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Bezeichnung der Erfindung: Bottom sheet separator-feeder
Title of invention:
Titre de l'invention :

Klassifikation / Classification / Classement : B 65 H 3/00

ENTSCHEIDUNG / DECISION

vom / of / du 3 March 1988

Anmelder / Applicant / Demandeur : XEROX CORPORATION

Patentinhaber / Proprietor of the patent /
Titulaire du brevet :

Einsprechender / Opponent / Opposant :

Stichwort / Headword / Référence : Separator-feeder/Xerox

EPÜ / EPC / CBE Article 56 EPC

Kennwort / Keyword / Mot clé : Inventive step (yes)

Leitsatz / Headnote / Sommaire

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Case Number : T 263/84 - 3.2.1

D E C I S I O N
of the Technical Board of Appeal 3.2.1
of 3 March 1988

Appellant : XEROX CORPORATION
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Decision under appeal : Decision of Examining Division 084 of the European Patent Office dated 10 May 1984 refusing European patent application No. 80 303 502.1 pursuant to Article 97(1) EPC

Composition of the Board :

Chairman : C.T. Wilson
Members : M. Liscourt
P. Ford

Summary of facts and submissions

I. European patent application No. 80 303 502.1 filed on 3 October 1980 and published under No. 0027341 was refused by a Decision of the Examining Division of the European Patent Office dated 10 May 1984. The decision was based on Claims 1-7 originally filed with Claim 1 amended as specified in the Appellant's letters received on 29 January 1983 and 22 October 1983.

The reason given for the refusal was that Claim 1 was not allowable since its subject-matter did not show the inventive step required by Articles 52(1) and 56 EPC.

II. A notice of appeal was filed on 6 July 1984 and the appeal fee paid at the same time. In the statement of grounds filed on 10 September 1984, it was requested that a patent should be granted on the basis of a new set of claims numbered 1-7 (set A) or on the basis of one of three sets of claims (sets B to D) filed as auxiliary requests.

III. In four communications of the Board of Appeal, reasons were given for the fact that the proposed claims did not comply with the requirements of the EPC.

In his last reply received on 16 September 1987, the Appellant gave reasons in favour of the allowability of a proposed new Claim 1, and in a letter dated 19th February 1988 confirmed that he requests grant of the patent on the basis of this single claim which reads as follows:

"A bottom-sheet separator-feeder for separating the bottom sheet from a stack of sheets, and then feeding the separated sheet to downstream sheet-using means, including a stack tray (5) having a support surface for supporting a

stack (7) of sheets positioned in the tray, and a perpendicular face against which an edge face of the stack is intended to rest and which defines one end of the tray; a suction sheet-feeder (37, 41) located at the opposite end of the tray; air injection means (12) adapted to provide a layer of pressurised air between the tray and the bottom of the stack, so as to offset some of its weight; a blower (55) for supplying pressurised air to the injection means and for sucking air from the sheet-feeder, and a valve (57) in the air conduit between the feeder and the blower, characterised by the injection means consisting of an injector (12); the valve being adapted to be cyclically operated during each sheet-feed cycle so that it is opened at the beginning of the sheet-feed cycle to cause a pulse in the pressure of the air supplied to the injector (12) sufficient to lift the stack (7) from the bottom sheet in the tray (5) each time a sheet is to be fed, acquisition of a sheet by the feeder resulting in reduced air flow to the injector sufficient to maintain the stack in its floating position relative to the tray (5), and closed after a bottom sheet has been fed, to allow a previously-fed sheet to return to the top of the tray without interference from the air flow from the injector;
the support surface bounding a generally U-shaped contiguous pocket (53) intended to underlie the bottom sheet when in place and defining a mouth therewith at the said opposite end of the tray;
the injector being positioned above the plane of the support surface and adapted to direct its effluent air stream into the mouth of the pocket (53), to build up in the pocket a pneumatic cushion taking part of the weight of the stack, and to riffle the edges of the lowermost sheets resting on the support surface, and by
the suction sheet-feeder being positioned adjacent to the injector and at least partly in the pocket (53) and below

the plane of the support surface, and having a raised portion (48) projecting above adjacent sheet-feed belts (37), whereby when part of one end of the bottom sheet has been sucked and/or blown down into contact with the feeder, and is held there by suction, the bottom sheet has its captured end curved by contact with the raised portion (48) to form a longitudinal corrugation, whereby air from the injector acts to separate from the corrugated bottom sheet any other sheet that might have moved downwardly with it."

Reasons for the decision

1. The appeal complies with Articles 106 to 108 and Rule 64 EPC and is admissible.

2. The new main claim consists of the original claim, limited by adding features which were already contained in the application as filed; Article 123(2) EPC is therefore satisfied.

3. An examination of the documents revealed in the search report and otherwise disclosed in the procedure shows that none of them disclose a bottom-sheet separator-feeder having all the features set out in Claim 1. The nearest document, DE-A-2 550 606, only reveals the features which are exposed in the pre-characterising part of Claim 1. The subject-matter of Claim 1 is therefore novel.

4. It remains to be examined therefore whether the subject-matter of the main claim involves an inventive step. This examination results in the following observations:

4.1 According to DE-A-2 550 606 a bottom-sheet separator-feeder for separating the bottom sheet from a stack of sheets and then feeding the separated sheet to downstream sheet-using

means includes a stack tray (see Fig. 2) having a support surface (106) for supporting a stack of sheets positioned in the tray, and a perpendicular face against which an edge face of the stack is intended to rest and which defines one end of the tray, a suction sheet-feeder (129, 122) located at the opposite end of the tray, air injection means (104) adapted to provide a layer of pressurised air between the tray and the bottom of the stack, so as to offset some of its weight, a blower (108) for supplying pressurised air to the injection means and for sucking air from the sheet feeder and a valve (136) in the air conduit between the

feeder and the blower. When operating to separate and feed sheets, the bloer operates continuously to keep the stack lifted from the surface 106,and the valve 136 remains open to suck into contact with a feeder belt 128 the leading edge of the sheet being fed from the stack.

4.2 According to the description in the present patent, when using this type of feeder from the state of the art, one of the major problems is that, without knowing how large a stack of documents is to be placed in the feed tray or the weight of the individual documents the device cannot be simultaneously gentle enough for small stacks of light-weight paper and yet be capable of handling large stacks of heavy-weight paper.

4.3 The problem to be solved by the present invention is accordingly to adapt the device of the state of the art in such a way that these drawbacks are remedied without the need for the user to have to set the device according to the weight of the sheet or to the height of the stack.

4.4 The solution proposed consists of a device including the features of the characterising part of Claim 1.

Thus, in accordance with the teaching of the present invention:

- the air cushion for lifting the stack is induced by an air current blowing from one end of the tray into a pocket formed in the support surface, this same current simultaneously separating the first sheet to be fed,

- the suction sheet-feeder is provided with means for corrugating the bottom sheet when attracted onto it,

- the injection means and the suction means are connected together in such a way that a spike is produced when the valve is opened, which helps to lift the stack at the beginning of one cycle and after a sheet has been sucked onto the feeder the strength of the air current depends on the bending modulus of said sheet.

4.5 An examination of the revealed prior art shows that none of the cited documents mentions the idea of lifting the stack by using a lateral air jet, lateral air jets being known only to fulfil the function of separating the first sheet. The same applies to the corrugating means provided on the feeder and to the measure of feeding the blower with air sucked from the sheet-feeder in the above way.

DE-A-2 731 632 for example discloses the use of the blast from an air injector (air knife) to riffle the lead edges of the lowermost sheets in a stack to facilitate the extraction of the bottom sheet, but in no discernible sense is the air blast used to support any of the weight of the stack.

US-A-3 926 427 discloses a sheet separator-feeder using reciprocable shuttles for peeling off the bottom sheet from a stack. One end of the sheet becomes attached by suction to a flexible belt under which one shuttle slides, and an air knife is used to separate from the bottom sheet any other sheet accidently drawn with it, although it is the shuttles which cooperate to bear the weight of the stack.

4.6 It is however not necessary to consider whether the individual characterising features of Claim 1 were obvious or not since it is the combination of these features which provides for the result that different strengths of paper and different thicknesses of stacks can be handled by the device which is subject-matter of Claim 1 without having to adjust the strength of the air flow or of any other part of the device. This result cannot be attributed to any individual measure or to any association of said individual measures functioning in their normal way and not producing any non-obvious working inter-relationship. There is thus a true combination of means, which cannot be considered as obvious for the man skilled in the field of paper-sheets handling devices.

4.7 The subject-matter of Claim 1 therefore includes an inventive step, and this claim is therefore allowable according to Articles 52(1) and 56 EPC.

Order

For these reasons, it is decided that:

1. The contested decision is set aside.

2. The case is referred back to the department of first instance with the order to grant a European patent on the basis of the following documents:

- Description pages 1 to 3 received on 16 September 1987
  pages 4 to 9 as originally filed and amended as specified in the Appellant's letter dated 7 September 1984.
- Drawings sheet 1/4 to 4/4 as filed.
- Claim 1 received on 16 September 1987.

The Registrar

S. Fabiani

S. Fabiani

The Chairman

C.T. Wilson