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D E C I S I O N
of 17 April 1996

Case Number: T 0119/93 - 3.5.1

Application Number: 82111442.8

Publication Number: 0085157

IPC: G06K 7/12

Language of the proceedings: EN

Title of invention:
Method and apparatus for identifying indicia

Patentee:
International Business Machines Corporation

Opponent:
GAO Gesellschaft für Automation und Organisation mbH

Headword:
IBM/Method and System for identifying objects, such as bank cheques

Relevant legal provisions:
EPC Art. 56, 84

Keyword:
"Inventive step - (yes)"

Decisions cited:
-

Catchword:
-

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Case Number: T 0119/93 - 3.5.1

D E C I S I O N
of the Technical Board of Appeal 3.5.1
of 17 April 1996

Appellant: (Opponent)
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Decision under appeal: **Decision of the Opposition Division of the European Patent Office posted 8 December 1992 rejecting the opposition filed against European patent No. 0 085 157 pursuant to Article 102(2) EPC.**

Composition of the Board:

Chairman: P. K. J. van den Berg
Members: R. Randes
G. Davies

Summary of Facts and Submissions

I. European patent No. 0 085 157, based on European patent application No. 82 111 442.8 filed on 10 December 1982 and claiming priority from US applications 344 667 (1 February 1982) and 433 311 (7 October 1982) was initially refused in a decision dated 17 April 1986. After appeal proceedings (T 0286/86), the patent was granted on 29 August 1990.

II. Opposition to the patent in its full extent was submitted by the appellant on 28 May 1991, citing as grounds Article 100(a) EPC, the subject-matter of the granted claims being alleged to lack an inventive step.

At oral proceedings held on 17 November 1992 the Opposition Division announced its decision to reject the opposition, the written decision being dispatched on 8 December 1992.

III. Notice of appeal was received from the opponent, with the appropriate fee, on 28 January 1993. A statement setting out the grounds of the appeal was received on 31 March 1993.

During the course of the appeal proceedings the respondent submitted amendments to the claims and description of the contested patent to take account of comments from the Rapporteur.

IV. At oral proceedings, conditionally requested by both parties, held on 17 April 1996, the appellant maintained the request for revocation of the patent in full. The respondent requested maintenance of the patent on the basis of the following documents:

Claims: 1 to 3 submitted on 15 March 1996;

Description: as granted, with amendment of page 2 lines 23 to 48 of the published specification as submitted in the form of pages labelled 2, 2a during the oral proceedings;

Drawings: as granted.

V. The independent claims read as follows:

"1. A method of automatically identifying objects such as bank cheques and other financial documents, which typically are printed on patterned paper and which receive overprinted marks from a variety of sources, such as conventional bank cheque marking inks, during their useful life, comprising the steps of marking said objects with characteristic indicia using an ink, subjecting said objects to exciting radiation, and selectively detecting radiation emanating from said indicia so as to detect said indicia,

wherein

said ink comprises a major portion of a carrier liquid that is capable of drying by evaporation and penetration of the material of said object without leaving any residue that is significantly absorptive of radiation either in the visible or in the near infrared portions of the spectrum, and a minor portion, having a concentration in the ink of a minimum of 0.09% by weight, of a dye which is a fluorescent agent that fluoresces mostly in the nearly infrared portion of the spectrum in the range from 650 nm to 800 nm,

said exciting radiation includes substantially no radiation in the near infrared portion of the spectrum from 650 nm to 800 nm, and only near infrared radiation in the range from 650 nm to 800 nm emanating from said indicia is detected."

"3. A system for identifying indicia which have been marked on an object such as a bank cheque or other financial document, which typically is printed on patterned paper and which receives overprinted marks from a variety of sources, such as conventional bank cheque marking inks, during its useful life, using a method in accordance with claim 1 or claim 2, comprising irradiating means (17, 18) to irradiate said marked object, and detecting means (19, 20) to detect radiation emanating from said object,

wherein

said irradiating means (17, 18) includes a low pass filter (18) so that the radiation used to irradiate said object includes substantially no radiation in the near infrared portion of the spectrum in the range from 650 nm to 800 nm, and

said detecting means (19, 20) includes a high pass filter (19) so that only near infrared radiation in the range from 650 nm to 800 nm emanating from said object can be detected."

VI. The following cited documents are still relevant:

D1: US-A-4 007 462;
D2: DE-A-2 530 905;
D4: US-A-3 946 203;

D7: H. Lindner et al.: "Elektrotechnik-Elektronik", pages 355, 356, VEB Fachbuchverlag, Leipzig, 1988 (not prior art);

D8: F. P. Carlson: "Introduction to applied optics for engineers", pages 121 to 123, Academic Press, New York, 1977.

D15: K. H. Drexhage: "Structure and Properties of Laser Dyes", pages 157, 172 to 175, in "Dye Lasers", Ed. F. P. Schäfer, Springer-Verlag, Berlin, 1973.

VII. The parties argued essentially as follows:

The appellant

1. To the formal aspects of the amended claims, it was pointed out that the phrases introduced by "such as" in the new claim 1 could not be considered to specify concrete features of the invention which would be considered in e.g. novelty evaluation, since they were optional. Further, the new claim 1 was considered to lack clarity by virtue of the combination of a precise range of wavelengths, 650 nm to 800 nm, with the qualifying and weakening phrases, "substantially no radiation" and "significantly absorptive ... in the near infrared portions of the spectrum".

As to the patentability of the alleged invention, the problem put forward in the patent had already been recognised, and proposals made to solve it, in the prior art. In order to overcome noise in the reading of bar codes, caused by extraneous fluorescent elements in the material of the carrier or by overprinted marks, D4 proposed the use of an ink which when excited by blue light emitted fluorescence in the red portion of the spectrum. In

D1, a stripe of fluorescent dye (various commercially available examples being mentioned) was painted onto the carrier, also in order to avoid interference arising from the carrier material or from overprints. Further D1 included the clear teaching, in column 4, lines 34 to 36, that if the effect was not sufficient, a dye fluorescing in the infrared should be substituted.

The specific range claimed was essentially arbitrary, being simply determined by the dyes and detectors on the market. In this context, reference was made to D15, Figure 4.5, which showed a dye having optical properties nearly identical with that preferred in the contested patent, and to Bild 6.133 of D7, showing the sensitivity of various detector materials, as well as that of the human eye. Thus once the person skilled in the art had the suggestion to use infrared fluorescing dyes, it was clear that dyes and detectors which work well in the spectral range contiguous with visible light were obtainable. The specific choice of 650 nm as the bottom of the range arose because of the wish to work in the invisible portion of the spectrum, the visible part ending at around this point. The choice of 800 nm as the upper limit was entirely arbitrary, reflecting the availability of a particular dye. If a dye fluorescing strongly at up to 900 nm had been available, the upper limit could have been set at that value.

The detailed specification in the claim of the concentration of the dye and the properties of the carrier liquid of the ink were considered to be everyday considerations for the person skilled in the art. In particular, the property that there

should be no residue of the carrier liquid significantly absorptive of radiation in the visible or near infrared portions of the spectrum, simply followed from a desire not have the carrier liquid interfere with the desired behaviour of the dye.

While D1 did not describe a printing process as such, neither was the claim limited to printing, so that D1 could not be considered irrelevant to the claimed material or incapable of combination with D4. In fact, rather than applying the teaching of D1 to D4, it was possible to demonstrate the lack of inventive step from D1 alone. D1 worked by marking with an inverse process to that of D4 or the patent; the characteristic indicia were detected by means of the areas which did not fluoresce when excited. Nonetheless, it was considered that all the claimed features apart from the specific numerical values were at least implicit to the skilled reader, in particular from the expressions "optical reading system", column 4, line 27, (in the context of the use of fluorescent dyes) and "suitable solvent" for the dye, column 3, line 18. The numerical values chosen were, as argued above, either arbitrary or the result of obvious considerations on the part of the designer.

The transparency in the near infrared of inks commonly used for overprinting relied on by the respondent in arguments for an inventive step would have been well known to the person skilled in the art. In D2 for example at page 7, lines 15 to 18, it was noted that common black marking inks absorb strongly in the visible range of the spectrum, but reflect strongly in the infrared. At most, this was

a bonus effect of using a spectral area which was anyway obvious. According to the case law of the EPO Boards of Appeal such a bonus effect could not be used to demonstrate an inventive step in the subject-matter of the claims.

No separate analysis of the subject-matter of claim 3 was made, the appellant taking the view that the arguments made against claim 1 applied equally to claim 3.

The respondent

2. The qualifiers in the claim ("significantly", "substantially") merely reflected the reality of practical systems, and their meaning would be clearly understood by the skilled reader. Further as a matter of language they were not qualifications of the spectral range, which was precisely defined. While the phrases beginning with "such as" did not necessarily exclude prior art used in other contexts, they did indeed contribute to the features of the claim in that the method must be suitable for performing the function defined in these phrases.

The nearest prior art document was D4. However, it specifically recommended the use of dyes fluorescing in a range outside that defined in the claims of the disputed patent. It laid emphasis on the recommended range being optimal, so that there was no reason to be seen in D4 itself to move away from those dyes to others fluorescing in a different range. Indeed there was strong motivation **not** to move away from that range.

The sentence in D1 suggesting the use of dyes fluorescing in the infrared was unclear. Rather than referring to noise in the sense of interference from overprints, it seemed more likely that it was simply referring to the potential visual irritation to users of a large visibly fluorescent stripe. This was a problem arising only in the context of D1, so that the skilled person would not see the suggestion as solving a problem found in the system of D4, and there would therefore be no motivation for a designer starting from the system of D4 to adopt this suggestion. It was to be noted that the appellant's interpretation of the cited sentence required the two references to "fluorescing dyes" to refer to different markings on the document, which seemed unlikely. Nowhere else in D1 was there any indication which could support the appellant's interpretation. Furthermore, the only reference in either document to problems caused by overprints was in D1 (column 1, lines 39 to 42), and the inference therefrom was that this specific problem had already been completely solved by the introduction of fluorescent dyes, as such.

The natural combination of teachings from D1 and D4 would not be the material claimed in the disputed patent. Rather it would be to use a stripe in the manner of D1, but of a dye as specified in D4. In this case the emission wavelength would lie outside the range specified in the claim.

As to the suggestion that the invention was obvious from D1 alone, the appellant was using hindsight to read too much into this document. D1 did not even specify what effect the laser had on the dyed

areas. Perhaps it changed the emission wavelength, or the polarity of light reflected. The "optical reading system" depended for its specification on the particular effect. Nor was it clear that the optical reading system utilised the method of excitation and emission at different wavelengths. Perhaps fluorescent dyes were used simply because they alone showed the required effect that their properties were changeable by the application of laser light. Further, there was no indication in D1 that the "suitable solvent" should be transparent both in the visible and the near infrared portion of the spectrum. This requirement arose as a result of the inventive insight of the invention to use the near infrared portion of the spectrum.

Even if it were accepted that D1 would give the skilled person the motivation to use infrared fluorescing dyes, no actual range was indicated, and it was well known that the term "infrared" covered a very wide spectral band. The actual wavelengths specified were by no means a trivial or arbitrarily selected range, a view supported by the Opposition Division in its decision. The inventive insight lay in seeing that by changing the dye in D4 to one which emitted in the range specified in the claim, the dye would fluoresce in a region in which the majority of common marking inks were largely transparent, thereby significantly reducing the noise introduced by overprints in such inks and increasing the reliability of the system. It was by no means to be expected that such an improvement could be made by changing the wavelength specified by D4 by a mere 10%, when that document indicated that the wavelength it gave was optimal. This statement in D4 would indeed discourage the skilled

person from looking for improvements in the vicinity of that wavelength. The lower limit of the range was determined by this transparency effect - see Figure 5 of the patent. On the other hand, the upper limit was dictated by the desire to use dyes useful for human readable markings, as discussed on page 3 of the published patent, at lines 17 to 20.

As to the suggestion that the range was dictated by the dyes and detectors available, there were many different dyes with different emission ranges. Document D8 showed that the detection range of silicon was much wider than D7 suggested, and even D7 showed that the skilled person could have adopted a different material for use in the detector, if a different range were desired. Thus the dyes and detectors did not constrain the range.

Reasons for the Decision

1. The appeal satisfies the requirements of Articles 106 to 108 and Rule 64 EPC and is, therefore, admissible.

2. *Admissibility of the amendments*

The Board considers that the amendments made to the claims do not render them unclear. The combination of specific numerical values for the spectral range and the percentage by weight of the dye, now definitely limiting the claim, with the qualifying terms "substantially" and "significantly" in the expressions "substantially no radiation" and "without leaving any residue that is significantly absorptive ... in the near infrared portions of the spectrum" is not unclear. Such terms are commonplace in patent claims and in this case in

particular they do not qualify the actual numerical values in any way which brings into doubt the matter for which protection is sought.

Further, the phrases introduced by "such as" are both clear and have a limiting effect on the claim, in that the method (or in the case of claim 3, the system) must be capable at least of identifying bank cheques having overprinted marks in conventional bank cheque marking inks.

The appellant did not raise any objections to the amendments on the grounds that the amendments made to both claims and description either extended the subject-matter beyond the content of the application as filed or extended the protection conferred. The Board is also satisfied that these amendments are clearly based on the original disclosure of the patent application and do not extend the protection.

Hence the amendments do not violate Articles 84, 123(2) or 123(3) EPC. Further, they were made in response to arguments relating to the inventiveness of the claimed material, the ground for opposition, so that it is appropriate for the Board to allow them.

3. *Novelty*

The appellant has not argued that the claimed material lacks novelty, and the Board is satisfied that it is indeed new with respect to the prior art available. In particular, neither D1 nor D4 specifies the range of 650 to 800 nm for the avoidance of excitation radiation and the detection of emission radiation.

4. *Inventive Step*

4.1 Starting from D4

D4 shows a bar code recognition system similar to that of the contested patent in which exciting radiation and luminescence are arranged to fall in non-overlapping portions of the spectrum. However, this document proposes a dye fluorescing in the visible red region of the spectrum, peaking at 600 nm (column 2, line 68), which dye is excited in the blue region according to curve 32 (Figure 4), peaking at 470 nm. Furthermore, it is made clear that this choice is considered to be optimal (column 1, lines 50 to 63). There is no indication in D4 which would lead the skilled person to consider substituting a dye fluorescing in the near infrared region of the spectrum.

D1 contains a suggestion to use dyes fluorescing in the infrared (column 4, lines 34 to 36). However, the Board concurs with the respondent's view that the skilled person would understand this single sentence in D1 to refer not to noise caused by background fluorescence, but to noise caused by the fluorescent stripe (proposed as part of the invention in D1) itself. A stripe of significant area fluorescing in the visible range might well be visually irritating to the user of the cheque. But there is no such stripe in D4. Hence the skilled person would not see this remark in D1 as relating to any problem which might arise in D4 and it would not, therefore, provide any motivation to change the dye proposed in D4.

The appellant has suggested no other reason for the skilled person to abandon the express teaching of D4 in favour of a dye fluorescing in the near infrared, nor is

any such reason apparent to the Board. Hence it is concluded that from the starting point of D4 the subject-matter claimed in the contested patent is not obvious.

4.2 Starting from D1

The Board considers the appellant's argument that the contested claims are obvious in the light of D1 alone to be based on a speculative analysis of the content of that document in the light of the contested patent. In particular D1 discloses absolutely no details of the bar-code reading system to be employed. Further, the nature of the change in the light emitting properties effected by the laser, upon which the appropriate reading system obviously depends, is unclear.

Nonetheless, it seems plausible that, as the appellant has maintained, the effect of the laser in D1 would be to "inactivate" the fluorescence of the dye (note the reference to "contrast" in column 3, line 7). In this case it would be reasonable for the skilled person to turn to D4 to provide details of an appropriate reading system. Thus the skilled person would arrive at a method of marking cheques etc. using a fluorescent stripe on which bars are written with a laser beam, and a reading system using excitation and emission in non-overlapping spectral ranges using one of the dyes put forward in D1 or D4, all of which appear to fluoresce in the visible range. In particular, the choice of "blaze orange" would apparently be natural, since it is mentioned in D1 and preferred in D4. However, the skilled person would also have a motivation to try dyes fluorescing in the infrared range according to the suggestion in D1, since the cheque would have a fluorescent stripe (in contrast to the situation if the skilled person started from D4).

However, this suggestion gives no indication of the appropriate spectral range to choose within the infrared.

According to the contested patent, most common bank cheque marking inks, while absorbing much light in the visible spectral range, are relatively transparent in the near infrared range, starting at around 650 nm (see Figure 5 and page 4, lines 36 to 39). Hence an ink fluorescing in this range is more reliably detectable in the presence of overprints than an ink fluorescing in other ranges. No available document gives this teaching. D2 does mention the transparency of common black printing inks in the infrared. However, it does so in a very different context, specifically printing black on black with two inks, one transparent in the infrared and one not, so that the printing can be read only with infrared illumination and detection (D2 page 7, lines 15 to 31). The Board sees no reason to suppose that the skilled person would find this teaching of any relevance to the systems of D1 or D4. Further, this citation does not deal with any other colours, nor does it mention any range within the infrared. Hence it does not appear to provide any evidence in support of the appellant's assertion that the transparency of common cheque marking inks in the near infrared (i.e. the range starting at 650 nm) was a matter of common knowledge. Hence the Board cannot see that the skilled person would have any motivation, if the suggestion to use infrared fluorescent dyes in D1 were adopted, to choose a range starting from the very edge of the visible range. Indeed, since radiation between 650 and say 750 nm would apparently not be entirely invisible (thus not "infrared") according to various documents which have

been put forward during the proceedings, the teaching of D1 would rather encourage the skilled person to choose a dye fluorescing in a region further into the infrared.

While the choice of 800 nm as the upper boundary for the range does not seem to be connected with any strong change in transparency of inks (see patent Figure 5), it serves a secondary purpose of ensuring that the ink, while not fluorescing significantly in the visible range, does make visible markings (page 3, lines 17 to 20). This is because the "narrow" emission curve 22 (see patent Figure 4) has steep slopes. Hence the upper boundary, too, of the claimed range is not arbitrary.

As to the appellant's assertion that the claimed range merely reflects the dyes and detectors which were on the market, it is clear that there must have been appropriate dyes and detectors available. However, the appellant has not made any convincing arguments that the inventor was restricted in the choice of these elements. Rather the respondent's assertion that there were many dyes and detector materials available, allowing a wide choice of spectral ranges, appears more plausible.

Hence, in conclusion, even if the skilled person were to combine the teachings of D1 and D4 in such a way as to make valuable the suggestion to use infrared fluorescing dye, there is no indication to be found in the prior art that there would be any motivation to use the claimed range. Neither would it seem to be simply arbitrary. Hence the Board concludes that the subject-matter of the claims is not obvious starting from D1, even in combination with D4.

4.3 The other documents cited in the proceedings are of less relevance. Nor were they, finally, depended upon in the appellant's arguments. Hence the Board concludes that the subject-matter of the disputed claims satisfies the requirements of Articles 52(1) and 56 EPC for an inventive step.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the first instance with the order to maintain the patent with the following documents:

   claims 1 to 3 filed on 15 March 1996;

   the description as granted, with the amendments to page 2, lines 23 to 48, filed during the oral proceedings;

   drawings as granted.

The Registrar: The Chairman:

M. Kiehl P. K. J. van den Berg