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D E C I S I O N
of 9 May 2000

Case Number: T 0918/98 - 3.5.1

Application Number: 91107694.1

Publication Number: 0457229

IPC: H04N 1/387

Language of the proceedings: EN

Title of invention:
Printing apparatus and information processing apparatus using the same

Applicant:
Hitachi, Ltd.

Opponent:
-

Headword:
-

Relevant legal provisions:
EPC Art. 56

Keyword:
"Inventive step (no)"

Decisions cited:
-

Catchword:
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Case Number: T 0918/98 - 3.5.1

D E C I S I O N
of the Technical Board of Appeal 3.5.1
of 9 May 2000

Appellant: Hitachi, Ltd.
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Decision under appeal: **Decision of the Examining Division of the European Patent Office posted 7 April 1998 refusing European patent application No. 91 107 694.1 pursuant to Article 97(1) EPC.**

Composition of the Board:

Chairman: P. K. J. van den Berg
Members: R. S. Wibergh
S. C. Perryman

Summary of Facts and Submissions

I. This appeal is against the decision of the Examining Division to refuse European patent application No. 91 107 694.1.

II. The Examining Division argued that the subject-matter of claim 1 was obvious having regard to the documents

D1: GB-A-2 117 208 and

D2: US-A-4 491 875.

A further document,

D3: US-A-4 004 079,

was also referred to.

III. Oral proceedings before the Board were held on 9 May 2000. In the course of the proceedings the appellant filed new claims.

Claim 1 of the **main request** read as follows:

"A printing apparatus comprising

- a dot printing element (1-17) for printing pixels with dots in accordance with an image information signal,

- a main control unit (100) generating the image information signal, and comprising

  - a data identifying signal receiving means

receiving a data identifying signal,

- a first control means capable of generating an image information signal from character data for printing said pixels with a predetermined dot size, the first control means generating the image information signal without referring to dither dot matrixes,

- second control means capable of generating an image information signal from picture data for printing an image having gradations, the second control means generating for every said pixel an image information signal, the image information signal being formed with reference to dither dot matrixes of several dots such that the image information signal corresponds to dither dot matrix data, the dots of one matrix having variable dot size, and

- control selection means (160) for selecting the image information signal of said first control means or of said second control means in accordance with the data identifying signal".

Claim 1 of the **first auxiliary request** specified additionally that the data identifying signal is received "from a data identifying signal input (S/D-SEL) of the main control unit". Analogous amendments were made in respect of the signal representing character data and the signal representing picture data.

Claim 1 of the **second auxiliary request** added the feature that "a matrix /is/ selected with reference to

a mean value of a plurality of pixels and every dot corresponding to a pixel".

Claim 1 of the **third auxiliary request** was the combination of the first and second auxiliary requests.

IV. The appellant argued that the invention involved an inventive step over the teachings of D1, D2 and D3.

V. The appellant requested that the decision under appeal be set aside and that a patent be granted on the basis of claim 1 of the main request, or claim 1 of one of the first, second or third auxiliary requests, all filed on 9 May 2000.

Reasons for the Decision

The main request

1. The invention is a printing apparatus, typically a laser printer, which is capable of printing characters and images. Images are subjected to halftoning by means of a dithering technique which results in printed dots of variable size. Character data bypass the halftoning stage and are printed as dots of a predetermined (maximum) size for high contrast.

2. *The prior art*

2.1 D1

According to the first embodiment described in D1, two originals, one containing images and the other characters, are simultaneously scanned. The image and

character data streams are combined, buffered, and separated. The images data are halftone processed but the character data are not. The data streams are once again combined and made to control an optical head such that a film is exposed in accordance with the two originals. The character data automatically take priority over the image data.

2.2 D2

D2 describes a halftone technique yielding dots of different size. According to the described example an input pixel characterised by a certain density value is divided into a number of micro-pixels, for example a square of four, by means of two dither matrices of the same size. Each dither matrix element is associated with a certain threshold value. The density values of the input pixels are compared with the thresholds. Depending on the result of the comparisons a large dot, a small dot or no dot at all is attributed to each of the four micro-pixels. In this way it is possible to express nine density values, ranging from no dots to four large dots.

2.3 D3

D3 is similar to D1 in that image data are halftoned whereas type (character) data are not. The image channel furthermore contains an initial averaging circuit which lowers the resolution in comparison with the line channel. A selection circuit connects either the image channel or the type channel to a recording unit, which might be a laser directly exposing a photosensitive printing plate. How this selection is performed is not described but may well require

operator action. According to the described embodiment each averaged scan area comprises 16 original pixels and is represented on the photographic film by 64 exposed areas (column 4, lines 38 to 43).

3. *Novelty*

3.1 The invention is new, as can be seen from the following comparison of claim 1 with the two closest prior art documents, D1 and D3.

3.2 Novelty with respect to D1

In D1 the final output is a single photographic film. A film is exposed rather than subjected to printing, and therefore a printing element in the normal sense of the word is not shown. A further difference is that the halftoning of the image data is not disclosed as being dithering. Finally, the selection of an information signal corresponding to either character data or picture data is effected (in the priority processing circuit 19) **before** the halftoning stage (circuit 23), not after it, as claimed.

3.3 Novelty with respect to D3

Also D3 is not concerned with the actual printing process but rather with the preparation of a printing plate. Furthermore, the actual word "dithering" is not mentioned. It is however disclosed that input pixels are represented by sub-pixels on the plate.

The appellant has argued that it is not disclosed in D3 how the selection of character/image data is performed. Still, the fact that a selection takes place at all is

indeed disclosed and consequently there has to be an input signal (possibly given by an operator) to the selecting circuit for identifying the data to be processed. The "data identifying signal receiving means receiving a data identifying signal" set out in claim 1 is therefore regarded as implicitly disclosed.

4. *Inventive step with respect to D1*

4.1 The appellant has argued that D1 does not belong to the correct technical area since the invention is a printing apparatus and D1 does not disclose a printing step.

D1 discloses a process leading up to the exposure of a photographic film. This film will then presumably be used to obtain a printing plate, an assumption which has not been challenged by the appellant. D1 therefore concerns a preparation stage to be followed by the actual printing stage. But the situation is not different according to the invention: all features of claim 1 except the first one are preparation steps leading up to a set of dot data suitable for printing. The claimed printing step is conventional, just as the printing step for which the photographic film in D1 is intended will also be conventional. Therefore, in the Board's view, D1 belongs to exactly the right technical area of preparing data for (some kind of) printing.

4.2 Starting out from D1, the skilled man would first have to choose a suitable kind of halftoning technique for the image data. One possibility is "dithering", a concept described in D2. The Board agrees with the Examining Division that the mere selection of this well-known technique is not inventive.

The appellant has however argued that the wording "dither dot matrix" in the present claim 1 should be understood as the actual dot pattern to be printed. In D2 the term "dither matrix" instead indicates the matrix of threshold values with which the incoming data are compared to yield the sub-pixels, or dots (possibly of varying size), which are to be printed.

4.3 For the purpose of the present decision the Board is prepared to accept this particular meaning of the expression "dither dot matrix". However, it appears that the feature does not in fact constitute a difference over D2. Claim 1 simply states that the second control means forms an image signal "with reference to dither dot matrixes" such that the signal corresponds to dither dot matrix data. But in any dithering method the output is inevitably a certain pattern of dots, ie a "dither dot matrix".

4.4 The appellant has explained that the above feature should be understood in the way that no comparisons with a threshold take place and the dither dot matrix is found directly from the input data, typically by means of a ROM storing all possible matrix configurations.

4.5 Although these features are not believed to be contained in the present claim 1, the Board is prepared to consider them. It appears however that also they cannot support an inventive step, for the following reasons.

It must be regarded as sufficiently well known that invariable data such as parameters and constants are conventionally stored in ROM and read out whenever they

are required. Figure 3 of D2 shows the possible dot matrices in the case of four sub-pixels and two dot sizes. There are nine such dot matrices, and any input signal will yield an output consisting of a sequence of these nine matrices and nothing else. This seems to be exactly the situation where the skilled man would not be satisfied with computing the same nine matrices over and over again but rather try to speed up the procedure by replacing the (eight) comparison steps with a single access to a memory. Considering the great amount of pixel data obtained in a scanning process and the natural desire to minimise the time needed to generate a print-out, the skilled man would look out for any possibility to reduce the data processing requirements.

4.6 The last difference between the invention and D1 concerns the structure of the picture data channel and the character data channel. According to claim 1 the selection whether the picture data or character data should be printed is made at the very end, in accordance with the value of the data identifying signal. In D1 this selection is effectively performed at the beginning, when the picture data, the character data and the data identifying signal are temporarily merged. Afterwards, the picture data stream and the character data stream are first separated and then combined again, but this final combination step involves no selection since the picture data stream has "gaps" corresponding to the data in the character data stream, and vice versa.

It is not explained in D1 why the picture and character channels are treated in this rather complex way. Possibly the reason is that the scanning and exposure operations have to be synchronised, which requires a

buffer memory for all data. The question is therefore whether the skilled person would have taken over prior art features for which no clear justification seemed to exist as far as his technical problem was concerned. According to the invention the separation of picture data and character data is necessary because the processing of the two types of data is different. But this was known from D1, and it was all that needed to be learnt from this document. There was no reason to consider other parts of the teaching which were irrelevant in the circumstances.

Therefore, it is not believed that the structural peculiarity of D1 - the merging of the picture data, the character data and the data identifying signal into one channel - created difficulties which it would have required inventive skill to overcome.

4.7 It follows that the invention does not involve an inventive step when compared with D1.

5. *Inventive step with respect to D3*

5.1 As to the technical area to which D3 belongs and the use of a dithering technique, the arguments above in respect of D1 apply also to D3. The only remaining question is therefore whether D3 also renders the last feature of claim 1 obvious: the "control selection means for selecting the image information signal of said first control means or of said second control means in accordance with the data identifying signal".

5.2 The appellant is of the opinion that since nothing is said in D3 about how the selection of type (character) data and picture data is performed, this feature was

not within the reach of the skilled person. It was for example possible that there was no selection at all in D3 but a mere merging of the two data streams, similar to the combination stage in D1.

The Board can however not accept this reasoning. It is stated in D3 that "for the reproduction of continuous tone graphic originals... as... a half-tone output, the multiplexer 48 directs the... outputs to the... emitter array... In the case of line graphic originals, the multiplexer 48 directs the sixteen line outputs... to the... emitter array" (text bridging columns 4 and 5). The impression is that an entire original is regarded as consisting either of line or image data and that therefore the multiplexer would not be switched over very frequently, something which would be consistent with the idea of an operator making the choice. In the Board's judgment, this operation can certainly be termed "selection".

5.3 It follows that the invention is obvious also when starting from D3.

6. For these reasons the main request is refused.

Auxiliary request 1

7. According to claim 1 of the first auxiliary request the data identifying signal receiving means receives the data identifying signal "from a data identifying signal input (S/D-SEL) of the main control unit". Similarly, the first control means generates the image information signal from character data "received from a character data input (S-DATA) of the main control unit", and the second control means generates a signal from picture

data "received from a picture data input (D-DATA) of the main control unit".

8. All three additions mention respective "inputs" of the main control unit. First, the addition concerning the "data identifying signal input" will be considered. This input cannot be identical with the input of the "data identifying signal receiving means" (a part of the main control unit) but must be situated before it. The first question is therefore whether there is support in the original application for a main control unit input separate from the input of the receiving means. The appellant has in this context referred to figures 1 and 2. Figure 1 is a block diagram of the main control circuit. It shows that the data identifying signal is output from a block 200 and is received by a circuit 160, which circuit can therefore be identified with the "data identifying signal receiving means" of claim 1 (which has no reference sign). This signal line crosses a border marked 100 representing the main control unit. The border is differently drawn than the boxes representing the various circuits. It will therefore hardly be understood as representing a physical interface but rather as merely indicating the parts of the circuitry which make up the main control unit. Therefore the crossing-point of a signal line with this border has no physical meaning. It does not indicate an "input" as this term is normally understood.

The same applies to the other two additions. It follows that none of them complies with Article 123(2) EPC.

9. The appellant has explained that the additions are intended to distinguish the invention from D1 by

clarifying that the picture data, character data and data identification signals are provided on separate channels rather than sharing a channel. But this distinction has already been considered (at point 4.6 above).

Auxiliary request 2

10. Compared with the main request, claim 1 of the second auxiliary request contains additionally the feature that "a matrix /is/ selected with reference to a mean value of a plurality of pixels and every dot corresponding to a pixel".

It is however already known from D3 to average the pixel values obtained by the scanner in order to reduce the resolution. In D3 each scan area has been averaged over 16 original pixels and is represented on the photographic film by 64 exposed areas (column 4, lines 38 to 43). This means that the number of pixels is not equal to the number of exposed areas, as claim 1 seems to require. Still, the desired resolution reduction and sub-pixel representation will be selected by the skilled person according to the quality of the original pictures and the capabilities of the disposable printer. There is nothing inventive in choosing a particular pair of parameters when the selection principles are the usual ones.

Auxiliary request 3

11. Claim 1 of this request includes the additions according to the first auxiliary request and is therefore also not acceptable under Article 123(2) EPC. But even neglecting this objection there would be no

inventive step in combining features - in this case the feature of processing the picture data and character data in separate channels and the feature of averaging pixels - which are not interrelated.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

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