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**Datasheet for the decision
of 15 July 2010**

Case Number: T 1827/08 - 3.2.03

Application Number: 01945825.6

Publication Number: 1336069

IPC: F24D 3/14, C23C 14/20

Language of the proceedings: EN

Title of invention:
Plastic pipe with a barrier layer

Patentee:
Nederlandse Organisatie voor Toegepast

Opponent:
REHAU AG & Co.

Headword:
-

Relevant legal provisions:
EPC Art. 54, 56

Relevant legal provisions (EPC 1973):
-

Keyword:
"Novelty - selection from a range (yes)"
"Inventive step - exclusion of hindsight"

Decisions cited:
T 0279/89

Catchword:
-



Case Number: T 1827/08 - 3.2.03

D E C I S I O N
of the Technical Board of Appeal 3.2.03
of 15 July 2010

Appellant I:
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Appellant II:
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Representative: -

Decision under appeal: Interlocutory decision of the Opposition
Division of the European Patent Office posted
15 July 2008 concerning maintenance of European
patent No. 1336069 in amended form.

Composition of the Board:

Chairman: U. Krause
Members: G. Ashley
K. Garnett

Summary of Facts and Submissions

- I. European patent EP-B1-1 336 069 relates to plastic pipes having a barrier layer on their outer side; such pipes are typically used in indoor heating systems and for outdoor water pipes. Grant of the patent was opposed for lack of novelty and inventive step (Article 100(a) EPC). The Opposition Division was of the view that the claims submitted during the oral proceedings as the first auxiliary request met the requirements of the EPC, and thus decided that the patent should be maintained on this basis. The decision was posted on 15 July 2008.
- II. The Patent Proprietor (Appellant I) filed notice of appeal on 15 September 2008, paying the appeal fee on the same day. A statement containing the grounds of appeal was filed on 12 November 2008.
- III. The Opponent (Appellant II) filed notice of appeal on 25 September 2008, paying the appeal fee on the same day. A statement containing the grounds of appeal was filed on 7 November 2008.
- IV. Oral proceedings were held on 15 July 2010.
- V. Requests

Appellant I requests that the decision under appeal be set aside and that the patent be maintained on the basis of the request filed during the oral proceedings before the Board of Appeal.

Appellant II requests that the decision under appeal be set aside and that the patent be revoked.

VI. Claims

(a) Claim 1 of Appellant I's request reads as follows:

"1. Plastic pipe with a barrier layer applied to its outer side, the thickness of the barrier layer being less than 1 μm , characterised in that a smooth interlayer is present between the plastic pipe and the barrier layer."

(b) Independent claim 11 is directed to a method:

"11. Method for the manufacture of a plastic pipe with a metal layer applied to its outer side, which is applied by physical vapour deposition under high vacuum, the outer side of the plastic pipe being smoothed by the application of a layer of lacquer before the layer of metal is applied, wherein the plastic pipe is a pipe according to claim 1 and said metal is the barrier layer and said layer of lacquer is the interlayer."

Dependent claims 2 to 10 and 12 to 18 concern preferred embodiments of the plastic pipe of claim 1 and the method of claim 11 respectively.

VII. Prior Art

The following documents, amongst others, were mentioned in the decision of the Opposition Division:

E2: JP-A-9-117978
E2A: English translation of E2
E5: DE-A1-33 20 273
E6: L. Holland, "Vacuum Deposition of Thin Films",
pages 358 to 369, Chapman & Hall, London 1956.

Appellant II submitted the following document together
with the grounds of appeal:

E13: EP-A-0 960 723

VIII. Submissions of the Parties

Novelty

(a) Document E2

Appellant II argues that claim 1 is broadly drafted,
merely referring to a "plastic pipe", and gives no
indication of the use of the pipe for transporting
liquids or gases. Therefore the tubular bodies
disclosed in E2, which are used for golf clubs or
fishing poles or the like, can be considered to be
"pipes" within the scope of the claim.

The tubes of E2 are made of plastic (epoxy resin
reinforced by glass or carbon fibres) and are coated
with a metal layer (eg aluminium) having a thickness of
about 0.7 μm . Although the metal layer is said in E2 to
be an interference film for aesthetic purposes, it
would nevertheless have the effect of a barrier film.
Prior to application of the metal layer, the external
surface of the tube is finished smooth by applying an
intermediate coating. Consequently, Appellant II

submits that all the features of claim 1 are disclosed in E2.

Appellant I is of the view that the fibre reinforced resin of E2 is a composite material and not a plastic. A tube used for golf clubs or fishing rods is not a tube in the sense of the disputed patent. The metal layer is said to be an interference layer whose purpose is merely aesthetic; whether or not it would function as a barrier is not certain, as this depends on the way it is applied.

(b) Document E13

Appellant II argues that Figure 4 of E13 discloses a plastic pipe (iv) provided with a barrier layer (iii) having a thickness of 0.1 to 200 μm . Between the plastic pipe and the barrier layer there is an intermediate layer (ii). Figure 4 shows the intermediate layer to be smooth, and in paragraph [0033] it is said that the surface is corona etched; since the disputed patent provides no definition of the meaning of "smooth", this feature is disclosed in E13. Consequently all the features defined in claim 1 are derivable from E13.

Appellant I argues that the skilled person wishing to derive the claimed subject-matter from E13 is faced with many choices, which render the claimed subject-matter novel. Firstly, he has to choose to make a pipe rather than a flat product, he then has to select thermoplastic as the base material (iv) instead of metal. An interlayer is an optional feature in E4, and is not disclosed as being smooth; in addition corona

etching does not inevitably mean a smooth finish. The choice of an interlayer having a thickness of less than 1 μm from the disclosed range of 0.1 to 200 μm is itself a novel selection.

Inventive Step

(a) Closest Prior Art:

Both parties agree that E5, which relates to plastic pipes for hot water applications, forms the closest prior art and discloses the vapour deposition of a barrier coating of metal on the pipes in order to prevent diffusion of oxygen through the pipe wall. There is also agreement that the subject-matter of claim 1 differs firstly in that the metal layer is thinner (being less 1 μm , whereas the layer of E5 is said to have a thickness of "a few μm "), and secondly, in the coating of a smooth interlayer between the pipe surface and the metal barrier layer.

(b) Problem to be Solved

Appellant II argues that the most expensive material used in the manufacture of the pipes of E5 is the metal, hence the objective problem is the provision of a pipe having an effective metal barrier layer of reduced thickness. Appellant I similarly defines the problem as being how to produce a thin, effective barrier layer.

(c) Solution

Appellant II argues that the solution is to be found in E6. Since E6 is a textbook providing a general teaching

on the subject of vapour deposition of thin metal coatings, it is to be expected that the skilled person would consult this document. E6 clearly teaches that a metal layer of less than 1 μm can be formed on plastic by rendering the surface smooth by a lacquer interlayer. Hence the skilled person is made aware that the metallic layer of E5 can be thinned to less than 1 μm if a smooth lacquer interlayer is used. The subject-matter of claim 1 thus lacks an inventive step.

Appellant I argues that E6 is concerned with metalizing plastics to produce reflective coatings, with the aim of improving lustre and reflection; there is no mention of improving the barrier function of metal layers on water pipes. In addition, E5 is directed to a simplified process for providing the metal barrier (page 5, last paragraph), hence the approach of E6, which involves the complication of an additional interlayer, is not consistent with the teaching of E5. There is, therefore, no reason for the skilled person to consult E6.

Reasons for the Decision

1. The appeal is admissible.
2. Claim 1 - Novelty (Article 54 EPC)
 - 2.1 Document E2

Claims 1 is directed to a plastic pipe and, as submitted by Appellant II, is not limited to pipes for carrying liquids or gases. The question is whether or

not E2 discloses an object that could be considered to be a "plastic pipe".

E2 relates to tubular bodies that are used for golf clubs, fishing rods or the like. The tubes of E2 are made from carbon or glass fibres impregnated with thermosetting resin, and are produced by winding a prepreg around a core (see paragraph [0019] on page 9 of E2A); this is a composite material, which would not normally be referred to as a "plastic".

Although the term "pipe" tends to convey the idea of length, there may be certain circumstances when "tubes" may also be considered to be "pipes". However in the present case, when considering the overall nature of the object of E2, it is difficult to say that a tube for golf clubs or fishing rods made from carbon or glass fibre bound by resin is a "plastic pipe" in the conventional sense of the expression. Consequently the claimed subject-matter is novel with respect to E2 in that it does not disclose a plastic pipe.

2.2 Document E13

E13 discloses composite insulation material in the form of either sheets (Figures 1 to 3) or tubes (Figure 4). Appellant II submits that the plastic pipe of claim 1 lacks novelty in light of the tube shown in Figure 4. This embodiment comprises a plastic tube (iv) at the core, which is surrounded by a layer of foamed material (i) that is 0.5 to 80 cm thick. On top of this is an interlayer of plastic (ii) and barrier layer of metal foil (iii). Irrespective of the functions of the various layers and their equivalents in claim 1, the

thickness of the claimed barrier layer (less than 1 μm) is considered to be novel over the disclosure of E13 for the following reasons.

The barrier layer of E13 is defined as being a metal foil having a thickness of 0.1 to 200 μm (see paragraphs [0029] and [0030]). The claimed range of less than 1 μm is thus small in comparison with the disclosed range. The only specific example of a tube according to the invention of E13 is example 9 (page 12, line 47 to page 13, line 1,) which has an aluminium layer of 9 μm ; thus the claimed range is remote from the disclosed value. The claimed range also has particular effects, namely providing an effective barrier with minimal material and improving the flexibility of the pipe. The criteria for a novel selection set out in T 279/89 (see Case Law of the Boards of Appeal I.C.4.2.1) are thus satisfied.

3. Inventive Step

- 3.1 The disputed patent concerns the application of a barrier layer of metal to the outside of a plastic pipe in order to prevent diffusion of gases and substances into the pipe from the outside.

Document E5 concerns plastic pipes for hot water applications, particularly under-floor heating, and discloses the deposition of a metal barrier layer onto the surface of the pipes to prevent diffusion of oxygen into the pipe from the air. Appellant I, Appellant II and the Opposition Division consider E5 to be the closest prior art, and the Board sees no reason to depart from this view.

3.2 The subject-matter of claim 1 differs from that of E5 in that:

i) the thickness of the barrier film is defined as being less than 1 μm , whereas in E5 it is said to be in the order of a few μm (see the last sentence on the second paragraph on page 9);

ii) there is a smooth interlayer between the plastic pipe and the barrier layer.

3.3 Appellant II defines the objective problem as being the provision of a pipe having a metal barrier layer of reduced thickness. Appellant I defines a similar problem, namely the formation of a thinner effective barrier layer.

3.4 The proposed solution to either of the above problems is to incorporate a interlayer between the surface of the plastic pipe and the metal layer. This has the effect of smoothing the surface of the plastic pipe and thereby preventing surface irregularities from disrupting the thin barrier layer (see paragraphs [0008] and [0019] of the disputed patent).

Appellant II submits that this solution is to be found in E6, whereas Appellant I argues that the skilled person would not even consult E6 in expectation of finding a solution.

3.5 E6 is an extract from a textbook with the title "Vacuum Deposition of Thin Films", and of particular relevance is the chapter concerning "Evaporated Coatings on

Plastic Materials and Lacquered Components" (chapter 12, starting on page 358).

Formation of metal films on plastic bases are discussed in the context of imparting surface reflectivity or electrical conductivity, ie in the optical and electrical fields of technology (page 358, first paragraph). The particular application of applying a metal coating as a barrier layer on a plastic pipes is not mentioned, but this is hardly surprising as the disclosure of E6 is dated 1956, which is some years before this particular technology had been established.

It is thus necessary to determine whether the skilled person would, despite the absence of specific instruction, nevertheless consider applying the teaching of E6 to the metal coating of plastic pipes.

- 3.6 Section 3 on page 366 deals with the metal finishing of lacquered components, and states that evaporated films rarely exceed a micron in thickness (last sentence on page 366); because the films are so thin they cannot be polished to achieve a reflecting surface. A lacquer layer therefore is applied to provide a smooth surface prior to coating; this enables a reflective surface to be obtained without the need for polishing.

E6 therefore discloses coating a plastic surface with an intermediate lacquer layer and a metallic layer of less than 1 μm in thickness. But it is not apparent that this provides the solution to the objective problem set out above.

E6 is not dealing with the reduction in the thickness of the metallic layer. In E6 a metal layer of less than 1 μm already exists, and the problem being addressed is how to achieve a reflective surface with such a thin layer. The lacquer removes surface marks resulting from polishing the plastic substrate to give a flat surface capable of having a mirror-like finish after coating, without the need for polishing. This is the solution to a completely different problem from the objective problem set out above.

There is no mention in E6 that the barrier properties of the metal film are improved, and this is not immediately obvious from E6. There is no indication, for example, that the resulting metal layer is free of interruptions; on the contrary E6 states that lacquering cannot cover up "bad defects".

3.7 Having read the disputed patent specification, it becomes clear that the solution could be derived from E6, but it would be inappropriate to regard the skilled person as having such knowledge.

3.8 The Board therefore comes to the conclusion that, starting from E5, the claimed solution to the problem of producing a thinner, effective metallic barrier layer cannot be derived in an obvious manner from E6. Consequently, the subject-matter of claim 1 has an inventive step.

4. Method Claim 11

The method of claim 11 refers to the plastic pipe of claim 1, and involves the application of a smooth

lacquer interlayer to the pipe surface before forming the metallic barrier film by physical vapour deposition under high vacuum. Consequently, the same arguments as set out above apply, and the method of this claim also has 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 Opposition Division with the order to maintain the patent on the basis of:
 - a) Claims 1 to 18 according to the request filed during the oral proceedings;
 - b) The description pages numbered 2 and 3 as granted;
 - c) The single figure as granted.

The Registrar:

The Chairman:

D. Sauter

U. Krause