BESCHWERDEKAMMERN DES EUROPÄISCHEN PATENTAMTS | BOARDS OF APPEAL OF THE EUROPEAN PATENT OFFICE | CHAMBRES DE RECOURS DE L'OFFICE EUROPEEN DES BREVETS

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File Number: T 620/91 - 3.2.5

Application No.: 85 304 599.5

Publication No.: 0 168 202

Title of invention: Method and apparatus for monitoring sheets

Classification: B65H 43/08

D E C I S I O N
of 2 March 1993

Applicant: DE LA RUE SYSTEMS LIMITED

Opponent: GAO Gesellschaft für Automation und Organisation mbH

Headword:

EPC Art. 52(1) and 56

Keyword: "Inventive step (yes) combination of means"

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Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number : T 620/91 - 3.2.5

D E C I S I O N
of the Technical Board of Appeal 3.2.5
of 2 March 1993

Appellant : (Proprietor of the patent)	DE LA RUE SYSTEMS LIMITED De la Rue House 3/5 Burlington Gardens GB-London W1A 1DL (GB)
Representative :	Skone James; Robert Edmund GILL JENNINGS & EVERY Broadgate House 7 Eldon Street GB-London EC2M 7LH (GB)
Respondent : (Opponent)	GAO Gesellschaft für Automation und Organisation mbH Euckenstraße 12 W-8000 München 70 (DE)
Representative :	Klunker . Schmitt-Nilson . Hirsch Winzererstraße 106 W-8000 München 40 (DE)
Decision under appeal :	Decision of the Opposition Division of the European Patent Office dated 2 May 1991 with written reasons posted on 4 July 1991 revoking European patent No. 0 168 202 pursuant to Article 102(1) EPC.

Composition of the Board :

Chairman : C.V. Payraudeau
Members : M.H.M. Liscourt
A. Burkhart

Summary of Facts and Submissions

I. An opposition was filed by the Respondent against the patent No. 0 168 202 granted on the basis of the European application No. 85 304 599.5.

II. The Opposition Division revoked the patent as granted for lack of inventive step and further auxiliary requests were rejected as contrary to the provisions of Article 123(2) EPC.

III. The Appellants (Proprietor) filed an appeal on 16 August 1991 and paid the corresponding fee simultaneously. The grounds of appeal were filed on 31 October 1991.

IV. Oral proceedings were held on 2 March 1993 on request of both parties at the end of which:

- The Appellant requested that the decision under appeal be set aside and that the patent be maintained as granted (main request) or on the basis of amended claims filed with the Statement of Grounds (first auxiliary request) or on the basis of the amended claims filed with letter dated 11 September 1992 with the replacement of the word "set" by the word "batch" in Claim 1 and 12 (five occurrences) (second auxiliary request) or on the basis of the amended claims filed with telecopy of 1 February 1993 with the replacement of the word "set" by the word "batch" (five occurrences (third auxiliary request).

- The Respondents (Opponents) requested that the appeal be dismissed.

V. Claim 1 according to the main request reads as follows:

"1. A method of monitoring the passage of sheets (59) at least one sheet sensing assembly (15, 18) of a sheet feeding apparatus, the or each sensing assembly (15, 18) generating an output signal whose level varies in accordance with a characteristic of the sheets, the method comprising for the or each assembly (15, 18) setting a single sheet output signal threshold (63) at a level which is less than that of the output signal generated by the sensing assembly when a sheet passes the sensing assembly; and monitoring the output signal at least when it passes the threshold (63) characterised by presetting a first threshold (62) spaced by a predetermined amount from a datum output signal level (57) achieved when no sheet is sensed, the predetermined amount being such that the first threshold (62) is not passed as a result of random noise variations in the output signal but is passed during the passage past the sensing assembly of all sheets which it is desired to monitor; monitoring the size of the output signal relative to the datum level (57) when the output signal first passes the first threshold (62) corresponding to the passage of a first sheet; generating the single sheet threshold (63) from the monitored size; and thereafter sensing when the output signal passes the thresholds (62, 63)."

and is followed by ten dependent claims numbered 2 to 11.

Claim 12 according to the main request is the single apparatus claim and reads as follows:

"12. Apparatus for monitoring the passage of sheets (59) past at least one sensing assembly (15, 18), the sensing assembly being adapted to generate on output signal whose level varies in accordance with a characteristic of the sheets, the apparatus comprising storage means (54) for storing for the or each sensing assembly a single sheet

output signal threshold (63) corresponding to a signal level which is less than that of the output signal generated by the sensing assembly when a sheet passes the sensing assembly; and monitoring means (52, 53) for monitoring the output signal; characterised by means (54) for storing a first, preset threshold (62) spaced by a predetermined amount from a datum output signal level (57) achieved when no sheet is sensed, the predetermined amount being such that the first threshold is not passed as a result of random noise variations in the output signal but is passed during the passage past the sensing assembly of all sheets which it is desired to monitor, the monitoring means (52, 53) being adapted to monitor the size of the output signal relative to the datum level (57) when it first passes the first threshold (62); and calculating means (53) for calculating the single sheet threshold (63) from the monitored size and for storing the single sheet threshold in the storage means (54)."

VI. The Appellants essentially submitted that the claimed method and the claimed device enable the automatic processing of sets or batches of sheets of different thicknesses without any intervention of an operator while the devices of the prior art necessitate a manual setting, performed directly or by introducing a master sheet in the device. In the method and device according to the invention, a first sheet threshold signal is automatically produced when the first sheet of a batch is automatically introduced into the device, this signal being used as reference for comparison with a preset no sheet threshold signal generated when no sheets are present and with signals produced by the following sheets of the same batch.

VII. The Respondents referred in their submissions essentially to the following documents:

- E1 WO-A-82/01698
- E3 EP-A-0 086 097
- E4 DE-A-2 426 642
- E5 WO-A1-81/01 827.

On the basis of these documents, the Respondents argued that all the steps of the process according to Claim 1 of the patent in suit were known from document E1 except the step of generating a single sheet threshold from the monitored size.

According to document E1, such a single sheet threshold value is set manually, taking into account the expected thickness of each one of the sheets to be handled. An auto-reference circuit compensates the mechanical and electrical drift by adding to the single sheet threshold value a predetermined potential corresponding to the signal produced in the absence of a sheet.

Considering such a manual setting as being a drawback, the method of the patent in suit uses the first sheet of each batch of sheets for automatically generating a single sheet threshold signal.

This is known from document E3 which describes a method of monitoring sheets according to which, in a preferred embodiment, the capacitance of a first single sheet is measured and the obtained value is used to generate automatically a reference value.

An analogous solution is proposed in document E4 according to which a reference value is generated by measuring a parameter of a first sheet which is used afterwards for comparison with the value produced by the following sheets.

There is therefore no invention in combining the teachings of documents E1 and E3 or E4.

Also, the document E5, already cited during the examination proceedings, describes a device wherein the distance between two rollers is used for detecting the thickness of the sheets which pass between them and thresholds are determined corresponding to the noise and to the passage of multiple sheets so that this device produces a signal each time a single sheet is sensed and another signal when multiple sheets are detected.

Document E5 describes thus a method which comprises all features of Claim 1 except the step consisting in setting a single sheet output signal threshold at a level which is less than that of the output signal generated by the sensing assembly when a sheet passes said sensing assembly and the step according to which a first threshold is preset spaced by a predetermined amount from a datum output signal level achieved when no sheet is sensed.

Therefore, when combining E5 with E3 or E4 which both teach to store a single sheet threshold value before introducing a batch of sheets in the device, the skilled person comes to the claimed method without having to exert inventive activity.

Reasons for the Decision

1. Interpretation of the claims

1.1 The independent Claims 1 and 12 concern, respectively, a method and a device for monitoring the passage of sheets

by sensing a characteristic of the sheets. It is not indicated in these claims what characteristic is sensed.

1.2 It results however clearly from the description and drawings of the patent in suit that the only characteristic which is measured for the object of these claims is the thickness of the sheets (which may be determined by different parameters such as physical, electrical or optical parameters). It is not envisaged to measure other characteristics such as the width or length of the sheets or their colour, for example. The word "characteristic" is therefore to be interpreted in this context as meaning "thickness".

2. Novelty

None of the cited documents describes all the features recited in Claim 1. This has not been contested by the Respondents.

The same applies for Claim 12 which recites all the device features which correspond to the process features of Claim 1.

The method according to Claim 1 and the apparatus according to Claim 12 are therefore novel.

3. Inventive step

3.1 The cited document which describes the nearest state of the art is document E1.

Document E1 describes a method of monitoring the passage of sheets according to which a sensing assembly (a linear variable differential transformer, L.V.D.T.) generates a

signal whose level is proportional to the thickness of the sheets. A single sheet signal level is set by the operator at a level less than an output signal generated during a single sheet passage and a double sheet signal level is derived from the single sheet signal level. In order to compensate for mechanical and electrical drift in the thickness level corresponding to the absence of a sheet, an auto-reference circuit derives first and second threshold values for single and double sheets respectively by adding predetermined potentials to the reference potentials. These predetermined differentials may be controlled manually by a variable resistor within a thickness control circuit.

According to this method, a single-sheet threshold is set manually by the operator, the reference level for this threshold and for the double-sheet threshold automatically set up being updated by the operator when the auto-reference circuit visually indicates that the signal produced in the absence of a sheet is outside the set reference level for the thresholds.

3.2 Starting from this state of the art, the problem which the method according to Claim 1 of the patent in suit is intended to solve is to propose a method according to which the passage of a batch of sheets may be automatically monitored without any intervention of the operator and whatever the thickness of the individual sheets.

3.3 According to Claim 1, this problem is solved by using two independent threshold values and by adopting the following conditions for said threshold values:

- the first threshold value is spaced by a predetermined amount from a datum output signal level obtained when

the sheet feeding apparatus is running without transporting any sheet, the predetermined amount being so chosen as to be smaller than the signal produced by the passage of the thinnest sheet to be handled but greater than the signal produced as a result of random variations or noises, this threshold being used for detecting the passage of a first sheet;

- the second threshold value or single sheet threshold is obtained by monitoring the size of the output signal when it passes for the first time the first threshold indicating the passage of a first sheet. The second threshold value is established at a level above the datum output signal level which is less than said output signal but higher than the first threshold value. The method provides sensing when the output signal passes the two thresholds.

3.4 The important differences between the method disclosed in document E1 and the method which is the subject-matter of Claim 1 reside therefore in that if, according to the method of document E1, a single-sheet threshold is also produced, this threshold is manually fixed by the operator as well as the reference level for this threshold and no first threshold value spaced by a predetermined amount from the datum output signal level is generated.

3.5 According to the Respondents, it was already known per se from the documents E3 and E4 to use the actual value obtained during the passage of a first sheet as a reference value for the following sheets. The combination of the teaching of the document E1 with the teaching of either document E3 or document E4 was obvious for the person skilled in the art and would lead to the method which is the subject-matter of Claim 1 of the patent in suit.

3.6 The Board cannot follow this reasoning.

As indicated above, the method of document E1 does not provide the automatic setting up of the single-sheet signal level. Even if the person skilled in the art would be incited to try modifying the method of document E1 in order to automatize it in the light of the teaching of documents E3 or E4, he would not arrive at the subject-matter of Claim 1 which, due to the use of a first threshold, allows the detection of a first sheet without influence of the noise or other random signals.

Since, according to the method of document E1, no threshold is established above the reference level, any random variation above the reference level of the signal produced when no sheet is present would be erroneously interpreted by the circuit as indicating the passage of a first sheet. Such random variations would be likely to occur since the reference level is only updated by the operator when the LEDs indicate that this level is no more appropriate.

3.7 The document E5 also cited by the Respondent discloses an apparatus for monitoring the passage of sheets. As acknowledged in the introductory part of the patent in suit (col. 1, lines 34-45), this apparatus allows the detection of single and double sheets by comparing the level of the signals produced when a single sheet or a double sheet is detected with preset values. If Figs. 6 and 7 of this document show above the 0 line a curve representing the idle noise and if this document indicates on page 10 lines 5-12 that the signal produced by the passage of a single sheet is sufficiently high to surpass the preset detection threshold whereas the idle noise is

not strong enough to reach this threshold, it does not envisage any measure to ensure that it is effectively so in particular for very thin sheets and does not provide any means for automatically setting up the threshold during the passage of a first sheet. For these reasons, and also for the same reasons as explained in relation to the document E1, the person skilled in the art, even if he would be incited to combine the teaching of this document with the teachings of document E3 and E4, would not arrive at the method which is the subject-matter of Claim 1 of the patent in suit.

3.8 The method which is subject-matter of Claim 1 was therefore not obvious for the skilled person and it satisfies therefore the requirements of Articles 52(1) EPC.

4. This applies also to dependent method Claims 2 to 11, since they contain, due to their reference to Claim 1, the features of Claim 1 and additional features which restrict their scope with respect to Claim 1.

5. As regards the apparatus Claim 12, it contains all the essential features of Claim 1 either in the form of means for performing the method steps or of means adapted for the corresponding method steps recited in Claim 1.

The apparatus according to Claim 12 is therefore also patentable, for the same reasons as the method according to Claim 1.

6. As the main request is accepted, there is no need for the Board to consider the auxiliary requests of the Appellants.

Order

For these reasons, it is decided that:

1. The decision under appeal is set aside;

2. The patent is maintained as granted.

The Registrar:

A. Townend

The Chairman:

C. Payraudeau