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Datasheet for the decision of 23 May 2017

Case Number: T 1704/12 - 3.2.03

Application Number: 04739443.2

Publication Number: 1636527

IPC: F24J2/46

Language of the proceedings: EN

Title of invention:
SOLAR COLLECTOR

Patent Proprietor:
VKR Holding A/S

Opponents:
Vaillant GmbH
Solvis GmbH & Co. KG
FAKRO PP Spolka z.o.o.

Headword:

Relevant legal provisions:
EPC Art. 100(a), 100(b), 100(c), 54, 56, 70(1)
RPBA Art. 12(4), 13(3)

Keyword:
Grounds for opposition - lack of clarity no ground for opposition - insufficiency of disclosure (no) - added subject-matter (no)
Novelty - (yes)
Inventive step - (yes)
Late-filed facts - submitted with the statement of grounds of appeal
Late-filed document - adjournment of oral proceedings would have been required (yes)

Decisions cited:
T 0190/99, G 0001/14, T 0691/12

Catchword:

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Case Number: T 1704/12 - 3.2.03

D E C I S I O N
of Technical Board of Appeal 3.2.03
of 23 May 2017

Appellant: (Opponent 1)	Vaillant GmbH Berghauser Strasse 40 42859 Remscheid (DE)
Representative:	Hocker, Thomas Vaillant GmbH Berghauser Strasse 40 42859 Remscheid (DE)
Appellant: (Opponent 2)	Solvis GmbH & Co. KG Grotrian-Steinweg-Strasse 12 38112 Braunschweig (DE)
Representative:	Einsel, Martin Patentanwälte Einsel & Kollegen Jasperallee 1a 38102 Braunschweig (DE)
Appellant: (Opponent 3)	FAKRO PP Spolka z.o.o. Ul. Wegierska 144a 33-300 Nowy Sacz (PL)
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Respondent: (Patent Proprietor)	VKR Holding A/S Breeltevej 18 2970 Hørsholm (DK)

Representative: Nordic Patent Service A/S
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Decision under appeal: **Decision of the Opposition Division of the European Patent Office posted on 6 June 2012 rejecting the opposition filed against European patent No. 1636527 pursuant to Article 101(2) EPC.**

Composition of the Board:

Chairman G. Ashley
Members: C. Donnelly
D. Prietzel-Funk

Summary of Facts and Submissions

I. The appeal lies from the decision of the opposition division rejecting the oppositions against European Patent No. EP-B-1 636 527.

Opponents I, II and III (hereinafter: the appellants I, II and III) lodged appeals against this decision in due form and time.

II. State of the art

The appellants relied on the following state of the art and technical specifications filed with their grounds of appeal to support their cases:

Appellant I

A1: DE 200 04 504 U1;
A2: DE 93 13 856 U1;
A3: Eberhard Baust, Praxishandbuch Dichtstoffe, 4. Auflage Düsseldorf 1995, S.119-125;
A4: US 4 813 203;
A5: DE 36 33 618 A1;
A6: US 5 596 981;
A7: DE 26 50 143 A1
A8: 3 Technical data sheet Otto-Chemie Novasil SP 5716, 6116, 6131;
A9: Beitz, Küttner (Hrsg): Dubbel, "Taschenbuch für den Maschinenbau" 14. Auflage, S.129 (Machinery Handbook , 14th Edition, page 129)

Appellant II

B1: US 4 141 339
B2: DE 26 50 143 A1 (same as A7)

B3: Prior use of Solar-Flachkollektor SOL 25 S from Stiebel Eltron GmbH &Co. KG, Dr. Stiebel-Straße, D-37603 Holzminden, Deutschland.

Appellant III

A2: DE 93 13 856 U1;
A3: Eberhard Baust, Praxishandbuch Dichtstoffe, 4. Auflage Düsseldorf 1995, S.119-125;
A4: US 4 813 203;
B1: US 4 141 339
B2: DE 26 50 143 A1 (same as A7)
D4: DE 201 119 62 U1
D5: DE 202 192 21 U1
D10: Data sheet "www.acc-silicones.com"
D11: H. Stöcker, "Taschenbuch der Physik", 3rd edition, 1998
D12: collection of coefficients of friction taken from website "www.carbidedepot.com"
D13: copy of webpage from "www.paint-and supplies.hardwarestore.com".

After the grounds of appeal had been filed, appellant III submitted references to various web pages in documents identified as D14,D15,D16,D17, in further support of its arguments relating to the calculation of the frictional forces present in a roof mounted solar panel arrangement.

Respondent

In support of its arguments relating to the weight of solar collectors the respondent cited SPF Solar Collector Factsheets for Fakro SKW 78x140 (P1), Fakro SKW 114x140 (P2), Fakro SKW 114x206 (P3), Fakro SKW 114x118 (P4).

III. In a communication pursuant to Article 15(1) RPBA, annexed to the summons to oral proceedings, the Board informed the parties of its provisional opinion. In particular, the Board indicated that it did not intend admitting the alleged prior use into the proceedings under Article 12(4) RPBA.

In reaction, Appellant III filed a further document:

D18: "Tribologie-Handbuch" H. Czichosand K-H. Harbig, Vieweg, Braunschweig/Wiesbaden 1992, pages 28 to 34 and 74 to 80.

In its response, Appellant II filed an enlargement of the specification box of drawing number 074272, which was cited as part of the evidence (B3) of the prior use.

By letter of 21 April 2017, the respondent filed auxiliary requests 3 to 5 and made a reference to a copy of webpage:

D19: http://www.moldeddimensions.com/shear.php; and submitted a further document:

D20: excerpt from Handbook of sealant technology; edited by K.L. Mittal, A. Pizzi;

By letter of 19 May 2017, appellant III submitted document:

D21: EP 820 552.

IV. Oral proceedings were held on 23 May 2017 during which appellant III submitted document FR 2 626 028.

At the end of the debate the parties confirmed the following requests:

Appellants I,II and III requested that the decision under appeal be set aside and that the patent be revoked.

The respondent requested that the decision under appeal be set aside and that the patent be maintained on the basis of the set of claims of auxiliary request 2 submitted with the letter dated 18 April 2013 as the new main request. The (former) main request regarding the claims as granted and the set of claims according to auxiliary request 1 were withdrawn.

V. Independent apparatus claim 1 according to the new main request (formerly auxiliary request 2) corresponds to claim 1 as granted and reads:

"A solar collector comprising:

an absorber (3), an insulating layer (2) beneath the absorber,
a cover pane (4) spaced above the absorber, and
an outer frame (1) having side panels surrounding the periphery of the insulating layer (2),
the side panels (1) having a ledge (1a) directed inwardly or outwardly from said side panel adjacent to its upper end,
the outer frame (1) being provided with one or more upwardly directed spacers (1c) for maintaining a distance between the ledges (1a) and the cover pane (4) while fitting the cover pane,

characterised in that it further comprises

a layer of flexible adhesive sealant (8) bridging said distance and connecting the periphery of the cover pane (4) to the ledges (1a) so that the layer of flexible adhesive sealant (8) is the only restriction on relative movement between the frame (1) and the cover pane (4)."

Independent method claim 10 as granted reads:

"A method for producing a solar collector having an absorber (3), an insulating layer (2) beneath the absorber, a cover pane (4) spaced above the absorber, and an outer frame comprising the steps of:
providing an insulation layer (2) and an outer frame having side panels (1), the side panels having a ledge (1a) directed inwardly or outwardly from said side panel adjacent to its upper end,
providing one or more spacers (1c) for maintaining a distance between the ledges (1a) and the cover pane (4) characterized in that the method further comprises
providing a flexible dam (7a) on the inner part of the ledges (1a) for separating the space between the ledges (1a) and the cover pane (4) from the interior space of the collector, placing a cover pane (4) on the one or more spacers (1c),
applying a liquid flexible adhesive sealant (8) to the space between the ledges (4) and the cover pane (4), and allowing the liquid flexible adhesive sealant (8) to cure."

VI. Arguments of the parties

The cases of the appellants in as far as they are relevant to the respondent's final main request are briefly summarised below. Details of all the parties' cases can be found in the written submissions and

minutes of the oral proceedings. Relevant arguments are dealt with in the "Reasons".

Appellant I

Novelty

Claim 1 lacks novelty in view of A1.

Inventive step

Claim 1 lacks an inventive step in view of:

A1 in combination with A2
A2 in combination with A1
A2 in combination with A5

Independent method claim 10 lacks an inventive step in view of:

A1 in combination with the skilled persons general knowledge.

Appellant II

Novelty

Claim 1 lacks novelty in view of B1 and B3. Claim 10 lacks novelty in view of B3

Inventive step

Claim 1 lacks an inventive step in view of:

B3 in combination with B1
B3 in combination with B2

B1 in combination with B2
B2 in combination with A2

Claim 10 lacks an inventive step in view of B1 in combination with B2

Appellant III

Novelty

Claim 10 lacks novelty in view of B2

Inventive step

Claims 1 and 10 lack an inventive step in view of the following combinations:

A2 with D5
A2 with D4
B2 with B1

Insufficiency of disclosure, Article 100(b) EPC

Appellants I,II and III reasoned that the requirements of Article 83 EPC are not met since the sealant-adhesive layer is not the only restriction on relative movement between the cover pane and the frame. In particular, friction between the upstanding rim 1c or the gasket covering it and the cover-pane is of the same order of magnitude as the shear stress opposing relative movement in the sealant-adhesive layer. The appellants further argued that the protective stripping 10 shown in figures 9 and 10a-c also inevitably would be a restriction on the relative movement between the cover pane and frame. Appellant II also considered that the confusion between the terms "ledge" and "latch"

used in the claim and the description respectively, would mean that the skilled person would not be able to carry out the invention.

Article 100(c) EPC, Extended subject-matter

Appellant II submitted that there is extended subject-matter since the German language version of claim 1 specifies a "relativen Moment" which is not mentioned in the originally filed documents.

Consideration of prior use B3 (Article 12(4) RPBA)

Appellant II submitted that the public prior use supported by documents B3 was filed with the grounds of appeal and should be taken into consideration since it only became aware of its existence after the opposition proceedings had been terminated. Therefore it had not been able to submit it earlier.

Admissibility of D21 and FR 2 626 028 (Article 13(3) RPBA).

Appellant III argued that D21 was submitted in reaction to the respondent's filing of auxiliary requests 3 to 5 with its letter of 21 April 2017. FR 2 626 028 was only discovered in a further search carried out immediately before the oral proceedings also in reaction to these requests. However, it is immediately apparent that this document is highly relevant to claim 1 of the new main request and should therefore be admitted into the proceedings.

Respondent

The respondent rejected all the arguments submitted by the appellants.

Reasons for the Decision

1. Prior use of the Stiebel Eltron Solar-Flachkollektor SOL 25 S (B3)

1.1 The admissibility criteria to be met by an allegation of prior use filed for the first time in appeal proceedings are laid out in T691/12 (also see Case Law of the Boards of Appeal, 8th Edition 2016, IV - C. 1.3.17 a)) These are:

(i) there should be no recognisable abuse of procedure;

(ii) the prior use must be prima facie so relevant that it puts in doubt the validity of the patent;

(iii) the prior use must be rigorously proven, such that there is no need for any further investigation as regards the nature of the subject-matter and the circumstances of its public availability.

1.2 As regards the first requirement, although there is no reason to believe that it was intentional not to submit the alleged prior use during the first instance proceedings, it must also be said that there does not

appear to be any solid reason why it could not have been filed earlier. Appellant II simply argued that it was not aware of its existence until more recently.

1.3 However, it is to be expected that a manufacturer of solar panels, such as appellant II, would have taken a keen interest in the results of the Stiftung Warentest report of April 2002, especially considering that it not only included results for the Solar-Flachkollektor SOL 25 S from Stiebel Eltron GmbH &Co. KG (being the subject of the alleged prior use), but also for a solar collector (Solvis Vacutherm Plus Paket VT 1) manufactured by appellant II itself.

1.4 Regarding the second requirement of T 691/12, it is not immediately evident that the alleged prior use puts the validity of the patent in doubt. As the respondent has pointed out in its letter of 18 April 2013 (see page 20, first paragraph), the foam tape used in the frame of the SOL 25PC (Kanada) solar collector cannot be construed to be a spacer for maintaining a distance between the ledges and the cover pane, as defined in claim 1, since such a foam material is not intended for, or capable of, maintaining a set distance.

1.5 The third criterion is also not met. No technical details of the solar collector actually tested are given in the Stiftung Warentest report, and different versions may have existed. For example, the "Fertigungsanweisung" relates to a collector labelled "SOL 25 PC (Kanada)" whereas the other documents submitted in support of the prior use come under the label "SOL 25 S", such that it is not clear what apparatus constitutes the prior use.

1.6 The hearing of the witness named by appellant II to confirm its case is tantamount to the board carrying out further investigations and counter to the third criterion.

1.7 Therefore, since none of the criteria are met, the board will not take the alleged prior use into consideration (Article 12(4) RPBA).

2. Admissibility of D21 and FR 2 626 028 into the appeal proceedings (Article 13(3) RPBA).

2.1 Appellant III submitted D21 in reaction to the respondent's filing of auxiliary requests 3 to 5. However, since the discussion of these requests was not necessary, the question of admissibility of D21 does not arise. FR 2 626 028 was filed during the oral proceedings together with a translation into English of the relevant technical terms. Clearly the board and the respondent cannot reasonably be expected to deal with such a late submission without adjournment of the oral proceedings. FR 2 626 028 is therefore not admitted into the proceedings (Article 13(3) RPBA).

3. Article 100(b), Insufficiency of disclosure

3.1 The appellants allege that the skilled person cannot carry out the invention as defined in claim 1 since it recites that "a layer of flexible adhesive sealant is **the only restriction** on relative movement between the frame and the cover pane", whereas in all the embodiments described in the patent there are obviously other restrictions on relative movement.

3.2 Appellants II and III have both submitted that "relative movement between the frame and the cover pane" is not limited to horizontal movement, but also includes relative movement in the vertical direction. They argue that the skilled person is not taught how to carry out the invention since the "upstanding rim 1c" is also a restriction on relative movement between the frame and the cover pane as it prevents relative movement of the pane towards the frame in the vertical direction.

3.3 However, in the board's view the skilled person possessed of a mind willing to understand the invention would consider that the vertical movement of the cover-pane into the material of the frame and cover-pane levitation are not technically sensible interpretations of the claim in the context of the patent specification; of relevance here is decision T190/99 (see Catchword), which deals entirely with the problem of relative movement in the horizontal direction due to differential thermal expansion of the materials (see for example, paragraphs [0004],[0006] and [0007]).

3.4 In particular, the appellants have argued that friction between the glass plate and the upwardly directed spacers of the frame is a further restriction on the relative movement between the frame and the cover pane. To demonstrate its point, appellant III carried out lengthy calculations of the frictional forces that must be acting between the upstanding rim support and the glass-pane to show that they are similar to those exerted by the silicon adhesive and cannot be neglected.

3.5 In view of this, appellant III has argued that the configuration shown in figure 3 of the letter of

5 October 2012 would be the only embodiment consistent with the claim language. However, as appellant III itself has stated, this embodiment is clearly impractical, which would lead to its rejection by the skilled person. In view of this the skilled person would construe the claim otherwise.

3.6 In the board's opinion, claim 1 has been deliberately drafted using the term "restriction" which is not synonymous with "resistance". In this case a "restriction" is considered to be the setting of a physical limit which cannot be crossed without failure of the apparatus.

3.7 Thus, although the board agrees with the appellants that frictional forces are inevitably present, these are not considered to be a restriction on relative movement between the frame and the cover pane of the solar collector of claim 1, since they do not place any limit on how far the cover pane can expand/contract in relation to the frame. On the other hand the layer of flexible adhesive sealant will inevitably fail beyond a certain degree of relative movement, thus imposing a physical limit. Appellant III accepts that at some point the adhesive-sealant will simply break, but does not regard such a failure as a restriction. The board disagrees since failure of the adhesive-silicon is a clear and recognisable restriction on the acceptable level of relative movement.

3.8 Furthermore, even if the frictional forces resisting relative movement are of the same order of magnitude as those of the adhesive sealant joint, both of these are insignificant compared with the forces generated by the difference in coefficient of linear thermal expansion. . Consequently, the skilled person with a

mind willing to understand the invention would also reject the notion that either frictional forces or the adhesive sealant itself could actually prevent relative movement between the cover pane caused by a difference in the thermal coefficients of linear expansion.

3.9 Even if a gasket were to be fitted over the upstanding rim 1c, as shown for example in figure 2a to 2c, it would not alter the situation since it is not bonded to the pane and would not fail even under extreme differential expansion between the frame and the pane.

3.10 The appellants further argued that the "protective stripping 10" shown in figures 9 and 10a-c is a restriction on relative movement. According to the description at paragraph [0054]-[0058] the protective stripping has several functions: (i) as a redundant means of securing the cover pane 4 to the frame 1 that prevents the cover pane 4 from falling should the silicon connection 8 between the frame 1 and the cover pane 4 against expectations ever fail; (ii) to protect the sensitive edges of the glass pane against mechanical impact; (iii) to improve weather protection. Thus, the protective stripping is no more functionally relevant to the solar collector in normal operation than a hub-cap is to a car-wheel or a bevel-protector is to a pipe in transport before welding. In particular, it will only act to hold the glass pane after failure of the silicon joint i.e. after the restriction set by this joint has been passed.

3.11 Further objections raised by Appellant II

3.12 Appellant II has submitted that whilst claim 1 refers to a "ledge 1a", the description at column 5 in paragraph [0029], lines 16 to 19 refers to "latch 1a". Since both terms make technical sense in the context of the patent the skilled person would be confused and unable to carry out the invention.

3.13 Leaving aside the fact that this is really an objection of lack of clarity which is not a ground of opposition and which cannot be raised against a granted claim (see G1/14), the board considers that the skilled person reading the claim with a mind willing to understand, rather than one distracted by minor discrepancies between the claim wording and the description, would have no difficulty in carrying out the invention since the figures clearly show a "ledge" as specified in the claims and this is what the skilled person would understand.

3.14 Taking into account the above considerations the board considers that the patent discloses to the skilled person how the invention can be carried out.

4. *Article 100(c) EPC extended subject-matter.*

4.1 The board does not accept Appellant II's argument that there is extended subject-matter since the German language version of claim 1 specifies a "relativen Moment" which is not mentioned in the original filed documents. As pointed out by the opposition division, it is the English language version of the text which is authentic (Article 70(1) EPC). Since no extended subject-matter has been identified in the English text

of the patent specification this objection was correctly rejected by the opposition division.

5. Novelty

5.1 Claim 1 with respect to A1

5.1.1 A1 simply discloses that the collector frame 1 surrounds ("Einfassen") a glass pane 2 (see page 4, lines 1 to 2, claim 1). No further details concerning the positioning of the glass pane 2 or the nature and properties of the unidentified material filling the gap between the frame and the glass pane are given. Further, the top of the upstanding outer edge of the frame is at the same height as the upper side of the glass pane (see figure 1), and hence would also present a restriction on relative movement between the frame and the cover pane in addition to that of the unidentified material. Thus, the board agrees with the respondent's analysis that A1 does not disclose the features of the characterising portion of claim 1.

5.1.2 Appellant I has argued that the skilled person is aware of various ways of connecting the cover glass to the frame, namely: (i) surrounding the cover pane with a positive fit frame as shown in US 5 596 981 (A6); (ii) using a rigid adhesive as shown in DE 2650 143 (A7); or (iii) fixing the cover pane with an elastic adhesive-sealant as shown in DE 93 13 856 (A2). Since A1 does not exhibit a positive fitting frame and since a rigid adhesive usually requires a small gap between the cover pane and frame, only variant (iii) is possible. However, whether the skilled person would elect to combine A1 and A2 is a matter of inventive step (see below).

5.2 Claim 1 with respect to B1

5.2.1 B1 does not disclose an outer frame having side panels surrounding the periphery of the insulating layer. It is explicitly stated at column 4, lines 25 to 27 that a significant factor in the reduced weight of the structure is the omission of a heavy metal frame. Since the device of B1 has no frame, the features of ledges and upwardly directed spacers are also failed to be disclosed. The rafters 10 are not part of the device, but part of the roof to which the device is fitted. Even if it were accepted that the rafters formed some kind of frame when the collector was in situ, the frame would only be on two sides of the insulating layer instead of surrounding the periphery of the insulating layer as required by claim 1.

5.2.2 The argument that the foam tape 20 forms the upwardly directed spacers provided on the outer frame for maintaining a distance between the ledges and the cover pane while fitting the cover pane, is also not convincing. The foam tape essentially functions as weather-proofing gasket to accommodate irregularities of contour of the upper edges of the rafter (see column 2, lines 34 to 36). It does not function as a spacer since the layer of adhesive-sealant 44 is applied to the top edges of the side and end walls 28 and 30 around the entire box, and the cover 18 is then pressed against this layer (see column 3, lines 40 to 46). There is no suggestion of any kind of element intended to relieve pressure on the adhesive-sealant by maintaining a gap.

5.3 Claim 10 with respect to B2

5.3.1 B2 discloses a device in which the cover-pane ("Abdeckscheibe 4") is joined to a frame element via an adhesive layer ("Klebeschicht 7" in figure 1 and "Klebeschicht 13" in figure 2); in both cases the adhesive is held in corrugations ("Flachsicke 6 or 12"). The corrugations are intended to replace spacers which had previously been used in the assembly of the collectors (see page 3, paragraph 4 and page 4, paragraph 3). In such an arrangement the peaks of the corrugations will act as spacers and the troughs as the gaps in which the adhesive is held. However, it is evident that such a configuration will also be to the detriment of the overall elasticity of the joint, particularly in shear mode, since the flanks of the corrugations provide rigid barriers to the shearing of the adhesive layer and act as a kind of stiff reinforcement. Therefore, as the respondent has argued, these connections are essentially non-elastic and fixed ("fest verbunden" - see page 5, line 4 and line 15).

Appellant I, when arguing its case for lack of novelty using A1 (see point 5.1.2 above), also agrees with this interpretation since it argued that the solar-collector disclosed in B2 was an example of a connection between the cover pane and frame using a rigid adhesive (see page 4 of letter dated 8 October 2012).

5.3.2 Therefore B2 at least does not disclose the feature of providing a flexible dam on the inner part of the ledges for separating the space between the ledges and the cover pane from the interior space of the collector. .

5.4 The subject-matter of claims 1 and 10 as granted is therefore novel and meets the requirements of Article 54 EPC.

6. Inventive step, Claim 1

6.1 The skilled person is considered to be an average degree qualified engineer with several years experience in the design and manufacture of solar panels who is therefore well aware of fundamental design considerations, such as the need to accommodate differential thermal expansion rates, and is capable of selecting basic materials, such as sealants, adhesives and gaskets from commercial suppliers catalogues.

6.2 Claim 1, Most relevant prior art

6.2.1 The appellants have submitted that the subject-matter of claim 1 lacks an inventive step taking A1, A2, B1 or B2 as the nearest prior art. As discussed when assessing the question of novelty above, B1 does not disclose an outer frame having side panels surrounding the periphery of the insulating layer and relies for support on the presence of rafters of the roofing system upon which it is to be mounted. The joints of the apparatus disclosed in B2 are rigid and the device is deliberately designed to dispense with the use of spacers by employing corrugated joints. A1 is not concerned with the positioning of the glass cover and would require a complete redesign of the outer frame in order to eliminate the outer rim which restricts lateral movement of the unidentified material between the frame and the cover pane.

6.2.2 In view of this, the board considers A2 to be the most promising starting point for the assessment of

inventive step, since it is common ground between the parties that this document discloses a similar type of apparatus from which the subject-matter of claim 1 only differs in that the outer frame is provided with one or more upwardly directed spacers for maintaining a distance between the ledges and the cover pane while fitting the cover pane. The appellants also agree that A2 is a promising starting point and submit that the subject-matter of claim 1 lacks an inventive step starting out from A2 in combination with any one of A1, A5, D4 or D5.

6.2.3 The technical effect of this feature is given in the patent at column 2, lines 28 to 32 which states "The construction with the spacers allows a substantial and controllable thickness of the layer to ensure adequate flexibility over the complete operating temperature of the solar collector".

6.2.4 The objective technical problem must be phrased in such a manner as not to contain a hint towards its solution, thus a mention of controlling the thickness of the adhesive-sealant layer is not appropriate? permissible. In this case a broader formulation is necessary, and the problem to be solved is how to ensure that the solar collector is capable of accommodating differential rates of linear expansion between the frame and cover pane over the complete anticipated operating temperature range of the collector.

6.2.5 The board accepts that the skilled person would have consulted A1, D4 and D5 since these documents also concern the construction of solar collectors.

6.2.6 However, A1 makes no mention of differential thermal expansion being a problem, and contains no discussion

of the connection between the cover pane 2 and the frame 1; it also does not identify the material used to fill the gap between the cover pane and the frame. Any possible displacement of the cover pane relative to the frame is also not mentioned. The skilled person seeking a solution to the above problem would therefore only extract any information from A1 with the benefit of hindsight in an attempt to try and make it fit the claimed solution.

6.2.7 D4 mentions neither the problem of thermal expansion nor the relative displacement of the cover pane to the frame. The spacer ("Abstandshalter 3") of D4 is fixed to both the absorber surface 2 and the cover pane 1 and extends around the periphery of the pane 1. The spacer is intended to maintain a set distance between the pane and the absorber surface (see page 2, lines 22 to 26). The sealing compound 4 itself forms the edge connection and there is no frame as such. Since there is no frame, there cannot be any relative movement between the frame and the pane. Thus, the spacer of D4 is not provided on the outer frame for maintaining a distance between ledges and the cover pane. Consequently, the skilled person would find no incentive from D4 to provide a spacer in the assembly of A2 in order to solve the above objective technical problem.

6.2.8 D5 also fails to address the problems of thermal expansion and relative movement between the cover pane and the frame. The main idea behind the assembly disclosed in D5 is to dispense with the conventional profile and frame arrangement by using a post/locking bar system. The assembly edges between the posts/ locking bars 8, 8' are sealed by a silicon seal 7. The spacer ("Abstandshalter 4") disclosed in D5 is intended to maintain the distance between the cover pane and the

absorber surface rather than between a ledge on a frame and the cover pane. The metal spacer 4 is placed immediately abutting the silicon seal 7 and is sealed to the glass pane and the absorber via seals 5. It is not clear whether the silicon seal ("Silicondichtung 7") is an adhesive-sealant adhering to the pane and absorber surface, or just a sealant which is free to slide over these surfaces. However, it is probable that the spacer will inevitably restrict shear movement of the seal 7 in one direction. Consequently, the skilled person would also not find a solution to the above technical problem in D5.

6.2.9 A5 discloses a frameless arrangement for mounting glazing on building facades and is not directly concerned with solar collectors. Further, it does not explicitly discuss the problem of differential thermal expansion and related stresses. In the arrangement disclosed in A5, the projections 24;44 act as spacers between the profile 10 and the glass pane 12;38,40 (see column 3, lines 41 to 43 and column 4, lines 10 to 14). The space between the glass pane and the profile 16 is filled with a silicon rubber 26;46. However, the bond between the glass pane and the profile 16 is non-elastic, since a cold vulcanising silicon material is used (see column 2, lines 37 to 45).

6.2.10 Thus, not only would the skilled person have needed the benefit of hindsight to consider consulting A5, but also the claimed solution to the objective technical problem is neither disclosed nor suggested.

6.2.11 In conclusion, starting out from A2 as the most promising prior art, the subject-matter of claim 1 involves an inventive step.

6.3 The appellants have also submitted that the subject-matter of claim 1 lacks an inventive step in view of A1 in combination with A2, B1 in combination with B2, B2 in combination with A2 and B2 in combination with B1. However, as reasoned above, none of the documents A1, B1 or B2 provide a more promising starting point than A2. B1 does not disclose an outer frame having side panels surrounding the periphery of the insulating layer, and relies on using the roof rafters as part of the supporting arrangement of the solar collector. B2 uses a rigid setting adhesive in combination with a corrugated support to produce a non-elastic joint incapable of accommodating any shear. Thus, in light of the disclosure of A2, neither B1 nor B2 provides a suitable starting out point for the invention, nor would a combination involving them lead to the subject-matter of claim 1.

6.4 As regards the combination of A1 and A2, appellant I's arguments regarding novelty (see above) effectively relate to inventive step in that it is alleged that the skilled person would find it obvious to fix the cover pane of the device of A1 with the elastic adhesive-sealant disclosed in A2.

6.5 However, the board sees no reason why the skilled person would do this without the benefit of hindsight, since the space to be filled by adhesive, sealant or gasket between the pane and the frame of the device according to A1 is fundamentally different to that of A2. In A1 the frame surrounds and grips ("Einfassen") the material, whereas in A2 the pane is merely placed on top of the adhesive-sealant which is spread on a ledge of the frame. In view of this there is no reason to believe that the material used in A2 would be suitable for replacing that of A1. Furthermore, since

the outer rim of the frame in A1 surrounds and grips the material, it is also a restriction on relative movement between the pane and the frame.

6.6 Thus, the subject-matter of claim 1 involves an inventive step and meets the requirements of Article 56 EPC.

7. *Inventive step, Claim 10*

7.1 The board also considers A2 to be the most promising starting point for reaching the subject-matter of the method claim 10.

7.2 The subject-matter of claim 10 differs from the disclosure of A2 by the steps of:

(i) providing one or more spacers for maintaining a distance between the ledges and the cover pane,
(ii) providing a flexible dam on the inner part of the ledges for separating the space between the ledges and the cover pane from the interior space of the collector,
(iii) placing a cover pane on the one or more spacers, and
(iv) applying a liquid flexible adhesive sealant to the space between the ledges and the cover pane.

7.3 All these features contribute to providing a substantial and controllable thickness of the sealant-adhesive layer to ensure adequate flexibility over the complete operating temperature of the solar collector. Thus, the objective technical problem to be solved is the same as that identified for claim 1.

7.4 The appellants have argued that the subject-matter of claim 10 lacks an inventive step starting out from A2 in combination with D4 or D5. However, as already argued above in relation to claim 1, neither D4 nor D5 render obvious the provision of one or more spacers for maintaining a distance between the ledges and the cover pane. Furthermore, neither D4 nor D5 teaches the application of a liquid flexible adhesive sealant.

7.5 B1 in combination with B2, or alternatively B2 with B1

As has already been reasoned, neither B1 nor B2 come near to the invention as claimed in claim 1. Even though claim 10 relates to a method and there are slight differences in some of the overlapping features, the same is true for claim 10. Even if the skilled person did consider combining these documents, it would not result in the subject-matter of claim 10 since B1 relies on the roof rafters for support and none of the non-elastic joints in B2 could be construed as a flexible dam. It would therefore not be possible for the skilled person to deduce the manufacturing method of claim 10 from these disclosures without the exercise of inventive skill.

7.6 A1 in combination with the skilled person's general knowledge (as disclosed in A3).

Appellant I admits that A1 does not disclose a flexible dam, or the nature of the unidentified material surrounding and supporting the pane. However, it submits that the choice of a liquid adhesive-sealant is an obvious choice of material for the joint between the pane and the frame and that the use of a flexible dam is standard procedure in the art, as explained in A3 at paragraphs 6.3 and 6.5.

In the board's view, this analysis is based entirely on hindsight since, even if a liquid adhesive-sealant were used to fill the space between the frame and the pane shown in figure 2, there would be no need to use a flexible dam since the material would be confined between the projection (spacer) upon which the pane rests and the upper outer rim which extends up to the height of the outer surface of the pane.

7.7 In conclusion, the subject-matter of claim 10 involves an inventive step and meets the requirements of Article 56 EPC.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The patent is maintained on the basis of the claims of the main request (former auxiliary request 2 submitted with the letter dated 18 April 2013).

The Registrar: The Chairman:

K. Götz-Wein G. Ashley

Decision electronically authenticated