

Internal distribution code:

- (A) Publication in OJ
(B) To Chairmen and Members
(C) To Chairmen
(D) No distribution

D E C I S I O N
of 4 June 2002

Case Number: T 1037/98 - 3.2.5

Application Number: 90110287.1

Publication Number: 0407720

IPC: B41M 1/30

Language of the proceedings: EN

Title of invention:
Recording sheet

Patentee:
ASAHI GLASS COMPANY LTD.

Opponent:
Manfred Kirchhoff Technische Beratung

Headword:

-

Relevant legal provisions:
EPC Art. 54, 56

Keyword:
"Novelty (main request, no; first auxiliary request, yes)"
"Inventive step (first auxiliary request, yes)"

Decisions cited:

-

Catchword:

-

Summary of Facts and Submissions

- I. The appellant (opponent) lodged an appeal against the interlocutory decision of the Opposition Division maintaining the patent No. 0 407 720 in amended form.

In the decision under appeal, it was held that the grounds of opposition submitted by the appellant under Article 100(a) EPC (lack of novelty and inventive step) did not prejudice the maintenance of the patent as amended.

The following documents were referred to in the appeal proceedings:

D1b: EP-A- 0 298 424

D2: JP-A-60-245588, with an English translation (D2a)

D5: New Paper Processing Handbook, August 1988, pages 633 and 634, with a translation of excerpts

D12: JP-A-59-78 925, together with an English translation (D12a)

D13: US-A-4271210

D14: American Ceramic Society Bulletin, March 1975, pages 286 to 288.

- II. Oral Proceedings were held before the Board of Appeal on 4 June 2002.

(i) The appellant requested that the decision under appeal be set aside and the patent be revoked.

(ii) The respondent (patentee) requested as a main request that the appeal be dismissed, or that the decision under appeal be set aside and the patent be maintained on the basis of the following documents:

- (a) claims 1 to 6 filed as first auxiliary request during the oral proceedings; or
- (b) claims 1 to 8 filed as second auxiliary request during the oral proceedings; or
- (c) claims 1 to 8 filed as fourth, fifth, sixth and seventh auxiliary requests on 3 May 2002 as third, fourth, fifth and sixth auxiliary requests, respectively.

III. Claim 1 of the patent as maintained by the Opposition Division (main request) reads as follows:

"1. A recording sheet comprising a substrate and a porous layer of ink absorbent formed directly upon said substrate, wherein the porous layer of ink absorbent is made mainly of pseudo-boehmite and the total volume of pores with a pore radius of from 1 to 10 nm in the layer of ink absorbent is from 0.3 to 1.0 ml/g and wherein the pore volume of pores with a radius of not larger than 10 nm is at least 70% of the total pore volume, the porous layer of ink absorbent consisting essentially of pseudo-boehmite and a binder."

Claim 1 of the first auxiliary request differs from claim 1 of the main request in that the word "plastic" is introduced before the first occurrence of the word "substrate".

The second to sixth auxiliary requests involve further or alternative amendments of the independent claims.

- IV. In written and oral proceedings, the appellant argued essentially as follows:

The objections of insufficient disclosure under Article 100(b) EPC raised in the proceedings before the Opposition Division are maintained.

The subject-matter of claim 2 according to the main and first auxiliary request is not supported by the description.

Claim 1 of the main request lacks novelty in view of the disclosure of document D1b, in particular Examples 2, 3 and 6. The term "substrate" as used in the patent in suit is a general term and includes in particular all the materials specified at page 2, line 55 to page 3, line 2 of the patent in suit.

In the method of Example 2 of document D1b, the substrate is paper with a coating of silica particles. Whilst it appears that the value for the amount of coating of 25 mg/m² as given in Example 2 is incorrect, the person skilled in the art would nevertheless be able to carry out the method of this example.

In the method of Example 6 of document D1b, the coating includes 19.6 parts pseudo-boehmite, 10 parts silica and 6 parts binder. The porous layer thus contains 71.9% pseudo-boehmite and binder and may thus be described as "consisting essentially of pseudo-boehmite and a binder".

Claim 1 of the main request also lacks novelty in view of the disclosure of document D2. Reliance is placed upon the submissions made in the proceedings before the Opposition Division.

It is accepted that the subject-matter of claim 1 of the first auxiliary request is novel. The subject-matter of claim 1 of the first auxiliary request does not, however, involve an inventive step. The sole feature which distinguishes the subject-matter of the claim from the disclosure of document D1b is the use of a plastic substrate. However, the present invention is concerned with an absorbent coating composition and the material of the substrate is not relevant, since any substrate would work.

Document D12 discloses the application of a transparent coating of pseudo-boehmite directly onto a substrate consisting of a single layer, such as Teflon. The invention is not limited to ink jet printing. The disclosure of document D12 can thus be combined with that of document D1b.

Document D13 discloses a process for forming a transparent porous layer of, for example, alumina, on a glass substrate. In order to avoid light scattering, the pore size is less than 100 Å. This teaching should thus be followed for a coating of a sheet for an overhead projector. Document D14 teaches that the pore size distribution should be restricted in order to achieve transparency.

The use of a plastic substrate, which is well known in the art, thus does not involve an inventive step.

V. In written and oral proceedings, the respondent argued essentially as follows:

In view of the fact that the value for the amount of coating of 25 mg/m² as given in Example 2 of document D1b is clearly incorrect, this example does not constitute an enabling disclosure from which any technical teaching can be derived. In view of the considerable amount of silica present in the coating of Example 6 of document D1b, the porous layer of ink absorbent does not consist essentially of pseudo-boehmite and a binder.

As regards Example 3 of document D1b, this example proposes using the base sheet of Example 2 of document D1b, that is, a paper coated with silica particles having an average particle diameter of 22 μm, coating this base sheet with a layer comprising silica particles having an average particle diameter of 6 μm and then applying a layer of pseudo-boehmite. Since claim 1 specifies the presence of a substrate and a porous layer, the substrate must be non-porous, so that a substrate having a coating of porous silica particles is excluded.

Claim 1 of the main request is thus novel.

Claim 1 of the first auxiliary request involves an inventive step. Document D1b represents the closest prior art. The problem is to provide a recording sheet for ink jet printing which provides fast absorption of ink whilst achieving a satisfactory colour density. This problem is solved, as illustrated in the experimental data attached to the response of 3 May 2002, by the omission of silica particles.

The teaching of document D1b is to rely on an effect which depends upon a combination of an ink absorbent, such as silica, with a substance, such as pseudo-boehmite, on the surface of the ink absorbent. The solvent for the ink, such as water, migrates through the pseudo-boehmite and is absorbed in the silica. There is no suggestion that pseudo-boehmite could provide a suitable absorbent in the absence of silica. Neither do any of the remaining documents contain such a suggestion.

Application Example 2 of document D12 relates to a polyethylene terephthalate film having a thin coating of an alumina sol to impart fog resistance to the film which is intended for use as a covering for growing plants. References in this document to paper making refer to coatings for improving the smoothness of the paper. This document thus does not address the problem solved by the present invention.

Document D2 proposes the use of an alumina xerogel and does not disclose the use of pseudo-boehmite.

Reasons for the Decision

Main Request

1. *Sufficiency of disclosure*

The objections of insufficient disclosure raised in the proceedings before the Opposition Division may be summed up as suggesting that preferred features, such as the absorptivity and pore radius of the pseudo-boehmite and the thickness of the pseudo-boehmite layer are, in fact, essential for the performance of the invention. This cannot be accepted. In order to satisfy

the requirements of Article 83 EPC, it is merely necessary that a person skilled in the art, having read the application as a whole, including the description and claims, is in a position to put the invention into practice. There is no suggestion that this is not the case for the patent in suit. Whilst the description indicates that better performance can be obtained by working within the preferred ranges of absorptivity and pore radius of the pseudo-boehmite and thickness of the pseudo-boehmite layer, there is nothing to indicate that the invention cannot be put into practice outside these ranges.

2. *Support by the description*

It was objected that the subject-matter of claim 2 is not supported by the description. The features of claim 2 are disclosed in the description at page 3, lines 17 to 19 and 32 to 34. The claim thus complies with the requirements of Article 84 EPC.

3. *Novelty*

3.1 Example 3 of document D1b relates to a method of preparing a recording sheet in which a base sheet is formed from high quality paper coated with silica particles having an average particle diameter of 22 μm , this base sheet is coated with a layer comprising silica particles having an average particle diameter of 6 μm , whereafter a mixture of pseudo-boehmite AS-3 manufactured by Catalysts & Chemicals Ind. Co. Ltd. with polyvinyl alcohol is applied to form a coating which is then dried.

3.2 The term "substrate" as used in claim 1 of the patent in suit is not regarded as being restricted to a non-porous or non-absorbent substrate. The fact that claim 1 refers to "a substrate and a porous layer of ink

absorbent formed directly upon said substrate" does not imply that the substrate is not porous or does not comprise a porous layer. Further, amongst the substrates exemplified at page 2, line 55 to page 3, line 2 of the patent in suit is included papers in general and, in Example 6 of the patent in suit, the substrate is art paper. Under these circumstances, the base sheet together with the coating of a layer comprising silica particles having an average particle diameter of 6 μm as used in Example 3 of document D1b is regarded as constituting the substrate upon which the porous layer of ink absorbent is directly formed.

- 3.3 Pseudo-boehmite AS-3 manufactured by Catalysts & Chemicals Ind. Co. Ltd. is that used in Example 1 of the patent in suit, and possesses the parameters of pore radius distribution and pore size specified in claim 1.
- 3.4 Finally, the porous layer of ink absorbent of Example 3 of document D1b consists essentially of pseudo-boehmite and a binder in the form of polyvinyl alcohol.
- 3.5 The subject-matter of claim 1 of the main request thus lacks novelty with respect to the disclosure of document D1b, referring in particular to Example 3.

First auxiliary request

4. *Novelty*

- 4.1 Claim 1 of the first auxiliary request is restricted as compared with claim 1 of the main request by the additional feature that the substrate is plastic. By virtue of the fact that the claim specifies that the porous layer of ink absorbent consists essentially of pseudo-boehmite and a binder, the presence of a significant amount of silica or other absorbent in the

porous layer is excluded. It was pointed out on behalf of the appellant that, in the method of Example 6 of document D1b, the coating includes 19.6 parts pseudo-boehmite, 10 parts silica and 6 parts binder. However, the presence of a significant amount of silica prevents the porous layer from being described as "consisting essentially of pseudo-boehmite and a binder". By virtue of the fact that the claim specifies that the porous layer of ink absorbent is formed directly upon the plastic substrate, the presence of a further layer including silica between the pseudo-boehmite layer and the plastic substrate is excluded.

- 4.2 There is no disclosure in the cited prior art of a recording sheet comprising a plastic substrate and a porous layer of ink absorbent formed directly upon the substrate, wherein the porous layer of ink absorbent consists essentially of pseudo-boehmite and a binder.
- 4.3 The substrate is a high quality paper in each of Examples 2, 3 and 6 of document D1b. In Example 4 of document D1b, relating to a sheet for an overhead projector, the only example in which a plastic substrate is used, the absorbent is a layer comprising a silica sol on which a layer comprising an alumina sol, but not a pseudo-boehmite, is formed.
- 4.4 Document D12 discloses in Application Example 2 a polyethylene terephthalate film onto which an alumina sol having a pseudo-boehmite structure is coated to provide a film for enhancing plant growth having fog resistance. No binder is present.
- 4.5 Document D2 discloses an ink-jet recording medium in which an ink-receiving layer comprising a porous alumina xerogel is provided on a support which may be a plastic. The alumina does not, however, possess a

pseudo-boehmite structure for the reasons set out in the decision of the Opposition Division at paragraphs B5b1 to B5b3.

4.6 The subject-matter of claim 1 of the first auxiliary request is thus novel. This was not contested by the appellant.

5. *Inventive step*

5.1 Closest prior art

Document D1b represents the closest prior art. The disclosure of Example 3 of this document is discussed at paragraphs 3.1 to 3.4 above. It is, however, necessary to consider the disclosure of this document as a whole. The object of the invention of document D1b is to improve recording sheets having a coating of an ink absorbent, such as porous silica particles, together with a binder. The solution to this problem as taught in document D1b is to provide a substance on the surface of the ink absorbent which has an absorptivity of from 20 to 100 mg/g, for example, pseudo-boehmite. This is achieved either by coating a mixture of the substance which has an absorptivity of from 20 to 100 mg/g and the ink absorbent together with a binder on a substrate, or by coating the substance which has an absorptivity of from 20 to 100 mg/g together with a binder on a substrate which has already been coated with the ink absorbent together with a binder. There is no suggestion that the component referred to in document D1b as the ink absorbent could be dispensed with, and all the examples utilise spherical silica particles as the ink absorbent.

5.2 Object of the invention

The object of the invention is to provide a recording sheet which provides fast absorption of ink whilst achieving a satisfactory colour density.

5.3 Solution

According to claim 1, the above object is achieved by the use of a plastic substrate and a porous layer of ink absorbent formed directly upon the substrate, wherein the porous layer of ink absorbent consists essentially of pseudo-boehmite and a binder.

As indicated by the experimental data attached to the response of the respondent of 3 May 2002, in the case of black and cyan inks, better reflection densities are achieved by pseudo-boehmite alone as compared with a pseudo-boehmite layer on a silica layer. Thus, at least for some purposes, for example black and white printing, improved results can be obtained by the omission of silica.

Whilst document D1b is regarded as representing the closest prior art, it is not accepted that the person skilled in the art, starting from the recording sheets formed as disclosed in Examples 2 and 3 of document D1b, would substitute a plastic sheet for the base sheet of these examples and thereby omit the ink absorbent. It is an essential feature of document D1b that the substance which has an absorptivity of from 20 to 100 mg/g is present in order to improve the performance of the ink absorbent and not to act as an ink absorbent alone. In terms of the preferred embodiment, the presence of pseudo-boehmite together with porous silica particles is found to enhance the ink absorption rate of the recording sheet. If it were desired to use a plastic substrate, the teaching of

document D1b as a whole would lead the person skilled in the art to proceed along the lines indicated by Example 4 of document D1b and to apply firstly a coating comprising a silica sol and polyvinyl alcohol, followed by a coating comprising an alumina sol and polyvinyl alcohol to the plastic substrate. If the skilled person were to attempt to adapt the procedure of Examples 2 or 3, a plastic sheet would be substituted for the high quality paper of Examples 2 and 3, which would first be coated with a layer of porous silica with a binder, whereafter a layer of pseudo-boehmite with a binder would be applied.

The remaining cited prior art does not suggest that pseudo-boehmite is capable of acting as an ink absorbent in the absence of silica when applied directly on a plastic substrate.

- 5.4 The subject-matter of claim 1 of the first auxiliary request thus involves an inventive step. Claims 2 to 6 are appendant to claim 1 and are directed to preferred embodiments of the recording sheet of claim 1. The subject-matter of these claims thus similarly involves an inventive step.

Order

For these reasons it is decided that:

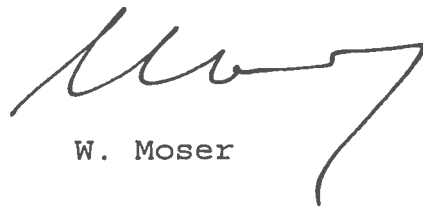
1. The decision under appeal is set aside.
2. The case is remitted to the first instance with the order to maintain the patent on the basis of the following documents submitted during oral proceedings:
 - (a) claims 1 to 6 filed as first auxiliary request;
and
 - (b) description: pages 2 to 9.

The Registrar:



M. Dainese

The Chairman:



W. Moser