BESCHWERDEKAMMERN DES EUROPÄISCHEN PATENTAMTS

BOARDS OF APPEAL OF THE EUROPEAN PATENT OFFICE

CHAMBRES DE RECOURS DE L'OFFICE EUROPEEN DES BREVETS

Internal distribution code:
(A) [ ] Publication in OJ
(B) [ ] To Chairmen and Members
(C) [X] To Chairmen
(D) [ ] No distribution

D E C I S I O N
of 10 October 2001

Case Number: T 0679/98 - 3.4.2

Application Number: 90306215.6

Publication Number: 0402143

IPC: G03G 15/00, G03G 15/20, B41J 2/20

Language of the proceedings: EN

Title of invention:
Image forming apparatus

Patentee:
CANON KABUSHIKI KAISHA

Opponent:
OCÉ-NEDERLAND B. V.

Headword:
-

Relevant legal provisions:
EPC Art. 56

Keyword:
"Inventive step (no)"

Decisions cited:
-

Catchword:
-

Europäisches Patentamt | European Patent Office | Office européen des brevets

Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 0679/98 - 3.4.2

D E C I S I O N
of the Technical Board of Appeal 3.4.2
of 10 October 2001

Appellant: (Opponent)
OCÉ-NEDERLAND B. V.
St. Urbanusweg 43
NL-5914 CC Venlo (NL)

Representative:
Van Meeteren, Arend Anthonie
OCÉ-TECHNOLOGIES B. V.
Patents & information
St. Urbanusweg 43
P.O. Box 101
NL-5900 MA Venlo (NL)

Respondent: (Proprietor of the patent)
CANON KABUSHIKI KAISHA
30-2, 3-chome, Shimomaruko
Ohta-Ku
Tokyo (JP)

Representative:
Beresford, Keith Denis Lewis
BERESFORD & CO
High Holborn
2-5 Warwick Court
London WC1R 5DH (GB)

Decision under appeal: **Interlocutory decision of the Opposition Division of the European Patent Office posted 19 May 1998 concerning maintenance of European patent No. 0 402 143 in amended form.**

Composition of the Board:

Chairman: E. Turrini
Members: A. G. Klein
V. Di Cerbo

Summary of Facts and Submissions

I. European patent No. 0 402 143 (application No. 90 306 215.6) was maintained in an amended form by the opposition division, on the basis of a set of claims of which claim 1 reads as follows:

"1 An image forming apparatus having a plurality of processing means for performing a process for forming a visible image by printing on a recording material (171 etc), the image forming apparatus comprising:

a detector (163-2)for detecting a plurality of quantities of state relating to said image forming process, and

control means (801,813,807 etc) for deriving from the detected quantities of state a control quantity for controlling a first aspect of the process, and for applying the determined control quantity to at least one (163-1) of said processing means,

characterised in that each of the detected quantities of state relating to said process for forming a visible image is examined by said control means using a plurality of qualitative classification standards (NB, NS, ZO, PS, PB) which are determined based on characteristics of said process,

in that the control means comprises a memory (803)for storing one or more rules qualitatively relating said quantities of state with the control quantity, a function memory (803) storing a plurality of membership functions expressing said quantities of state and said control quantity as members of a

plurality of fuzzy sets, a part of the fuzzy sets being used for examining the quantities of state and an inference computer (801,803,805) comprising a central processing unit (CPU) which, from the degree to which each of the detected quantities of state belongs to the or each fuzzy set, infers in accordance with said rule(s) a value for said control quantity, and

in that said central processing unit (CPU) is further arranged at other times to control a second aspect (133) of the process which is different from the first aspect and is not controlled by fuzzy inference."

The opposition division in its interlocutory decision referred in particular to the following documents:

01: US-A-4 348 102;

02: "An introductory Survey on Fuzzy Control"; M. Sugeno; Information Sciences: An International Journal, Volume 36, 1985, pages 59 to 83;

03: "Application of Fuzzy Control for Servo Systems"; Y. F. Li et al.; Proceedings of the IEEE International Conference on Robotics and Automation, Philadelphia 1988, pages 1511 to 1519;

06: "Al application for progress regulation and servo control"; N. R. Sripada et al; IEE Proceedings, Volume 134, Pt. D, No. 4, July 1987, pages 251 to 259; and

07: GB-A-2 142 751.

In the opposition division's view, the apparatus of

claim 1 differed from the closest prior art described in document O7 in that the central processing unit was arranged for controlling a first aspect of the image forming process in accordance with fuzzy inference and in that it was further arranged at other times to control a second aspect of the image forming process which was not controlled by fuzzy inference. The implementation of fuzzy control in an image forming device did not involve an inventive activity in view in particular of the background knowledge of the skilled person with respect to fuzzy control as exemplified by document 02 and by the teaching of document 03 relating to the simulation of fuzzy control of a servo motor, the latter being suitable for use in a printer.

The opposition division considered that there was however no teaching in the available prior art that would prompt the skilled person to arrange the controlling means so that fuzzy control and non-fuzzy control are run on a same central processing unit (CPU) in a multi-tasking mode, when implementing fuzzy control in an image forming device as known from document 07 (see point 5 of the reasons).

II: The appellant (opponent) lodged an appeal against the opposition division's interlocutory decision, relying in its statement of the grounds of appeal upon the following additional citation:

09: "AN EXPERIMENTAL STUDY ON FUZZY PARKING CONTROL USING A MODEL CAR"; M. Sugeno et al; Industrial Applications of Fuzzy Control, Elsevier, 1985, pages 125 to 138.

III. Oral proceedings were held on 10 October 2001, which

were not attended by the respondent (proprietor of the patent), as announced in its letter of 4 September 2001 in which it also requested that the appeal be dismissed and that the patent be maintained in the form allowed by the interlocutory decision of the opposition division.

The appellant requested that the decision under appeal be set aside and that the European patent in suit be revoked.

IV. The appellant in support of its request submitted that at the date of the patent in suit, implementing different controllers in a single CPU operated in a time-shared mode was a common procedure, as was evidenced for instance by document 07.

There was also ample evidence in the prior art citations that fuzzy logic was known as a relatively simple means of controlling complex, non linear processes, which in substance only involved the solution of elementary geometrical problems, like the calculation of areas and the determination of the position of centres of gravity, and which did not require much processing time. Document 03 for instance explicitly states that "such non-mathematical control algorithms can easily be implemented in a computer and they are straight forward and should not involve any computational problems" (see page 1511, right-hand column, the second paragraph).

Document 06 relates to temperature control and regulation, which is close to the application envisaged also in the patent in suit. This citation already discloses a servo control process in which both non-

fuzzy aspects (the actual controlling of the temperature) and fuzzy aspects (the calculation of the switching parameters) are implemented in a single controller. Moreover, once the operational temperature is achieved, temperature regulation is performed in a fully fuzzy mode, which in the embodiment disclosed is implemented in a separate controller. The document however explicitly states that normally both servo control and regulation would be combined in a single controller (see page 252, paragraph 1.4).

Document 09 also discloses an application in which a single processor controls both a non-fuzzy position measuring process aspect, namely the determination of the car's position, and a fuzzy process aspect, namely the calculation of speed and stirring angle.

Accordingly, the claimed integration of fuzzy and non-fuzzy process controllers in a single CPU is an option which the skilled person would have envisaged in an obvious way.

V. The respondent in its written submissions contested that measurement of direction and distance in document 09 constituted a control function within the meaning of the patent. Further, this document was merely an academic paper reporting on experiments, which would not have been taken into account by a person skilled in the art of image forming.

Document 03 considers fuzzy control as an alternative to non-fuzzy control, which implies that it does not contemplate using fuzzy and non-fuzzy control aspects alongside each other in a single microprocessor. This document also discloses the use of pre-established

look-up tables, and it does not therefore allow for real-time process control.

Document 06 expressly states that separate controllers are used for convenience and to shorten the computation time, and that a work station which is significantly more powerful than the IBM PC is required to facilitate more realistic applications. The skilled person is thus told how onerous the implementation requirements are likely to be in a real-world image printing operation with multiple inputs. This citation therefore actually teaches away from the invention.

Reasons for the Decision

1. The appeal is admissible.

2. *Admissibility of document 09 into the procedure*

Document 09 was relied upon by the appellant for the first time in its statement of the grounds of appeal of 22 September 1998, which is long after expiry of the delay for filing an opposition.

The technical content of the document is however easy to understand, and the respondent implicitly accepted its introduction into the procedure and discussed its merits in its response of 12 April 1999 to the statement of the grounds of appeal. He did not either contest the board's provisional opinion as expressed in its communication of 18 May 2001 annexed to the summons to attend oral proceedings, that late filed document 09 could be allowed into the procedure.

Accordingly, document 09 is admitted into the procedure.

3. *Patentability*

3.1 The respondent did not contest the opposition division's conclusions that the closest prior art was disclosed in document 07, that despite the elaborate wording of claim 1 the claimed apparatus was distinguished from it essentially by the implementation of fuzzy control and by the fact that fuzzy and non-fuzzy controls were run on the same CPU in a multi-tasking mode, and that the implementation of fuzzy control in an image forming device could not per se involve inventive activity.

Indeed, the citations on file in the board's view provide ample evidence that at the date of the patent the interest of using fuzzy logic in the control of processes was well known, in particular in the art of temperature control in general. Therefore, the mere idea of using this known technique also in conjunction with the control operations in the image forming apparatus of document 07 cannot positively contribute to inventive step.

For these reasons, the present decision may concentrate on the issue of the contribution involved by the second claimed distinguishing feature, namely the implementation of the control of both fuzzy and non-fuzzy process aspects in a single CPU.

3.2 Document 07 is dedicated to the non-fuzzy control of an image forming apparatus using a CPU operated in a time-shared mode, a plurality of different tasks being

executed in parallel in such a way that at each instant only one task is executed and the other tasks are in a waiting state (see page 3, lines 5 to 8). The automatic control operations include temperature control for maintaining a temperature of a fixing heater at a constant temperature, which is an application contemplated also in the description of the present patent, toner density control, photosensitive material potential control, light intensity control, etc. (see page 2, lines 36 to 40, table 3 on page 7 and the paragraph bridging pages 8 and 9). The document also discloses a separate microprocessor unit dedicated to controlling the servo motor of the optical system and to operating a speech recognition unit, as was correctly recognised by the opposition division (see Figure 15 and the paragraph bridging pages 18 and 19).

In view of the use of a separate CPU for the servo motor control in document 07, the opposition division concluded that the prior art did not prompt the skilled person to allocate the fuzzy control of a unit **such as a servo motor** to the main CPU when implementing fuzzy control in the apparatus of document 07 (see the last sentence of paragraph 5.4.2 of the reasons of the interlocutory decision).

However, the board notes that present claim 1 does not specify which aspect of the control process is subjected to fuzzy control, and that the embodiment of the patent in suit corresponding to an apparatus of the type disclosed in document 07 actually incorporates fuzzy control of the heater of a fixing device (see page 7, lines 29 to 38, Figure 1 and dependent claims 16 and 17).

In document 07 the fixing heater is controlled in a non-fuzzy mode by the main CPU operated in a time-shared mode, in parallel with other non-fuzzy control tasks.

Fuzzy logic was known at the priority date of the patent in suit to be particularly well suited for the control and regulation of temperature in technical applications involving heating processes (see the examples in the paragraph bridging pages 72 and 73 of document 02 and in the third paragraph of the right-hand column on page 1511 of document 03, or the only example described in the paragraph bridging pages 251 and 252 of 06).

Accordingly, merely replacing the non-fuzzy fixing heater controller as implemented in the main CPU of document 07 by a fuzzy controller, thus leaving the other non-fuzzy controllers of said main CPU unmodified, which immediately leads to an apparatus as set out in claim 1 of the patent in suit, cannot be considered to imply an inventive step, in the absence of any strong reason for the skilled person not to envisage such dual implementation in a single CPU.

The appellant in this respect demonstrated at the board's satisfaction that at the date of the patent the skilled person was aware of the fact that fuzzy logic did not involve any fundamental difference or computational difficulty which could have deterred him from implementing fuzzy control alongside non-fuzzy control in a single CPU.

Document 03 indeed explicitly states that fuzzy control algorithms can easily be implemented in a computer and

that they are straightforward and should not involve any computational problems (see page 1511, right-hand column, second paragraph).

Document 06, which describes an application of artificial intelligence in which both fuzzy and non-fuzzy control functions cooperate so as to achieve temperature control, stresses that both functions would "normally" be combined in a single controller, even if in the example described they were implemented separately for convenience and to shorten the computation time (see page 252, paragraph 1.4).

Document 09 describes an experimental study on fuzzy control of a model car. In this application a single microprocessor controls both non-fuzzy aspects of the control process, like the measurement of distance and direction using ultrasonic transducers, and the fuzzy inference of control signals for the car movement. This document does indeed not relate to the type of image forming apparatus concerned by the patent in suit, and it cannot be considered as forming part of the prior art which the skilled person would necessarily have taken into consideration, accordingly. The document however simply confirms that implementing both fuzzy and non-fuzzy control functions in a single CPU does not raise any particular technical difficulties.

Incidentally, the specification of the patent in suit, which does not offer any specific details of the

operation of the CPU sharing both fuzzy and non-fuzzy tasks, also suggests that there was no particular technical difficulty at the filing date of the patent for the skilled person to implement such dual operation.

For these reasons, the subject-matter of claim 1 as amended in accordance with the respondent's request (patent maintained in the form allowed by the interlocutory decision of the opposition division) does not involve an inventive step within the meaning of Article 56 EPC.

4. The requirements of Article 102(3) EPC for the patent being maintained with a so amended claim are not met, accordingly.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The patent is revoked.

The Registrar: The Chairman:

P. Martorana E. Turrini