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DECISION
of 18 February 2004

Case Number: T 0558/00 - 3.5.1

Application Number: 89302318.4

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IPC: H04N 1/40, H04N 1/29,
G03G 13/09

Language of the proceedings: EN

Title of invention:
Image forming method

Patentee:
CANON KABUSHIKI KAISHA

Opponent:
Xeikon International NV

Headword:
Developer/CANON

Relevant legal provisions:
EPC Art. 56, 100a

Keyword:
"Inventive step (no)"

Decisions cited:
T 0623/97, T 0967/97

Catchword:
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Boards of Appeal

Chambres de recours

Case Number: T 0558/00 - 3.5.1

DECISION
of the Technical Board of Appeal 3.5.1
of 18 February 2004

Appellant: CANON KABUSHIKI KAISHA
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Decision under appeal: Decision of the Opposition Division of the
European Patent Office posted 27 March 2000
revoking European patent No. 0332428 pursuant
to Article 102(1) EPC.

Composition of the Board:

Chairman: S. V. Steinbrener
Members: R. R. K. Zimmermann
V. Di Cerbo

Summary of Facts and Submissions

- I. European patent number 0 332 428 (application number 89 302 318.4) was granted with effect of 6 July 1994. The patent claims two different priority dates, 10 March 1988 and 20 July 1988, from the Japanese patent applications Nos. 54821/88 and 182562/88, respectively.
- II. The patent was revoked in first opposition proceedings for lack of inventive step; in subsequent appeal proceedings the case was remitted with decision T 492/97 to the first instance for further prosecution; finally the patent was again revoked by the opposition division, this time for added subject-matter, in a decision posted 27 March 2000.
- III. The appellant (patent proprietor) filed a notice of appeal, and paid the appeal fee, on 26 May 2000, and submitted a written statement setting out the grounds of appeal on 2 August 2000.
- IV. In preparation of oral proceedings scheduled for the 18 February 2004, the appellant filed two sets of amended claims with letter dated 13 January 2004. The first claim thereof designated as replacement main request reads as follows:
- "1. An image forming method, comprising:
gradation-processing an image signal based on a halftone image to output a pulse-width-modulated signal (f);

using a laser beam to form a latent image of dots on a latent image-bearing member (3) the size of each dot being based on the pulse-width-modulated signal; and developing the latent image with a developer comprising a toner (37) and magnetic carrier particles (27) to reproduce the halftone image using a reversal developing method;

the method being characterized in that:

said toner has a volume-average particle size of M and comprises toner particles (37) having a particle size of r ; and has a volume-basis distribution such that it comprises 90% by volume or more of toner particles satisfying $M/2 < r < 3M/2$ and comprises 99% by volume or more of toner particles satisfying $0 < r < 2M$, where M is 5 to 9 microns;

said magnetic carrier particles (27) have a resin coating layer, an electric resistivity of 10^7 ohm.cm or larger, and a particle size of between 30 and 100 microns;

and the latent image is developed using a superposition of an AC bias on a DC bias."

Claim 1 of the second claim set (designated as replacement auxiliary request) combines this claim 1 with dependent claim 2 by introducing the words "is produced by a pulverisation process and" into the characterizing part of the claim immediately after the words "said toner".

- V. In the appeal proceedings the following documents were cited, among others, as pieces of prior art relevant to the patent under dispute:

T. Nishimura et al. "Electrophotographic Color Printing Using Elliptical Laser Beam Scanning Method",

J. Imaging Technology, vol. 12, no. 6, December 1986, pp. 329-333

EP-A-0 227 006, published 1 July 1987

US-A-4 737 433, published 12 April 1988

VI. Regarding inventive step, the appellant argued that the invention, starting from a PWM (pulse-width-modulated) laser beam scanning method, resided in the particular developing process claimed. The claimed process was characterized by a combination of parameter ranges defining the sizes of the toner and the magnetic carrier particles and the electric resistivity of the magnetic carrier particles. This combination was novel and brought a remarkable improvement over the prior art as proven by the specific examples and the comparative examples described in the patent and patent application as originally filed.

The toner and carrier parameters were the result of a delicate and unique optimisation process; a slightly different toner or carrier could produce entirely different or unpredictable results.

The Nishimura document was relevant because of disclosing a PWM laser beam scanning system and was also an appropriate starting point in the prior art for assessing inventive step. The appellant explicitly conceded that the claims as amended did not enjoy the priority date 10 March 1988 from the Japanese patent application No. 54821/88.

However, the cited prior art did not anticipate the developing process as claimed in connection with a digital PWM laser beam scanning method. In particular documents EP-A-0 227 006 and US-A-4 737 433 were related to analogue image forming methods so that the skilled person would not take them into consideration; actually any information about toner and carrier composition for use in an analogue system or about developing techniques for conventional analogue systems would be considered as irrelevant by the skilled person if dealing with a digital method.

In addition, neither one of these documents disclosed the claimed parameters of the toner and carrier in combination. Picking up specific values from these documents for putting an argument against the invention would be inadmissible since it would be based on an a posteriori knowledge of the invention. The skilled person would actually receive inconsistent and even contradictory information from the citations and would rather set aside them instead of using them for improving the prior art.

VII. Accordingly, the appellant requested that the decision under appeal be set aside and that the patent be maintained on the basis of claims 1 to 16 filed as main request with letter dated 13 January 2004 or on the basis of claims 1 to 15 filed as auxiliary request with the same letter.

VIII. The respondent (opponent) requested that the appeal be dismissed.

IX. In particular, according to its submissions, the appellant's conclusions were unsupported by the actual wording of the claims since the imaging process was not restricted to a PWM laser beam method but in the light of the very broad meaning of the feature "the size of each dot being based on the pulse-width-modulated signal" included any kind of laser printing process, as for example conventional dot matrix and dithering methods.

Furthermore, the toner and carrier particles came into play only beginning with the developing phase of the imaging process. The manner how in the exposure phase the latent image was produced on the photosensitive drum, for example, was irrelevant. Even the dot sizes and resolution requirements were not substantially different to other exposure techniques; the laser beam itself had an important spot diameter, for example, of 70 to 80 μm as indicated in the patent specification, page 10, lines 11 to 13, producing grey shades of the latent image like an analogue latent image. Although toner material and developing methods were, in principle, susceptible of optimisation, the present claims were too broad in scope and the parameter chosen too incomplete and arbitrary as to render the alleged optimisation plausible within the whole range of methods falling under the claims.

Regarding the scope of the claims and the basic processes underlying the exposing and developing steps of the image forming method, it was clearly justified, therefore, to cite documents against the patent irrespective of the particular, digital or analogue exposure technique used in such pieces of prior art.

From both documents, EP-A-0 227 006 and US-A-4 737 433, it was known that generally finer toner particles reduced the granularity of the image and allowed to reproduce finer image structures, but also, on the other hand, if the particle size was substantially smaller than 5 μm , it produced various problems which should be avoided. The document EP-A-0 227 006 proposed an AC and DC voltage as developing bias, a toner particle size of preferably 5 to 30 μm , produced by a pulverisation process, and a carrier having ferrite particles of a size from 20 to 60 μm and an electric resistivity of no more than $10^{12} \Omega\cdot\text{cm}$.

The document US-A-4 737 433 explicitly expounded about the advantages to be achieved by limiting the toner size distribution to a narrow range and disclosed essentially the two ranges defined in the patent claims to this end.

According to the respondent the skilled person would consider it an obvious improvement to use this information regarding the developing process with the PWM laser system of the Nishimura document.

- X. The Board announced the decision on the appeal at the end of the oral proceedings which took place on 18 February 2004.

Reasons for the Decision

1. The appeal complies with the requirements of Articles 106 to 108 and Rules 1(1) and 64 EPC and is thus admissible.
2. The appeal, however, is not allowable. Indeed, both main and auxiliary requests fall short of meeting the requirement of inventive step set out in Articles 52(1) and 56 EPC and forming one of the grounds of opposition raised against the patent under dispute.

Since the subject-matter of claim 1 of the main and auxiliary requests are substantially identical, the only difference being that the latter is more restricted, the Board considers it appropriate to assess the requirement of inventive step together for both requests.

3. The inventive step requirement of the EPC is examined on the basis of the so-called problem and solution approach developed by the case law and practice of the EPO. As stated by the Board (in a different composition) in decision T 967/97 - Chipkarte/OVD KINEGRAM (not published in OJ EPO), point 3.2, inventive step has to be denied if at least one path starting from a point in the prior art exists, leading to the solution of a technical problem, in the light of which the skilled person would regard the invention as obvious. In T 623/97 (not pub. in OJ EPO), point 4.4, the Board held that an invention, although requiring various steps for arriving at the complete solution of the technical problem, should be regarded as obvious if the technical problem to be solved leads the skilled person

in a step-by-step manner to the solution and each individual step is obvious in the light of what has already been accomplished and of the residual task still to be solved.

4. The Nishimura document is indeed, as both parties submitted, an appropriate starting point in the prior art for assessing inventive step. It appears to be further undisputed that this document discloses an image forming method having all the features of the first part of claim 1, except for an indication that the developer used according to the patent in suit comprises, in addition to the toner component, magnetic carrier particles, although the document does not exclude the use of such type of developers. In respect of the toners used it only mentions the circumstance that colour toners are deposited on the photosensitive drum by reversal developing in sequence of the colours yellow, magenta, cyan and black (see section 3, page 331); it does not identify any particular composition or size parameters of such toners. Nor does it indicate any other details of the developing process.
5. Therefore, the magnetic carrier particles and the further features of the second part of claim 1 are considered as characterizing the claimed invention against the Nishimura document.
6. It is clear that the Nishimura document only incompletely discloses the experimental printer for carrying out the printing method described therein. Apparently, however, this experimental printer uses the technology of conventional laser printers so that the Board accepts the document as an enabling disclosure of

the elliptical laser beam printer and printing method. The parties to the appeal proceedings did not raise any doubts in this respect.

7. The skilled reader of the Nishimura document, nevertheless, is forced to fill the informational gaps left by this document when he tries to rework this printing method. In particular, he has to find an appropriate developing stage for disposing the toners onto the photosensitive drum. In respect of the Nishimura document the skilled person is thus expected to solve the technical problem of implementing a developing technique which ensures or even improves the copy quality achieved with the elliptical laser beam printing method (see also section 5 on page 333).

8. In this context, the document US-A-4 737 433 will be considered relevant since it suggests a developing technique with an improved copy quality (US-A-4 737 433, column 2, lines 33 to 45).

The circumstance that there is no reference to digital printing or to laser beam scanning would not deter the skilled person from considering this document. The Nishimura document itself does not give any indication that only particular type of developers or developing methods are appropriate for this purpose. On the contrary, the remark on page 332 that " other toners also offer about the same characteristics" indicates that the type of developer is not a sensitive issue for carrying out the experimental method.

Moreover, the developing process acts upon the electrostatic latent image, which is essentially the

same whether it was produced by laser or xenon lamp exposure, for example. Achieving high resolution and resolving fine image structures is also an issue in the document US-A-4 737 433 (see for example column 2, lines 11 to 13).

Finally, the Board considers the parties' unanimous view correct that the first priority date does not apply any more to the present claims and that thus the document US-A-4 737 433 forms part of the prior art.

It follows that the skilled person is to be expected to consider the US-A-4 737 433 in combination with the Nishimura document.

9. From the US-A-4 737 433, in particular column 2, line 49 to column 3, line 9 and taking into account the definitions given in respect of volume average radius, it follows that
- (I) a volume average diameter M of the toner particles within the range of from about $1,0 \mu\text{m}$ to $7,0 \mu\text{m}$ is preferred, and that
 - (II) a toner particle size distribution is used having
 - (IIa) 90 % within the range from about $0,8M$ to about $1,2M$, and
 - (IIb) 99 % within the range of from about $0,5M$ to $2M$.

These parameter ranges clearly anticipate the corresponding claim definitions.

10. Furthermore, the US-A-4 737 433 indicates in column 4, lines 35 to 37 a preferred embodiment using a developer with magnetic carriers, again however, without specifying the carrier details.

The skilled person is thus left with the residual task to find an appropriate carrier which may be used with a toner having fine and narrowly distributed particles as specified above.

11. The document EP-A-0 227 006 refers to similarly fine sized toner particles, 5 μm to 30 μm , produced by pulverisation (see, for example, page 6, lines 20 to 25) and proposes a carrier having particles sizes between 20 and 60 μm (see page 5, lines 8 f.). The carrier is for example a ferrite powder, which has an insulating resin coating, exhibiting an electric resistivity from 10^8 to 10^{12} $\Omega\cdot\text{cm}$ and thus anticipating the corresponding toner and carrier features defined in claim 1.
12. In addition, the document EP-A-0 227 006 proposes the application of an AC bias on a DC bias for depositing the toner particles onto the image carrying member (see page 5, lines 44 to 49), thereby also anticipating the last feature of claim 1.
13. It follows that the skilled person, to implement an appropriate developing method, is led in a step-by-step manner, which requires in each step only an obvious partial solution, from the Nishimura document to a solution which is included into the scope of claim 1. Therefore, the invention as defined in the first claim of each of the individual requests is regarded to lack an inventive step.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

M. Kiehl



The Chairman:

S. V. Steinbrener