

Veröffentlichung im Amtsblatt Publication in the Official Journal Publication au Journal Officiel	Ja/Nein Yes/No Oui/Non
---	------------------------------



12

Aktenzeichen / Case Number / N^o du recours : T 108/85
Anmeldenummer / Filing No / N^o de la demande : 80 901 951.5
Veröffentlichungs-Nr. / Publication No / N^o de la publication : WO 81/01120

Bezeichnung der Erfindung: High-speed printer
Title of invention:
Titre de l'invention :

Klassifikation / Classification / Classement : B 41 J 3/18

ENTSCHEIDUNG / DECISION

vom / of / du 17 December 1986

Anmelder / Applicant / Demandeur : Eric Marshall Design International Ltd

Patentinhaber / Proprietor of the patent /
Titulaire du brevet :

Einsprechender / Opponent / Opposant :

Stichwort / Headword / Référence :

EPÜ / EPC / CBE Article 56 EPC

Kennwort / Keyword / Mot clé :
"Inventive Step" - "Kinematic inversion" - "True combination"

Leitsatz / Headnote / Sommaire



Case Number : T 108/85

D E C I S I O N
of the Technical Board of Appeal 3.2.1
of 17 December 1986

Appellant : Eric Marshall Design International Ltd.
36 Stafford Road
Wallington, Surrey
SM6 9AA (GB)

Representative : Burford, Anthony F., et. al.
W.H. Beck, Greener & Co.
7 Stone Buildings, Lincoln's Inn
London WC2A 3SZ (GB)

Decision under appeal : Decision of Examining Division 086 of the
European Patent Office dated
29 November 1984 refusing European patent
application No. 80 901 951.1 pursuant to
Article 97(1) EPC

Composition of the Board :

Chairman : P. Delbecque
Member : C. Wilson
Member : F. Benussi

Summary of Facts and Submissions

- I. European patent application 80 901 951.6 filed on 17 October 1980 and published with publication No. WO 81/01120 claiming priority from a prior application of 19 October 1979 (GB 7 936 450), was refused by the decision of the Examining Division 086 of the European Patent Office dated 29 November 1984. The decision was based on Claims 1-3 filed with Applicants' letter of 12 September 1984 and Claims 4-7 filed with Applicants' letter of 20 February 1984.
- II. The reason given for the refusal was that the subject-matter of independent Claims 1 and 3 was lacking in inventive step in the light of US-A-3 963 340.
- III. On 25 January 1985 the Applicants lodged an appeal against the decision, paid the fee within the time limit and filed a statement setting out the grounds of appeal on 26 March 1985, together with new independent Claims 1 and 3.

The claims read as follows:

1. A method of printing a line of entire characters serially along a printing line onto a receiver, comprising steps of:
 - (i) providing the photoconductive circular periphery of a rotatable carrier with an electrostatic charge,
 - (ii) rotating the carrier and directing serially onto its charged periphery images of successive entire characters of the line of characters so as to result in said periphery acquiring along it a series of uncharged areas each corresponding to a respective such character,

- (iii) as the carrier rotates, applying serially to each uncharged area of the periphery a particulate fixable toner material having an electrostatic charge which is such that the toner material becomes electrically adherent to the uncharged areas,
- (iv) translating the carrier, in a plane normal to its axis of rotation, along a stationary receiver and bringing the adherent material of each area serially into a position most closely adjacent to the receiver,
- (v) applying an electrostatic field to cause transfer of the adherent material from the carrier to the receiver at said most closely adjacent position, and
- (vi) acting on the transferred material to fix it on the receiver,

characterised in that:

- (a) the carrier is rotated at constant speed uninterruptedly for the duration of printing of a line of characters,
- (b) the direction and rate of rotation of the carrier are made such, in relation to the direction and rate of translation of the carrier with respect to the receiver, that in said most closely adjacent position there is no relative motion along said line,
- (c) the axis of rotation of the carrier is maintained at a constant separation, relative to the receiver, for the duration of said translation along the line.

3. Apparatus, for printing a line of entire characters serially along a printing line onto a receiver, comprising:

- (i) a carrier having a photoconductive circular periphery,
- (ii) means for rotating said carrier,

- (iii) means for producing an electrostatic charge on said periphery,
- (iv) means for directing serially onto the charged periphery of the carrier, whilst it is rotating, images of successive entire characters of the line of characters so as to result in said periphery acquiring along it a series of uncharged areas each corresponding to a respective such character,
- (v) means for applying serially to each uncharged area of the periphery, as the carrier rotates, a fixable toner material having an electrostatic charge which is such that the toner material becomes electrically adherent to the uncharged areas,
- (vi) a stationary receiver,
- (vii) means for simultaneously translating the carrier in a plane normal to its axis of rotation along said receiver such that adherent material of each area is brought serially into a position most closely adjacent to the receiver,
- (viii) means for applying an electrostatic field to cause transfer of the adherent material from the carrier to the receiver at said most closely adjacent position,
- (ix) means for fixing the transferred material on the receiver,

characterised in that:

- (a) said rotating means rotate the carrier at constant speed uninterruptedly for the duration of printing of a line of characters,
- (b) said rotating means rotates the carrier in a direction and at a rate of rotation which are such, in relation to the direction and rate of translation of the carrier with respect to the receiver, that in said most closely adjacent position there is no relative motion along said line,

- (c) said translating means maintains the axis of rotation of the carrier at a constant separation relative to the receiver for the duration of said translation along the line.

The Appellants argue essentially that whereas according to US-A-3 963 340: the motion of the print head is always a compound of a translatory motion upon which there is superimposed an accelerate/decelerate motion, so that the rate of translation is not constant throughout the travel of the print head; the drum (702) in Figs. 12D and 12E rotates at a constant speed only for a very short interval during printing, that speed being selected to synchronise with the character disc (52) and not with the speed of translation of the print head; and there is always reciprocal motion of the character-delivery member (ribbon or drum) relative to the platen (3), according to the present invention: the translatory motion of the print head is constant throughout its travel; the photoreceptor drum rotates at constant speed throughout the travel of the print head, that rotation being selected such that there is no relative motion between the periphery of the drum and the platen; the photoreceptor drum does not reciprocate relative to the platen.

Each of these differences is a move away from what is taught by US-A-3 963 340 as being essential in the apparatus which it discloses. It is argued that such a combination of three major differences could not possibly be obvious to the man skilled in the art.

- IV. In reply to a communication from the Board dated 27 September 1985, in which the Rapporteur gave his preliminary opinion that none of the characterising features of Claims 1 and 3, neither alone nor in combination would appear to add anything inventive to the

subject-matter of the respective claims, the Appellants stressed in their letter received 7 December 1985 that the invention is defined over the prior art by the combination of the characterising features. They summarised their arguments as follows:

- (i) There is no disclosure in the cited art of characterising clause (a) of the Applicants' claims.
- (ii) In regard to characterising clause (b), even if it is inferred that the apparatus of US-A-3 963 340 "ought" to have relative speed of rotation of drum (702) and print head (700) selected to result in absence of relative motion at the point of contact, there is no statement to that effect in that patent.
- (iii) There is no disclosure in the cited art of characterising clause (c), and in fact every one of the very numerous embodiments disclosed in US-A-3 963 340 specifically includes a reciprocating movement of the print delivery item with respect to the receiver.
- (iv) As compared with US-A-3 963 340, the invention claimed has the very considerable advantage of eliminating the need for providing a step-by-step advance/retard motion of the print-delivering item relative to the receiver. It is the combination of integers (a), (b) and (c) which permits this improvement, and it is submitted that no conclusive argument has been made that such a combination would be obvious and lacking in inventive step.

V. The Appellants request the cancellation of the Decision dated 29 November 1984 and the grant of a European patent

based on the independent Claims 1 and 3 in the form received by the European Patent Office on 26 March 1985.

Reasons for the Decision

1. The appeal complies with Articles 106 to 108 and Rule 64 EPC and is, therefore, admissible.
2. There are no formal objections to the new Claims 1 and 3 since they are adequately supported by the original application documents.
3. After examining the prior publications cited in the search report, the Board is of the opinion that the subject-matter of Claims 1 and 3 is new.
4. Therefore, the question to be considered is whether this subject-matter involves an inventive step. The following points emerge.
 - 4.1 Features (i) to (iv) of the first part of Claim 1 are based on the nearest prior art, US-A-3 963 340, in which a rotary carrier (702), Fig. 12D, is translated along a stationary receiver on a plate (3). Characters are then transferred directly from the carrier to the receiver by moving the carrier into and out of contact with the receiver. According to the present application the characters are transferred from the electrostatic field, and are then fixed on the receiver, as claimed in Claim 1 by features (v) and (vi). However, since feature (v) is a well-known alternative to direct contact transfer, and fixing as in feature (vi) has normally to be carried out, no inventive merit can be attributed to these features which are also therefore correctly placed in the first part of the claim.

4.2 The problem to be solved in respect of the prior art reflected in the first part of Claim 1 is stated to be the removal of the following inherent disadvantages, namely: operational noise, complexity of moving parts, printing speed limitations and need for special papers, (see page 2, lines 1-6 of the application, received 14.09.84). This problem appears to be no more than the usual striving of the man skilled in the art for continually improving the prior art by eliminating its disadvantages, and is solved by the characterising features of Claim 1, viz:

- (a) the carrier is rotated at constant speed uninterruptedly for the duration of printing of a line of characters,
- (b) the direction and rate of rotation of the carrier are made such, in relation to the direction and rate of translation of the carrier with respect to the receiver, that in said most closely adjacent position there is no relative motion along said line,
- (c) the axis of rotation of the carrier is maintained at a constant separation, relative to the receiver, for the duration of said translation along the line.

It is more convenient to consider these three features in reverse order.

4.3 Therefore starting with feature (c), it follows automatically from the choice of character transfer by means of an electrostatic field that the movement of the carrier towards and away from the receiver could be eliminated. Indeed, any movement towards and away from the receiver would apparently adversely affect the transfer when an electrostatic field is utilised. No inventive merit can therefore be seen in this feature.

4.4 With regard to feature (b), the Examining Division correctly argued, that whilst it is admitted that the drum (702) according to US-A-3 963 340 and the carriage (700) do not move at a constant speed along the receiver, the speed of the carriage during printing is limited by the overspeed clutch (72) and must therefore be constant for this short printing period, which can be for printing several images without returning the drum. Also, to avoid blurring of the printed symbol on the paper, the carrier must be rotated at this same constant speed thus eliminating any relative movement between the surface of the carrier and the paper at the point of character transfer. The Board agrees with this analysis.

The Appellants argued that whilst it is admitted that the speed of rotation of the drum (702) is maintained constant (for a very short period) during actual printing of a character, that speed is evidently not such as is required to eliminate relative motion between the drum and the platen "because there is in every case a wiping action occurring between the drum and the platen". This statement is not however correct, particularly in respect of the embodiment shown in Figs. 12D and 12E. In the description of this embodiment in US-A-3 963 340, (see column 16, lines 11 to 34), no reference is made to a wiping action, and clearly no such wiping action between the drum and platen is possible without blurring of the transferred characters occurring. The wiping action referred to with respect to the other embodiments, e.g. Fig. 12B, column 15, lines 57 to 66 quite clearly refers to the wiping action of the print transfer member (716) across the back of the ribbon (714) at the pressure point (718). In this case there can be no relative motion between the ribbon (714) and the platen (3) at the pressure point (718) without blurring occurring.

Therefore, the conclusion that no relative motion occurs between the drum (702) surface and the platen (3) during printing whilst not stated in the US-A-3 963 340, appears to be justified. No inventive merit can therefore be seen in feature (b).

- 4.5 The last feature to be considered is feature (a), namely that the carrier is rotated at constant speed uninterruptedly for the duration of printing of a line of characters. From a consideration of this feature with feature (b), it follows that feature (a) is the equivalent of saying that the carrier is translated with respect to the receiver at constant speed uninterruptedly for the duration of printing of a line of characters.

Having regard to the apparatus according to US-A-3 963 340, the print head (700) carrying drum (702) is driven from a constant speed motor via an accelerate-decelerate ratchet panel and cam mechanism (column 5, lines 6-63 of the U.S. spec.). The constant speed motor also drives a character disc (52) directly to rotate at constant speed. The accelerate-decelerate motion of the print head (700) is imparted solely for the purpose of obtaining synchronism with the character disc (52), (see column 5, lines 6-18 of U.S. spec.). Clearly, in any printing method of the general type as disclosed in the U.S. spec. and in the present application it is essential to synchronise the rotation of the character or stencil disc with the speed of the carriage, and hence rotation of the drum. It cannot be seen as inventive to effect a simple kinematic inversion, viz. instead of rotating the disc with a constant speed, to translate the carriage and hence rotate the drum with a constant speed, particularly since the advantages to be achieved can be foreseen, namely e.g. increased speed of printing and avoidance of inertial problems in stopping and starting the disc in comparison with stopping and starting

the relatively heavy printing head. The appellant argues that such conclusion pre-empts the present alleged invention, and is arrived at with the benefit of hindsight "because the problem stated was already facing the man skilled in the art (the Inventor of USA No. 3963340) who nevertheless went to enormous trouble to construct the extremely complicated accelerate-decelerate drive device shown in Figs. 2a and 3. If it had in fact been obvious to provide a simple, constant and synchronised (with translation) motion of the drum (702) in the manner of the present invention, surely that would have occurred to the inventor of the USA device."

However, such argument completely ignores the fact that whereas the U.S. spec. was filed on 18.04.75, the present application claims a priority date of 19.10.79. In this four and a half years considerable advances have been made. Although at the application date of the U.S. application it was clearly considered that it was worthwhile to have a complicated drive system for the print head while driving the character or stencil disc at a constant speed, it cannot therefore be said that it was not obvious to drive the print head at a constant speed and then synchronise the speed of the stencil disc, as in the present alleged invention. There may have been many reasons why this was not possible at that time. For example, it may have been thought impossible to control the disc at a sufficiently high speed. That this was not the case at the priority date of the present alleged invention is clear from the fact that the Appellants did not think it necessary to describe how he would synchronize the speeds of the stencil disc and the rotary drum (3). Clearly he felt it was sufficiently obvious not to require describing.

If the manner in which synchronisation could be achieved had not been obvious at the priority date of the present application, then the application insofar as it is completely silent as to how this synchronisation is to be

achieved, would not disclose the invention in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art, and would not therefore comply with Article 83 EPC, and accordingly would not be allowable.

The fact that it is desirable to avoid stopping and starting the printing head cannot be denied. The inertial forces involved with respect to the head are clearly much higher than with respect to the disc, so that it is clearly advantageous to move the head at a constant speed rather than the disc. Given therefore that it was obvious at the priority date of the present application how one could synchronize the constant speed of translation of the carriage, and hence the constant speed of rotation therewith, with the speed of rotation of the stencil disc, it cannot be considered as inventive to interchange the functions of constantly moving parts with intermittently moving parts in such a way that the relative interaction of the parts remains the same. Such a constructional measure forms part of the normal considerations of the man skilled in the art. Feature (a) also does not therefore add anything inventive to the subject-matter of Claim 1.

- 4.6 Although none of features (a), (b) or (c) alone add anything inventive to the subject-matter of Claim 1, it must still be determined whether the combination of these features, as asserted by the Appellants, is inventive.

The Appellants have asserted that "the invention claimed has the very considerable advantage of eliminating the need for providing a step-by-step advance retard motion of the print-delivering item relative to the receiver. It is the combination of integers (a), (b) and (c) which permits this improvement".

However, the features (a), (b) and (c) do not appear to constitute a true combination in the sense of mutually supporting each other to achieve a new technical effect or result. Rather they appear merely to constitute an association of parts in which each functions in its usual way without producing any non-obvious working relationship. Feature (a), resulting merely from a kinematic inversion, provides continuous movement of the carriage along the receiver, but is completely independent of the method adopted for transferring the characters (determining feature (c)). Similarly, feature (c), determined by the method of character transfer adopted, is completely independent of feature (a). Clearly, if no impact is needed for transfer, there is no need to move the carrier towards and away from the receiver. This method of transfer is already well known in the art. Moreover, feature (b) must be present in the US-A-3 963 340 if it is to function at all practically, so that this feature cannot contribute to any inventive combination.

The subject matter of Claim 1 is therefore lacking in an inventive step and the claim is unallowable.

5. The apparatus Claim 3 must also fail for the same reasons.

Order

For these reasons,

it is decided that:

the appeal is dismissed.

The Registrar:

B A Norman

The Chairman:

P Delbecque