Neutral Citation Number: [2008] EWCA Civ 192

Case No: A3/2007/0879

IN THE SUPREME COURT OF JUDICATURE
COURT OF APPEAL (CIVIL DIVISION)
ON APPEAL FROM THE HIGH COURT OF JUSTICE
CHANCERY DIVISION (PATENTS COURT)
The Hon Mr Justice Kitchin
HC06C01151

Royal Courts of Justice
Strand, London, WC2A 2LL

Date: 19/03/2008

Before:

LORD JUSTICE JACOB
LORD JUSTICE LLOYD
and
SIR JOHN CHADWICK

- -

Between:

European Central Bank	**Claimant/ Respondent**
- and -	
Document Security Systems Incorporated (a company incorporated under the laws of the State of New York, USA)	**Defendant/ Appellant**

- -
- -

Simon Thorley QC and Miles Copeland (instructed by Bird & Bird)
for the Claimant/Respondent
Piers Acland (instructed by McDermott Will & Emery UK LLP)
for the Defendant/Appellant

Hearing dates: 5/6/7 February 2008

- -

Approved Judgment

Lord Justice Jacob (giving the judgment of the court):

1. Kitchin J, by his judgment of 26th March 2007, [2007] EWHC 600 (Pat), on the application of the European Central Bank ("the ECB"), held that Document Security Systems Inc.'s ("DSS") EP UK 0 455 750 was invalid. So he ordered its revocation. He did so on the ground of added matter. He rejected attacks of anticipation and obviousness.

2. DSS appealed the finding of added matter. The ECB challenged the findings of non-obviousness but only on a contingent, "squeeze", basis: that if the man skilled in the art had sufficient common general knowledge and was clever enough to deduce what was claimed in the granted patent simply from the specification as filed, then the claimed invention would be obvious to him over the cited prior art. After we had heard argument we concluded that it was not necessary to consider this altemative basis of attack. So also with the cross-appeal about the rejection of the finding of anticipation.

3. Before we proceed further, it is worth briefly recording the position about the litigation concerning the sister patents in other European countries. DSS contend that the patent in suit and its sister patents are infringed by euro banknotes. Imaginatively but overoptimistically it tried to bring central proceedings before the Court of First Instance of the EU. On 5th September 2007, that Court held, not surprisingly, it had no jurisdiction to hear patent infringement proceedings even against an EU institution, case T-295/05.

4. Meanwhile the ECB had started revocation proceedings in France, Germany, the Netherlands, Spain, Italy, Belgium, Luxembourg and Austria. These are ongoing. We were given an update of the position in each country. In Germany and France there have been first instance decisions. None of the other proceedings have got that far. Kitchin J's decision came first. The German Federal Patent Court (the Bundespatentgericht) did not agree with him by a decision of 27th March 2007. It held the patent valid. Then, on 9th January 2008, the French Court (le Tribunal de Grande Instance de Paris) agreed with Kitchin J and disagreed with the German Court. On 12 March 2008 the Dutch Court agreed with the German Court. In sporting terms, the score is currently 2-2 to the ECB at first instance level.

5. All this is deeply regrettable. It illustrates yet again the need for a one-stop patent shop (with a ground floor department for first instance and a first floor department for second instance) for those who have Europe-wide businesses. The case illustrates another point too: Kitchin J records at [88] that "the positions adopted by DSS before this Court and the CFI are radically different." As he went on to say:

> This case therefore seems to me to be a very powerful illustration of why it is desirable to try infringement and validity issues together, where at all possible. If they are tried separately it is all too easy for the patentee to argue for a narrow interpretation of his claim when defending it but an expansive interpretation when asserting infringement.

Professor Mario Franzosi likens a patentee to an Angora cat. When validity is challenged, the patentee says his patent is very small: the cat with its fur smoothed down, cuddly and sleepy. But when the patentee goes on the attack, the fur bristles, the cat is twice the size with teeth bared and eyes ablaze.

6. So much is by-the-by. The key question before us was whether there was added matter. We indicated to the parties at the oral hearing that we thought Kitchin J was right on this point and so did not go to consider obviousness. These are our reasons for upholding Kitchin J. Before we turn to them, we would like to pay a particular tribute to the oral argument of Mr Piers Acland for DSS. It was both concise and precise. The fact that we do not accept it is beside the point. We do not think DSS's case could have been advanced more cogently.

General Technical Background

7. Kitchin J set this out at [6]-[35]. There was no quarrel with any of this, so we borrow it wholesale:

> *Security printing*
>
> [6] Security printing is the field of the printing industry that deals with the printing of items of value such as banknotes, travellers' cheques, passports, stock certificates, postage stamps and identity cards. The goal of security printing is to ensure that original documents can be authenticated, the production of counterfeits is made as difficult as possible and that counterfeits are readily detectable. A number of techniques and materials have been developed over the years to try to ensure that the security printing industry remains ahead of counterfeiters as copying technology has evolved. By 1989, common and well known techniques and materials included the following:
>
> (i) Specialised substrate materials. Banknotes were generally made of good quality paper. Sometimes high quality 100% rag paper was used which is dull when seen under ultra violet light. Coloured fibres and threads were embedded to give the paper added individuality.
>
> (ii) Specialised inks such as magnetic and fluorescent inks which were difficult and expensive to obtain.
>
> (ii) Watermarks which were first introduced in Bologna, Italy in 1282 and have been commonly used in security printing ever since. Watermarks are made either by varying the thickness of the paper in a mould while it is being made, or by impressing a water coated metal stamp or 'dandy roll' onto the paper during manufacturing.
>
> (iv) Printed patterns made using sophisticated and expensive printing techniques such as intaglio printing, which I

explain later in this section. These could print with an extremely accurate register and in fine detail.

(v) Iridescent foils and structures such as holograms which display a colour or image change when viewed from different angles.

(vi) Unique serial numbers which make counterfeiting more time consuming and counterfeit notes easier to identify and track.

(vii) Banknotes printed with fine alignment between the printing on each side of the note. Accurate imitation was difficult without printing machinery and technology not readily available to the counterfeiter.

(viii) Screen traps designed to create a moiré pattern when a note is reproduced, as I shall explain.

Printing techniques

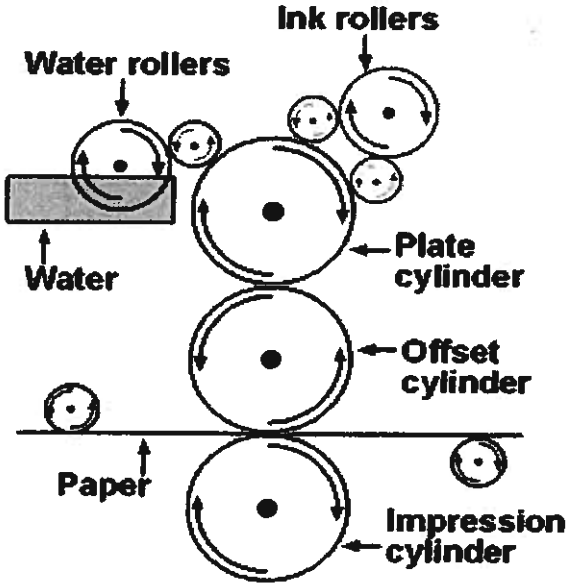
[7] *Letterpress printing.* This is a printing technique which has been used since the 13th century. The figures or digits to be printed are raised up from the surface of the printing plate, rather than engraved into it. The plate is then inked and pressed against the printing substrate to obtain the image. It is still used today for printing serial numbers on banknotes.

[8] *Intaglio printing.* Intaglio is a printing technique in which the image to be printed is incised into the surface of a metal plate, typically made from copper or zinc. The incisions may be engraved into the plate by hand or laser or may be etched by the action of an acid.

[9] To print from an intaglio plate, the surface is covered in ink and the excess is wiped away leaving it only in the incisions. The substrate is then brought into contact with the plate and both are run through a printing press under very high pressure. The press 'draws' the ink from the incisions by a combination of pressure, osmosis, and electrostatic pull, thus transferring the ink from the plate onto the substrate to form the print. Intaglio printing is commonly used in the production of banknotes, often in combination with other printing methods. It creates a unique texture on the printed copy that is difficult to replicate.

[10] *Offset lithography.* Lithography is based upon the repulsion of oil and water, with the image drawn onto a surface and treated in such a way as to retain ink, whilst the non image areas are chemically treated to accept water and repel ink. In offset lithography the inked image is transferred ("offset") from

the printing plate to a rubber cylinder and then to the printing substrate. A number of separate plates with different colours can be superimposed to create the final image. The technique is illustrated in the figure below:



[11] Banknote printing often uses a variation of the technique called dry offset printing. This is similar to offset lithography in that a rubber blanket is used to carry the image from the printing plate to the printing substrate. The image areas on the printing plate are raised above the surface of the plate, much like letterpress printing. Ink is distributed through a series of rollers and onto the raised surface of the plate. The plate transfers the image to the blanket, which then prints the image on the substrate. In banknote technology, offset printing is exploited to print security inks that do not easily emulsify, such as UV fluorescent inks.

[12] All the techniques I have described are very expensive to operate. Other printing techniques have therefore been developed to allow printing on smaller commercial and domestic scales. Two have been particularly successful, namely inkjet and laser printing.

[13] *Inkjet printing* involves spraying tiny droplets of ink under high pressure onto the printing substrate. There are different ways of depositing a droplet of ink but they all suffer from the problem of "fixing" the ink on the page. Most inks are aqueous and therefore smudge very easily.

[14] *Laser printing* is another method of non-impact printing. It is a digital process that relies on a chip within the printer to convert the image data it receives into a series of pixels called a raster image.

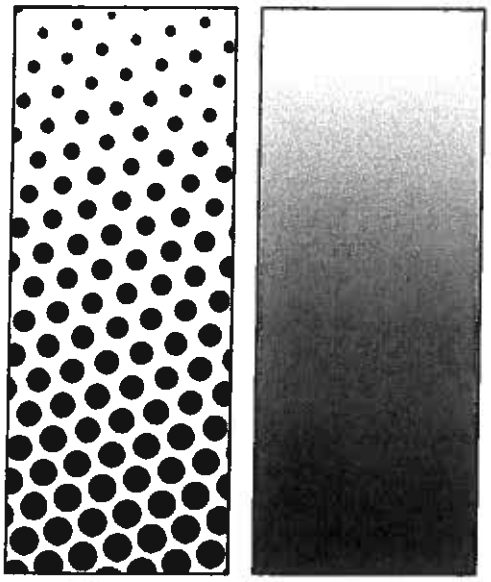
[15] Within the laser printer is a rotating electrostatic drum that can be either negatively or positively charged, and the laser unit itself. Once the chip has converted the image to a raster image, the laser is directed by the chip to "draw" the image onto the charged drum as a series of lines of dots, on the same principles of halftoning which I explain below. The rotation of the drum corresponds to the y direction of the image plane, and the switching on and off of the laser (thereby creating the dots) corresponds to the x direction of the image plane, together making up the resolution of the printer.

[16] When the laser hits the drum, the charge on the drum is reversed in a small area. The drum is then exposed to very fine particles of toner which are attracted to the charged sections of the drum which were "drawn" by the laser. The image is then transferred to the substrate by rolling the drum over it. Finally, the toner is fused to the substrate by passing it through two heated rollers.

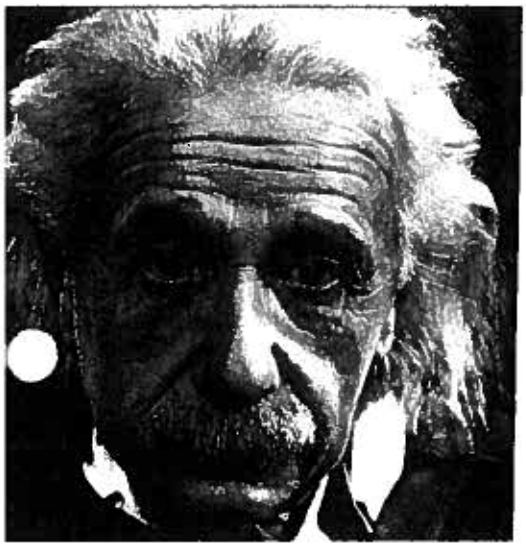
Line and halftone printing

[17] A continuous tone image (such as a photograph) may be produced by simply printing it onto the page. But this creates a problem for the printer because a black and white image may have hundreds of shades of grey and a colour image may have millions of different colours. The answer is the technique of halftone printing.

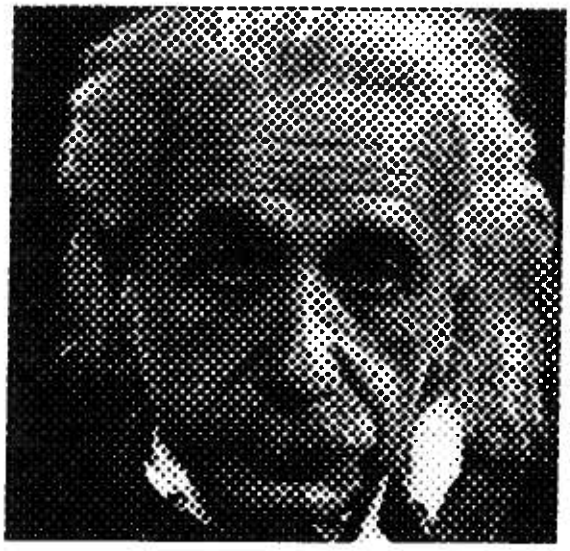
[18] Halftone printing is a method of creating printable images by converting an original continuous tone image into an image composed of dots or lines. If the dots are small enough, the dotted areas are perceived as uniform shades of grey or colour. By varying the size of the printed dots, either the shade of grey (in black and white printing) or the precise colour (in colour printing) can be adjusted. This is demonstrated by the diagram below, which shows on the left an enlarged view of a scale of halftone dots, and on the right, how it appears with the dots at normal size:



[19] Similarly, the figure below shows a continuous shade image and a dot screened image. From a very short distance away, the halftone dots are clearly visible. However, from a few metres away, the images appear to be the same, due to the limitations of the human eye.



inuous tone portrait



Screened portrait

[20] The main advantage of halftone printing is its capacity to allow a limitless number of shades or colours to be created from a very small number of ink colours.

[21] A process called screening is used to break down an image into this series of dots. Historically this was achieved by using a contact screen made up of a grid-like mesh that was

placed over a photographic film; hence the expression photographic halftoning. In this technique the original image is projected through the contact screen onto the photographic film and thus becomes broken up by the mesh of the screen. The resultant image appears on the film or other such surface beneath as a series of dots i.e. a halftone image. The amount of light that does or does not pass through the image and screen to hit the film corresponds to the size of the dots created on the film. Some information in the image is inevitably lost with this method but, if fine enough screens are used, this is not observed by the naked eye. Thus, the quality of the end result of screening to create halftone images is dependent upon the choice of screen frequency and dot shape.

[22] *Screen Frequencies* are measured in lines per inch ("lpi"). The finer the screen (i.e. the higher the lpi), the more detailed the image can be in the finished format. In 1989, a typical frequency of a screen was 100 lpi; a frequency as low as 65 lpi was considered coarse and one of 150 lpi considered fine.

[23] The same technique can be used to print colour images. The impression of white can be created by combining three colours of light: red, green and blue. When two of these three colours are combined, the result is one of the three so called subtractive colours: yellow, magenta and cyan. Combinations of the subtractive colours, printed with a transparent ink in varying dot sizes, can make up an almost complete range of colours. Because inks of the three subtractive colours, when they are combined, do not produce black but only a grey (due to fundamental limitations of the ink dyes), black is added in the printing process to achieve sufficient shadow and contrast of the image. Black is referred to as "Key" in the printing industry and together, the four colours of the subtractive printing process are known as CYMK. These four colours alone are generally the basis of all colour printing.

[24] Colour images were printed in much the same way as black and white images. The reproduction was achieved by photographing three separate conversions of the original image through red, green and blue colour filters, whilst a fourth colour separation might record the blackish tones of the original. Photographic separation films were then used to produce the printing plates which were mounted on the cylinders of the rotary offset printing press.

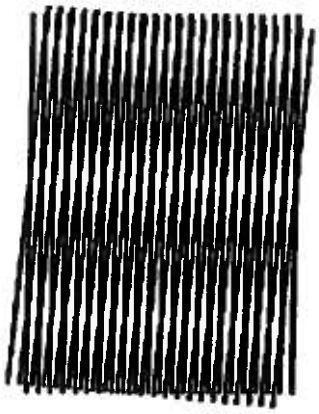
[25] From the early 1970s, high-end dot-generating colour scanners became available to the printing industry. Typical of these were the Hell DC and the Crossfield Magnascan. These scanners were expensive and complicated devices that required

operation by highly trained personnel. They scanned at a very high resolution. Typically a beam of light passed through a colour transparency original and was then split into three parts, the separated beams then passing through blue, green and red filters to separate photo-electric cells. These photo-cells generated electrical signals proportional to the blue, green and red transmissions at each point in the transparency. The signals were fed to a computer and then colour corrected separations produced. Thereafter the process was essentially the same as the old photographic process in that the colour separations were halftoned and the resulting films were used to make yellow, magenta, cyan and black printing plates. In summary, these machines provided a new way of making films. In order to make a printed image, it was still necessary to use the films to make an offset printing plates and then use the plates in the printing machine.

Moiré effect

[26] Moiré is an optical interference effect created when two periodic structures are overlaid. Any variety in the periodic structure, be it a different frequency of line within the structure, a different curvature of line, a different angle of line or a slight mismatch in the overlay of the structures, can result in the appearance of low frequency banding on top of the original structure.

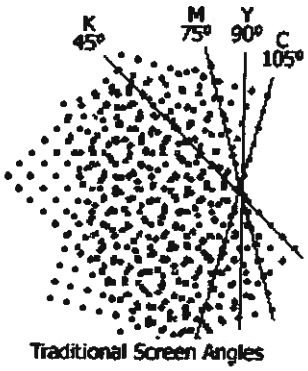
[27] The figure below shows a moiré pattern formed by two sets of parallel lines, one set inclined to the other at an angle of 5°. The interaction between the lines creates a visible pattern of roughly horizontal dark and light bands, the moiré pattern, superimposed on the two sets of lines.



[28] It is a feature of moiré that a relatively small displacement in the overlaid structures produces a relatively large displacement in the elements of the moiré pattern. So

moiré magnifies the original displacement. It therefore provides an extremely sensitive way of detecting minute differences in almost identical repeating structures.

[29] In the case of colour halftone printing, moiré patterns can result if the lines of dots of the four different colours are simply printed on top of each other, as it is highly likely there will be some sort of mismatch between them. This problem was solved by changing the angle of each colour screen by 15° as measured from the horizontal, so that the collection of printed dots created "rosettes" of colour, as seen in the figure below:



Traditional Screen Angles

[30] The moiré effect has also been put to good use. By 1989 it was appreciated that visible moiré effects could occur if the original image contained pattern with a spatial frequency close to that of the halftone screen. So designers of banknotes and other security documents took advantage of this phenomenon and deliberately introduced fine line patterns, called screen traps, which were intended to cause obvious moiré interference if the security document was reproduced. It was unknown what screen frequency or screen orientation the counterfeiter would use so designers tried to use screen traps with as many spatial frequencies and orientations as possible. One way of achieving this is demonstrated in a Dutch 100 Guilder note produced in evidence and called the "snipe" note because it contains a prominent image of that bird. The screen trap covers a circular area of the banknote to the left of the image of the snipe and consists of a pattern of concentric lines that vary in spatial frequency between 75 and 200 lpi. The concentric nature of the design ensured that all possible orientations of halftone screens were covered and the line frequency range extended over the range of commonly used halftone screens.

Copying devices

[31] Photocopiers use a combination of light, mirrors, electrostatic charges and toner to sweep across an original

document and then print a copy of it. The printing section of the process involves the same thermal toner transfer described in connection with laser printing.

[32] The copying section of the process originally involved mirrors projecting light onto a rotating charged drum. A beam of light was passed across an original document placed on the copier's glass surface, thereby illuminating the original in a series of strips. A mirror within the copier directed light reflected from the white areas of the document through a lens and onto the rotating drum. The light discharged those areas of the drum onto which it fell. The copy was then printed by exposing the drum to toner and rolling it against the substrate. The toner and substrate were fused together by heated rollers.

[33] In the 1970s and the 1980s the first generation of colour copiers such as the Xerox 6500 and the Canon NP Color T became available. They were analogue machines and worked by filtering the light by which the original was imaged through red, green and blue filters and using corresponding translucent coloured toners, matching the three key colours, cyan, magenta and yellow, together with black as necessary. Copy and print machine cycles were required for each colour. The machines were very large and expensive and the quality of the output was low.

[34] The first copiers to use digital technology began to emerge in the mid to late 1980s. The machines made by Canon (the Canon CLC range) were widely regarded as the best, but they were still expensive. Others were made by Sharp and Toshiba. In these machines the original document was no longer passed over by a moving light, but was scanned by a charge-coupled device ("CCD") that was made up of thousands of photodiodes. The photodiodes broadly correspond to pixels. The CCD array was indexed in the x direction and scanned in the y direction. The digitised image was then processed and printed using either laser or ink-jet printing.

[35] Early colour copiers presented only a limited threat since they were not capable of highly accurate colour reproduction, and counterfeits made using them were usually easily recognisable. But with models such as the Canon CLC, which was launched in 1987 and quickly gained a large market share, good colour reproductions of banknotes became much easier. By 1988 it was recognised that colour copiers were, or were going to be, a threat to the document security industry. It was appreciated that such copiers were likely to become cheaper, more widely available and of better quality. The number of casual counterfeiters was expected to grow.

The skilled addressee

8. It was common ground that this would be a team consisting of a technical specialist and an artist-designer. Kitchin J held at [36] that it would be a team skilled in the design of banknotes and this is not challenged.

The common general knowledge ("cgk") of the skilled addressee

9. This is of some importance, for the more the notional addressee of the patent application is taken to know, the more likely is it that he will see something implicit in the disclosure. Uncontroversially Kitchin J held the following to be part of the cgk:

> [37] .. the skilled team would have knowledge of the general functionality of colour copiers but would not have access to detailed technical information on the latest developments in copier technology. Neither side suggested that anyone involved in the development of electro-photographic processes would form part of the team. Members of the skilled team would, however, be familiar with the basics of photocopier technology and, of course, they could make enquiries where necessary of the manufacturers of such machines.

And at [43]:

> (i) The general principles of physics and optics underlying the technical matters set out in the technical background.
>
> (ii) The principles underlying the formation of moiré interference fringes.
>
> (iii) The printing methods available for large scale production.
>
> (iv) The fact that banknote production would involve more than one printing method and intaglio methods were almost universally used, together with other offset printing processes.
>
> (v) The fact that the formation of moiré fringes had been a problem arising from the use of copying processes using halftone screens.
>
> (vi) The fact that this problem arose from interference between the halftone screens or between the screens and a pattern in the original image.
>
> (vii) An appreciation that colour copiers were likely to become much more widespread, cheaper and of better quality as technology advanced and that there was an incentive to incorporate security features that would address the issues raised by these copiers.

(viii) The general principles of electrophotography underlying colour photocopier technology.

(ix) Familiarity with the design features of banknotes currently and previously in circulation in other major jurisdictions, including the fact that banknotes commonly comprised many closely spaced lines of different orientations and spacings, whether printed by intaglio or offset printing techniques.

10. The experts were not agreed on certain other matters. Kitchin J made his findings about these matters at [45-52]. We do not set it all out here. It is enough to note his particular finding that:

> [52].. it was a matter of common general knowledge that the new generation of copiers did, on occasion, produce moiré effects with the existing screen traps but I do not accept that it was generally appreciated or understood exactly how those effects were created. This was not a matter to which those in this field had actually turned their minds.

General Principles as to the "added matter" objection

11. The legal provision is Art. 123(2) of the EPC transposed into UK law as s.72(1)(d) of the Patents Act 1977:

> "The European patent application or European patent may not be amended in such a way that it contains subject-matter which extends beyond the content of the application as filed."

Breach of this rule is a ground of revocation.

12. Kitchin J summarised the legal principles for the application of this rule in a manner which was not challenged and which we accept is correct:

> [96] The test for added matter was explained by Aldous J in *Bonzel v Intervention Ltd* [1991] R.P.C. 553 at 574:
>
> "The decision as to whether there was an extension of disclosure must be made on a comparison of the two documents read through the eyes of a skilled addressee. The task of the Court is threefold:
>
> (a) To ascertain through the eyes of the skilled addressee what is disclosed, both explicitly and implicitly in the application.
>
> (b) To do the same in respect of the patent as granted.

> (c) To compare the two disclosures and decide whether any subject matter relevant to the invention has been added whether by deletion or addition.
>
> The comparison is strict in the sense that subject matter will be added unless such matter is clearly and unambiguously disclosed in the application either explicitly or implicitly."

[97] A number of points emerge from this formulation which have a particular bearing on the present case and merit a little elaboration. First, it requires the court to construe both the original application and specification to determine what they disclose. For this purpose the claims form part of the disclosure (s.130(3) of the Act), though clearly not everything which falls within the scope of the claims is necessarily disclosed.

[98] Second, it is the court which must carry out the exercise and it must do so through the eyes of the skilled addressee. Such a person will approach the documents with the benefit of the common general knowledge.

[99] Third, the two disclosures must be compared to see whether any subject matter relevant to the invention has been added. This comparison is a strict one. Subject matter will be added unless it is clearly and unambiguously disclosed in the application as filed.

[100] Fourth, it is appropriate to consider what has been disclosed both expressly and implicitly. Thus the addition of a reference to that which the skilled person would take for granted does not matter: *DSM NV's Patent* [2001] R.P.C. 25 at [195]-[202]. On the other hand, it is to be emphasised that this is not an obviousness test. A patentee is not permitted to add matter by amendment which would have been obvious to the skilled person from the application.

[101] Fifth, the issue is whether subject matter relevant to the invention has been added. In case G1/93, *Advanced Semiconductor Products*, the Enlarged Board of Appeal of the EPO stated (at paragraph [9] of its reasons) that the idea underlying Art. 123(2) is that that an applicant should not be allowed to improve his position by adding subject matter not disclosed in the application as filed, which would give him an unwarranted advantage and could be damaging to the legal security of third parties relying on the content of the original application. At paragraph [16] it explained that whether an added feature which limits the scope of protection is contrary to Art 123(2) must be determined from all the circumstances. If it provides a technical contribution to the subject matter of the claimed invention then it would give an unwarranted advantage to the patentee. If, on the other hand, the feature merely

> excludes protection for part of the subject matter of the claimed invention as covered by the application as filed, the adding of such a feature cannot reasonably be considered to give any unwarranted advantage to the applicant. Nor does it adversely affect the interests of third parties.
>
> [102] Sixth, it is important to avoid hindsight. Care must be taken to consider the disclosure of the application through the eyes of a skilled person who has not seen the amended specification and consequently does not know what he is looking for. This is particularly important where the subject matter is said to be implicitly disclosed in the original specification.

Introduction to the added matter objection in this case

13. It is the 6th point which is of crucial importance here. For the matter said to be added in the patent as granted is now admittedly not expressly disclosed in the application. DSS originally contended there was express disclosure, a case which in Kitchin J's word "collapsed", [120]. The original contention was based on a misreading of the patent application – and in particular that it expressly taught the overlaying of a grid. But a more careful reading of this rather muddled and confusing document simply showed that this could not be so – see as to more detail Kitchin J at [110] – [119] quoted below. Whether the EPO Board of Appeal misread the document when it suggested the amendment to introduce feature D no one knows. But it is entirely possible – perhaps likely - that is what happened. No attempt was made on this appeal to resurrect any case of express disclosure. The contention now is just that the "added matter" was all implicit in the application as filed.

14. The parties agreed that claim 1 of the granted patent (the only claim that needs to be considered) could be conveniently broken into elements in the following way:

A A method of making a document that is not faithfully replicable by scanning-type copying devices, the document using a visible original image comprising art, pictures and/or image forms made of curvilinear lines, dots and/or swirls, the method comprising the steps of

B determining the scanning pitch distance (p) and width of the scanning lines of the copying devices;

C1 producing a grid pattern of parallel lines having a pitch distance (d) minutely more or less than the scanning pitch distance (p),

C2 the difference between the pitch distance (d) of the parallel lines and the scanning pitch distance (p) being within a range from about one-half the width of the scanning lines to about one-half the scanning pitch distance (p); and

D1 overlaying the grid pattern on the original image to produce on the document a printed image which comprises the original image having a superimposed transmitted or obstructed print pattern conforming to the grid pattern

D2 and in which the print pattern normally is not discernible by the naked eye, such that the original image and the printed image appear to the naked eye to be generally the same,

E the print pattern causing visibly discemable interference (e.g. moiré) patterns and/or false tones, colours or omissions to be produced in the printed image in copies of the document made by the copying devices.

15. The added matter objection arises because there is nothing express in the application as filed about steps D1 and D2; nothing about making an original image and overlaying on it a grid pattern with a pitch distance minutely more or less than that of the copier. Is it nonetheless implicitly said? Would the skilled reader, despite the absence of any express teaching, necessarily find those elements without adding anything himself? This must be answered solely on the basis of the application as filed - as if the reader had never seen the patent as granted. Moreover it must be answered, as was agreed, as of the date of the application in 1990. It is not enough that the features may be obvious – they must necessarily be implicit.

16. Kitchin J rather kindly said the patent "is not written in the clearest terms". That is so also for the application. That does not help a suggestion of implicit disclosure. If the document is a puzzle, then that may well be all it is – not a clear teaching, express or implied. One should not strain to make sense of a document which is actually lacking in clarity. If one does one is in danger of adding matter oneself.

The patent as filed

17. Largely the text of the patent as granted and that of the as-filed specification is the same. There were certain deletions from the as-filed version to which we will come (the German court attached importance to the deleted claim 13), but we start with text that is the same in both. The parties agreed that it was actually more convenient to refer to the text from the granted patent because it has column and line numbers. We will use these for identification only. The key text is that of the as-filed document.

18. The title of the application is "Nonreplicable document and method for making the same". It starts with a heading "Background of this Invention". [0001] says:

> The invention relates generally to bogus or counterfeit document detection methods and, particularly to the method for printing or otherwise making a product document that this will be nonreplicable by any scanning-type copying device such as a copying machine, video opticon and the like.

19. There is then a sub-heading "Discussion of the Prior Art". This describes intaglio and gravure printing processes at [0002] and other processes at [0003]. It may be noted that the inventor says he regards a dot as "merely a line of short length."

20. In [0004] after some irrelevant material about how much of a literature search the inventor has done and how he had "blended his skill in printing with the knowledge of optics that is readily available to one of ordinary skill", the inventor goes on to provide a conventional explanation of moiré and the problems it has created in halftone screening:

> Accordingly, and being long familiar with the phenomenon of moiré that often occurs in printing, he reasoned that what had always occurred as a problem could be turned to the advantage of society in the elimination of the counterfeiting of face – value documents. For the edification of the reader it will suffice to say that the moiré is a serious problem in color reproduction. It is the occurrence of an interference pattern caused by the over printing of the screens in colorplates (similar effects can be observed by superimposing two pieces of a fine grid network such as window screening). Indeed, the technique of rotating half tone screens, when making the negatives for a printing plate, has been developed in order to avoid the moiré interference. Often it appears as the geometrical design that results when a set of straight or curved lines is superposed onto another set. If a grating design, made of parallel black and white bars of equal width, is superposed on an identical grating, moiré fringes appear as the crossing angle is varied from about one second of arc to about 45 degrees. The pattern will consist of equispaced parallel fringes; but, if two gratings of slightly different spacing are superposed, fringes will appear (known as "beat" fringes) which shift positions much faster than does the displacement of one grating with respect to the other ($2_{23\text{-}48}$).

21. Further on in [0004] he says he has appreciated that a moiré pattern could be used as a security feature:

> It became apparent to the instant inventor, therefore, that the moiré pattern, rather than as an indicator which is gradually removed from an image, may also be used as an indicator of some perhaps latent defect in a document. More appropriately, there had to be some way in which a pattern could be included in an image by printing it in a selected pattern. Then, when the image was viewed through a superposed grid, such as previously discussed, a moiré pattern would be observed according to the degree in which the patterns interfered with each other. Moreover, if one were to reduce the moiré apparatus to its simplest form, that is, such as viewing some background through the common parallel-stake snow fence (suggested by the previous description of parallel black grid lines spaced by parallel white or clear areas of equal width), and if the pattern over which it is superposed is formed of lines and dots that are equally spaced from each other (whether parallel or curvilinear), but a fraction off the pitch (or spacing) of the overlaid grid, the observer would be deprived of a high percentage of the background field of vision. Thus, the background image, if formed of the line and dot printed grid, would be rendered nonreplicable to any apparatus being used to record the view. It is this particular aspect of moiré pattern creation that is used by the instant inventor to create this

> invention. Further, he also recognized that because the modern copy machine, whether it be a standard color tone copier or a laser printer, scanned the image to be copied with a fixed-pitch scanning system, it was unnecessary to devise overlay grid means. In fact, the modern replicator contains such a grid in the fixed – pitch, parallel scan format that is used to view the image to be replicated (3_{15-47}).

22. The Judge said, accurately:

> [56] A number of points emerge from this passage. First, it introduces the notion of a moiré inducing pattern being included in an original image. Second, it describes viewing the image through a superimposed grid or "snow fence" to create a moiré effect. It is important to note that the superimposed grid discussed here is not a part of the original image but rather a grid through which the image is viewed. Third, it explains that the inventor has had the idea that it is not necessary to superimpose a grid because modern copiers or printers scan the image to be copied with a fixed pitch scan format and that this itself involves applying a form of grid - a theme to which the specification later returns.

23. [0005] opens with an identification of the threat posed by modern colour photocopiers. It then identifies the problem which the invention is aimed at:

> In particular, no one heretofore has found a way to provide an original banknote or important document which embodies the two often-sought features of a copy-proof instrument; for example, one which to the unaided eye is both indistinguishable from a prior (genuine) item and which is capable only of obviously bogus copier replication (4_{9-15}).

24. There then comes the second major heading: "Summary of the Invention". The inventor begins by asserting that the problem has now been solved:

> [0007] The problem posed by copier replication has been solved by this invention, which is based upon the serendipitous discovery and novel concepts described below. Consequently, it is now possible, for the first time to produce legal tender paper currency, genuine travelers cheques, original postage stamps, government issued food stamps, important documents or certificates and the like, which to the naked eye are identical to prior items of the same kind but, in fact, have characteristics which reveal copier (especially color) replications to be obvious counterfeits (4_{23-33}).

25. [0008] sets out what the inventor says led him to his invention:

> [0008] The instant inventor in the course of searching for a solution to this problem accidentally discovered that a color

> copier replication of an original travelers cheque cannot itself be used to produce a closely matching copy. Actually, it was found, surprisingly, that no matter how the color copier was adjusted to eliminate blemishes or defects apparent to the casual observer, the copies made from the first copy always had such prominent tell-tales, in one form or another.

26. It is this paragraph which is central to Mr Acland's argument. It is said alone or in conjunction with a much later paragraph, [0024], implicitly to disclose what is claimed and in particular the creation and overlaying of the slightly mismatching grid.

27. The patentee continues:

> [0009] On the basis of his knowledge and skill as an expert in the printing art and the science of optics, the instant inventor recognized that in this discovery he had the key to solving the copier replicating problem. Thus, he conceived the idea of using the bane of the printer to the advantage of the counterfeit preventor. He would use the moiré effect to reveal the bogus color copy of a genuine banknote, for example, by producing the note image lineations in mismatch to the scanner of a color copier. The mismatch would be slight and not noticeable to the naked eye and thereby both basic requirements, which no one else was ever able to meet, could be totally satisfied. Moreover, the cost of producing such counterfeit-proof certificates need not be substantial.

28. So the idea is "*producing the note image lineations in mismatch to the scanner of a colour copier*". What is of importance is how the inventor teaches the implementation of that idea. What the Court must do is to decide, without hindsight, whether the D features are actually taught by implication.

29. Still under the heading "summary of the invention" (and still in [0009]) the specification says this:

> The basic method of counterfeit protection teaches the inclusion of lines, dots and/or swirls embodied and integrally formed into art, pictures and other forms of images. The grid lines are made so as to differentiate minutely in vertical and/or horizontal pitch from the linear grids employed by the scanning mechanisms of the machines used to replicate these black-white or colored documents. Generically, such scanning replicators are typically black and white optical reproduction systems, such as office copiers, color copiers, and opticons that are used in conjunction with video systems. Subclassed in this generic group are the new and increasingly common, laser color and black and white optical reproduction systems. After creation of the authentic document, that is, one including the grid lines of predetermined pitch, the primary method of counterfeit protection, as well as the product thereof, have been realized. Any attempt at imitation or replication by means of a scanning-

> type copier will result in the generation of interference patterns and tones which are readily discernable (by the untrained and naked eye) from the original (or authentic) document in that the aesthetics of the document are distorted, omitted or otherwise completely destroyed in the replication (5_{12-35}).

30. This requires careful reading – a reading which of course one expects to be elaborated upon when one comes to the heading "Detailed Description of the Preferred Embodiment". What the skilled reader is taught is this: that the invention is to be performed by forming lines, dots or swirls into an image. These comprise grid lines which are made with a pitch which is minutely different from the pitch of the scanning mechanism of the copier. This is not the overlaying of a grid onto an image.

31. [0012] says the same thing:

> From the foregoing, and in view of the detailed description set forth below, it will be understood that this invention relates to a method producing an article of manufacture or product. Further, in its method aspect this invention comprises the step of producing an electro-optically nonreplicable original-certificate by providing on a matte a lineate pattern of visible image-defining lines which are of predetermined moiré-producing pitch relative to an electro-optic copy machine scan protocol. Otherwise expressed, this method includes the preliminary step of determining the pitch of an electro-optic copy machine scaimer.

32. So the reader is taught to start by determining the pitch of a scanner and then provide a pattern of "*visible image defining lines*" of a predetermined pitch. Again that does not say overlay a grid on an image.

33. The next major heading is "Brief Description of the Drawings" (actually it says "of the Drawings" twice). Fig. 1a is "the pattern of lines, dots and swirls of an intaglio or gravure plate". Fig 1b is "a grid overlay" consisting of two arrays of equally spaced black stripes oriented orthogonally to each other. Fig 1c is "the view of Figure 1a through the grid overlay of Figure 1b". But this is not, as was contended before trial, the beginning of a description of steps D. This grid is not the grid of feature D. Although that is now conceded, it is valuable to explain why. That involves trying to understand the far-from-easy-to-follow "Detailed Description of the Preferred Embodiment"

34. The inventor says, [0017] that:

> By the use of Figures 1a through 2c, the reader shall now be instructed in the method of producing the nonreplicable image of the instant invention.

35. So it is here that one would expect to find the method of claim 1 actually to be described if claim 1 contains no added matter. But it is not. The Judge explained why in a passage, which, as I have said, is no longer challenged:

[107] The argument ran as follows. Figure 1a is described as a "*pattern, consisting of various lines, dots and swirls*" (Patent 6_{45-46}; application, p.12, last two lines). The specification goes on to explain that "*Those of ordinary skill will readily understand that such an image may be printed in intaglio or gravure (more commonly rotogravure) and adaptations of these processes*" (Patent col.7, lines 15-18; application p.13, last paragraph). In the language of claim 1 of the Patent as granted, Figure 1a was said to represent "*the original image*" referred to in integer D1.

[108] Figure 1b is described as "*a grid overlay*" (Patent, 6_{47} and col.7, para [0019]; application p.13, line 1 and p.14, first main paragraph).

[109] Figure 1c is described as "*the view of Figure 1a through the grid overlay of Figure 1b*" (Patent 6_{48-49}; application, p.13, lines 2-3). The specification describes the effect of the overlay in terms of transmittal or obstruction of the Figure 1a pattern (Patent 7_{32-44}; application, p.14) as follows:

> "When the Figure 1b pattern is overlain the Figure 1a printed pattern, a distortion 20 in the Figure 1a results as shown in Figure 1c. The instant inventor defines the Figure 1c pattern as a type of moire distortion pattern resulting from a mapping of the Figure 1a pattern by the function of the Figure 1b grid overlay. Those of ordinary skill will also recognize that, were the function to be reversed, that is, the grid lines 17', 19' of Figure 1b were to become the areas of image transmittal (rather than obstruction) and the areas denoted k to be areas of obstruction or opacity, the Figure 1c map would depict the compliment of the illustration 20 actually shown."

[110] This, it was submitted, clearly and expressly disclosed the overlaying of a grid to produce the combined protected image and hence all the elements of integer D1. The position of DSS was supported by the evidence of Mr van Renesse. He came to the same conclusion in paragraphs 102 to 104 of his first report.

[111] On a first reading there appears to be much force in this argument. The use of the terms "grid" and "overlay" do, at least at first sight, suggest integer D1. Mr van Renesse evidently thought so and it may be that the Board of Appeal did too. However, on closer analysis it becomes apparent the description is of something quite different. It is in fact a description of the superimposition of one structure on top of another to create moiré interference. The grid overlay of Figure 1b is that of the scanning type copying device and not a grid

> which will result in the formation of a combined image on the copy protected document.
>
> [112] This is the clear sense of the whole of paragraph [0019] where the pattern of figure 1c is described as being "*a type of moiré distortion pattern*" (Patent 7_{32-38}; application, p.14). It is confirmed by the following passage (Patent 7_{58}-8_5; application, p.15):
>
> > "If, for example, the horizontal lines 17 of Figure 1b were the nonscanned areas in a **copy machine protocol**, and the interstitial or "see through" areas corresponded to the actual scanning lines, the illustration of Figure 1c would in reality **be the resultant replica or counterfeit**." (emphasis added).
>
> [113] If the overlay depicted in Figure 1b were not of the scanning protocol of a scanning-type copying device, Figure 1c could not be "*the resultant replica or counterfeit*".
>
> [114] I therefore have no doubt that integer D1 is not expressly or implicitly disclosed in the description or images of Figure 1. In the end Mr van Renesse accepted as much in cross examination. For his part Dr Furley correctly explained the description in paragraphs 41 to 50 of his second report.

36. So the specific detailed description of the patent does not describe the method of claim 1, there is no overlaying of a grid to produce a document which cannot be copied – the grid referred to is the grid imposed by the copier when one is trying to produce a counterfeit, not a grid overlaid on the basic artwork.

37. It is perhaps worth recording Mr van Renesse's acceptance of this under cross-examination. It reveals how he had fallen into the trap of reading the specification with hindsight and how, when he was taken through the detailed description of of the invention, he found he had to recognise that it did not contain any disclosure of the steps D. He read both documents shortly before the trial, so he could not but help know what was said to be the added matter. And of course he was reading both documents in 2006, many years after the relevant date. The questioning about the detailed description went like this:

> Q You had a picture made of lines and dots so you had a visible image?
>
> A Yes
>
> Q Made up of these lines and dots?
>
> A Yes
>
> Q You then alter the spatial arrangement of the lines and dots so that you still have a visible image but the lines and dots making it up are so separated as to be able to create moiré?

A If you read it that way, yes. I never read it that way. I thought it was an incorrectness.

Q It then makes sense does it not?

A Yes

And so it does – that is what the patentee was teaching when he said one should use "a distorted image" (7_{56}) and "if the Figure 1a print were arranged cleverly so as not to be picked up by the scanning protocol so as to ensure that the greater part of the image was not picked up by the scanning protocol" (col. 8_{8-9}).

38. So the features D of claim 1 are not in the specific description in the place where, most of all, one would expect them to be disclosed. It is a bold submission that nonetheless the specification as filed discloses them, albeit only by implication. Why should the ordinary unimaginative skilled man be taught the feature when the patentee himself does not use it?

39. There are two possible sources suggested. First there is [0008], the passage about discovering that a photocopy of a photocopy is distorted and the original claim (which is also in the specification as filed) and claim 13 of the specification as filed. The latter is merely a claim to making a copy of an unprotected original document by using a photocopier. So the information in the two sources is essentially the same. The Bundespatentgericht relied particularly on original claim 13, Mr Acland on [0008]: the point is the same either way.

40. It is worth noting that this point was not originally the centre of the argument before Kitchin J. Yet if there was a clear, but implicit, disclosure, the point would surely have been prominent enough to found a central part of the argument. I turn to it.

41. The first thing to observe is that both passages are only about making a photocopy of an unprotected original. Neither contains any generalisation of that. For that reason alone, it seems to me that they do not and cannot disclose the generality of claim 1: it is much wider. To generalise would be to add matter.

42. Mr Acland submits however that the passage actually discloses, by implication rather than expressly, a lot more to the skilled man: that he would be taught the process of claim 1 in its full generality. It is said he would appreciate that a grid is overlaid on the image by the first photocopying operation. He would also realise that that grid has dimensions as specified in elements C, i.e. with a mismatch. In connection with the latter he would be helped by the later passages in the specification which do not actually say anything about the dimensions still less imposing a grid. The key passage reads as follows:

> [0024] The benefits of the aforementioned technique [which are "to simply change the the dimensions of lines and dots on a document so as to inherently vary the pitch between the various pattern elements" (9_{44-47})] can be casually acquired by documents that are subjected to handling and indeed, those which have ben counterfeited, especially since the toner application process of a color replicating device employs a

> matte-warping (distorting) heat process of the type described above. A replication of such a distorted document by either a color or black and white copier or a scanning video opticon, will produce an image that is literally full of moiré distortions.

43. We are quite unable to suppose that the skilled man would read the document as disclosing the overlaying of a mismatching grid on the original image. The passage we have just quoted is preceded by this:

> Accordingly, the instant inventor suggests that, after a document of the type contemplated herein has been printed, the medium upon which it is printed be dimensionally altered, generally by the application of heat. If performed on a suitable printing matte, the imprinted pattern will be subtly altered and the basic concept of the invention incorporated therein.

"Dimensionally altering" a printed medium is simply not overlaying a grid – it is miles away from disclosing that.

44. Briefly Mr Acland also relied upon fig. 3 and its description in col. 9. This reliance failed in argument when, under a little pressure from the Court, he frankly confessed that it required "an eye of faith" to see that fig. 3b showed the superimposition of a grid. It clearly does not and the muddled description in col. 9 (which we do not set out) does not disclose such superimposition. Reliance on fig 3 was abandoned.

45. Finally Mr Acland sought to show that the evidence of both experts recognised a clear disclosure of the imposition of a mismatching grid. In particular Mr van Renesse said that "although it is not said, I think everybody in the trade would know how you did that". And "I cannot conceive of any other method."

46. Kitchin J dealt with that:

> [126] However, Mr van Renesse also accepted that the teaching of the specification as to the basic method of the invention is not to do it that way, but rather to make the protected image out of lines, dots and swirls which incorporate the grid. This is explained in paragraph [0009] of the specification, at col.5, lines 12-35 (see paragraph [62] above; application, p.9): "*The basic method of counterfeit protection teaches the inclusion of lines, dots and/or swirls embodied and integrally formed into art, pictures and other forms of images. The grid lines are made so as to differentiate minutely in vertical and/or horizontal pitch from the linear grids employed by the scanning mechanisms...*"
>
> [127] He also accepted that the teaching of paragraph [0012], at col.6, lines 11-16 (paragraph [64] above; application, pp.11-12): *providing on a matte an image of visible image defining lines....*" is inconsistent with the DSS position as to how the document would be understood. It is, however, consistent with a method of implementation which involves altering the spatial

> arrangement of the lines and dots so as to create an image which is visible and will create moiré when screened.
>
> [128] Finally, he was asked about the figures, which are, as I have indicated, said to be a detailed description of the preferred embodiment. As to Figure 1, Mr van Renesse accepted that this is teaching the reader to arrange the lines cleverly so as to get moiré (see particularly, Patent, col.7, lines 12-15; col.8, lines 8-10; application, pp.13-15). This is, of course, wholly different to making them by screening.
>
> [129] As to Figure 3, Mr van Renesse explained that Figure 3a is the original document and Figure 3b the protected document. Figure 3b involves the re-arrangement of the lines and dots of Figure 3a so as to create a moiré effect. Again, this is not screening.

47. We have read and re-read Mr van Renesse's evidence. In the end we cannot find any basis for a clear implicit disclosure of what is claimed, particularly the features D. Mere assertion they would be taught is simply not enough, and that is all the more so given that what the patentee actually says is the method of his invention does not involve the overlaying a grid.

48. As for DSS' expert, Dr Furley, Mr Acland particularly relied on the following passage:

> Q. Therefore if the frequency of the grid is a slight mismatch to the scanning pitch of the scanner, it will lead to interference on the second generation copy.
>
> A. Yes
>
> Q. That is what you would understand if you were a skilled person in this art from the passage in the patent application that we have just looked at (i.e. that corresponding to [0008]). This is what causes that phenomenon to happen.
>
> A. Yes

49. We do not think this is enough. Firstly the final "yes" is not clearly to the first of the two questions which were put at the same time. Secondly the cross-examination went on (as it had to) about the specific disclosure and Dr Furley clearly did not accept that overall there was a teaching of overlaying a mismatching grid on an image. The Judge accurately summarised his evidence:

> [130] Dr Furley could see nothing in the application which clearly disclosed to him integer D1. He explained his understanding of it in his report. He found it confusing and imprecise. However he did not make the same error as Mr van Renesse as to the teaching concerning the figures. He understood the method of the invention to involve the

> incorporation of lines dots and swirls into the artwork and then the addition of grid lines – a notion which he found to be very unclear. In cross examination he maintained his position. He had said in his report that it was common general knowledge to incorporate a grid pattern in a note as originally designed, or to print a grid pattern across a design already in circulation. Not surprisingly he therefore accepted that, on the assumption the specification was teaching the skilled person he needed a grid pattern on a document in slight mismatch to the pitch of the scanner, he would know that a simple way of doing that would be to print or superimpose the grid pattern across the design already in circulation. I have to say I do not think this takes DSS very far. A set of rulings could obviously be incorporated into or added to any design. This was the classic way screen traps were made. DSS maintained, however, that the Patent is concerned with something different, namely laying a line screen over the original and so producing a new image which is visually indistinguishable from the old.

50. The Judge's finding at [52] (quoted above at [10]) is also of relevance here. People knew there were sometimes moiré effects with the new generation of copiers but the skilled man did not appreciate exactly how those effects were created. If that is so, he would not necessarily be able to work out features C/D from [0008], still less find a disclosure by implication.

51. The Judge gave his reasons for holding that there was added matter at [131-136]. He particularly dealt with the notion of implicit disclosure from the [0008]. He said:

> [134] Fourth, the application does describe the accidental fashion in which the invention was made. It is apparent from this description that there was some sort of interaction between the first image created by the copier and the mechanism of the copier when a further copy was made. But it is not clear whether that interaction was caused by the grid imposed by the output printer of the copier or the grid imposed by the scanning mechanism or by a mixture of the two. Nor does the application suggest that this aspect of the way the invention was made forms part of the teaching as to how it is to be performed.

52. We do not think that summary of the position can be bettered. It is the reason why this appeal should be dismissed.