BESCHWERDEKAMMERN DES EUROPÄISCHEN PATENTAMTS

BOARDS OF APPEAL OF THE EUROPEAN PATENT OFFICE

CHAMBRES DE RECOURS DE L'OFFICE EUROPEEN DES BREVETS

File No.: T 0903/92 - 3.5.1

Application No.: 86 104 711.6

Publication No.: EP B1 0 198 381

Classification: G05D 16/06, F02M 69/00

Title of invention: Fuel pressure regulator

D E C I S I O N
of 29 September 1993

Proprietor of the patent: Tom McGuane Industries, Inc.

Opponent: Robert Bosch GmbH

Headword:

EPC: Art. 114(1 and 2), Art. 123(2 and 3), 56

Keyword: "Admissibility of late-filed document (yes)" - "Inventive step (no)"

Headnote
Catchwords

Europäisches Patentamt | European Patent Office | Office européen des brevets

Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 0903/92 - 3.5.1

D E C I S I O N
of the Technical Board of Appeal 3.5.1
of 29 September 1993

Appellant: (Opponent)
Robert Bosch GmbH
Postfach 106 050
D-70442 Stuttgart (DE)

Representative:
Robert Bosch GmbH
Postbox 30 02 20
D-70442 Stuttgart (DE)

Respondent: (Proprietor of the patent)
Tom McGuane Industries Inc.
32031 Townley Avenue, Madison Heights
Michigan 48071 (US)

Representative:
G. Zwirner
Sonnenbergerstraße 100
D-65193 Wiesbaden (DE)

Decision under appeal: **Interlocutory decision of the Opposition Division of the European Patent Office dated 18 August 1993 concerning maintenance of European patent No. 0 198 381 in amended form.**

Composition of the Board:

Chairman: P.K.J van den Berg
Members: C.G.F. Biggio
G. Davies

Summary of Facts and Submissions

I. European patent EP-B1-0 198 381, based on application No. 86 104 711.6 filed on 7 April 1986 and claiming the priority of patent application No. 721 958 filed on 11 April 1985 in the United States of America, was granted on 23 November 1989 and opposed on 11 June 1990.

II. By an interlocutory decision dated 18 August 1992, the Opposition Division decided to maintain the patent in amended form.

The decision was based on the patent as made up by the following documents:

Description: Columns 1 to 3 of the patent, as granted, and page 1, filed on 23 May 1992,

Claims: 1, as filed on 23 May 1992, and 2 to 4 of the patent as granted,

Drawings: Figure 1 and 2 of the patent as granted.

III. The following prior art documents were considered during the opposition procedure:

D1 = DE-A-2 921 799,
D2 = US-A-3 278 155,
D3 = US-A-3 511 270,
D4 = US-A-4 237 924,
D5 = DE-A-1 290 327,
D6 = DE-A-2 354 461, and
D7 = DE-A-2 816 479.

Documents D1 to D4 were mentioned in the European search report, while documents D5 to D7 were cited by the Opponent. All these documents were mentioned and discussed in the appealed decision.

IV. The Opposition Division found (see: appealed decision, page 4, item 2) that, with respect to the closest prior art on file at the time of the appealed decision, i.e. D6, the novelty of the subject-matter of Claim 1, as filed on 23 May 1992, was represented by the following combination of features:

(1) a passage from the exterior of a valve housing 10 to a first chamber 16 in said valve housing 10,

(2) a light spring 34 interposed between said cage 19 (located inside said valve housing) and a ball 28 (intended to cooperate with a valve seat 27), urging said ball 28 through an opening 30a in a retainer plate 30 toward said valve seat 27,

(3) the said valve seat 27 being frustoconically shaped,

(4) said retainer plate 30 and said cage 19 forming a clearance space 33 wherein the guide plate 29 is arranged, the outer diameter of said guide plate 29 being less than the diameter of said clearance space 33, the radial and axial dimensions thereof being such that the guide plate 29 can move laterally and, to a small degree, axially,so as to accommodate any misalignment between the ball 28 and the frustoconical valve seat 27.

In its appreciation of the inventive contribution of said combination of features, the Opposition Division found that the features 1) and 2) were known from several cited documents and that feature 3) was known as such, e.g. from D2. For these reasons it concluded that:

"An employment of such features in the fuel pressure regulator according to D6 would fall within the customary practice of the skilled man" (see: appealed decision, page 9, item 6).

The Opposition Division was nevertheless of the opinion that the subject-matter of Claim 1, as filed on 23 May 1992, involved an inventive step, because none of the considered documents hinted at the feature 4 mentioned by the characterising portion of said claim, and stated that:

"In particular no document discloses or hints to a fuel pressure regulator having a frustoconical valve seat in combination with said feature 4), (see: appealed decision, page 12, item 12).

V. On 24 September 1992, the Appellant (Opponent) filed a Notice of Appeal, paid the appropriate Appeal Fee and filed the Grounds for Appeal, together with a new prior art document, DE-A-2 837 045, which was identified by the reference D8.

The Appellant submitted that a fuel pressure regulator - according to Claim 1 as filed on 23 May 1992, i.e. as maintained by the Opposition Division - was known in D8 to such an extent that the subject-matter of said Claim 1 manifestly lacked an inventive step pursuant to Article 56 EPC. The Appellant made a close analysis of the fuel pressure regulator according to said Claim 1 and submitted that, having regard to the disclosure of

D8 (see: Figures 5 and 6; page 11, lines 13 to 28), all the features of said fuel pressure regulator were essentially anticipated by said citation. Consequently, it was submitted that citation D8 should be considered to represent the most relevant and close prior art and, therefore, the Board was requested to recognise the relevance of said late-filed citation and, accordingly, introduce D8 into the appeal procedure, pursuant to Article 114 (1) EPC.

The Appellant requested that the appealed decision be set aside and that the patent be revoked in its entirety. Oral Proceedings were also requested.

VI. The Respondent (Patentee) submitted a reply on 12 February 1993.

The Respondent admitted that D8 seemed to represent the closest prior art and, therefore, filed an amended draft of Claim 1, delimited in respect of D8, as well as amendments to the description, to be inserted between lines 33 and 34 and lines 38 and 39, respectively, of Column 1 of the patent at issue. It was submitted that support (Article 84 EPC) for the newly drafted Claim 1 was to be found in the drawings, in combination with the description (page 3, lines 14 to 25) of the patent at issue.

However, it was further submitted that - the embodiment, shown in Figure 5 of D8, showed the cage 41 with a uniform cavity closed by spring-ring 50, disk 49 and ball 47, - a separate clearance space for allowing limited movement of disk 49 was not provided, so that the characterising portion of the new Claim 1 could not be taken from D8, whereas - the clearance space 33 according to the invention formed a bearing (Gleitführung) for the guide plate 29, which was termed

accordingly,and - such bearing offered some friction and damping effects onto the movements of the ball 28 so that wobbling of the ball-caused by the action of inertial forces when the regulator is part of a vehicle-would be avoided.

In conclusion, the Respondent submitted that a fuel pressure regulator showing the combination of all the features mentioned by the newly drafted Claim 1 were neither disclosed nor hinted at by any of the prior art documents on file, taken individually or in combination, The Opposition Division had correctly stated in the appealed decision the reasons for considering that said fuel pressure regulator did involve an inventive step over the prior art, and the reasons of the Opposition Division in the appealed decision were applicable to the subject-matter of the newly-drafted Claim 1, because the last feature of said claim largely corresponded to feature 4) of Claim 1, as submitted to the Opposition Division.

Consequently, the Respondent requested that the appeal be dismissed and that the patent be maintained with the proposed amendments.

VII. Claim 1, as filed on 12 February 1993, reads:

"A fuel pressure regulator comprising:

(a) a housing (10),

(b) a diaphragm (15) dividing the housing (10) into a first chamber (16) and a second chamber (17),

(c) an inlet (23) and an outlet (24) associated with the second chamber (17) of the housing (10),

(d) a frustoconical valve seat (27) associated with the outlet (24),

(e) a cage (19) mounted on and movable with the diaphragm (15),

(f) a spring (21) within the first chamber (16) yieldingly urging the cage (19) toward the valve seat (27),

(g) a retainer plate (30) fixedly mounted on said cage (19) and having an opening (30a) therethrough,

(h) a guide plate (29) overlying said retainer plate (30) and having an opening (29a) therethrough,

(i) a ball (28) positioned between said cage (19) and said guide plate (29) and engaging the opening (29a) of said guide plate (29),

(j) said cage (19) having a cavity (35) in which said ball (28) is held,

(k) said ball (28) being movable relative to said guide plate (29),

(l) the opening (29a) of said guide plate (29) having a diameter less than the diameter of said ball (28),

(m) the diameter of the opening (30a) in said retainer plate (30) being less than the outer diameter of said guide plate (29),

(n) a light spring (34) interposed between said cage (19) and said ball(28) urging said ball (28) through the opening (30a) in said retainer plate (30) toward said valve seat (27), characterized by

(o) a passage (22) from the exterior of the housing (10) to said first chamber (16);

(p) said retainer plate (30) and an radially outer portion of said cage wall (19) forming a clearance space (33), wherein said guide plate (29) is arranged, the outer diameter of said guide plate (29) beingless than the diameter of said clearance space (33), the radial and axial dimensions thereof being such that the guide plate (29) can move laterally and, to a little degree, axially, so as to accommodate any misalignment between the ball (28) and the frustoconical valve seat (27)".

N.B. The reference signs a) to p) have been added by the Board toclearly identify the various features mentioned in Claim 1.

Reasons for the Decision

1. *Admissibility of the Appeal*

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

2. *Article 123 (1 & 2) EPC*

No objection pursuant to Article 123 (1 and 2) EPC arises in respect of the new Claim 1, as filed on 12 February 1993.

3. *Novelty*

The Board finds that citation D8, with reference to its Figure 5 and page 11, lines 13 to 28, discloses a fuel pressure regulator comprising the following features:

(a) a housing 37,

(b) a diaphragm 40 dividing the housing 37 into a first chamber 38 and a second chamber 39,

(c) an inlet 54 and an outlet 53 associated with the second chamber 39 of the housing 37,

(d) a valve seat 51, having a conically shaped surface 52 associated with the outlet 53,

(e) a cage 41 mounted on and movable with the diaphragm 40,

(f) a spring 44 within the first chamber 38 yieldingly urging the cage 41 toward the valve seat 51, 52,

(g) a retainer plate (spring-ring) 50 fixedly mounted on said cage 41 and having an opening therethrough,

(h) a guide plate 49 overlying said retainer plate (spring-ring) 50 and having an opening therethrough,

(i) a ball 47 positioned between said cage 41 and said guide plate 49 and engaging the opening of said guide plate 49,

(j) said cage 49 having a cavity in which said ball 47 is held,

(k) said ball 47 being movable together with and relative to said guide plate 49,

(l) the opening of said guide plate 49 having a diameter less than the diameter of said ball 47,

(m) the diameter of the opening in said retainer plate (spring-ring) 50 being less than the outer diameter of said guide plate 49,

(n) a light spring 48 interposed between said cage 41 and said ball 47 urging said ball 47 through the opening in said retainer plate 50 toward said valve seat 51, 52,

(o) a passage 32 (see: Figure 4 and page 11, lines 13 to 14) from the exterior of the housing 37 to said first chamber 38,

(p) said retainer plate (spring-ring) 50 and the outer wall of said cage 41 forming a void space, wherein said guide plate 49 is arranged, the outer diameter of said guide plate 49 being less than the diameter of said void space, the radial and axial dimensions thereof, as they are appreciable upon inspection of Figure 5, being such that the guide plate 49 can move laterally and axially, so as to accommodate any misalignment between the ball 47 and the frustoconical valve seat 51, 52, i.e.:

"to maintain, at any time, the ball 47 coaxial with the conical surface 52 of the valve seat 51, upon the action exerted by the light spring 48 onto the ball 47 and the guide plate 49 (see: page 11, lines 22 to 28).

The fuel pressure regulator according to Claim 1 differs from that according to Figure 5 of D8 in that the latter does not show a passage 32 from the exterior of the housing 37 to said first chamber 38, and in that the void space, formed by retainer plate (spring-ring) 50 and the outer wall of cage 41, does show such radial and axial dimensions that the guide plate 49 can freely move axially.

In D8, the axial movement of guide plate 49 is limited only by the action exerted onto it by the light spring 48 through the ball 47, but not by a mechanical arrangement, stake 32, as shown by Figure 2 of the patent at issue, which, in the fuel pressure regulator according to the invention, positively limits the axial movement of guide plate 29 to the "little extent" mentioned in Claim 1.

The fuel pressure regulator according to Claim 1 is, therefore, novel, when compared with that according to Figure 5 of D8.

The Board finds that citation D8 represents, nevertheless, a prior art which is closer to the claimed invention than any of the documents D1 to D7, considered during the opposition procedure; accordingly, document D8 is introduced into the present appeal procedure, pursuant to Article 114 (1) EPC.

4. *Inventive Step*

The problem to be solved by the patent at issue is to provide a fuel pressure regulator which obviates the need for accurate formation of flat surfaces and the like and which can be manufactured at a low cost (see: column 1, lines 34 to 38).

4.1. The Board finds that D8 aims to solve a very similar problem (see: page 4, lines 7 to 11) and that D6 mentions the same problem as the patent at issue (see: page 2, lines 10 to 13 and 24 to 27).

The Board is, consequently, of the opinion that the mere statement of the problem to be solved by the patent at issue does not involve an inventive step.

4.2. D8 states, on page 11, lines 13 to 14, that the fuel pressure regulators disclosed with reference to its Figures 5 and 6 are modified embodiments of that disclosed with reference to its Figure 4, i.e. they are modified embodiments of the same inventive concept. It is clear, therefore, that the feature:

"a passage 32 from the exterior of the housing 37 to said first chamber 38", disclosed by D8 with reference to its Figure 4 and on page 10, lines 32 to 32, could also be used in the fuel pressure regulator according to Figure 5.

The Board, therefore, is of the opinion that the use of such a feature in the claimed fuel pressure regulator does not involve an inventive step.

The Respondent has not disputed this view. In the submissions filed on 12 February 1993, the Respondent stated in fact that the corresponding feature of the claimed fuel pressure regulator remained in the characterising clause of Claim 1 only for the formal reason that said feature was not shown by the embodiment according to Figure 5 of D8.

4.3. The Board points out that, according to the patent at issue,

the very importance of the feature of the fuel pressure regulator which accommodates any misalignment between the ball 28 and the valve seat 27, thereby providing for the proper centering of the ball in the valve seat and obviating the need for accurate formation of flat surfaces of the valve seat, is to be seen in the fact that lateral movements are allowed to the guide plate 29 and, consequently, to the ball 28 (see: Column 1, lines 53 to 55, and Column 2, lines 48 to 50), whereas

the axial movement of the guide plate 29 and the "little extent" thereof are just mentioned as such, without any indication of their importance for the solution of the problem to be solved by the claimed fuel pressure regulator (see Column 2, lines 41 to 42).

Accordingly, the Board is of the opinion that the "little extent" to which the axial movement of the guide plate 29 is positively limited by the mechanical arrangement - stake 32, as shown by Figure 2 of the patent at issue - is irrelevant for the solution of the problem to be solved by the claimed fuel pressure regulator and that the difference, shown by the latter in respect of that according to Figure 5 of D8, may not be construed as involving an inventive step.

4.4. Moreover, the Board points out that the very important feature of the fuel pressure regulator according to D8, which permits to maintain the ball 47 permanently coaxial to the conically shaped valve seat 51, 52, thereby providing for the proper centering of the ball in the valve seat and obviating the need for accurate formation of flat surfaces of the valve seat, is also to be seen in the fact that lateral movements are allowed to the guide plate 49 and, consequently, to the ball 47 (see page 5, lines 2 to 11, and page 11, lines 22 to 28).

The Board is, consequently, of the opinion that a person skilled in the art, starting from the teaching of D8, would not need to apply any inventive activity to arrive at the subject-matter of Claim 1, which, consequently, has to be considered as not patentable pursuant to Article 52 (1) and 56 EPC.

5. Concerning the Respondent's submission that the clearance space 33 according to the invention formed a bearing for the guide plate 29 and that such bearing offered some friction and damping effects onto the movements of the ball 28, so that wobbling of the ball - caused by the action of inertia when the regulator is part of a vehicle - would be avoided, the Board observes that,

- the problem of avoiding wobbling of the ball caused by the action of inertia when the regulator is part of a vehicle, was not mentioned at all in the patent at issue, and,

- by the action of the light spring 48, according to Figure 5 of D8, some friction and damping effects onto the movements of the ball 47 are manifestly also offered, due to the fact that the guide plate 49 is held against the retaining plate (spring-ring) 50, whereby wobbling of the ball 47 is manifestly also avoided in the fuel pressure regulator according to said citation.

Accordingly, this submission of the Respondent does not alter the Board's opinion that the subject-matter of Claim 1 lacks an inventive step.

6. In conclusion, the Board points out that:

- the Opposition Division recognised an inventive step in the subject-matter of Claim 1, as effective at the time of the appealed decision, merely because it found that none of the documents D1 to D7, which were then on file, disclosed or hinted at a fuel pressure regulator showing a frustoconical valve seat in combination with feature 4) of said

Claim 1 (see: appealed decision, page 12, item 12), and

- said feature 4), considered by the Opposition Division, largely and substantially corresponds to feature p) of the presently effective Claim 1, as the Respondent pointed out in his submissions (see: Item VII).

The Board agrees with the reasons of the Opposition Division, having regard to the prior art as represented by documents D1 to D7 which were then on file, but does not agree with the Respondent's submission that said reasons are still applicable at the present stage of the proceedings.

At the present stage of the proceedings, in fact, the closest prior art on file is represented by D8, which discloses a fuel pressure regulator showing, in essence, not only all the other features of the claimed fuel pressure regulator, but also a frustoconical valve seat in combination with feature p), which indeed substantially corresponds to feature 4), considered by the Opposition Division.

Order

For these reasons, it is decided that:

1. The appealed decision is set aside.

2. The patent at issue is revoked.

The Registrar: The Chairman:

M. Kiehl P.K.J. van den Berg