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Bezeichnung der Erfindung: Solar reflector
Title of invention:
Titre de l'invention :

Klassifikation / Classification / Classement : F24J 2/14, F24J 2/52

ENTSCHEIDUNG / DECISION

vom / of / du 11 January 1991

Anmelder / Applicant / Demandeur : Bronstein, Allen I.

Patentinhaber / Proprietor of the patent /
Titulaire du brevet :

Einsprechender / Opponent / Opposant :

Stichwort / Headword / Référence : Solar reflector/Bronstein

EPÜ / EPC / CBE Article 54 EPC

Schlagwort / Keyword / Mot clé : "Novelty (yes)"
"Inventive step (yes)", after amendment

Leitsatz / Headnote / Sommaire

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Case Number : T 410/88 - 3.2.3

D E C I S I O N
of the Technical Board of Appeal 3.2.3
of 11 January 1991

Appellant : Bronstein, Allen I.
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Decision under appeal : Decision of Examining Division 073 of the European Patent Office dated 25 March 1988 refusing European patent application No. 84 305 637.5 pursuant to Article 97(1) EPC.

Composition of the Board :

Chairman : C.T. Wilson
Members : H. Andrä
W. Moser

Summary of Facts and Submissions

I. European patent application No. 84 305 637.5, filed on 17 August 1984 and published on 3 April 1985 (publication No. 0 136 044), was refused by a decision of Examining Division 073 dated 25 March 1988.

II. The decision was based on Claims 1 to 13 received on 15 December 1987.

The reason given for the refusal was that the subject-matter of Claim 1 lacked novelty having regard to the prior art known from US-A-4 293 192.

III. On 25 May 1988 the Appellant lodged an appeal against the decision. The appeal fee was paid on the same day and the Statement of Grounds of Appeal was received on 11 July 1988 together with three new sets of documents each comprising Claims 1 to 15 and pages 1 to 4 of the description according to a principal submission "A" and auxiliary submissions "B" and "C".

The Appellant argued that the revised Claim 1 both according to the principal submission and to the auxiliary submissions incorporates as a distinction from the relevant prior art disclosed in US-A-4 293 192 the feature that the tensioning means includes a cantilever support member which both tensions the sheet and transfers the weight of the second form member to the frame end member.

IV. As a result of objections raised by the Rapporteur by telephone on 4 December 1990, the Appellant filed by letter of 18 December 1990, received on 20 December 1990, a set of amended Claims 1 to 14 and amended pages 1 to 4 of the description.

The Appellant requests grant of a patent on the basis of these documents, together with pages 5 to 11 of the description as originally filed and sheets 1/9 to 9/9 of the drawings as originally filed.

V. Subsisting Claim 1 reads as follows:
(a mistake obvious from original Claim 4 has been rectified in line 33 of Claim 1, wherein "of the second form member" should read "or the second form member").

"A solar reflector comprising a first form member (32a, 32b), a second form member (34a, 34b) parallel to, and spaced longitudinally apart from, the first form member (32a, 32b), the first and second form members (32a, 32b and 34a, 34b) having peripheries (36a, 36b and 38a, 38b) having identical form surfaces (40a, 40b, 42a, 42b) along portions thereof, a generally rectangular flexible sheet (60a, 60b) having a reflective surface (62), a first pair of opposite edges (64a, 68b, 66a, 66b) and a second pair of opposite edges (68a, 68b, 70a, 70b), securing means (72a, 72b, 74a, 74b) for securing the first pair of opposite edges (64a, 64b, 66a, 66b) of the sheet (60a, 60b) to the identical form surfaces (40a, 40b, 42a, 42b) so that said reflective surface is concave, and tensioning means (44a, 44b, 55) for tensioning the sheet (60a, 60b) between the first and second form members (32a, 32b and 34a, 34b), a longitudinally-extending frame structure (14) having a first end (20, 22), a second end (24, 26), and a frame end closure (30) at the second end (24, 26) outboard of the second form member (34a, 34b), the frame structure (14) having a longitudinal axis generally orthogonal to said first and second form members (32a, 32b and 34a, 34b), the first form member (32a, 32b) being attached generally across the first end (20, 22) of the frame structure (14),

the tensioning means (44a, 44b, 55) including a support member (44a, 44b) being adapted to transfer the weight of the second form member (34a, 34b) to the frame structure (14),

characterised in that

the support member is a cantilever support member (44a, 44b) attached to either of the frame end closure (30) or the second form member (34a, 34b) and extending in cantilever fashion toward the other (34a, 34b or 30) thereof, the cantilever support member (44a, 44b) being adapted to both tension the sheet (60a, 60b) and to transfer the weight of the second form member (34a, 34b) in a cantilever fashion to the frame end closure (30)."

Reasons for the Decision

1. The appeal complies with Articles 106 to 108 and Rule 64 EPC and is admissible.

2. **Amendments**

2.1 Claim 1 is essentially a combination of features of original Claims 1 to 4.

The features of Claim 1 that the second form member is spaced longitudinally apart from the first form member and that the frame structure has a longitudinal axis generally orthogonal to the first and second form members can be derived from Figures 1 and 2 of the original drawings. The feature of Claim 1 that the reflective surface is concave is based upon the feature of original Claim 1 that the reflective surface is infacing, taking account of the configuration of the reflective sheet illustrated in

Figures 1 and 5 of the original drawings. The term "a first pair of opposite edges ... and a second pair of opposite edges ..." of Claim 1 is based upon the term "opposite edges (64a, 64b, 66a, 66b) and lateral edges (68a, 68b, 70a, 70b)" in original Claim 1, the present term being preferable with regard to clarity (Article 84 EPC), since in a rectangular sheet the lateral edges as well as the longitudinal edges are opposite edges.

2.2 Dependent Claims 2 to 14 correspond in their substance to original Claims 5 to 17 in the indicated order.

2.3 Having regard to pages 1 to 4 of the description, the amendments filed with the letter dated 18 December 1990 concern the adaptation to the claims in accordance with Rule 27(1)(c) and (d) EPC.

2.4 The amendments to the claims and to the description are not, therefore, objectionable under Article 123(2) EPC.

All claims clearly define the subject-matter for which protection is sought. They meet, therefore, also the requirements of Article 84 EPC.

3. Novelty

3.1 The nearest prior art with regard to the subject-matter of Claim 1, in the Board's view, is reflected by US-A-4 293 192 (D1) which also was chosen by the Appellant for delimiting Claim 1 over the state of the art.

This known solar reflector discloses the combination of features of the precharacterising portion of Claim 1.

The solar reflector according to Claim 1 differs from what is disclosed in document D1 by the features of the characterising portion of Claim 1.

3.2 Having regard to the other documents cited in the search report, the following is to be noted:

3.2.1 US-A-4 106 484 (D2) discloses a solar energy concentrator having a flexible reflective sheet (11) secured with its side edges against adjacent parallel sides of rectangular tubes (12). Neither first and second form members for securing the flexible sheet to identical form surfaces of the form members nor tensioning means for tensioning the flexible sheet between first and second form members are provided in this arrangement.

3.2.2 US-A-4 220 136 (D3) concerns a solar energy collector having a housing (14), the housing comprising a rigid trough shaped body (22) and carrying a parabolic reflector (16). The housing has a pair of end members (24) comprising tubular axle stubs (28) for rotating the collector (10). As the reflector is carried by the housing or the end members, tensioning means for tensioning the sheet between first and second form members are not provided.

3.2.3 US-A-4 000 734 (D4) describes a solar energy collector comprising a plurality of elongate reflectors (11A, 11B) mounted for movement around a heating tube. The reflectors appear to be rigid troughs which present a reflective surface (24) to the sun. There is no disclosure either of securing means for securing the reflective sheet to first and second form members or of tensioning means for tensioning a flexible reflective sheet between first and second form members.

None of these documents discloses a solar reflector comprising the combination of features contained in Claim 1.

3.3.1 The subject-matter of Claim 1 is, therefore, novel in the sense of Article 54 EPC.

4. Inventive step

4.1 In the solar reflector disclosed by document D1 reflecting the nearest prior art, the weight of the second form member (24) is transferred via plate (70) and slide (26) to the frame structure (slideway (12), mounting (16)). A screw (34) threaded into lug (36) of the slide (26) transfers tension between the slide (26) and an anchor (28) of the frame structure for tensioning the flexible sheet between the first and second form members (22; 24).

Numerous parts, some of which are heavy, are required to align, tension and support the second form member, the production of these parts requiring a great number of fabrication steps and consequently high costs. Due to the considerable number of parts necessary for tensioning the flexible sheet and for transferring the weight of the second form member to the frame structure, the assembly of the solar reflector is cumbersome.

4.2 As against this prior art, the problem to be solved by the present invention can be seen in providing a solar reflector which is of relatively light construction, is easily tiltable, can be readily assembled and is readily expandable to form a bank of solar reflectors which are adjustable together.

According to Claim 1 of the invention, this objective has been arrived at by the features that the support member is

a cantilever support member attached to either of the frame end closure or the second form member and extending in cantilever fashion toward the other thereof, the cantilever support member being adapted to both tension the sheet and to transfer the weight of the second form member in a cantilever fashion to the frame end closure.

4.3 This arrangement of the solar reflector permits that the slide and the slideway provided for in the reflector known from document D1 can be left out since the cantilever support member takes over both the function of tensioning the flexible sheet and the function of transferring the weight of the second form member to the frame end closure. Thus, against the relevant prior art, the construction of the solar reflector may be simpler and lighter and the assembly of the structure can be quicker and easier, since the separate assembly of a slideway or of a plurality of slideways in a configuration being expanded to form a bank of solar reflectors is eliminated.

4.4 Considering the solar reflector disclosed by document D1, the skilled person is provided with the information to arrange elements, namely threaded screw (34), lugs (32; 36) and anchor (28), exclusively for the purpose of transferring tension between the flexible sheet and the frame structure, wherein these elements do not assist in transferring the weight of the second form member to the frame structure. The threaded screw (34) of document D1 cannot be regarded as a cantilever support member as claimed in Claim 1 of the invention since it has only a tensioning function (cf. column 2, line 64 to column 3, line 3 and Claim 1 of document D1) and does not contribute to supporting the second form member.

According to the teaching of Claim 1 of the invention, a cantilever support member attached to either of the frame

end closure or the second form member is provided which is adapted to take over the double function of tensioning the flexible sheet and of transferring the weight of the second form member in a cantilever fashion to the frame end closure. Thus, the invention proceeds in a different direction as compared with the reflector construction shown in document D1, no incentive being therefore provided by this document to arrive at the cantilever support member of Claim 1.

4.5 The further documents cited in the search report, which have not been referred to in the decision under appeal, all lie further away from the claimed solar reflector (cf. above paragraphs 3.2.1 to 3.2.3). The Board is convinced that this prior art cannot provide a lead to the subject-matter of Claim 1 of the invention, since none of these documents suggests the arrangement of a cantilever support member designed to tension a flexible solar reflector sheet and to transfer the weight of a reflector form member to the frame structure.

4.6 Undoubtedly, the Appellant has succeeded in creating a solar reflector arrangement of simplified construction since the number of elements required for achieving the above-said double function has been reduced to a considerable extent as compared with the nearest prior art. The Board considers, therefore, that the simplicity of the solution provided by the invention to all of the different aspects of the underlying problem is a further indication of non-obviousness.

5. For the foregoing reasons, the Board has come to the conclusion that the subject-matter of Claim 1 would not be obvious from the prior art relied on by the Examining Division and the further citations revealed in the search report.

6. It follows that Claim 1 is acceptable under Article 52(1) EPC.

The same applies to the dependent Claims 2 to 14, having as subject-matter preferred embodiments of the invention as claimed in independent Claim 1 (Rule 29(3) EPC).

7. In the documents indicated in paragraph IV above, the following clerical errors should be rectified:

- Claim 1, line 10, "68b" should read "64b"
- Claim 1, line 25, insert a comma after "(14)"
- Claim 1, lines 33, 34 "of the second form member" should read "or the second form member".
- Claim 5, line 1, "refelector" should read "reflector"
- Claim 10, line 3, "110b" should read "100b"
- Description, page 1, line 22, "feature" should read "features".

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 documents indicated in paragraph IV above, including the corrections as indicated in paragraph 7 above.

The Registrar: The Chairman:

N. Maslin C.T. Wilson

for 25.3.91
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