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

001095

Aktenzeichen / Case Number / N° du recours : T 328/86 - 3.4.1

17

Anmeldenummer / Filing No / N° de la demande : 81 301 628.4

Veröffentlichungs-Nr. / Publication No / N° de la publication : 0 038 207

Bezeichnung der Erfindung:
Title of invention:
Titre de l'invention : Apparatus for controlling the lateral alignment of a belt and electrostatographic printing machines and document handlers incorporating same

Klassifikation / Classification / Classement :

G03G 15/00, G03G 15/26, B65H 23/02

ENTSCHEIDUNG / DECISION

vom / of / du

28 March 1988

Anmelder / Applicant / Demandeur :

Xerox Corporation - New York

Patentinhaber / Proprietor of the patent /
Titulaire du brevet :

Einsprechender / Opponent / Opposant :

Stichwort / Headword / Référence :

EPÜ / EPC / CBE Articles 52(1), 56, 83, 123(2) EPC

Kennwort / Keyword / Mot clé : "Inventive step (Yes), feasibility of the invention (Yes), subject-matter extending beyond the content of the original application (No)"

Leitsatz / Headnote / Sommaire

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Case Number : T 328/86- 3.4.1

D E C I S I O N
of the Technical Board of Appeal 3.4.1
of 28 March 1988

Appellant : Xerox Corporation
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USA

Representative : Mr T.J. Frain
Rank Xerox Limited
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Decision under appeal : Decision of Examining Division 044 of the European Patent Office dated 27 March 1986 refusing European patent application No. 81 301 628.4 pursuant to Article 97(1) EPC

Composition of the Board :

Chairman : K. Lederer
Members : E. Turrini
O. Bossung

Summary of Facts and Submissions

I. European patent application No. 81 301 628.4, published as No. 0 038 207, was refused by decision of the Examining Division of the European Patent Office.

The invention relates to an apparatus for counteracting automatically any tendency for a travelling belt to wander from its intended path and to an electrostatographic printing machine and a document handler incorporating same.

II. The decision under appeal was based on seven claims. The Examining Division refused the application on the grounds of inadmissible amendment of Claim 1 (Article 123(2) EPC) and of non-feasibility of the invention (Article 83 EPC).

III. The Appellant appealed against the decision and requested that the impugned decision be cancelled. He essentially argued as follows:

As far as Article 123(2) EPC is concerned, although the word " remote" was not used in the original application, this feature can be deduced from the description and drawings as originally filed.

As far as the non-feasibility of the invention (Article 83 EPC) is concerned, Article 83 refers to the whole application, which gives sufficient information to realise the invention. Moreover, even from the wording of Claim 1 a skilled man would understand how to realise the invention.

IV. Following an informal personal consultation, the Appellant filed on 18 March 1988 a letter requesting that a European

patent be granted on the basis of new Claims 1 to 5 annexed to the letter.

Present Claim 1 reads as follows:

"Apparatus for counteracting automatically any tendency for a travelling belt (10) to wander from its intended path (16), including a roller (20) about which the belt is partially wrapped, the roller being pivotally mounted by holding means (70) for movement about a pivot axis remote from, and substantially normal to, the roller axis, the roller being frictionally driven around its axis by the belt (10), characterised in that the holding means comprises a furcated member including a pair of leaf springs (71, 73) each supporting one end of the roller (20) respectively, the pivot axis being substantially at the point of intersection of the extensions of the leaf springs (71, 73) and being substantially normal to a plane containing the roller axis and the point of intersection of the extensions of the leaf springs (71, 73), and in that the belt (10) is in such frictional engagement with the roller (20) that movement of the belt laterally of its path causes the roller to move in unison therewith and to pivot about the pivot axis to maintain the belt (10) substantially in its intended path (16)".

Claims 2 and 3 are dependent on Claim 1.

Present Claim 4 reads as follows:

"An electrostatographic printing machine having a photoconductive belt (10) arranged to move in a predetermined path through a plurality of processing stations disposed therealong, including apparatus as claimed in any preceding claim for keeping the belt on its path."

Present Claim 5 reads as follows:

"A document handler for an electrophotographic printing machine having a document drive belt arranged to move in a predetermined path, and including apparatus as claimed in any of Claims 1 to 3 for controlling the alignment of the belt."

Reasons for the Decision

1. The appeal is admissible.

2. There is no objection to the current set of claims as far as Article 123(2) EPC is concerned, since it is supported by the original disclosure.

The features of present Claim 1 are supported by the original Claims 1 and 3 to 5, by the original description, page 8, and by the original Figure 2.

In particular, the features that the pivot axis is not only normal to, but also remote from the roller axis, and more specifically is "substantially at the point of intersection of the extensions of the leaf springs and substantially normal to a plane containing the roller axis and said point of intersection" are disclosed by the original Figure 2 in connection with the original description, page 8, lines 22 to 24 ("The extensions of leaf springs 71 and 73 intersect one another at a pivot point about which roller 20 tilts during lateral movement of belt 20"). Indeed, the fact that the point of intersection of the extensions of the leaf springs is remote from the roller axis and the fact that the slots in broken lines (Figure 2) have their longitudinal axes in the plane of the longitudinal axes of

the leaf springs, so as to force the roller axis to pivot, as indicated by arrow 74, in said plane, support unambiguously the features of the pivot axis outlined in Claim 1.

Also, the expression at the end of present Claim 1 "to maintain the belt (10) substantially in its intended path (16)" complies with the operation of the apparatus as disclosed in the original application, in particular in Figures 2 and 3 and in the original description, page 8, line 25 to page 9, line 16. Moreover, it is self-evident that, if the frictional force disappears, the belt returns, under the action of the leaf spring, exactly to its intended path; if, on the contrary, the frictional force does not disappear, the leaf springs remain slightly deflected so as to counterbalance said force. Such operation of the apparatus springs justifies the wording "substantially in its intended path".

It is true, as outlined above, that some of the before-mentioned features of present Claim 1 are mainly disclosed by the original drawings. However, the drawings have to be considered part of the content of the application (Articles 78, 85 and Rule 43 EPC; Guidelines C-VI, 5.5), as it is pointed out also in the Decision of the Technical Board of Appeal T 169/83 (OJ 7/1985, pages 193 to 209, in particular paragraph 2.5).

As far as Claim 5 is concerned, this is supported by the original description, page 1, first paragraph and page 9, second paragraph.

3. Feasibility of the invention.

Present Claim 1 defines unambiguously the pivot axis and the whole restoring mechanism, which maintains

substantially the belt in its intended path as outlined in the preceding section 2.

Thus, the application in suit complies with Article 83 EPC.

4. Novelty.

4.1 Document US-A-3 974 952 (A1) (Figures 4, 4a and 4b) refers to an apparatus for counteracting any tendency for a travelling belt (W) to wander from its intended path (column 5, lines 15 to 18), including a roller (44) about which the belt (W) is partially wrapped, the roller being pivotally mounted by holding means (60, 70) for movement about a pivot axis (castering axis 100) remote from, and normal to, the roller axis, the roller being frictionally driven around its axis by the belt (the bearing 122 together with the roller and the belt indicate, at least implicitly, that the roller is "frictionally driven by the belt"). The above-mentioned features correspond to the preamble of Claim 1.

However, the apparatus is so constructed that the roller is also pivotally mounted about a gimbal axis 105 (column 8, line 28) and there is "no lateral resistance to the entering web" (column 10, lines 1 to 14), i.e. there is no substantial frictional engagement between roller and web (belt) in the lateral direction. Moreover, the holding means does not include leaf springs (supporting back and front plates 60 and 70 of Figures 1 and 2 are obviously rigid) and is not furcated (plates 60 and 70 are parallel so that there is no point of intersection of the two supports).

Thus, the features of the characterising part of Claim 1 are not present in document A1.

4.2 Prior art document US-A-3 796 488 (A2) (Figure 4) describes an apparatus for counteracting automatically any tendency for a travelling belt (10) to wander from its intended path (column 2, line 61 and column 6, lines 12 to 16), including a roller (22) about which the belt (10) is partially wrapped, the roller being pivotally mounted by holding means (23, 24) for movement about an axis (19) normal to the roller axis, the roller being frictionally driven around its axis by the belt.

Contrary to the subject-matter of Claim 1, in document A2 the pivoting axis normal to the roller axis is not remote from said roller axis and the lateral movement of the belt does not cause the roller to move in unison therewith, but rather the belt comes into contact with a lateral protrusion (23'). As a consequence, the roller pivots about the pivoting axis (19) in such a way that the belt is returned automatically to its initial position.

4.3 Prior art document US-A-3 500 694 (A3) (Figure 6) describes an apparatus in which, contrary to the subject-matter of Claim 1, the belt is restored in its intended path by means of a sensing device having a sensing finger positioned adjacent an edge of the belt and pivoting the roller about an axis perpendicular to the roller axis by means of a servo system actuated by said sensing finger (column 9, line 66 to column 10, line 13).

4.4 The other cited documents do not come closer to the subject-matter of Claim 1 than documents A1, A2 and A3 and need not be discussed for this reason.

4.5 For the above reasons the subject-matter of Claim 1 is considered to be novel within the meaning of Article 54 EPC. The independent Claims 4 and 5 include the features of

Claim 1. Their subject-matter has therefore also to be considered novel (Article 54 EPC).

5. Inventive step.

5.1 Claim 1 is based, as before outlined, on document A1, which is, in the Board's view, the nearest prior art.

Starting from the disclosure of this document, the objective problem to be solved is to maintain or improve the automatic counteracting action against any tendency for a travelling belt to wander from its intended path, while substantially rendering the apparatus less complex and less costly and at the same time avoiding the introduction of any local stresses resulting in damage to the edges of the belt.

This problem is solved by the features of the characterising portion of Claim 1.

5.2 Referring to the solution of this problem, the man skilled in the art would try to avoid the complexity of the apparatus of document A1 due to the double pivoting axes of rotation (100 and 105) and would look at prior art documents in the same technical field showing simplified solutions. He would indeed be expected to consider, e.g. document A2, whereby the counteracting action for automatically controlling the later position of the belt is obtained by means of only one pivoting axis. However, the latter document teaches to achieve the automatic counteraction by means of lateral protrusions or flanges which give rise to local stresses of the belt with possible subsequent damage of its edges.

He would, therefore, consider other prior art documents and look for solutions avoiding such stresses as, e.g.

suggested by document A3, which teaches to replace the flanges or protrusions with a sensing finger positioned adjacent an edge of the belt and pivoting the roller about an axis perpendicular to the roller axis by means of a servo system actuated by said sensing finger. However, this solution is complicated and costly.

The other cited prior art documents are not particularly relevant in judging the inventive step.

Summarising none of the cited documents would suggest to him the solution outlined by the features of the characterising portion of Claim 1, whereby obtaining a surprisingly simple restoring mechanism by means of a resilient holding means pivoting about a unique pivot axis and avoiding at the same time stresses due to dynamic friction between the moving belt and fixed parts of the apparatus, e.g. protrusions, thus solving the posed technical problem.

5.3 Thus, the subject-matter of Claim 1 is considered to involve an inventive step within the meaning of Article 56 EPC and Claim 1 is, therefore, allowable under Article 52(1) EPC.

5.4 Claims 2 and 3 depending on Claim 1, correspond to particular embodiments of the invention. Moreover, independent Claims 4 and 5 include all the features of Claim 1. Claims 2 to 5 are, therefore, also allowable under Article 52(1) EPC.

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 grant a European patent on the basis of the following documents:

2.1 Description, pages 1 to 6, filed on 18 March 1988.

2.2 Claims 1 to 5 filed on 18 March 1988.

2.3 Drawings: sheets 1/2 and 2/2 as originally filed.

The Registrar: The Chairman:

F.Klein K.Lederer