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D E C I S I O N
of 8 August 2001

Case Number: T 0487/99 - 3.2.3

Application Number: 94480037.4

Publication Number: 0631845

IPC: B24C 1/00, H01L 21/00, B24C 3/22

Language of the proceedings: EN

Title of invention:
An improved aerosol cleaning apparatus

Applicant:
International Business Machines Corporation

Opponent:
-

Headword:
-

Relevant legal provisions:
EPC Art. 56

Keyword:
"Inventive step - neighbouring field"

Decisions cited:
-

Catchword:
-

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Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 0487/99 - 3.2.3

D E C I S I O N
of the Technical Board of Appeal 3.2.3
of 8 August 2001

Appellant: International Business Machines Corporation
Old Orchard Road
Armonk, N.Y. 10504 (US)

Representative: de Pena, Alain
Compagnie IBM France
Département de Propriété Intellectuelle
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Decision under appeal: **Decision of the Examining Division 2.3.02.097 of the European Patent Office dated 21 October 1998 refusing European patent application No. 94 480 037.4 pursuant to Article 97(1) EPC.**

Composition of the Board:

Chairman: C. T. Wilson
Members: F. Brösamle
J. P. Seitz

Summary of Facts and Submissions

I. With decision of 21 October 1998 the examining division refused European patent application No. 94 480 037.4 in the light of

(D1) US-A-5 209 028 and

(D2) DE-A-4 134 731

for reasons of lack of inventive step.

II. Against the above decision the applicant - appellant in the following - lodged an appeal on 15 December 1998 paying the fee on the same day and filing the statement of grounds of appeal on 10 February 1999 together with new claims.

III. Following the board's Communication pursuant to Article 110(2) EPC in which the board expressed its provisional opinion with respect to the requirements of Articles 123(2), 54, and 56 EPC of the claims filed with the statement of grounds of appeal, the appellant with letter of 13 February 2001 filed amended claims 1 to 11.

IV. Claims 1 and 7 as the independent claims thereof read as follows:

"1. A method of removing unwanted particles on a surface of a substrate comprising the steps of:

- providing a movable holder (110) to hold the substrate (220);

- creating an aerosol using Joule-Thompson expansion, said aerosol including solid particles; and,

- directing said aerosol at the surface of said substrate for bombarding said unwanted particles with said solid particles to perform a blasting operation;

said method being characterized in that it further comprises the step of:

- rotating the substrate (220) for applying a centrifugal force on said unwanted particles (210) on said surface,

wherein the substrate rotational speed includes at least one cycle consisting of two phases: a speed increase from zero (ramping up) followed by a constant speed (flat level), before the speed is decreased to zero (ramping down) and wherein said blasting operation is performed during a part or the totality of said cycle so that the combination of said bombardment of solid particles and the centrifugal force from the rotating of the substrate causes dislodging and removal of unwanted particles from the surface."

"7. An aerosol spray apparatus (200) for removing unwanted particles on a surface of a substrate comprising:

- a movable holder (110) to hold said substrate (220);

- an aerosol producing means (100) including a nozzle head (105) disposed adjacent to the substrate and adapted for directing said aerosol at the surface of said substrate using Joule-Thompson expansion to include solid particles; and,

- means for directing said aerosol at the surface of said substrate for bombarding said unwanted particles with said solid particles to perform a blasting operation;

said apparatus characterized in that it further comprises:

- programmable rotation means (112) connected to said movable holder adapted to rotate the substrate for applying a centrifugal force on said unwanted particles, wherein the substrate rotational speed includes at least one cycle consisting of two phases: a speed increase from zero (ramping up) followed by a constant speed (flat level) before the rotational speed is decreased to zero (ramping down); and,

- programmable blasting means connected to said directing means to perform said blasting operation for a selected time duration during a part or the totality of said cycle so that the combination of said bombardment of solid particles and the centrifugal force from the rotating of the substrate causes dislodging and removal of unwanted particles from the surface."

V. The appellant essentially argued as follows:

- in view of the board's Communication pursuant to Article 110(2) EPC an amended set of claims is filed to overcome the board's objections;

- on the basis of this set of claims a final substantive examination should be carried out by the board;

- the scope of the claims is more limited by incorporating features derived from the originally filed description, see page 8 last and page 9 first paragraph, and Figures 2A and 2C.

VI. It is requested to set aside the impugned decision and to grant a patent on the basis of claims 1 to 11 submitted on 13 February 2001.

Reasons for the Decision

1. The appeal is admissible.

2. *Amendments*

By deleting the features "at a microscopic level", a centrifugal force "greater than 1 g" and solid particles "travelling at approximately the speed of sound" from the independent claims the board's former objections with respect to the requirements of Article 123(2) EPC are overcome.

3. *Novelty*

Novelty of the subject-matter of claims 1 and 7 was not disputed in the impugned decision; the board shares

these findings so that it is not necessary to discuss this issue in detail since the appellant has restricted the independent claims to the feature of applying a **cycle** of the substrate rotational speed and the blasting operation to cause dislodging and removal of unwanted particles from the surface.

4. *Inventive step*

4.1 Claims 1 and 7 being closely related they are dealt with simultaneously in the following.

4.2 Starting point of the invention is (D1) and claims 1 and 7 obviously are delimited over this piece of prior art. In (D1), see column 3, lines 63 to 65, claim 6 and Figures 5A and 5B and the corresponding description it is set out that the substrate is rotated when subjected to a cleaning action. However, the rotation of the substrate is not described to be sufficient to **cause a centrifugal force** on the unwanted particles of the substrate to be cleaned.

4.3 The method of claim 1 therefore differs from this disclosure by the characterising features of the claim, namely:

(a) rotation of the substrate in order to apply a centrifugal force on the unwanted particles,

(b) rotational speed including at least one two-phase cycle in which the speed is first increased and then held at a constant value, and

(c) blasting operation is performed during a part or the totality of the cycle so that the combination

of blasting and the centrifugal force causes dislodging and removal of the unwanted particles from the surface.

4.4 For the above reason the objectively remaining technical problem to be solved by the claimed invention aims at enhancing the known spray - cleaning process/apparatus of (D1).

4.5 For the following reasons the subject-matter of claims 1 and 7 is rendered obvious by the prior art to be considered:

4.5.1 A skilled person being confronted with the not totally effective proceedings to remove unwanted particles on a surface of a substrate disclosed in (D1) is likely to consider a **neighbouring technical field** in which similar problems arise and would turn to (D2) in which also **sensitive articles** have to be cleaned, see column 1, lines 56 to 59, thereof, by applying again an aerosol **and** rotating the substrate for applying a centrifugal force on the unwanted particles on the surface of the substrate, see (D2) column 2, lines 28 to 46.

The unwanted particles consequently are dealt with by the combination of "the bombardment of the aerosol spray" and "the centrifugal forces from the rotating of the substrate" which features cause "dislodging and removal of unwanted particles from the surface".

In respect of features (b) and (c) above, it is further pointed out that centrifugal machines are normally accelerated up to their operating speed (first phase) and then held at this speed (second phase) until the

treatment time is reached and the machine is stopped, and further, that once the person skilled in the art decides to combine the effects of blasting and centrifugal cleaning,(as in (D2)), it forms part of his normal considerations to decide how long to continue blasting during the centrifugal treatment, i.e. whether for the whole or only for part thereof. No inventive contribution can therefore be seen in these features.

4.5.2 Since the characterising features of apparatus claim 7 are the same as those of method claim 1, however presented as programmable means for carrying out the method steps, and such automation is in line with the general trend in technology and cannot be considered inventive, the subject-matter of this claim also is lacking in inventive step.

4.5.3 Summarizing, the combination of (D1) and (D2) renders obvious the subject-matter of claims 1 and 7 within the meaning of Article 56 EPC so that these claims are not allowable.

4.5.4 Since the appellant in his letter of 13 February 2001 wished a **final** substantive examination by the board he cannot be surprised by the board's extended interpretation of (D2) with respect to the above newly introduced feature to claims 1 and 7 which is also derivable from (D2).

4.5.5 In the absence of patentable subject-matter the impugned decision cannot be set aside.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

A. Counillon C. T. Wilson