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Bezeichnung der Erfindung: Fluidic control system including variable venturi
Title of invention:
Titre de l'invention :

Klassifikation / Classification / Classement : F02M 9/14

ENTSCHEIDUNG / DECISION

vom / of / du 21 August 1990

Anmelder / Applicant / Demandeur : Abbey, Harold George

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 (no) - logical technical deduction"

Leitsatz / Headnote / Sommaire

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Case Number : T 509/88 - 3.2.2

D E C I S I O N
of the Technical Board of Appeal 3.2.2
of 21 August 1990

Appellant : Abbey, Harold George
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Decision under appeal : Decision of Examining Division of the European Patent Office dated 29 April 1988 refusing European patent application No. 83 302 569.5 pursuant to Article 97(1) EPC

Composition of the Board :

Chairman : G. Szabo
Members : K. Stamm
W. Moser

Summary of Facts and Submissions

I. European patent application No. 83 302 569.5, filed on 6 May 1983 and published on 14 November 1984 under publication number 124 666, was refused by the decision of the Examining Division dated 29 April 1988.

The decision was based on a main request with Claims 1 to 15 and on an auxiliary request with Claims 1 to 15.

II. In its decision, the Examining Division held that the subject-matter of main and auxiliary Claim 1 did not involve an inventive step having regard to documents

(1) US-A-4 308 835 and
(2) US-A-1 612 320.

III. On 8 July 1988 the Applicant filed an appeal against the decision and paid the appeal fees. The Statement of Grounds was filed by telex on 8 September 1988 and confirmed by letter filed on 12 September 1988.

In his response to a communication issued by the Board referring to document

(3) US-A-2 205 027

the Appellant presented Claim 1 and dependent Claims 2 to 15 which are identical with those in the auxiliary request before the first instance. Claim 1 reads:

"A variable Venturi structure comprising:

a) a tubular casing (10) into which a fluid stream is admitted;

b) a cylindrical spool (16) supported within the casing (10) for axial movement therein, the spool (16) having an interior flow passage (PP/SP), and the spool (16) defining an exterior flow passage (TP) in an annular space between the spool (16) and the casing (10), which exterior passage (TP) is always open in the course of said movement whereby the fluid stream admitted into the casing (10) is divided and flows through the interior and exterior passages, said spool (16) having a Venturi-contoured surface lying in at least one of said passages,
characterised in that

c) the spool (16) is supported for free axial movement within the casing (10) so that the fluid stream exerts a hydrodynamic force on the spool (16) which acts to displace the spool (16) axially in the downstream direction; and

d) wherein the structure comprises spring means (18) to which said spool is linked with mechanical advantage and responsive to the axial displacement of the spool (16) to develop a countervailing force less than the spring force acting on the spool oppositely to said hydrodynamic force whereby the extent of spool displacement is the resultant of the hydrodynamic and countervailing forces, said displacement occurring throughout an extended range of flow conditions."
(Emphasis on amendments in respect of the main claim, belonging to the main request which was rejected by the Examining Division).

The Appellant argued that in (3) no reference was made to a velocity pressure, that no knowledge was transmitted as regards the hydrodynamic forces, that no suggestion was to

be found to replace the vacuum motor/vacuum amplifier by a spring. He also pointed out that the mechanical advantage was an essential feature and that the teaching of document (1) would suggest to the skilled man that amplification of the pressure difference was necessary for linearisation of the venturi-vacuum.

IV. The Appellant requests grant of a patent according to Claim 1 or to Claim 1 in combination with one of the dependent claims. He also requests reimbursement of the appeal fee.

Reasons for the Decision

1. The appeal is admissible.

2. **Amendments**

2.1 Claim 1 restricts the original Claim 1 in accordance with the description and comprises linguistic amendments not extending beyond the original content of the application. The feature "linked with mechanical advantage" in particular, is based, for instance on page 8, second paragraph of the original description. This claim, therefore, meets the requirements of Article 123(2) EPC.

3. **Novelty**

The structure according to Claim 1 is novel:

None of the available documents presents all the features of the claimed structure in one embodiment, in particular the feature "spring means ... with mechanical advantage and responsive to the axial displacement of the spool ... ". Therefore, the requirements of Article 54 EPC are met.

4. Closest prior art, technical problem and solution

4.1 Document (1) appears to come closest to the invention and presents the basis of the precharacterising portion of Claim 1. This document suggests to control the position of a movable spool in exact accordance to the pressures measured at two distinct places. The pressure difference is increased by means of a special "vacuum amplifier". The amplified pressure difference is then led to a vacuum motor which by means of a movable rod guides the spool accordingly.

The technical problem with which the person skilled in the art is faced in respect of this document can be determined as follows: Further development of such known devices; in particular searching for a less complicated construction.

4.2 The problem is solved according to the characterising features of Claim 1 as follows: The movement of the spool is initiated by the hydraulical force of the fluid stream (instead of the movement of a vacuum-motor upon amplification of a measured pressure difference). Spring means are linked to the spool with mechanical advantage and responsive to the axial displacement of the spool to develop a countervailing force. The extent of the spool displacement is the resultant of the hydrodynamic and countervailing spring-forces throughout an extended range of flow conditions. Such a device does not need a vacuum amplifier and a vacuum motor as in document (1); hence it represents a reduction in the complexity of the former device.

5. Inventive step

5.1 A person skilled in the art, starting from document (1) and aiming at a simplification as mentioned above, would in the first place try to simplify the principal elements of the known device as such. Technical modifications would have to be envisaged for finding alternatives to the two large and cumbersome devices, viz. the vacuum amplifier as well as the vacuum motor. It is also clear that these two devices present particular arrangements which - following from the teaching of (1) - appear to be indispensible. Document (1) would not, therefore, in itself encourage the skilled man to look for a solution according to Claim 1.

5.2 However, the skilled man being aware of document

(3) US-A-2 205 027,

which has been mentioned in the search report, would undoubtedly find there suggestions in direct relation to the posed technical problem.

A prominent difference between the solution according to document (1) and the subject-matter disclosed in document (3) would immediately attract the attention of the man skilled in the art: In document (3) the spool is moved without being guided by a motor-driven rod in response to a measured pressure difference, the axial movement of the spool being initiated by means of suction in the engine cylinder and forming the resultant of this suction as well as of the tension of a spring. The tension of that spring is adjustable.

5.3 The arguments of the Appellant in support of inventive step as mentioned under paragraph III. above cannot be adopted by the Board as becomes evident when the following is taken into account:

The skilled man would find in document (3) mainly the following ideas in direct response to the posed problem:

1) The fluid pressure situation can be used for causing movement of the spool; consequently, the vacuum motor as well as the measurement of the pressure difference may become superfluous;

2) A return spring force and thus means for determining its size are necessary when 1) is to be applied.

As a consequence of these results of a first analysis, the skilled man will be logically pushed to the question of what forces are available and what means would allow the determination of the spring force. It is to be reminded here that the skilled man is not only familiar with the static pressure ("suction") mentioned in document (3), but also with the corresponding dynamic pressure ("velocity pressure") - without needing particular mentioning in a document: Both these forces are part of the well-known energy equation of BERNOULLI, which forms part of the basis knowledge in hydraulics. Therefore, making use of the hydrodynamic force is a possibility being offered by the cooperating technical facts, answering to the question of simplification by enabling better use of the participating cause-effect-relationship.

Since the spring according to document (1) was already located outside the casing, connection of the spool by means of a lever - and thus including advantage - would appear to form an elementary adaptation of the device in (1) according to the ideas mentioned above and caused by the teaching of document (3).

These findings lead to the development and simplification looked for. They represent the decisive ideas leading

necessarily to the subject-matter of Claim 1, in particular according to its characterising portion, as commented on under paragraph 4.2 above. The feature "said displacement occurring throughout an extended range of flow conditions" is not only too vague to restrict in fact the subject-matter of the claim but reflects not more than the necessity of the skilled man to follow the general principle of making optimal use of the available technical means under the given conditions.

5.4 It follows from the above that the subject-matter of Claim 1 is a **logical technical deduction** obvious to the skilled man having regard to documents (1) and (3) when trying to solve the posed problem. The claim does not, therefore, involve an inventive step in the sense of Article 56 EPC and is not allowable since it does not meet the requirements of Article 52(1) EPC.

5.5 The dependent claims describe embodiments of the subject-matter of Claim 1 using generally known means. Claim 1 in combination with one of the dependent claims 2-15 (cf. auxiliary requests under paragraph IV above) defines, therefore, subject-matter which is also obvious to the skilled man and thus not allowable.

6. From the above it follows that the appeal is not allowable; consequently, pursuant to the provisions of Rule 67 EPC the appeal fee is not to be reimbursed.

Order

For these reasons, it is decided that:

1. The appeal is dismissed.

The Registrar: The Chairman:

S. Fabiani G. Szabo

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