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Anmeldenummer / Filing No / N° de la demande : 85 101 315.1

Veröffentlichungs-Nr. / Publication No / N° de la publication : 0 152 875

Bezeichnung der Erfindung: Vapor generating and recovery apparatus including
Title of invention: continuous conveying means through a vapor zone
Titre de l'invention :

Klassifikation / Classification / Classement : B01D1/00; C23G 5/04

ENTSCHEIDUNG / DECISION

vom / of / du 15 March 1990

Anmelder / Applicant / Demandeur : McCord, James W.

Patentinhaber / Proprietor of the patent /
Titulaire du brevet :

Einsprechender / Opponent / Opposant :

Stichwort / Headword / Référence :

EPÜ / EPC / CBE Article 56

Schlagwort / Keyword / Mot clé : "Inventive step (yes)"

Leitsatz / Headnote / Sommaire

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Case Number : T 375/89 - 3.4.2

D E C I S I O N
of the Technical Board of Appeal 3.4.2
of 15 March 1990

Appellant : McCord, James W.
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Decision under appeal : Decision of Examining Division 031 of the European Patent Office dated 7 February 1989 refusing European patent application No. 85 101 315.1 pursuant to Article 97(1) EPC

Composition of the Board :

Chairman : J.D. Roscoe
Members : C. Black
L. Mancini

Summary of Facts and Submissions

I. European patent application No. 85 101 315.1 (publication number 0 152 875) was refused by decision of the Examining Division.

II. The reason given for the refusal was that the subject-matter of Claim 1 as filed on 9 February 1987 was obvious to the skilled person having regard to the disclosure in the following documents:

(1) US-A-4 389 797
(2) FR-A-2 313 955.

Starting from document (1), the problem, viewed under objective criteria, was to improve the apparatus so that substantially all of the vapour generated in the operation performed is recovered.

Document (1) disclosed an apparatus combining all the features of the preamble of Claim 1, so also did document (2), apart from the features associated with the conveyor means.

In document (2), generation of vapour and its recovery in liquid form by cooling were performed in separate chambers, thus leading to a complete recovery of the vapour. It lay within the scope of a skilled person to consider the two chamber construction of document (2) for the apparatus known from document (1), since the presence of a conveyor means did not exclude the possibility of a two-chamber system. To implement this there were onlytwo possible locations for the cooling chamber, namely downstream or laterally of the conveyor, and the lateral

arrangement could be arrived at by the skilled engineer by routine work. The same was true for the claimed location, in relation to the output and input, of the means defining the path for vapour communication from the vaporising to the condensing chamber.

III. The Appellant lodged an appeal against the decision.

IV. In a communication of the Board, pursuant to Article 11(2) of the Rules of Procedure of the Boards of Appeal, expressing doubts as to whether the subject-matter of the then valid Claim 1 involved an inventive step, a new document, US-A-3 656 492 (3), was introduced into the procedure.

V. Oral proceedings were held at the end of which the Appellant withdrew all previous requests and requested that the decision under appeal be set aside and a patent granted on the basis of Claims 1 to 15 handed over at the oral proceedings, of which Claim 1, the only independent claim, reads as follows:

"1. A vapor generating and recovery apparatus (10) comprising:

means defining at least one vaporizing chamber (28) in which a liquid (12) is vaporized; heat emitting means (42) located in the vaporizing chamber (28) for heating the liquid (12) to a temperature above the vaporizing temperature to create a vapor zone above the liquid;

cooling means (44) for cooling the vapor to a temperature below the vaporizing temperature;

at least one opening in the apparatus (10) providing conveyor inlet and outlet means (34, 36) and conveyor means (38) extending through the conveyor inlet (34) into the vaporizing chamber (28), across the vaporizing chamber, and out of the vaporizing chamber through the conveyor outlet (36);

C H A R A C T E R I Z E D B Y

means defining at least one condensing chamber (30) adjacent to the vaporizing chamber (28) in which said cooling means (44) is located and the vapor (31) is condensed and separated from the vaporizing chamber (28) by a wall (26); and an opening (32) disposed within said wall (26) spaced from said at least one opening (34, 36) in the housing (10) whereby vapors to be condensed are drawn away from said at least one opening (34, 36) in the housing and said opening (32) in said wall (26) defines a path for vapor communication from the vaporizing chamber (28) to the condensing chamber (30) through the wall (26), which is located laterally to one side of the conveyor means (38)."

VI. The essential arguments presented by the Appellant were as follows:

Pressure differences generated by the local vaporisation and condensation of the vapour caused a flow of vapour which in the apparatus of D3 was generally laterally outwards and turbulence occurred above the weir formed by the inner wall of the channel- form vaporisation chamber thus giving rise to an upward flow of vapour towards the conveyor inlet and outlet rather than a flow in a direction away from them. The suction boxes provided at these points would also draw the vapour outwards.

When the condensing chamber was separated from the vaporising chamber by a wall disposed laterally of the conveyor path and in vapour communication with it only through an appropriately located aperture or apertures, the aperture represented a local point of low vapour pressure causing vapour to flow towards it from high pressure zones. Thus, by appropriate positioning of the aperture(s) in relation to the inlet and outlet means for the conveyor means, vapour could be made to flow away from these means thus eliminating leakage to a large extent or the need for such elaborate cooling systems as shown in D1. In fact, the apparatus of D1 would be quite ineffective from the point of view of vapour recovery since the inner ends of the conduits for the conveying means were fully immersed in the high pressure vapour zone thus causing substantial leakage.

None of the cited documents disclosed the use of an apertured wall between vessels in which vaporisation and condensation respectively took place, nor the concept of causing vapour to flow away from openings through which leakage might occur.

Reasons for the Decision

1. The appeal is admissible.

2. Claim 1 is a combination of Claims 1 and 17 as originally filed with the additional features that the vaporising and condensing chambers are separated by a wall disposed laterally to one side of the conveyor means in which the opening defining the path of vapour communication between the chambers is located. These features are disclosed in the original drawings when read in conjunction with the

description. Therefore, neither the amendments to Claim 1 nor those to the remaining claims and description which are consequential on the amendment of Claim 1 are such that the application as amended contains subject-matter extending beyond the content of the application as filed (Article 123(2) EPC).

3. **Novelty**

3.1 In the apparatus described with reference to Figures 1 to 3 of document (1), which has the combination of features set out in the preamble of Claim 1, the only cooling means are those surrounding the channels through which conveying means enter and leave the vaporising chamber and a coil mounted above but in the same chamber as the heating means. None of these cooling means is separated by an apertured wall from the vaporising chamber.

3.2 The apparatus disclosed with reference to Figures 1 and 2 of document (2) has no conveyor means or inlets and outlets therefor. Apart from this, the wall 7, which separates its vaporising and condensing chambers, terminates below the top of the vertically extending walls of the apparatus so that the path for vapour communication between the two chambers is over the top of this wall rather than through an opening in it.

3.3 In the apparatus described in document (3), which also has the combination of features set out in the preamble of Claim 1, there is no wall having an opening forming a vapour communication path between the vaporising chamber and the condensing chamber, which in this case surrounds the top of the vaporising chamber.

3.4 The apparatuses disclosed in the documents cited in the Search Report but not mentioned in the examination

procedure are more remote from the claimed subject-matter, which is, therefore, novel in the sense of Article 54 EPC.

4. **Inventive step**

4.1 In the Board's opinion, the closest prior art is the apparatus disclosed in D3 which possesses in combination all the features of the preamble of Claim 1. This apparatus also includes a small chamber surrounding the open top of the vaporising chamber and into which a cooling coil extends.

This chamber in which condensed vapour collects appears to be generally annular and is of open channel form. It is separated from the uppermost portion of the vaporising chamber by base and inner side surfaces of the channel walls. In operation, the heavy vapour pours over the top of the channel wall into the chamber.

4.2 The prior art apparatus differs from that claimed in Claim 1 essentially in that there is no opening disposed in the separating wall so that none of the further requirements relating to this opening are fulfilled. The Appellant has stated that the apparatus claimed achieves a more efficient recovery and thus reduced loss of the vapour, which in practical realisations was often either expensive or noxious or both, than in the prior art arrangement and the Board has no reason to doubt the truth of this statement, particularly when considering the described embodiment.

4.3 Therefore, the objective problem to be solved was how to reduce the vapour loss from an apparatus such as described in D3.

4.4 No inventive step would be required to recognise this problem since it is clear from D3 itself and D1 (column 1, lines 26-36) and it is indeed well known to be highly undesirable that the type of solvents used in degreasing should escape either into the cleaning establishment or into the atmosphere at large and that many attempts, illustrated by the prior art cited in the Search Report, have been made in the past to eliminate or at least reduce such escape. As the laws on pollution become more strict it is evident that further improvements in this respect are required.

4.5 It remains to be determined, therefore, whether the apparatus according to Claim 1 is obvious having regard to the disclosures in the cited documents.

4.6 In D3 itself it is recognised that some solvent vapour by-passes the condensing chamber and suction boxes are provided around the points through which the steel strip or the conveyor carrying the articles to be degreased (column 1, lines 62-65) enter or leave the apparatus to prevent leakage into the atmosphere and refers later to wastage through the suction boxes. There is, however, no suggestion to modify the condensing system to reduce this wastage. The Board considers that all the discussion in D3 might suggest to the skilled person would be to recover vapour from the air extracted by the suction boxes, as suggested for the plenum chambers col. 4, lines 26 to 31 of US-A-3 123 083 referred to in the European Search Report.

4.7 In D1, the arrangements for preventing loss of vapour take the form of cooling coils disposed at the vapour entrance to and around the narrow (see column 2, lines 46-48; column 3, lines 53-58) passages through which the conveyor means enters and leaves the apparatus. These passages may be upwardly inclined so as to better retain the heavy

vapour (column 3, line 45). There are also cooling coils above the conveyor path to confine the vapour. While the skilled person might be induced by this to substitute for, or place ahead of, the suction boxes (essentially as in US-A-3 123 083) in D3 conveyor conduits designed and cooled as described in D1 and/or to place a cooling coil directly above the vaporising chamber, there is nothing to lead him to provide openings in the wall separating the vaporising and cooling chambers.

4.8 In the apparatus of D2, which like that of D1 is open-topped, the vapour is confined from above by a cooling coil. As in D3, vapour flows over the top of an unapertured wall into a chamber containing a cooling coil where it condenses.

4.9 Thus, D2 also provides no reason or suggestion to form an opening or openings in the separating wall in D3 or to substitute for this wall a wall located laterally of the conveyor means with an opening by which it is connected to a condensing chamber so located as to cause vapour to be drawn away from the opening(s) through which the conveyor means enter the apparatus.

Although the Board has thoroughly scrutinised all the other documents cited on the European Search Report, it can find none in which vapour passes through an opening in a wall separating adjacent vaporing and condensing chambers. In these circumstances and for the reasons given in detail above, the Board is satisfied that the apparatus claimed in Claim 1, and hence also that claimed in the remaining claims which are all appendant thereto, is not only novel but also involves an inventive step within the meaning of Article 56 EPC.

4.10 Even if the skilled person starting from the apparatus of D1 came to the idea as suggested by the Examining Division of introducing into the apparatus of D1 features disclosed in D2 either in substitution for features having analogous functions or to provide additional facilities, this would not result in the apparatus claimed since neither of the documents discloses the use of an aperture in the wall between vaporising and condensing chambers, still less suggest that the aperture (opening) should be so located as to draw vapour away from the opening(s) through which the conveyor means enters and leaves, which is the main feature providing the advantages claimed.

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 grant a patent on the basis of the following documents:

Claims 1 to 15 handed over at the oral proceedings;
page 1 of description handed over at the oral proceedings and pages 2 to 8 filed 31 May 1988 with the words "for example" deleted at line 24 of page 13;
drawings as originally filed.

The Registrar: The Chairman:

M. Beer J.D. Roscoe