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T 83

Case Number: T 140 / 82

DECISION

of the Technical Board of Appeal 3.4.1

of 28 July 1983

Appellant: The Charles Stark Draper Laboratory Inc.
555 Technology Square
Cambridge, MA 02139
United States of America

Representative: Slight, Geoffrey Charles et al
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Decision under appeal: Decision of Examining Division 035 of the European Patent Office dated 27 April 1983 refusing European patent application No 79 900 965.9 pursuant to Article 97(1) EPC

Composition of the Board:

Chairman: R. Kaiser

Member: O. Huber

Member: P. Ford

I. Summary of Facts and Submissions

(1) On 8 August 1979, the appellant filed International Application No. PCT/US 79/00581, entitled "Molded Inertial Sensor", under the Patent Cooperation Treaty in the United States of America, claiming priority from an application for an US national patent, filed on 8 August 1978 and designating one state for a European Patent. On 6 March 1980 the application was published (publication No. WO 80/00370).

European application No. 79 900 965.9 based on the above mentioned International Application, was refused by decision of Examining Division 035 of the European Patent Office, dated 27 April 1982, on the basis of claim 1, filed on 14 November 1981. The ground for refusal was that an inertial sensor comprising interfitting molded plastics structural components having relatively small cross-sectional areas wherein said plastics is reinforced with fibres with substantially random orientation (first part of claim 1) was known from Proceedings of the IEEE 1978 National Aerospace and Electronics Conference (NAECON 78), held 16 - 18 May 1978, Vol. 2, pages 782-788 (received in the library of the EPO on 4 August 1978), hereinafter referred to as Document 1, and that a fibre reinforcement in the range of 10% to 40% (characterising part of claim 1) did not involve an inventive step.

(2) On 24 June 1982 the appellant lodged an appeal against the decision by telex and paid the appeal fee. A document reproducing the contents of the telex was filed on 26 June 1982. The appellant submitted a Statement of Grounds and a new set of claims (one independent claim

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for a product followed by two dependent claims and one independent claim for a method adapted for the manufacture of the product) by telex on 25 August 1982 and a confirmation letter of the telex on 27 August 1982. An affidavit dealing with the fabrication of molded plastic structural components suitable for inertial sensors was filed on 3 September 1982.

Claim 1, the characterising portion of which has been divided into two parts, marked (a) and (b) for present purposes, reads as follows:

> An inertial sensor having a gimbal (16) comprising interfitting molded plastics sleeve and inner gimbal members (18,17) having relatively small cross-sectional areas wherein said plastics is reinforced with glass or carbon fibres with substantially random orientaion characterised in that (a) said fibre reinforcement is in the range of 10% to 40% and (b) the inner gimbal member has end portions (17b, 17c) frictionally engaging the interior wall of the molded sleeve member (18).

Claim 4 has the following wording:

> A method of injection molding plastics sleeve and inner gimbal members (18,17) for an inertial sensor as claimed in claim 2 or 3 wherein the members are molded with injection pressure in the range of 15 000 to 20 000 lb/in squared, injection cylinder temperature in the range of 575 to 650 degrees F, and mold temperature in the range of 100 to 350 degrees F.

By a communication dated 28 February 1983, the rapporteur, on behalf of the Board, additionally cited US-A-3 954 932 (document 2), "Plastics Engineering Handbook of the Society of the Plastics Industry", fourth edition, 1976, p. 67, 68 (document 3) "Neue polymere Werkstoffe 1969 - 1974", Carl Hanser Verlag München Wien, 1975, p. 98, 99 (document 4) and "Encyclopedia of Polymer Science and Technology" vol. 9, 1968, p. 58 (document 5).

Observations of the appellant to this communication and a second affidavit were received on 26 May 1983.

(3) The appellant has submitted the followng arguments:

Doc. 1 does not disclose a friction fit between the molded plastics sleeve and the end portions of the inner gimbal member of the inertial sensor. A man skilled in the art of molded plastics did not have any idea that precision plastics components of an inertial sensor, capable of forming a direct rigid friction-fit with one another without using a bonding or sealing agent, and suited for use in high stress and high vibration environments might be fabricated only by molding without machining. The special percentage choice of glass or carbon fibre reinforcement made such a fabrication possible. In addition, the long felt need and commercial success are indicative of invention.

(4) The appellant has requested the cancellation of the decision to refuse the application.

II. Reasons for the Decision

1. The appeal complies with Articles 106-108 and Rule 64 EPC. It is therefore admissible.

2. There is no formal objection to the current claims, since they are supported by the original documents.

3.1 The preamble of claim 1 is based on prior art as disclosed in doc. 1, see Figs. 6 and 8 which are identical with Fig. 2B and Fig. 1 of the present application.

No values for the percentage of the fibre reinforcement (feature (a)) are disclosed in doc. 1.

The inner gimbal member of this known inertial sensor has also end portions, see Fig. 6, engaging the interior wall of the molded sleeve member, see Fig. 8 (feature (b) in parts). So far as the junction of the gimbal with the sleeve is concerned it was pointed out in doc. 1, see p. 784, left-hand column, last paragraph, and p. 786, left-hand column, penultimate paragraph, that these two components were designed for assembly in the as-molded condition, thus eliminating a costly machining operation. A friction fit was not mentioned. The inertial sensor according to claim 1 is therefore new.

3.2 According to p. 2, ll. 7-18, of the description the application has for its objects to povide inertial sensors produced by precision, high volume production fabrication techniques, constructed of inexpensive material, whereby the components require simplified design with very few piece parts, characterised by minimal in-process assembly operations and tooling.

These aims were already mentioned in doc. 1, see p. 782, left-hand column, p. 784, p. 785, right-hand column under (2) and in particular p. 786, left-hand column.

3.3 These problems are solved by the characterising features (a) and (b) but only with regard to the junction of the gimbal (16) with the sleeve (18) encasing the gimbal.

3.4 If it is desired to manufacture the gimbal-sleeve-unit on the basis of doc. 1 information is needed about the appropriate percentage of the filler material (glass or carbon fibres).

According to claims 2 and 3 the molded plastics consist preferably of polyphenylene sulfide (PPS). In doc. 3, p. 68, left-hand column, fourth and fifth paragraph, it is disclosed that PPS with a glass fibre content of 40% yields rigid structural parts with a high tensile strength and a high temperature stability. In doc. 2 one finds a range of 5-30% of graphite filler and of 10-40% of glass fibres which are added to PPS when fabricating structral parts: see the Table at the bottom of column 2. Thus, the information on the appropriate filler concentration was readily available in the literature. Feature (a) is therefore not based on an inventive step.

3.5 As noted above, the gimbal and the sleeve disclosed in doc. 1 are precisely molded to size and assembled in the as-molded condition, thus eliminating a costly machining operation. The necessary alignments and gas tightness require a fast fit of the gimbal in the sleeve. From what has already been said, it can be deduced that a person skilled in the art studying doc. 1 will realise

that the required fast seating of the end portions of the gimbal in the sleeve may be achieved by frictional engagement only, particularly as the use of sealing or bonding agents or of another method of bonding, e.g. ultrasonic bonding, is not mentioned. Besides, it has long been common practice to use frictional engagement to keep together structural parts made of plastics. If the skilled person is uncertain whether the gimbal and the sleeve of a molded inertial sensor which are made of reinforced plastics with a commonly used reinforcement percentage according to feature (a) allow a mere friction fit, he can make some simple experiments. Very easily he will find that there is no difficulty at all.

The two affidavits filed do not offer reasoned arguments that a friction fit between the two parts in question requires inventive activity from the person skilled in the art.

Finally, the appellant's assertion that a long prevailing need is satisfied by the invention is not convincing since all the essential measures for satisfying that need and for solving the encountered problems were already disclosed in doc. 1. The same is true for the alleged commercial advantage.

3.6 Thus, the inertial sensor according to claim 1 does not involve an inventive step (Article 56 EPC). Claim 1, therefore, cannot be allowed under Article 52(1) EPC.

4. Claims 2 and 3 are formulated as dependent claims. They are not allowable since their existence is conditional on the allowability of claim 1. Furthermore, in view of

the prior art (doc. 2-4), the Board cannot find any patentable features in the sub-claims.

5. With regard to the independent method claim 4, it must be stated that the claimed pressure and temperature ranges cover and/or overlap commonly used ranges. It is mentioned in doc. 5, p. 58, penultimate line, that a reciprocating-screw injector operates at pressure ranges of 10,000 - 20,000 psi. Doc. 4, p. 99, discloses that the temperature of the injection cylinder lies in the range of 310 - 375°C (claim 4: 301-343°C) and the mold temperature in the range of 65-150°C (claim 4: 37-178°C) when PPS (filled or unfilled) is injection molded. The plastics material specialist is aware of the fact that these published data do not give strict limits. Furthermore, he knows that, in order to get the best possible product, pressure and temperature data must be adapted to the composition of the plastics used, the type of machine, the shape of the article etc.

Under these circumstances, claim 4 lacks inventive step as required by Article 56 EPC and cannot be allowed, having regard to Article 52(1) EPC.

III. Order

For these reasons,

it is decided that:

The appeal is dismissed.

The Registrar

signed J. Bergeron

The Chairman

signed R. Kaiser