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**D E C I S I O N**  
of 15 January 1998

**Case Number:** T 0777/95 - 3.2.4

**Application Number:** 89114397.6

**Publication Number:** 0353763

**IPC:** F02M 69/08

**Language of the proceedings:** EN

**Title of invention:**  
A fuel supply device of an engine

**Patentee:**  
Toyota Jidosha Kabushiki Kaisha, et al

**Opponent:**  
Orbital Engine Company (Australia) Pty Limited

**Headword:**  
-

**Relevant legal provisions:**  
EPC Art. 56

**Keyword:**  
"Inventive step - no - (main request and auxiliary requests I to IV)"  
"Inventive step - yes - (auxiliary request V)"  
"Problem to be solved"

**Decisions cited:**  
T 0021/81, T 0069/83

**Catchword:**  
-



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Boards of Appeal

Chambres de recours

Case Number: T 0777/95 - 3.2.4

**D E C I S I O N**  
of the Technical Board of Appeal 3.2.4  
of 15 January 1998

**Appellant:**  
(Opponent) Orbital Engine Company (Australia) Pty Limited  
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**Decision under appeal:** Decision of the Opposition Division of the  
European Patent Office posted 14 July 1995  
rejecting the opposition filed against European  
patent No. 0 353 763 pursuant to Article 102(2)  
EPC.

**Composition of the Board:**

**Chairman:** C. A. J. Andries  
**Members:** H. A. Berger  
M. Lewenton

## Summary of Facts and Submissions

I. The appellant (opponent) lodged an appeal, received on 12 September 1995, against the decision of the opposition division, dispatched on 14 July 1995, rejecting the opposition against the patent No. 0 353 763. The appeal fee was paid on 11 September 1995. The written statement setting out the grounds of appeal was received on 13 November 1995.

II. Opposition was filed against the patent as a whole and based on Article 100(a) EPC (lack of novelty and lack of inventive step). The following prior art documents were cited during the opposition proceedings and have again been taken into account in the appeal proceedings:

D1: WO-A-88/07628  
D2: WO-A-87/00583  
D3: US-A-4 693 224  
D4: JP-A-63-167071  
D6: JP-A-61-104154

III. In addition the following prior art documents were cited during the appeal proceedings:

D8: GB-A-804 588  
D9: GB-A-2 094 398  
D10: GB-A-2 112 455  
D11: GB-A-2 146 068  
D12: DE-C-278 081  
D13: DE-C-369 793  
D14: DE-C-916 365  
D15: DE-A-3 201 044  
D17: DE-U-1 775 843  
D18: US-A-4 523 719

D19: Automotive Fuel Injection Systems, A Technical Guide, published 1982 by Haynes Publishing Group, page 34.

IV. Oral proceedings were held on 15 January 1998 during which the respondent filed six sets of claims according to a main request and five auxiliary requests.

V. Claim 1 of the main request reads as follows:

"A fuel supply device of an engine, comprising,

- a nozzle opening (24, 44) for injecting fuel and pressurized air,
- valve means (20, 40) comprising a needle (23; 43) arranged in a needle insertion bore (22; 42) having a diameter larger than that of said needle for electromagnetically controlling the opening operation of said nozzle opening (24, 44) formed at a tip end of said needle insertion bore;
- a nozzle chamber (32; 58) having an air inlet (32a, 58d) connected to a pressurized air source (34) and an air outlet (32b, 58a) separately formed from and spaced from said air inlet and connected to said needle insertion bore via a pressurized air outflow passage (35; 35'; 59); and
- fuel injection means (36, 62) arranged in said nozzle chamber for injecting fuel, characterized in that
- said needle (23; 43) has an enlarged portion (38; 39; 43a) formed thereon, said enlarged portion closing the entire cross-section of the needle insertion bore and being slidably fitted into said needle insertion bore (22; 42) at a position opposite to said nozzle opening (24, 44) with respect to a connection portion of said pressurized air outflow passage (35; 35'; 59) and said needle insertion bore."

Claim 1 of auxiliary request I differs from Claim 1 of the main request by the following features added at the end of the Claim:

"wherein said enlarged portion (38) has an end face (38a) which is positioned adjacent to said connecting portion, so as to wipe off the fuel stuck onto the inner wall of the needle insertion bore (22; 42)."

Claim 1 of auxiliary request II differs from Claim 1 of auxiliary request I by the definition of the "end face (38a)" as "a conical end face (38a)".

Claim 1 of auxiliary request III differs from Claim 1 of auxiliary request I by the following features added at the end of the Claim:

"said pressurized air outflow passage (35;59) is obliquely connected to said needle insertion bore (22,42)."

Claim 1 of auxiliary request IV differs from Claim 1 of auxiliary request III by the definition of the "end face (38a)" as "a conical end face (38a)".

In each of the auxiliary requests I to IV the embodiment of Figure 18 of the patent specification is claimed in a further independent claim.

VI. Claim 1 of the auxiliary request V reads as follows:

"A fuel supply device of an engine, comprising,  
- a nozzle opening (24) for injecting fuel and pressurized air,  
- valve means (20) comprising a needle (23) arranged in a needle insertion bore (22) having a diameter larger than that of said needle for electromagnetically controlling the opening operation of said nozzle opening (24) formed at a tip end of said needle insertion bore;

- a nozzle chamber (32) having an air inlet (32a) connected to a pressurized air source (34) and an air outlet (32b) separately formed from and spaced from said air inlet and connected to said needle insertion bore via a pressurized air outflow passage (35);  
and
- fuel injection means (36) arranged in said nozzle chamber for injecting fuel, characterized in that
- said needle (23) has an enlarged portion (39) formed thereon, said enlarged portion closing the entire cross section of the needle insertion bore and being slidably fitted into said needle insertion bore (22) at a position opposite to said nozzle opening (24) with respect to a connection portion of said pressurized air outflow passage (35) and said needle insertion bore, wherein said pressurized air outflow passage (35) is obliquely connected to said needle insertion bore (22), and said enlarged portion (39) has a cutaway portion (39a) connecting said pressurized air outflow passage (35) to said nozzle opening (24)."

Independent Claim 6 of the auxiliary request V reads as follows:

- "A fuel supply device of an engine, comprising,
- a nozzle opening (24) for injecting fuel and pressurized air,
  - valve means (20) comprising a needle (23) arranged in a needle insertion bore (22) having a diameter larger than that of said needle for electromagnetically controlling the opening operation of said nozzle opening (24) formed at a tip end of said needle insertion bore;
  - a nozzle chamber (32) having an air inlet (32a) connected to a pressurized air source (34) and an

air outlet (32b) separately formed from and spaced from said air inlet and connected to said needle insertion bore via a pressurized air outflow passage (35);

and

- fuel injection means (36) arranged in said nozzle chamber for injecting fuel, characterized in that
- said nozzle chamber (32) has another air outlet (32c) formed on the inner circumferential wall of said nozzle chamber and connected to said needle insertion bore (22) via a bypass passage (70) at a position opposite to said nozzle opening (24) with respect to a connecting portion of said pressurized air outflow passage (35) and said needle insertion bore (22),
- wherein said needle (23) has an enlarged portion formed thereon, said enlarged portion closing the entire cross-section of the needle insertion bore and being slidably fitted into said needle insertion bore (22) at a position opposite to said nozzle opening (24) with respect to the connection portion of said bypass passage (70) and said needle insertion bore, and said pressurized air outflow passage (35) is obliquely connected to said needle insertion bore (22)."

VII. The appellant regards document D6 as the most relevant prior art document in assessing inventive step. He is of the opinion that it is normal design procedure for the skilled person to provide a needle with an enlarged portion which closes the entire cross-section of the needle insertion bore. He drew attention in this respect to documents D15 and D13. With regard to the embodiment disclosed in Figure 2 of document D6 it would be obvious to provide the enlarged portion so that its end face is positioned adjacent to the connection portion of the pressurized air outflow

passage and the needle insertion bore, since the guiding portion of the needle shaft in this known embodiment is already provided in this region. The effect of wiping off the fuel stuck on the inner wall of the needle insertion bore would automatically be obtained. Inventive step could not be derived merely from an additional effect. The appellant drew attention in this respect to the decisions T 69/83 and T 21/81. He argued concerning the conical end face that most enlarged portions on needle shafts are provided with a conical end face. It is furthermore already known from document D6 that the pressurized air outflow passage is obliquely connected to the needle insertion bore. Claims 1 of the main request and the auxiliary requests I to IV therefore are not patentable in the opinion of the appellant.

With regard to auxiliary request V the appellant argued that the meaning of the cutaway portion of the enlarged portion defined in Claim 1 also comprises a conical end face and annular restrictions of the enlarged portion. These cutaway portions however are normal practice for the skilled person in the opinion of the appellant. With respect to independent Claim 6 of the auxiliary request V, which claims the device of Figure 18 as granted, the appellant maintained that neither the description nor the drawings of the impugned patent disclose an enlarged portion closing the entire cross-section of the needle insertion bore with respect to this embodiment and that therefore Claims 1 and 6 of the auxiliary request V could not be patentable.

VIII. The respondent considers document D6 as the most relevant prior art document since it discloses all the features of the preamble of each Claim 1 of the main request and the subsidiary requests. Although it would be an alternative construction to provide an enlarged portion on the needle instead of a restricted needle



guiding bore in the housing wall, as shown in document D6, the skilled person has no reason or hint to change this known device. If he changed it he would not provide the enlarged portion in a position so that the end face is adjacent to the connecting portion of the pressurized air outflow passage and the needle insertion bore, in order to wipe off fuel stuck on the inner wall of the needle insertion bore. By wiping the fuel from the wall an effect similar to a catalytic effect would be obtained and the fuel in the needle insertion bore would be rapidly blown out into the combustion chamber. None of the prior art documents gives any hint to obtain this surprising effect by the enlarged portion. The effect of the conical end face is not described in the patent but this conical portion might guide the air flow from the air outflow passage into the needle insertion bore and improve fuel transportation by the air. Although document D6 shows the obliquely connected air outflow passage the combination with an enlarged portion on the needle can not be derived therefrom. According to the respondent, the Claims 1 of the main request and the auxiliary requests I to IV therefore are patentable. ....

With regard to Claim 1 of the auxiliary request V the respondent pointed out that none of the prior art documents discloses a cutaway portion in an enlarged portion on the needle, in the sense of the patent. This cutaway portion has a guiding function for the flow of the air fuel mixture. Concerning Claim 6 of the auxiliary request V the respondent argued that a bypass air passage, which ends in the needle insertion bore at a position opposite to the nozzle opening with respect to the fuel air mixture inlet into the needle insertion bore, is not disclosed in the cited documents. By means of the air flow through this bypass passage fuel is carried away toward the nozzle opening when the nozzle is opened. An enlarged portion on the needle is clearly

shown in Figure 18 as granted (Figure 19 of the originally filed application). This enlarged portion must close the entire cross-section of the needle insertion bore in order to prevent fuel outflow into the spring chamber. The respondent therefore considers the devices of Claims 1 and 6 of the auxiliary request V to be inventive.

IX. *Requests*

The appellant (opponent) requested that the decision under appeal be set aside and the patent be revoked.

The respondent (patentee) requested the cancellation of the decision under appeal and the maintenance of the patent on the basis of one of the six sets of claims submitted during the oral proceedings.

**Reasons for the Decision**

1. The appeal is admissible.

2. *Amendments*

2.1 Since the main request and the auxiliary requests I to IV will be rejected due to lack of inventive step (see following sections 6.1 to 6.5), it is appropriate to examine with regard to Article 123 EPC only the amendments which concern the auxiliary request V.

2.2 Claim 1 of the auxiliary request V mainly comprises the features of granted Claims 1, 2 and 9 (originally filed Claims 1, 2, 8, 3 and 11) and the feature that said enlarged portion closes the entire cross-section of the needle insertion bore. This last mentioned feature is disclosed in column 4, line 54 to column 5, line 2 of the granted patent (page 7, lines 18 to 24 of the

originally filed application). It is clear from Figure 5 in combination with Figure 1 that the enlarged portion closing the entire cross-section is positioned opposite the nozzle opening with respect to a connection portion of the pressurized air outflow passage and the needle insertion bore and that this enlarged portion extends further and is provided in the extension with a cutaway portion to connect the pressurized air outflow passage to said nozzle opening (also see column 6, lines 7 to 15 of the granted patent and page 8, lines 28 to 35 of the originally filed description). The added features furthermore restrict the protection conferred by the granted Claim 1.

- 2.3 The features of the preamble of the independent Claim 6 of the auxiliary request V are the same as those of Claim 1 and are originally disclosed as stated above with regard to Claim 1. The first part of the characterizing portion of Claim 6 is disclosed in granted Claim 14 (originally filed Claim 17). The second part of the characterizing portion of Claim 6 is based on the characterizing features of the granted Claim 1. The last part of the characterizing portion of Claim 6 (obliquely connected) is disclosed in Figure 18 of the granted patent (Figure 19 of the originally filed application). The enlarged portion closing the entire cross-section of the needle insertion bore is also shown in this Figure 18. This enlarged portion not only is obviously a guiding portion for the needle but also clearly closes the needle insertion bore at the side of the spring chamber. The board cannot agree with the appellant's argument that closing of the cross-section is not disclosed. It is true that the relevant element in the drawing has no reference sign and that nothing is indicated thereto in the description, however Figure 18 is unequivocally clear for a person skilled in the art in this respect, not only due to the

specific location of that element but also due to the analogous design of that element and the enlarged portion 38 in Figure 1.

All features of granted Claim 1 are claimed in independent Claim 6, in addition to specific features of the embodiment of Figure 18, which restrict the protection compared to that conferred by the granted Claim 1.

2.4 All the remaining dependent Claims 2 to 5 and 7 of the auxiliary request V correspond to dependent claims in the granted patent.

2.5 The amended set of Claims 1 to 7 of the auxiliary request V therefore does not contravene Article 123 EPC.

3. *Novelty*

3.1 Document D1, which was brought forward as prior art according to Article 54(3)(4) EPC with respect to the subject-matter of the disputed Claims 1 (main and auxiliary requests I to V), does not disclose an enlarged portion closing the entire cross-section of the needle insertion bore. The enlarged portion shown therein is provided with guide ribs (36) allowing fluid flow therebetween. The subject matter of the Claims 1 of all the requests therefore is novel with regard to the prior art known from document D1.

3.2 None of the other cited prior art documents discloses a device with all the features of Claim 1 of the main request or of one of the auxiliary requests I to V. The devices of Claim 1 of the main request and of the auxiliary requests I to V therefore are new in the meaning of Article 54 EPC. This was not disputed by the appellant.

3.3 Also the devices claimed in independent Claims 12, 11, 10, 9 and 6 of the respective auxiliary requests I to V are not disclosed in any one of the cited prior art documents and therefore are new in the meaning of Article 54 EPC. Novelty was not disputed by the appellant in this respect.

4. *Closest prior art*

Document D1 is prior art according to Article 54(3)(4) EPC and is therefore not of relevance for assessing inventive step.

Document D6 describes a fuel supply device with all the features of the preamble of Claim 1 of each of the requests. Since neither documents D8 to D11, D15 and D17 to D19 (which disclose fuel injection valves without pressurized air supply) nor documents D2 to D4 and D12 to D14 (although these disclose fuel injection valves with pressurized air supply) come closer to the subject-matter of Claim 1 of the main request or of any of the auxiliary requests I to V, this document D6 is taken as the starting point in assessing inventive step.

Document D6 discloses a fuel supply device of an engine, comprising,

- a nozzle opening (52) for injecting fuel and pressurized air,
- valve means (57) comprising a needle (Figs. 2 and 5) arranged in a needle insertion bore (59) having a diameter larger than that of said needle for electromagnetically controlling the opening operation of said nozzle opening (52) formed at a tip end of said needle insertion bore;

- a nozzle chamber (mixing chamber 60) having an air inlet (26) connected to a pressurized air source (21) and an air outlet separately formed from and spaced from said air inlet (26) and connected to said needle insertion bore via a pressurized air outflow passage (58);

and

- fuel injection means (fuel throttle 47) arranged in said nozzle chamber (mixing chamber 60) for injecting fuel.

The pressurized air outflow passage (58) is obliquely connected to the needle insertion bore (59).

## 5. *Problem and solution*

- 5.1 The problem stated in the patent as granted is to provide a fuel supply device capable of injecting the entire fuel, injected by means of the fuel injector, from the nozzle opening of the fuel supply device (see column 1, lines 31 to 34).

According to the explanation of the patentee, fuel stuck to the inner wall of the needle insertion bore is wiped off in a first stage by the enlarged portion with its end face positioned adjacent to the connection portion of the pressurized air outflow passage and the needle insertion bore, whereafter in a second stage the airstream wipes the fuel from the bore surface downstream of said connection portion (see Claims 1 of the auxiliary requests I to IV). This seems to be correct and can be understood when looking at the Figures 1, 4, 7 and 16 which show such a positioning of the enlarged portion adjacent to this connection portion. The respondent argued that the position of the enlarged portion of the embodiment of Figure 17 has to

be considered as being adjacent to this connection portion. In the embodiment of Figure 18 however an enlarged portion, which unequivocally is present for guiding and sealing purposes, is only provided at the end of the needle insertion bore, at a considerable distance from said connection portion. The problem to carry away the fuel accumulated in the needle insertion bore toward the nozzle opening is however solved according to the embodiment of Figure 18 (see description column 11, line 25 to column 12, line 1) in a different manner, namely only by the air blown through a bypass passage (70) into the needle insertion bore.

- 5.2 Claim 1 of the main request was apparently an attempt to claim a device which comprises both different solutions, the solution with the enlarged portion on the needle and the pressurized air, and the solution with solely the pressurized air blown into the needle insertion bore through the bypass passage. Since in this Claim 1 neither the position of the enlarged portion proximate the mentioned connecting portion nor the bypass passage is defined, the board is not convinced that the features of Claim 1 of the main request are suitable for solving the above described problem.

This problem furthermore has been set out in the description of the granted patent as a problem resulting from the embodiment according to document D6. This can however not be correct, since document D6 does not disclose a hollow space in the needle insertion bore above the so called "connection portion". Starting from an embodiment according to document D6 in order to assess inventive step, therefore entails defining another objective problem to be solved.

5.3 The fuel supply device of document D6 comprises a needle insertion bore which is restricted above the connection portion (58-59) to an extent such that the needle is slidably fitted in said restricted portion of the needle insertion bore.

5.4 The device of Claim 1 of the main request differs from that of document D6 by the characterizing features of said Claim 1, i.e. in that said needle has an enlarged portion formed thereon, said enlarged portion closing the entire cross-section of the needle insertion bore and being slidably fitted into said needle insertion bore at a position opposite to said nozzle opening with respect to a connection portion of said pressurized air outflow passage and said needle insertion bore.

5.5 Due to this general wording of Claim 1 these features of Claim 1 apparently also solve the problem of guiding the needle and preventing fuel from outflow of the needle insertion bore in the direction opposite to the nozzle opening.

5.6 Therefore, starting from document D6 the problem to be solved is to provide a construction for guiding and sealing the needle in the fuel supply device, which is a general, commonly known problem in this technical field.

6. *Inventive step*

6.1 The respondent is of the opinion that there is no reason to change the construction shown in document D6. The appellant however argued that it is normal design procedure to select for a needle guide and sealing portion either a restricted needle insertion bore (as in document D6) or a larger needle insertion bore combined with an enlarged portion on the needle (as in most of the cited prior art documents, i.e. D4, D8, D15



etc). Both constructions would be well known and obvious alternatives and the skilled person would select the one or the other version.

- 6.2 The board agrees with the argument of the appellant, since nozzles with a needle bore having a constant and somewhat larger diameter than the needle and a needle with an enlarged portion formed thereon for closing the entire cross-section of this needle insertion bore are generally known (and disclosed for instance in documents D8 to D12, D15 and D17). Since both alternative constructions, i.e. the restricted bore on the one hand and the larger bore combined with an enlarged needle portion on the other hand, solve the same guiding and sealing problem, it is obvious for the skilled person to select one or the other of these two well known possibilities, i.e. the one he thinks best in the given circumstances, and to provide instead of the restricted needle guiding bore, as in the embodiment of document D6, a through bore of constant diameter in combination with an enlarged needle portion as disclosed in the cited prior art documents D8 to D12, D15 and D17. The skilled person would prefer, for example, the construction with the enlarged needle portion mainly if mass production is concerned, since machining the needle seems to be easier with regard to the exact centring of the different diameter portions than machining the nozzle housing. In order to allow fuel flow in the passage between the needle and the needle insertion bore, the enlarged portion must be provided at a position opposite to the nozzle opening with respect to the connection portion of the pressurized air (fuel/air mixture) outflow passage and the needle insertion bore, i.e. at a position similar to that of the restricted guiding bore shown in document D6 (see Figure 2).

The device of Claim 1 of the main request therefore does not involve an inventive step (Article 56 EPC) and Claim 1 is not patentable. The main request therefore has to be rejected.

6.3 According to Claim 1 of auxiliary request I the enlarged portion has an end face which is positioned adjacent to the connecting portion, so as to wipe off the fuel stuck on the inner wall of the needle insertion bore.

In view of the short length of the guiding portion of the embodiment shown in Figure 2 of document D6 it is obvious that the enlarged guiding portion (see above section 6.2) formed on the needle must end adjacent to the connection portion of the fuel/air outlet at one side in order to get a sufficient length of this guiding portion, this being so in particular since no additional guiding portion is provided between the needle and the needle insertion bore at the nozzle outlet side. When the needle is moved in the opening direction, i.e. in flow direction, any fuel stuck on the inner wall of the needle insertion bore is automatically wiped off by the end face of this enlarged portion fitted in the needle insertion bore of constant diameter.

The respondent argued that none of the prior art documents discloses the effect of wiping off the fuel from the wall of the needle insertion bore by the enlarged portion adjacent to the connection portion of the air outflow passage and the needle insertion bore.

The board is of the opinion that if it is already obvious from the state of the art to arrive at something falling within the terms of a claim because an advantageous or an analogous effect could be expected to result from the combination of that state

of the art with the general common knowledge, the subject-matter of said claim lacks an inventive step, irrespective of whether an extra (possibly unforeseen) effect is obtained. The board follows in this respect the decision T 21/81 (also see T 69/83, section 5, last paragraph). In the present case the person skilled in the art led by the problem to select from two well known comparable alternative constructions the one which seems to be simpler to make, arrives at a solution according to which the end face of the enlarged portion is positioned adjacent to the connection portion. This obvious solution leads to the additional effect of wiping the fuel from the inner wall of the needle insertion bore.

The device of Claim 1 of the auxiliary request I therefore does not involve an inventive step (Article 56 EPC) and Claim 1 is not patentable (Article 52 EPC). The auxiliary request I therefore has to be rejected.

6.4 According to Claim 1 of the auxiliary request II the adjacent enlarged portion has a conical end face. . . .

It is normal practice that the enlarged portion provided on the needle has a conical end face, see documents D8 to D12, D15 and D17, and it is therefore obvious when using this construction in the device of document D6 to provide the enlarged portion with a conical end face. Although a possible effect of this conical end face is not described in the patent specification, the respondent argued that this conical end face may have a positive influence on the air/fuel flow. If the subject-matter of the claim however is obvious with regard to the prior art documents,

inventive step cannot be based on an additional positive effect (see arguments in section 6.3 of this decision and decision T 21/81), particularly if such an effect is merely alleged but not proven.

The subject matter of Claim 1 of the auxiliary request II therefore does not involve an inventive step (Article 56 EPC) and Claim 1 is not patentable (Article 52 EPC). The auxiliary request II therefore has to be rejected.

- 6.5 According to Claim 1 of the auxiliary request III the end face of the enlarged portion is positioned adjacent to said connecting portion and the pressurized air outflow passage is obliquely connected to the needle insertion bore, and according to Claim 1 of the auxiliary request IV the adjacent end face of the enlarged portion of the device of Claim 1 of the auxiliary request III is of conical shape.

Document D6 already discloses an air outflow passage which is obliquely connected to the needle insertion bore. Inventive step therefore cannot be based on this feature. Furthermore, the conical shape of the end face of the enlarged portion is obvious as explained in section 6.4 of this decision.

The subject-matter of Claim 1 of the auxiliary request III and the subject matter of Claim 1 of the auxiliary request IV therefore do not involve an inventive step (Article 56 EPC) and are not patentable (Article 52 EPC). The auxiliary requests III and IV therefore have to be rejected.

- 6.6 According to Claim 1 of the auxiliary request V the enlarged portion has a cutaway portion connecting said pressurized air outflow passage to said nozzle opening.

None of the cited prior art documents discloses an enlarged portion with a cutaway portion in the sense of this Claim 1. The appellant argued that the cutaway portion could have any shape and that also a conical end shape or an annular restricted end portion would fall within the scope of that wording.

According to Claim 1 the cutaway portion connects the pressurized air outflow passage to said nozzle opening and according to the description (see granted patent, column 6, lines 7 to 24) the enlarged portion is arranged to cover the opening of the pressurized air outflow passage 35, and a cutaway portion 39a is formed on the outer circumferential wall of the enlarged portion at the pressurized air outflow passage 35. It is therefore clear that the cutaway portion is formed so that the air flow from the outflow passage is guided in the direction to the nozzle opening which excludes annular cutaway portions and other cutaway portions which are not suitable for this particular purpose.

Since none of the prior art documents discloses such a cutaway portion on the enlarged portion of the needle, the subject-matter of Claim 1 of the auxiliary request V is inventive (Article 56 EPC) and Claim 1 can be maintained (Article 52 EPC).

Independent Claim 6 of the auxiliary request V claims the device shown in Figure 18 of the granted patent.

None of the cited prior art documents discloses the feature that the nozzle chamber has another air outlet formed on the inner circumferential wall of the nozzle chamber and connected to the needle insertion bore via a bypass passage at a position opposite to the nozzle

opening with respect to a connecting portion of the pressurized air outflow passage and the needle insertion bore. A person skilled in the art can therefore not be led to the claimed solution.

The device of Claim 6 therefore is inventive (Article 56 EPC) and Claim 6 can be maintained (Article 52 EPC).

- 6.7 Claims 2 to 5 of the auxiliary request V which claim further embodiments of the subject matter of Claim 1, and Claim 7 which claims a further embodiment of Claim 6 also can be maintained.
7. Only Figures 1 to 3, 5, 6 and 18 of the drawings can remain. These figures must be renumbered.
8. In the description, which must be adapted to the new set of claims and to the remaining drawings of the auxiliary request V, it should furthermore be indicated that Figure 1 does not show the invention as claimed but is only used to explain features which are present in an embodiment according to the invention.

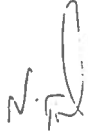
Order

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 maintain the patent on the basis of the fifth auxiliary request with the following claims, and description and drawings to be adapted:

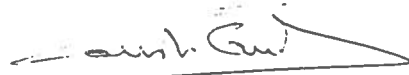
Claims: 1 to 7 as filed during the oral proceedings  
(auxiliary request V).

The Registrar:



N. Maslin

The Chairman:



C. Andries

301  
L  
Le

