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# D E C I S I O N
# of 7 March 2002

**Case Number:** T 0382/00 - 3.2.3

**Application Number:** 95943067.9

**International Publication Number:** WO 96/23599

**IPC:** B05D 1/34, 3/04, B05C 9/06, 11/06
D21H 23/48, 25/16

**Language of the proceedings:** EN

**Title of invention:**
Method and apparatus for coating substrates using an air knife

**Applicant:**
Minnesota Mining and Manufacturing Company

**Opponent:**
-

**Headword:**
-

**Relevant legal provisions:**
EPC Art. 56

**Keyword:**
"Inventive step - non-obvious combination of known features"

**Decisions cited:**
-

**Catchword:**
-

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Beschwerdekammern | Boards of Appeal | Chambres de recours

**Case Number:** T 0382/00 - 3.2.3

**D E C I S I O N**
**of the Technical Board of Appeal 3.2.3**
**of 7 March 2002**

**Appellant:** Minnesota Mining and Manufacturing Company
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**Decision under appeal:** **Decision of the Examining Division 2.3.07.085 of the European Patent Office dated 16 November 1999 refusing European patent application No. 95 943 067.9 pursuant to Article 97(1) EPC.**

**Composition of the Board:**

**Chairman:** C. T. Wilson
**Members:** F. Brösamle
B. Günzel

## Summary of Facts and Submissions

I With decision of 16 November 1999 the examining division refused European patent application No. 95 943 067.9 in the light of

(D1) US-A-3 508 947

(D2) US-A-4 109 611 and

(D3) "Pulp and Paper Manufacture", volume 8, Michael Kouris, 3rd edition, 1990, published by "The Joint Textbook Committee of the Paper Industry", TAPPI and CPPA, Atlanta, pages 78 to 81.

II. Against the above decision the applicant- appellant in the following - lodged an appeal on 11 December 1999 paying the fee on the same day and filing the statement of grounds of appeal on 21 March 2000.

III. Following the board's Communication pursuant to Article 11(2) RPBA in which the board set out its provisional opinion with respect to the requirements of Article 56 EPC oral proceedings were held on 7 March 2002 in which the appellant submitted new Claims 1 to 16.

IV. The new independent Claims 1 and 13 read as follows:

"1. A method of coating a substrate (32) with plurality of layers of coatings comprising the steps of:

- moving the substrate (32) along a path through a coating station,

- metering at least one first coating fluid (34) and a second coating fluid (36), wherein the first coating fluid formulation differs from the second coating fluid formulation,

- forming a composite layer (48) comprising the at least one first coating fluid (34) and the second coating fluid (36),

- contacting the substrate (32) with the flowing composite layer (48) to interpose the first coating fluid (34) between the substrate (32) and the second coating fluid (36) to apply an excess of the second coating layer on the substrate (32), and

- doctoring the composite layer with a gas (52) from a gas knife (54) over the whole width of the layer to remove some portion of the second coating layer (64) to produce a multiple layer composite coating (64) on the substrate (32) downweb of the gas knife (54) to leave a coating comprising a plurality of distinct, superposed layers of the first and second coating fluids (34, 36)."

"13. An apparatus for coating a substrate with plurality of layers of coating fluids of different formulations comprising:

- means (10) for bringing together a first coating fluid (34) and a second coating fluid (36) to create a metered plurality of flowing layers of fluid in face-to-face contact with each other to form a composite layer (48),

- means for moving the substrate (32) at a spaced distance from the means (10) for bringing together to permit the composite layer (48) to form a continuous flowing fluid bridge to the substrate (32) for the coating width and to deposit the coating layer on the substrate (32) to interpose the first coating fluid (34) between the substrate (32) and the second coating fluid (36) to apply an excess of the second coating layer on the substrate (32), and a gas knife (54) which doctors the composite layer (48) with a gas (52) over the whole width of the layer to remove some portion of the second coating layer and to produce a multiple layer composite (64) coating on the substrate (32) downweb of the gas knife (54) to leave a coating comprising a plurality of distinct, superposed layers of the first and second coating fluids."

V. The arguments of the appellant essentially can be summarized as follows:

- US-A-2 761 419 (patented 4 September 1956) - Mercier in the following - discloses that two or more layers of coating composition when simultaneously applied onto a moving substrate do not mix since a laminar flow thereof is maintained and since there is not enough time to mix prior to their deposition on the moving substrate;

- (D1) has to be seen, as the nearest prior art in which metering/doctoring of several layers is achieved by pumps which force the coating fluid through slots in an application die; the layers are brought thereafter into mutual contact to form

a composite layer which is applied to the moving substrate;

- the margins of the moving substrate according to (D1) are submitted to doctoring/metering knives in the form of brushes or flexible resilient strips to spread out any excess material, see Figures 3 to 5; from Figure 5 of (D1) a skilled person was aware that it is useful to create a vacuum in the vicinity of the metering/doctoring knife to avoid any turbulence of air surrounding the free falling curtain of the multilayer and the moving substrate; (D1) leads a skilled person therefore not to use any metering device different from brushes or flexible strips;

- in contrast to (D1) the claimed subject-matter is restricted to the application of an air knife as doctoring/metering device which air knife is active over the whole width of the layer to be applied to the moving substrate;

- up to now metering/doctoring of substances to be applied to a moving substrate in the form of a multilayer was not carried out since multilayers are very sensitive; what was done instead was a quantity - control of any substance via its pump;

- the subject-matter according to claims 1 and 13 offers, however, the possibility of metering and not only spreading-out material - over the **whole** width of the multilayer and even down to very thin layers without disturbing the flow of individual layers or causing mixing of neighbouring layers.

- summarizing, the available prior art does not render obvious the subject-matter of claims 1 and 13.

VI. The appellant requests to set aside the decision under appeal and to grant a patent with the documents filed in the oral proceedings, namely

**claims:** claims 1 to 16

**description:** pages 1 to 16

**drawings:** Figure sheets 1/2 and 2/2.

## Reasons for the Decision

1. The appeal is admissible.

2. *Amendments*

2.1 Claim 1 corresponds to originally filed claim 1, its additional feature "over the whole width of the layer" clearly being disclosed in the originally filed description corresponding to WO-A- 96/23599, see in particular page 5, lines 15/16.

2.2 In claim 13 all features of originally filed claim 13 are contained, however, in a different wording, see "different formulations" being based on "wherein the first coating... differs from the second coating..."; the additional feature "over the whole width..." is again derivable from WO-A- 96/23599, page 5, lines 15/16.

2.3 Summarizing, amended claims 1 and 13 submitted in the oral proceedings are not open to an objection under Article 123(2) EPC.

3. *Novelty*

The issue of novelty needs no detailed discussion since the examining division and the board clearly acknowledged novelty of the claimed subject-matter.

4. *Nearest prior art, problem of the invention, solution*

4.1 The nearest prior art has to be seen in (D1) which document already discloses the application of a composite layer on a moving substrate and some sort of metering/doctoring of excess material, however, only in the **marginal areas** of application and with elements which have to be seen as **spreading** elements but not as elements being capable of **reducing** the amount of excess material over **the whole width** of the layer.

4.2 It is the object of the invention to provide an apparatus and a method for more versatile multilayer coating with a reliable doctoring feature for an outer one of the fluid layers, see opening of the amended description following the discussion of the document according to Article 54(3) EPC.

4.3 This object is solved by the features laid down in claim 1 (method claim) and claim 13 (apparatus claim) basically by the provision of a metering element over the whole width of the composite layer and in that this metering element is a so-called air knife, *per se* known for instance from (D3), see pages 78/79, remark "B" and

Figures 52, 55A and 55B thereof.

4.4 With the subject-matter of claims 1 and 13 it is achieved that - contrary to teachings before the claimed date of priority - an air knife is to be used in combination with a **composite** layer to be applied to a moving substrate. This "knife" clearly allows **doctoring/metering** of **excess** material and not only **spreading out** of excess material as in (D1), see Figures 3 to 5 and spreading elements "32,33", being only arranged to treat the **margins** of coating application but not over the **whole width** of the layer. In addition the claimed air knife is a useful means to replace **large amounts** of excess material of the second coating layer which amount may be necessary in cases of minimum flow rates preventing coating thinly at slow and moderate speeds, see WO-A-96/23599, page 2, lines 3 to 14 and 23 to 26 and page 6, line 30 to page 7, line 4, as well as page 9, lines 7 to 21.

4.5 The non-existence of any prior art suggesting the application of an air knife in combination with a composite layer is admitted by the board as a first sign that a skilled person could not rely on prior teaching, see in this context (D1) and its vacuum - installation "44" according to Figure 5 and column 7, lines 33 to 44, teaching that even ambient, not-pressurized air had to be drawn off in the vicinity of the element ("knife") spreading out excess material in the marginal areas of coating application.

4.6 Considering this prior knowledge a skilled person is not led to the application of an **air knife** - being based on high air pressures to remove excess material-

but is rather directed in a contrary direction, namely not to disturb the composite layer by air turbulence caused by the application of an air knife.

4.7 From the Mercier - document a skilled person was aware that coating - materials leave any application nozzles with a **laminar, undisturbed flow** and *prima facie* it appears desirable not to disturb this laminar flow since it had to be expected that otherwise **mixing** of neighbouring layers would be promoted.

4.8 It is observed that (D2) clearly deals with the formation of a composite layer (three layers according to its Figure 1) **without**, however, **using any subsequent knife**, such as a blade, brush, roller or even an air knife which fact underlines the technical knowledge prior to the present application. According to (D2) the feed lines "18, 19, 20" are provided with **flow meters** ("15 to 17") respectively being an equivalent measure to controlled pumps.

4.9 The mere existence of an air knife, see (D3) for example, has to be seen as an element which was on the market but was not seen to be applicable for doctoring **composite** layers without knowing the present invention. Consequently a skilled person **could** have made use of an air knife to solve the above object of the invention but **would** not have done so since the totality of circumstances to be considered in the present case was against the application of an air knife over the whole width of the layer as the means to safeguard a plurality of **distinct**, superposed layers - namely without mixing thereof, see last two lines of claims 1 and 13.

5. Summarizing, the subject-matter of claims 1 and 13 is seen as novel and inventive so that a patent is to be granted.

The dependent claims 2 to 12 and 14 to 16 relate to embodiments of the independent claims and are likewise allowable.

The amended description moreover meets the basic requirements of the EPC and is suitable for grant also.

## Order

## For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the examining division with the order to grant a patent with the documents filed in the oral proceedings:

**claims**: claims 1 to 16;

**description:** pages 1 to 16;

**drawings:** Figure sheets 1/2 and 2/2.

The Registrar: The Chairman:

A. Counillon C. T. Wilson