martens, Ehrat and Martin.
- ii) Claims 1 and 6 of the Patent are invalid for excluded subject matter pursuant to section 1(2) Patents Act 1977.
- iii) The claim for infringement is dismissed.