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Datasheet for the decision of 9 June 2009

Case Number: T 1356/07 - 3.2.05

Application Number: 02735091.7

Publication Number: 1384026

IPC: F16L 59/153

Language of the proceedings: EN

Title of invention:
A reinforced flexible pipeline having a thermal barrier

Patentee:
NKT Flexibles I/S

Opponent:
Technip France SA

Headword:
-

Relevant legal provisions:
EPC Art. 56

Relevant legal provisions (EPC 1973):
-

Keyword:
"Inventive step (yes)"

Decisions cited:
-

Catchword:
-

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Case Number: T 1356/07 - 3.2.05

D E C I S I O N
of the Technical Board of Appeal 3.2.05
of 9 June 2009

Appellant: (Opponent)	Technip France SA 6-8, Allée de l'Arche Faubourg de l'Arche ZAC Danton F-92400 Courbevoie (FR)
Representative:	Bertrand, Didier S.A. FEDIT-LORIOT et autres Conseils en Propriété Industrielle 38, avenue Hoche D-75008 Paris (FR)
Respondent: (Patent Proprietor)	NKT Flexibles I/S Priorparken 510 DK-2605 Brøndby (DK)
Representative:	Hegner, Anette Hegner & Partners A/S Banemarksvej 50 DK-2605 Brøndby (DK)
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office posted 15 June 2007 rejecting the opposition filed against European patent No. 1384026 pursuant to Article 102(2) EPC 1973.**

Composition of the Board:

Chairman: W. Zellhuber
Members: P. Michel
E. Lachacinski

Summary of Facts and Submissions

I. The appellant (opponent) lodged an appeal against the decision of the Opposition Division rejecting the opposition filed against European Patent No. 1 384 026.

II. Oral proceedings were held before the Board of Appeal on 9 June 2009.

The appellant requested that the decision under appeal be set aside and that the patent in suit be revoked in its entirety.

The respondent (patentee) requested that the appeal be dismissed.

III. The following documents are referred to in this decision:

D1: US-A-5,934,335
D2': WO-A-00/66934
D3: US-A-5,307,842
D6: "Recommended Practice for Flexible Pipe", API Recommended Practice 17B, 1998, page 108

IV. Claim 1 as granted reads as follows:

"1. A reinforced flexible pipeline comprising an inner liner (3) on whose inner side an inner reinforcement layer (2) is provided, and on whose outer side an outer reinforcement layer comprising at least a layer selected from the group consisting of pressure absorbing layer and tension absorbing layer (4, 5, 6, 7) is provided, wherein an additional barrier layer (9, 10,

11) is arranged between the inner reinforcement layer (2) and the liner (3), and that the additional barrier layer (9, 10, 11) is thermally insulating and is composed of profiles made completely or partly of a polymer **characterised in that** the additional barrier layer (10,11) is formed by at least a layer of geometrically locking profiles."

"11. Use of a reinforced flexible pipeline for transporting oil with a temperature above 130°C wherein said pipeline comprises an inner liner (3) on whose inner side an inner reinforcement layer (2) is provided, and on whose outer side an outer reinforcement layer comprising at least a layer selected from the group consisting of pressure absorbing layer and tension absorbing layer (4, 5, 6, 7) is provided, wherein an additional barrier layer (9, 10, 11) is arranged between the inner reinforcement layer (2) and the liner (3), the additional barrier layer (9, 10, 11) being sufficiently thermally insulating to keep the inner liner with a temperature of below 130°C, **characterised in that** said additional barrier layer (10,11) is formed by at least a layer of geometrically locking profiles."

V. In the written and oral proceedings, the appellant has argued substantially as follows:

The subject-matter of claim 1 lacks novelty in view of the disclosure of document D1. In particular, the term "geometrically locking profiles" is vague and does not distinguish the claim from the pipeline shown in Figure 2 of document D1. As disclosed at column 7, lines 48 to 53, the layer 7 of this embodiment may be formed by winding an elastomer band with the edges of

the band practically touching. The abutting edges of the band thus constitute a geometrical cooperation between adjacent turns which prevent movement in the axial direction of the pipeline. In addition, the band partially fills the interstices in the carcass 1, resulting in geometrical locking of the band with respect to the carcass.

Insofar as the subject-matter of claim 1 is considered to be new, it nevertheless does not involve an inventive step. The subject-matter of claims 1 and 11 is distinguished from the disclosure of document D1 solely by the internal layer being formed by at least a layer of geometrically locking profiles.

The problem to be solved is to provide increased resistance to compressive forces acting on the barrier layer as well as permitting improved insulation.

The solution to this problem is disclosed in document D2'. In the paragraph common to pages 3 and 4, it is stated that imbrication of the lateral faces of adjacent profiles improves cohesion of the layer and avoids the formation of thermal bridges. Whilst document D2' refers to solving the problem of the vault effect, it is also disclosed that the invention is concerned with ensuring good thermal insulation. Both problems are solved by means of the same solution.

In addition, document D6 indicates that a lack of interlock in insulating layers is a known problem in pipelines, so that insulating layers formed of interlocking profiles are well known in the art.

Thus, regardless of the location of the insulating layer, it does not involve an inventive step to form the layer from interlocking profiles.

In the event that document D3 is regarded as representing the closest prior art, the subject-matter of claims 1 and 11 would not involve an inventive step in view of the disclosure of document D2.

VI. In the written and oral proceedings, the respondent has argued substantially as follows:

The band (7) of the embodiment of Figure 2 of document D1 is not thermally insulating and cannot be regarded as a layer of geometrically locking profiles. In fact, there is no insulating layer in the pipeline of document D1. The ability to withstand high temperatures is achieved by using a layer which is not destroyed by heat. No interlocking occurs between the edges of the band. Further, the band is soft and cannot have any locking effect with respect to adjacent layers.

The reference in claim 2 of the patent in suit to mechanical locking refers to a preferred arrangement in which the profiles are fixed to one another.

The subject-matter of claims 1 and 11 is thus distinguished from the disclosure of document D1 by the provision of a barrier layer formed by at least a layer of geometrically locking profiles.

Document D3 is a closer prior art document than document D1, since it is concerned with thermally protecting a flexible pipe.

Document D2' is directed to the solution of a different problem, that of the vault effect. This effect is not relevant to the pipeline of document D1 or D3.

The combined teachings of documents D1 or D3 with document D2' would suggest that any insulating layer should be provided on the outside of the reinforcement layer.

The subject-matter of claims 1 and 11 thus involves an inventive step.

Reasons for the Decision

Inventive Step

1. Closest Prior Art

Document D1 is regarded as representing the closest prior art. This document discloses, with particular reference to the embodiment shown in Figure 2, a reinforced flexible pipeline comprising an inner reinforcing layer in the form of a flexible metal tube (1), referred to as a carcass, an outer reinforcement layer (4a), and a barrier layer (2) arranged between the inner and outer layers. The barrier layer (2) consists of a main exterior polymer layer (6) and a relatively thin internal layer (7) (see column 5, lines 32 to 41). As disclosed at column 7, lines 48 to 53, the internal layer (7) may "… be obtained by winding an elastomer band with the edges of the elastomer band practically touching and sufficiently soft for it to fill the interstices (in the carcass)

partially and for its external surface to have an almost continuous and smooth appearance…".

The internal layer (7) cannot, however, be regarded as being a layer of geometrically locking profiles. Firstly, there is no interlocking between adjacent edges of the band, which are merely "practically touching". Secondly, there is no locking effect resulting from the partial filling of the interstices in the carcass, owing to the softness of the band which renders it deformable. The band thus does not create any locking effect, either with an adjacent turn of the band, or with an adjacent layer.

In this connection, it may be noted that, contrary to the description of the patent in suit in paragraph [0040], the embodiment of Figure 2 is not regarded as being within the scope of claim 1, since it does not comprise a layer of geometrically locking profiles as specified in claims 1 and 11. The sole embodiment of the invention disclosed in the patent in suit is thus that of Figure 3.

The subject-matter of claims 1 and 11 is thus distinguished from the disclosure of document D1 in that the additional barrier layer is formed by at least a layer of geometrically locking profiles.

2. Problem to be Solved

The problem solved by the provision of a barrier layer in the form of at least a layer of geometrically locking profiles is to provide increased resistance to

compressive forces acting on the barrier layer as well as permitting improved insulation.

3. Solution

Document D2' discloses a pipeline in which a thermally insulating layer formed of profiles surrounds a central core (1) in which are provided pressure and tension absorbing layers. The thermally insulating layer is surrounded by a protective sleeve (13). As stated at page 3, lines 4 to 8, of document D2', the object of the invention is avoid the vault effect, that is, resistance to radial deformation (see page 1, lines 31 to 35), whilst ensuring good thermal insulation.

Thus, if the person skilled in the art was seeking to improve the thermal insulation of the pipeline of document D1, the teaching of document D2 would lead to the provision of one or more thermally insulating layers around the reinforcing layers. There is no inducement to replace the internal layer (7) of Figure 2 of document D1 by a thermally insulating layer formed by geometrically locking profiles. In particular, it is noted that the layer (7) preferably has a relatively small thickness (column 5, lines 38 to 41), and it is not suggested that the layer has a significant insulating function.

Document D6 may be regarded as being an indication that layers of locking profiles are conventionally used as thermally insulating layers in the field of flexible pipes. However, this does not amount to an indication that a thermally insulating layer formed by geometrically locking profiles should be provided

within an outer reinforcement layer as specified in claims 1 and 11 of the patent in suit.

4. Alternative Approach

It was suggested by the respondent that document D3 should be regarded as representing the closest prior art. In contrast to document D1, the pipeline disclosed in this document comprises a thermal protection layer (7) formed of a composite material comprising cork granules (column 3, lines 43 to 48). However, even if this layer was replaced by a layer formed by geometrically locking profiles, the resulting pipeline would not satisfy the criterion of claim 1 that the thermally insulating layer should be provided within the reinforcing layers.

5. The subject-matter of claims 1 and 11 thus involves an inventive step.

Claims 2 to 10 and 12 to 14 are dependant from claims 1 and 11 and relate to preferred aspects of the pipeline as claimed in claim 1 and the use of a pipeline as claimed in claim 11 respectively. The subject-matter of these claims thus also involves an inventive step.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

D. Meyfarth W. Zellhuber