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| Publication au Journal Officiel | Oui/Non |

Aktenzeichen / Case Number / N^o du recours : T 431/89 - 3.2.1

Anmeldenummer / Filing No / N^o de la demande : 84 111 971.2

Veröffentlichungs-Nr. / Publication No / N^o de la publication : 0 141 291

Bezeichnung der Erfindung: Shift valve for automatic transmission

Title of invention:

Titre de l'invention :

Klassifikation / Classification / Classement : F16H 5/64

ENTSCHEIDUNG / DECISION

vom / of / du 2 October 1990

Anmelder / Applicant / Demandeur : Nissan Motor Company Ltd

Patentinhaber / Proprietor of the patent /

Titulaire du brevet :

Einsprechender / Opponent / Opposant :

Stichwort / Headword / Référence :

EPÜ / EPC / CBE Art. 56

Schlagwort / Keyword / Mot clé : "Inventive step (yes)"

Leitsatz / Headnote / Sommaire



Case Number : T 431/89 - 3.2.1

D E C I S I O N
of the Technical Board of Appeal 3.2.1
of 2 October 1990

Appellant : Nissan Motor Company Ltd
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Decision under appeal : Decision of Examining Division 117
of the European Patent Office dated
20 December 1988 and posted
8 February 1989 refusing European
patent application No. 84 111 971.2
pursuant to Article 97(1) EPC

Composition of the Board :

Chairman : F. Gumbel
Members : P. Alting van Geusau
F. Benussi

Summary of Facts and Submissions

I. European patent application No. 84 111 971.2, filed on 5 October 1984 and published on 15 May 1985 under publication No. 0 141 291, was refused by a decision of the Examining Division given at the oral proceedings dated 20 December 1988.

A written decision setting out the reasons for this decision was posted on 8 February 1989.

The decision was based on Claims 1 and 2 filed on 13 September 1988.

II. The reason given for the refusal was that the subject-matter of Claim 1 lacked an inventive step in view of the prior art disclosed in the book "Automatische Automobilgetriebe" by J. Stüper (Springer Verlag 1965) on pages 322 to 339 (D1), showing a Daimler-Benz automatic transmission, and the general knowledge of the skilled man.

III. An appeal was lodged against this decision on 18 April 1989 with payment of the appeal fee on the same day.

In the Statement of Grounds of Appeal filed on 13 June 1989 the Appellant (applicant) argued that the prior art shift valve disclosed in D1 comprises, in contrast to the claimed shift valve, a second spring which is set to be stronger than the force of a first spring so as to shift the shift valve in a second speed position when the vehicle is at a standstill. As a result, although the reference teaches the use of two springs, there is no suggestion to set the force of the second spring smaller than the force of the first spring as has been defined in Claim 1 of the present application.

Moreover, an exchange of the springs of the known shift valve would result in an improper functioning of the known transmission and, therefore, the reference teaches the very contrary of the concept of the present invention.

IV. By letter of 7 June 1990 the Appellant filed, in accordance with a request of the Board by telephone on 20 March 1990, a new introductory part of the specification in which the prior art disclosed in D1 has been acknowledged as well as a new page 2/2 of the drawings.

Some amendments to claim 1 and the description were agreed to over the telephone on 24 September 1990. The Appellant, by implication, requests grant of a patent on the basis of the Claims 1 and 2 filed on 13 September 1988, and the description and drawings as initially filed comprising the amendments filed by letter of 7 June 1990 and subsequent correction to these documents agreed to over the telephone.

V. Current claim 1 reads as follows:

"1. A shift valve for an automatic transmission comprising a valve body (20) formed with a valve bore, a spool (22) and a plug (24) slidably fit in said valve bore the spool (22) being biased in a first direction by a spring (36) and the plug (24) being biased by said first spring (36) in a second opposite direction, the first spring (36) being positioned between the plug (24) and the spool (22), and a second spring (38) provided for biasing said spool (22) in said second direction, said spool (22) having a pressure acting area upon which a governor pressure (P_G) is applied and is urged in the second direction when said governor pressure is applied to said pressure acting area,

said plug (24) having a pressure acting area upon which a throttle representative pressure (P_{TH}) is applied and is urged in the first direction to urge said spool (22) in the first direction via said first spring (36) when said throttle representative pressure (P_{TH}) is applied to said pressure acting area of said plug (24), the shift valve being characterized in that the force of the second spring (38) is smaller than the force of said first spring (36)."

Reasons for the Decision

1. The appeal is admissible.
2. Amendments
 - 2.1 The current Claim 1 is based on the original Claim 1 and includes further details with respect to the force of the second spring (38) being smaller than the force of the first spring (36) which is disclosed on page 3, lines 15 to 17 of the original specification. Claim 1 further includes clarifications of the claimed subject-matter which are directly derivable from the description of the shift valve depicted in Fig. 3 of the application, which part of the description also supports the subject-matter of Claim 2.

The amendments made to the description and the amendment made to Fig. 3 of the drawings are only for the purpose of adapting the description to the current version of the claims, indicating the prior art and removing inconsistencies.

Therefore the current version of the application does not contravene Art. 123(2) EPC.

3. The Board notes that the shift valve according to Claim 1 is defined in part by references to applied pressures (governor and throttle pressures) needed to give the valve a particular, wanted technical functioning.

Although generally speaking such references to features not forming a structural part of the claimed arrangement may introduce unclarity, in view of the fact that the shift valve bore is an integrated part of the automatic transmission housing so that the connections to the valve parts are predetermined, the skilled man would not have any difficulty in recognising the respective valve ports for these pressure sources and therefore, in the Board's opinion, no objections with respect to clarity of the claimed subject-matter arise in the present case.

4. **Novelty**

- 4.1 The precharacterising part of Claim 1 is correctly based on the disclosure of D1 which comes in the Board's opinion nearest to the subject-matter of Claim 1.

The shift valve according to Claim 1 thus differs from what is disclosed in D1 by its characterising features and is therefore deemed novel (Art. 54 EPC).

5. **Inventive step**

- 5.1 According to the description of the present application various kinds of shift schedule lines, which represent the change over characteristic of an automatic transmission, are required, dependent upon the use of the transmission with different types of engines and in different types of vehicles.

Although it was known in conventional shift valves discussed in the present application with reference to Fig. 1 and 2 to change a portion of the shift schedule line by changing of a spring in the valve arrangement further adjustment of the shift schedule line required, according to the present application, a redesign of the valve which lead to numerous kinds of valve bodies, spools and plugs to be manufactured with resulting cost increase as well as a more difficult management of these numerous parts.

The present application avoids these drawbacks in that on each side of the spool a different spring is positioned with the condition that the spring force of the spring acting together with the governor pressure on the valve spool is smaller than the spring force of the spring acting on the opposite side of the valve spool. By appropriate selection of the spring forces adaptation of the whole of the shift schedule line is now achievable.

As a result of the above effects the underlying objective problem to be solved by the present application thus basically relates to an improvement of the known shift valves so that their changeover characteristic may easily be adjusted to the particular needs.

5.2 Considering the functioning of the shift valve according to the present application more in detail, the changeover characteristic determined by the position of the shift schedule line, which represents the condition of equilibrium of the forces acting on the valve spool, depends on forces generated by the throttle pressure and governor pressure and by the springs working on the spool ends.

As can be derived from the diagram shown in Fig. 4 of the application the shift schedule line comprises two line portions (A and B) of which a first portion (A) meets the above condition of equilibrium of forces when the plug is in contact with the spool and a second portion (B) meets the condition when the spring positioned between the spool and plug is in progress of compression (see also page 4, line 22 to page 5, line 30 of the description) the point of connection between the two lines (A and B) representing the condition when the plug has just come into contact with the spool.

Conventional prior art shift valves comprising a spring between the plug and spool ("first spring" in Claim 1 under consideration) could be adapted to a different shift valve in response to the governor pressure by replacing the spring by a weaker or stronger one which resulted in another position of the second portion (B) of the shift schedule line. The relative position of the first portion of the shift schedule line was thereby not altered.

5.3 Considering now the cited prior art the Board notes that none of the cited documents discloses or gives a hint to either the above stated underlying problem or to the claimed solution.

However, as regards the problem itself, the Board cannot see any merit in the recognition of the desire to adapt the changeover characteristic in accordance with the circumstances of the use of the automatic transmission in particular since, as is acknowledged in the present application in the discussion of the conventional shift valves, it was already known to adjust a portion of the shift schedule line to meet a wanted shift value in response to the governor pressure by selecting an appropriate spring.

On the other hand such known "one-spring" shift valves cannot in the Board's view give a lead to the application of two springs in the manner as claimed in Claim 1 under consideration.

5.4 The document D1 relied upon by the Examining Division discloses a shift valve comprising two springs in the positions defined in the preamble of Claim 1 under consideration. However, contrary to the requirement defined in the characterising part of Claim 1, the force of the second spring is stronger than the force of the first spring so that, when there is no hydraulic pressure acting on the shift valve, the shift valve is in the second gear position to avoid creep of the motor car.

This functioning is described on page 326, lines 5 to 7 and page 336, last paragraph of D1.

In their decision, the Examining Division argued that cheaper transmissions do not include the above anti-creep measures and although in the Daimler-Benz transmission, hydraulic pressure is used to switch from second to first gear the skilled man knows that it is also possible to preload a valve with springs and would therefore modify the known valve by using a stronger spring to urge the shift valve towards the first gear position.

The Board cannot accept this line of argument. In the conventional shift valves there is only one spring (see the prior art referred to in Fig. 1 of the application) so that, at standstill, the shift valve is always in the first gear position.

Therefore, in accordance with this teaching of the prior art, if one desires in the Daimler-Benz transmission to start from a first gear position of the valve the skilled

man has nothing else to do than to take out the second spring and its plug to bring it back to the conventional valve structure. He had no reason to use a stronger spring between 4 and 5 instead, since he had put in the spring between 5 and 6 to counteract this spring with the view to forcing the plug in the 2nd gear position in the first place. Therefore, making the "first" spring stronger than the "second" would in the Board's opinion indeed go against the teaching of D1, as argued by the Appellant.

- 5.5 In view of the foregoing considerations it is concluded that no lead to the subject-matter of Claim 1 can be derived from the above cited document and since the other documents cited in the search report lie further away, the shift valve according to Claim 1 is considered to imply an inventive activity (Art. 56 EPC).
6. It follows that Claim 1 is acceptable under Art. 52(1) EPC. The same applies to the dependent Claim 2 which concerns a particular embodiment of the invention according to the independent Claim 1 (Rule 29(3) EPC).
7. The description and the drawings including the amendments agreed over the telephone are in agreement with the actual wording and scope of the claims. The description also complies with Rule 27(1)(c) and 27(1)(d) EPC. Hence those documents are also suitable for the grant of a patent.

Order

For these reasons, it is decided that:

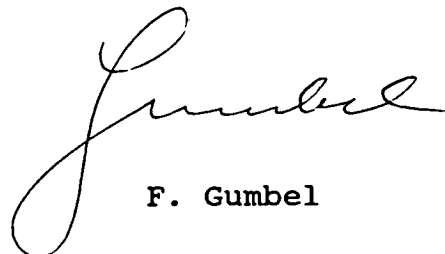
1. The decision under appeal is set aside.
2. The case a remitted to the first instance with the order to grant the patent on the basis of the following documents
 - Claims: 1 and 2 filed on 13 September 1988
 - Description: pages 1, 2, 2a filed on 7 June 1990 and pages 3 to 6 as originally filed
 - Drawings: page 1/2 as originally filed, page 2/2 filed on 7 June 1990 with the amendments to Claim 1 and pages 2, 2a and 5 of the description as agreed over the telephone on 24 September 1990.

The Registrar:



S. Fabiani

The Chairman:



F. Gumbel

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