

Deckblatt Übersetzung

Daten der Übersetzung:

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| Court/Gericht: | Bundesgerichtshof |
| Date of Decision / Datum der Entscheidung: | 2015-06-09 |
| Docket Number / Aktenzeichen: | X ZR 51/13 |
| Name of Decision / Name der Entscheidung: | Einspritzventil |





FEDERAL COURT OF JUSTICE

IN THE NAME OF THE PEOPLE

JUDGMENT

X ZR 51/13

Pronounced on:
9 June 2015
Wermes
Judicial Secretary as
Clerk of the court
registry

in the patent nullity proceedings

Einspritzventil/
Injection valve

Patent Act Sec. 83(1) and (4), Sec. 116(2)

- a) A plea in law, an amendment to a plea in law or a defense based on limited patent claims which has not been rejected by the Patent Court under Sec. 83(4) Patent Act may not be rejected on appeal.
- b) A ground for nullity which has been raised only after the reference under Sec. 83(1) Patent Act, but which the Patent Court has decided on the merits, shall fall for decision in the appeal proceedings without further ado, even if the Patent Court has left open whether the admission of the further ground for nullity is relevant.

Federal Court of Justice, judgment of 9 June 2015 - X ZR 51/13 –

Federal Patent Court

The X. Civil Senate of the Federal Court of Justice, following the oral hearing on 9 June 2015, attended by the presiding judge Prof. Dr. Meier-Beck, the judges Gröning, Dr. Grabinski and Hoffmann as well as the judge Dr. Kober-Dehm

ruled that:

On the cross-appeal of the first plaintiff, the judgment of the First Senate (Nullity Senate) of the Federal Patent Court, pronounced on 20 November 2012, is set aside as to costs and insofar as the action of the first plaintiff was dismissed on the ground of nullity due to lack of executable disclosure.

In all other respects, the appeals against the above judgment are dismissed.

To the extent of the reversal, the matter is referred back to the Patent Court for a new hearing and decision.

By operation of law

Facts of the case:

1 The defendant is the proprietor of European patent 1 389 274 (patent in suit), which was granted with effect for the Federal Republic of Germany, was filed internationally on 17 May 2002, claiming a U.S. priority of 23 May 2001, and relates to a directly actuated injection valve. The patent in suit comprises 42 claims, of which claims 1 and 33, to which the further claims refer back, are as follows:

- "1. An injection valve (100) for injecting fuel into a combustion chamber of an internal combustion engine, said injection valve (100) comprising:
- (a) a valve housing (102) comprising:
 - a fuel inlet port (108, 208);
 - an interior chamber fluidly connected to said fuel inlet port (108, 208); and
 - a valve seat (112) for cooperating with a valve member (114, 314) to seal said interior chamber from said combustion chamber when said injection valve (100) is closed;
 - (b) said valve member (114, 314) having one end disposed within said valve housing (102) and an opposite end extendable from said valve seat (112) toward said combustion chamber, wherein said valve member (114, 314) comprises a sealing surface that fluidly seals against said valve seat (112) when said injection valve (100) is closed and that is liftable away from said valve seat (112) when said injection valve (100) is open;
 - (c) a biasing mechanism associated with said valve member (114, 314), said biasing mechanism applying a closing force to said valve member (114, 314) when said valve member (114, 314) is in said closed position;
 - (d) an actuator assembly associated with said valve member (114, 314), wherein said actuator assembly comprises a dimensionally responsive solid member that is actuatable to apply an opening force to said valve member (114, 314) stronger than said closing force, for moving said valve member (114, 314) to said open position; and
 - (e) a hydraulic link assembly comprising a passive hydraulic link having a hydraulic fluid thickness through which said opening and closing forces are transmitted, whereby said hydraulic fluid acts

substantially as a solid with said thickness being substantially constant while said actuator assembly is actuated and wherein said thickness of said hydraulic link is adjustable while said actuator assembly is not actuated in response to changes in the dimensional relationship between components of said injection valve (100) to maintain a desired valve lift upon actuation of said actuator assembly.

33. A method of operating the fuel injection valve (100) of claim 1 wherein said fuel injection valve (100) comprises a longitudinal axis, said method comprising:
- (a) actuating said fuel injection valve (100) by activating said actuator assembly to cause said dimensionally responsive member to expand in length in the direction of said longitudinal axis;
 - (b) transferring movement caused by expansion of said dimensionally responsive solid member through said passive hydraulic link to cause a corresponding movement of said valve member (114, 314) to open said fuel injection valve (100) by lifting said valve member (114, 314) away from said valve seat (112) while simultaneously compressing said biasing mechanism;
 - (c) deactuating said fuel injection valve (100) by deactivating said actuator assembly to cause said dimensionally responsive solid member to contract in length, to unload said biasing mechanism, and cause a corresponding movement of said valve member (114, 314) to close said valve (100); and
 - (d) providing sufficient time between consecutive valve openings to allow flow of at least some of said hydraulic fluid within said hydraulic link assembly to adjust said hydraulic fluid thickness through which said opening and closing forces are transmittable."

2 The plaintiffs have argued that the subject matter of the patent in suit is not patentable and goes beyond the content of the application as originally filed. The first plaintiff also claimed that the teaching of the patent in suit was not disclosed in an executable manner. The defendant opposed the action and, in the alternative, defended the patent in suit with several limited sets of claims.

3 The Patent Court declared the patent in suit partially null by giving it the wording of auxiliary claim IV. Accordingly, patent claim 1 reads:

"An injection valve (100) for injecting fuel into a combustion chamber of an internal combustion engine, said injection valve

(100) comprising:

- (a) a valve housing (102) comprising:
 - a fuel inlet port (108, 208);
 - an interior chamber fluidly connected to said fuel inlet port (108, 208); and
 - a valve seat (112) for cooperating with a valve member (114, 314) to seal said interior chamber from said combustion chamber when said injection valve (100) is closed;
- (b) said valve member (114, 314) having one end disposed within said valve housing (102) and an opposite end extendable from said valve seat (112) toward said combustion chamber, wherein said valve member (114, 314) comprises a sealing surface that fluidly seals against said valve seat (112) when said injection valve (100) is closed and that is liftable away from said valve seat (112) when said injection valve (100) is open;
- (c) a biasing mechanism associated with said valve member (114, 314), said biasing mechanism comprising a valve spring (116) and a disc spring (150) for applying a compression force to said dimensionally responsive member, said biasing mechanism applying a closing force that originates from said valve spring (116) and said disc spring (150) to said valve member (114, 314) when said valve member (114, 314) is in said closed position;
- (d) an actuator assembly associated with said valve member (114, 314), wherein said actuator assembly comprises a dimensionally responsive solid member that is actuatable to apply an opening force to said valve member (114, 314) stronger than said closing force, for moving said valve member (114, 314) to said open position; and
- (e) a hydraulic link assembly comprising a passive hydraulic link having a hydraulic fluid thickness through which said opening and closing forces are transmitted, whereby said hydraulic fluid acts substantially as a solid with said thickness being substantially constant while said actuator assembly is actuated and wherein said thickness of said hydraulic link is adjustable while said actuator assembly is not actuated in response to changes in the dimensional relationship between components of said injection valve (100) to maintain a desired valve lift upon actuation of said actuator assembly,
wherein said hydraulic link assembly is disposed within said interior chamber,
wherein said hydraulic link assembly comprises a fluidly sealed hydraulic cylinder (160) that is fluidly sealed from said interior chamber, said hydraulic link assembly

comprising a piston (114b, 314b) and said hydraulic fluid being disposed within said hydraulic cylinder (160),

wherein said passive hydraulic link is configured to be adjustable by allowing movement of hydraulic fluid from a first chamber on a first side of the piston (114b, 314b) to a second chamber on a second, opposite side of the piston (114b, 314b) while said actuator assembly is not actuated, and

wherein said hydraulic cylinder (160) is configured to be moveable relative to the valve housing,

wherein said disc spring (150) bears against said hydraulic cylinder (160) and said valve spring (116) bears directly against said piston (114b) to transmit a closing force directly to said valve member (114)."

- 4 In its appeal, the defendant essentially continues to seek dismissal of the action and, in the alternative, defends the patent in suit with the limited sets of claims preceding the auxiliary request IV filed at first instance. The appeal of the second plaintiff and the cross-appeal of the first plaintiff continue to pursue the first-instance applications for a complete declaration of nullity of the patent in suit.

Grounds of the decision:

5 I. The patent in suit relates to a directly actuated injection valve and a method for actuating the valve. In particular, the patent in suit relates to an injection valve, which can be used in internal combustion engines and injects fuel under high pressure into the combustion chamber.

6 1. The patent in suit explains that the direct injection of a gaseous fuel into the combustion chamber of an internal combustion engine is advantageous. On the one hand, throttle losses could be eliminated and a high compression ratio could be obtained by injecting the fuel at a late stage. Secondly, emissions of nitrogen oxides and particulate matter can be significantly reduced if the fuel contains natural gas, propane or hydrogen. In this case, it is necessary to inject the fuel into the combustion chamber under high pressure in order to overcome the pressure prevailing there and to allow good mixing of the fuel with the combustion chamber air.

7 Injection valves that would meet these requirements would have to satisfy numerous demands. Since the valves are exposed to high fuel pressures, it must be ensured that the valve, when closed, effectively prevents fuel leakage into the combustion chamber between injection events by means of a fluid-tight seal. In addition to the known needle valves, this can be achieved by a valve design with a valve element that opens outward when displaced in the direction of the combustion chamber. Furthermore, the injection would have to take place within a very short time interval, typically only a few milliseconds.

8 All direct injection systems in internal combustion engines known in the state of the art would be actively opened and closed by a hydraulic actuator. However, the required rapid opening and closing of the valve via the active hydraulic system is associated with design disadvantages. In particular, a hydraulic pump unit and a reservoir for the hydraulic fluid are required, and the hydraulic fluid must be sealed off from the gaseous, high-pressure fuel. In addition, due to the dynamic flow of the fluid, actuating the valve via the hydraulics causes time delays in the response behavior of the valve system, which are detrimental to precise injection timing, and allows only limited control of the valve stroke.

9 In contrast, direct actuation of the injection valve is advantageous, as described in international patent application 01/29400 (D2). However, this has a hollow-tube-shaped actuating element which is complicated and expensive to manufacture. 2.

10 2. This gives rise to the technical problem of providing a reliably switching injection valve for injecting fuel into a combustion chamber of an internal combustion engine with as little design effort as possible. It is to be solved by a valve with the following features (*italics the features of the auxiliary requests*):

1. The injection valve has:
 - 1.1 a valve housing (102) with
 - 1.1.1 a fuel inlet (108, 208),
 - 1.1.2 an internal chamber in fluid communication with the fuel inlet,
 - 1.1.3 a valve seat (112) for cooperating with a valve element (114, 314) to seal the inner chamber from the combustion chamber when the injection valve (100) is closed;
 - 1.2 a biasing mechanism associated with the valve element,
 - 1.3 an actuating assembly associated with the valve element; and
 - 1.4 a hydraulic connection assembly.
2. The valve element (114, 314) has.
 - 2.1 an end portion located in the valve body,
 - 2.2 an opposite end portion extendable from the valve seat (112) toward the combustion chamber,
 - 2.3 a sealing surface which
 - 2.3.1 provides fluid sealing with respect to the valve seat when the injection valve (100) is closed, and
 - 2.3.2 is liftable from the valve seat when the injection valve (100) is open.
3. The biasing mechanism applies a closing force to the valve element when the valve element is in the closed position.
4. The actuating assembly has a solid member (*solid member*) that is
 - 4.1 is dimensionally responsive (*dimensionally responsive*); and

- 4.2 is actuable to apply an opening force to the valve member that is greater than the closing force and moves the valve member to the open position;
- 4.3^V *wherein the biasing mechanism comprises a valve spring (116) and a disc spring (150) for applying a compressive force to the solid member from which the closing force originates.*
- 5. The hydraulic connection assembly
 - 5.1 has a passive hydraulic connection,
 - 5.2 has a hydraulic fluid thickness,
 - 5.2.1 through which the opening and closing forces are transmitted,
 - 5.2.2 which is substantially constant when the actuation assembly is actuated so that the hydraulic fluid acts substantially as a solid, and
 - 5.2.3 which is adjustable in response to changes in the dimensional relationship (*changes in the dimensional relationship*) between components of the injector to maintain a desired valve lift upon actuation thereof when the actuation assembly is not actuated;
 - 5.3^I *has a hydraulic cylinder (160) in which the hydraulic fluid is disposed, with fluid sealing to the internal chamber, and a piston (114b, 314b);*
 - 5.4^{II} *is arranged in the inner chamber;*
 - 5.5^{III} *is adjustable by allowing movement of hydraulic fluid from a first chamber on a first side of the piston to a second chamber on a second, opposite side of the piston when the actuator assembly is not actuated;*
 - 5.6^{IIIA} *wherein the hydraulic cylinder is adapted for movement relative to the valve housing;*
 - 5.7^{IV} *wherein for direct transmission of the closing force, the diaphragm spring (150) presses against the hydraulic cylinder and the valve spring (116) presses directly against the piston (114b).*

11 Figure 1 of the patent specification reproduced below shows an example of an embodiment.

12 3. With regard to some of these features, the patent claim requires explanation:

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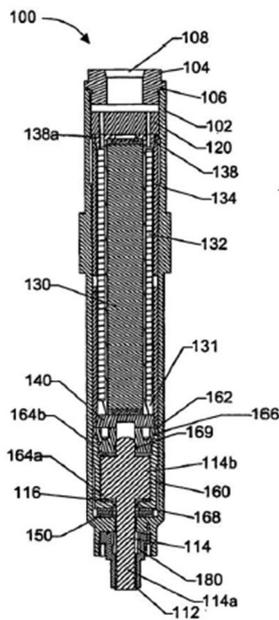


FIG. 1

(a) The Patent Court correctly assumed that the actuating element (130) according to feature 4, which is referred to as "solid" by the claim in the language of the proceedings, must not only consist of solid material, which would also include a hollow tubular design of the element, but must be solid. This is because both paragraph 10 and paragraph 46 of the description of the patent in suit refer to the advantages of a solidly formed actuating element over a hollow tubular actuating element known in the state of the art as being simpler and less expensive to manufacture than the hollow tubular actuating element used in the state of the art.

14

b) By virtue of feature group 5, the device according to patent claim 1 differs, as the Patent Court correctly pointed out, from the injection valves known in the state of the art and discussed in the introduction to the description, which effect the opening and closing of the valve by means of an active hydraulic system. In contrast, the hydraulic connection group (feature 5.1), which is referred to as passive, merely transmits the opening force emanating from the actuating element to the valve element and at the same time ensures compensation for changes in the dimensioning of the valve's components that may result from manufacturing tolerances, wear and temperature-dependent changes in the size of the assemblies. For this purpose, the hydraulic fluid is almost incompressible and acts almost like a solid during the very fast injection process (feature 5.2.2), whereas the hydraulic fluid can distribute itself by inflow and outflow during the long pauses between the injection processes compared to the injection process and thus provide for the compensation of changes in the dimensioning of the components (feature 5.2.3).

15

c) Contrary to the opinion of the defendant's appeal, the passive hydraulic connection does not necessarily have to be fluid-tightly encapsulated from the rest of the valve interior. The passage in paragraph 28 of the description of the patent in suit relied upon by the defendant for the interpretation

it advocates merely delimits the passive hydraulic connection group according to the invention from the valve designs known in the state of the art, in which the opening force is generated by an active hydraulic pump. When the description in this respect speaks of a hydraulic fluid enclosed in the hydraulic connection group, this does not necessarily require a fluid-tight seal with respect to the other interior of the valve. Rather, the hydraulic fluid need only be enclosed in the connection assembly in such a way that it cannot escape from the assembly during rapid actuation of the actuator, thus ensuring that it transmits the opening force of the actuator to the valve element substantially like a solid (feature 5.2.2). An encapsulated hydraulic fluid system, on the other hand, is addressed by the patent in suit only in connection with the use of a gaseous fuel (paragraph 9, column 3, lines 24 to 26). However, the injection valve according to claim 1 is not limited to an application in internal combustion engines operated with gaseous fuel; rather, only claim 20 contains such a limitation, whereas claims 21 and 22 expressly provide for the operation of the valve with liquid fuels. For this reason, the hydraulic connection assembly according to the patent in suit is only preferably intended to have a hydraulic cylinder with fluid seal, which is fluid-tightly sealed with respect to the inner chamber (para. 12 sp. 4 lines 25 to 27 and feature 5.3 according to auxiliary claim I), but can also be designed in such a way that the fuel flows through the actuating assembly and through the hydraulic connection assembly into the inner chamber (para. 14 sp. 4 lines 49 to 55).

16 d) Therefore, contrary to the view of the defendant's appeal, it is also not mandatory to use a hydraulic fluid in the hydraulic connection group which is different from the fuel used. On the contrary, the patent in suit expressly states that diesel fuel, for example, which is also used as fuel in the internal combustion engine, can be used as hydraulic fluid (para. 9, column 3, line 22 f.). A hydraulic fluid different from fuel requires only a device according to claim 22.

17 II. The Patent Court assumed that the subject matter of the patent in suit did not go beyond the content of the original disclosure insofar as a solid element was claimed as part of the actuator assembly (feature 4). The original documents (hereinafter cited according to the published international application 02/095212 [K3]) refer to the element as solid only in connection with

an actuator consisting of magnetostrictive material, but the skilled person understands this as an example of the actuating element generally described as solid.

18 However, only the subject matter of the patent in suit in the version of auxiliary request IV was patentable, whereas the subject matter of patent claim 1 in the granted version was not new compared to the German patent specification 198 54 506 (D3) and in the versions of auxiliary requests I, II, III and IIIA was obvious to the skilled person to a mechanical engineer with a university education in the field of internal combustion engines with several years of experience in the development and design of injection valves for internal combustion engines. This also applied to the subject matter of the subordinate process claim 33 in the corresponding versions of the application.

19 The citation D3 anticipated all features of claims 1 and 33, in particular by teaching the skilled person in Figure 2 to make the actuating element solid.

20 In the version of auxiliary claims I, II, III and IIIA, the subject matter of claim 1 was suggested by D3 in combination with citation D2. The injection valve presented in D3 was exclusively designed for the use of liquid fuels. For the skilled person, the need arose to further develop such an injection valve for operation with gaseous fuels. In his search for a hydraulic connection assembly that is sealed and thus also designed for operation with gaseous fuels, he comes across D2, which shows an assembly that is sealed fluid-tight with respect to the fuel. Therefore, the skilled person would only have to replace the hydraulic connection group provided in the D3 with the one presented in the D2. Since the D2, unlike the valve according to the patent in suit, does not primarily present an outward-opening injection valve, but mentions such a valve as a further possibility in the description, the skilled person would have to redesign the design features of the hydraulic connection group of the inward-opening valve for the needs of an outward-opening injection valve in the direction of the combustion chamber, which would, however, be possible for him on the basis of his knowledge and skill.

21 The subject matter of patent claim 1 as amended by auxiliary claim IV, on the other hand, was new and based on inventive step.

22 The publication of the US application 2001/0032612 (D8) did not prevent this. The patent in suit could claim its priority, since this application was the first application for the invention within the meaning of Art. 87 EPC. Contrary to the plaintiffs' view, the first application was not US application 09/522 130 (K19). This application did not teach a solid, but a hollow tubular actuating element.

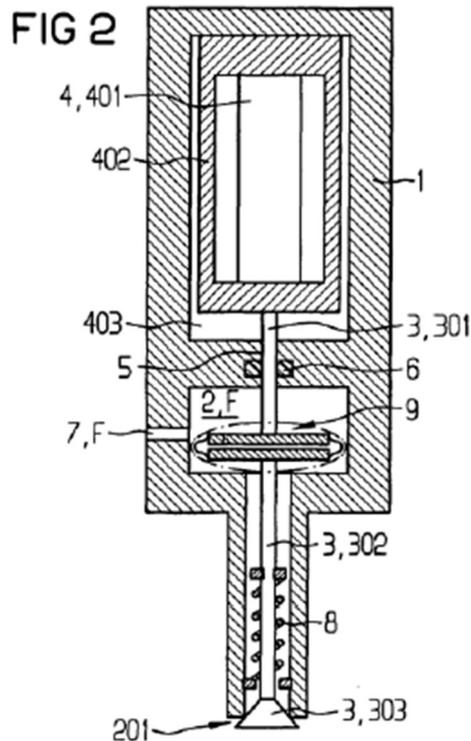
23 None of the other citations disclosed the additional feature 4.3^{IV}, according to which the closing force applied to the valve element by the biasing mechanism was provided by a valve spring and a disk spring of the hydraulic connection assembly. The skilled person would not arrive at this constructive interrelationship, in particular, by looking at citations D3 and D2 together. If the skilled person inserts the hydraulic connection assembly shown in D2 into the injection valve of D3, he will in any case not achieve a design solution in which the closing force in the closed state also comes from the diaphragm spring. Nor was this a measure that had been obvious on the basis of general technical knowledge.

24 Nor was there any ground for nullity on the grounds of lack of practicability, which the first plaintiff had asserted with the argument that the compensation space for the hydraulic clearance compensation was insufficient in the valve according to the patent because it was within the scope of professional skill to provide a sufficiently dimensioned compensation space within the hydraulic connection unit.

25 III. This assessment withstands the attacks of the defendant's appeal.

26 1. A device according to claim 1 is either fully anticipated by citation D3, figure 2 of which is shown below, or at least suggested by the writing.

27



a) The D3 refers in general to a metering device, but also addresses in particular injection processes in motor vehicle engines and deals with the design problems to be overcome in this connection (p. 1 lines 9 to 13; p. 3 lines 28 to 31, 50 to 59). The injection valve presented in the paper has a valve housing 1. The fluid is supplied to the fluid chamber 2 via a fluid supply line 7. The orifice 201 of the metering device cooperates with the sealing head 3, 303 at the end of the sealing needle 3 to seal the fluid chamber from the outside. For the skilled person, it is understood that in the use of the

metering device as an injection valve in motor vehicle engines addressed by the citation, the purpose of this is to seal off the fluid chamber from the combustion chamber of the engine. Feature 1.1 is therefore realized.

28

b) The sealing needle 3, at the end of which the sealing head 3, 303 is located, has a first needle part 3, 301, which is located in the valve housing, and a second needle part 3, 302, at the end of which the sealing head 3, 303 is located. The second needle part and the sealing head extend outwardly from the orifice 201 when the metering device is used as an injection valve in the open state of the valve toward the combustion chamber. The sealing head 3, 303, which is part of the second needle part 3, 302, has a bearing surface which is at least partially worked out in the form of a sealing seat (p. 3 lines 51 to 53). This produces a fluid seal with respect to the combustion chamber in the closed state, whereas the sealing seat is lifted from its seat in the open valve state. This corresponds to feature group 2.

29

c) In accordance with features 1.2 and 3, a return spring 8 pushes the valve needle 3 in the closed state in the direction of the actuator 2 so that the sealing head 3, 303 is pressed against the housing 1 (p. 3 lines 50 f.).

30

d) The D3 at least suggests to the skilled person to open and close

the metering device by means of an actuating assembly designed according to feature 1.3 and feature group 4.

31 (1) The metering device has an actuator 4 to which the valve needle 3 is attached and which is therefore associated therewith as a valve element. The actuator 4 consists of a piezo actuator, preferably a ceramic multilayer piezo actuator (p. 3 lines 41 to 43). Since this element has the task of opening and closing the metering device and must overcome the spring force of the return spring 8 during opening, features 4.1 and 4.2 are realized.

32 (2) At least in the result without success, the defendant's appeal complains that the citation does not teach to design the actuator as a dimensionally responsive solid element (feature 4). In this context, it is not decisive which conclusions can be drawn from a technical point of view from the fact that Figure 2 shows the dosing device in a cut-open state, whereby the valve needle and the actuator are shown without hatching. However, the drawing could be interpreted to mean that the housing 1 and the Bourdon tube 402, which holds the piezo actuator 401 under tension, are shown as cavities, as are the fluid chamber 2 and the fluid chamber 903 shown enlarged in Figure 1, because they must accommodate the corresponding assemblies within them, whereas the piezo actuator 401, as well as the valve needle 3, are not shown in a cut-open state and are therefore shown without hatching. From which, in turn, it could be concluded that in the drawing those components which, for the purposes of the device, are designed as hollow bodies because they must receive parts of the assemblies within them, are shown hatched, while the other components, for which this is not the case, are shown without hatching. However, this can be left open. For the skilled person, it is already appropriate to design the piezo actuator 401 like the valve needle in a solid form and not in the form of a hollow body, since he does not recognize any necessity for such a design, which is more complex than a solid element and which is neither mentioned in the description nor suggested by the drawing.

33 (e) Finally, the skilled person will also find in the D3 a hydraulic connection assembly according to feature 1.4, which is designed according to feature group 5. For, according to the formulated task, the document deals in particular with the problem of compensating for changes in length between the

components of the metering device in a suitable manner and proposes for this purpose the use of a compensating element, which is reproduced enlarged in Figure 1 and explained in the description (p. 2 line 38 to p. 3 line 34 and p. 4 line 5 ff.). In the balancing element 9, a hydraulic fluid is enclosed in the hydraulic chamber 9, 903, which is formed by the walls 9, 901; 9, 902, and 9, 905. Here, the hydraulic chamber is in fluid communication with the fluid chamber via the microbore 9, 904. When the piezo actuator expands and thus exerts an opening force on the first part of the valve needle 3, 301, which acts on the hydraulic chamber of the balancing element via the first wall 9, 901, this application of force occurs so quickly that the fluid does not have sufficient time to flow out of the hydraulic chamber through the very small microbore 9, 904. From this it can be seen that the hydraulic fluid in the hydraulic chamber transmits the opening force and the stroke caused by the linear expansion of the piezo actuator to the second part of the valve needle without any appreciable losses (cf. p. 2 lines 47 to 53; p. 4 lines 18 to 21, lines 32 to 43). In contrast, the changes in length due to settling and aging, as well as the changes due to temperature, occur very slowly compared to the opening process, which is why the fluid can flow through the microbore in this case and thus compensate for the changes in the component dimensions mentioned (p. 2 lines 54 to 65; p. 5 lines 21 to 34). The hydraulics of the compensating element thus act passively and merely pass on the expansion and contraction of the piezo actuator to the valve needle without themselves actively influencing the position of the valve needle. At the same time, the compensating element ensures that the stroke by which the valve needle is lifted from its seat in the direction of the combustion chamber always remains constant, which is necessary for the proper functioning of the injection process (p. 2 lines 18 to 20, p. 3 lines 27 to 31, p. 4 lines 41 to 43).

34 2. The appeal does not separately attack the assumption of the Patent Court, which is free of legal errors, that the same applies to the subject matter of claim 33.

35 3. It also challenges unsuccessfully, at least in the result, the assumption of the Patent Court that the subject matter of patent claim 1 in the version of auxiliary claims I to IIIA is suggested by a combination of D3 with D2.

36 a) The object of examination of auxiliary request I differs from that of the main request by feature 5.3I, according to which the hydraulic connection group comprises a hydraulic cylinder fluid-tightly sealed from the valve inner chamber with the hydraulic fluid and a piston.

37 b) Auxiliary claim I is admissible because, contrary to the opinion of the second plaintiff, a hydraulic connection group characterized in this way is originally disclosed. Insofar as the latter objects that Figure 1 contained in the original documents is insufficient as a disclosure of this additional feature because the skilled person cannot infer from the figure which parts are to be attributed to the hydraulic connection group and by what means the latter is encapsulated from the interior of the valve, this does not preclude a sufficient original disclosure. For the skilled person takes from the application (K3, p. 15 lines 5 to 16) that the hydraulic fluid in the hydraulic cylinder is enclosed by a cylinder cover 162 and seals 162, 168, 169, which are at the same time used as reference signs in Figure 1 and refer to components of the valve shown which are delimited by drawings. In addition, a sealed hydraulic fluid system is also mentioned in connection with the use of a gaseous fuel (K3, p. 3 lines 9 to 20). Admittedly, this only occurs in connection with the criticism of valves known in the state of the art, which operate with an active hydraulic unit and directly inject gaseous fuels. However, it is obvious to the skilled person that the merely passive hydraulic connection group must also be sealed with respect to gaseous fuels when these are injected. Accordingly, it is explained to him with respect to Figure 2 that another seal 270, not shown in Figure 1, may prevent high pressure fuel from entering the portion of the valve body in which the hydraulic connection group and the actuating assembly are housed. From Figure 2, it can be seen that at the same time, seal 168 is further provided to encapsulate the hydraulic connection assembly from the rest of the interior of the valve.

38 c) It can be left open whether the skilled person, as the Patent Court assumed, had reason to examine whether he could also use the advantageous

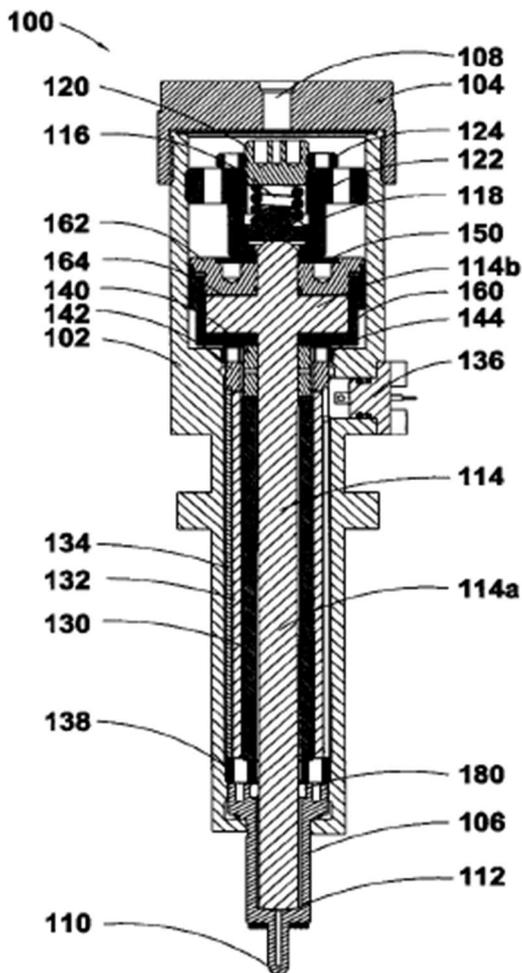


Figure 1

compensating element presented in D3 for an injection device in which the fuel is not suitable as a fluid for the compensating element, and in this connection to take D2 into consideration because an encapsulated compensating element (hydraulic connecting element) suitable for this purpose is presented there. In any case, the skilled person had reason to pick up on the reference in D2 that the injection device presented, which is provided with an inward-opening valve in the example shown in Figure 1 reproduced opposite, could also be designed with an outward-opening valve (into the combustion chamber) and that in this case the actuating device is preferably positioned above the valve needle and acts on the needle with the opening directed downward (p. 10 lines 29 to 33). The

examination of how this could be implemented constructively led the skilled person to an injection device according to auxiliary claim I.

39 (1) Appeal of the second plaintiff and cross-appeal rightly criticize the deduction of the Patent Court (made in connection with the examination of novelty for D14 [= K19]) as to how the skilled person would have implemented the possibility of a different construction of the device addressed in D2 insofar as it is primarily guided by a detail of the embodiment example, namely the adjusting screw 120 for adjusting the valve spring preload at the upper end of the injection valve, which the skilled person, according to the Patent Court, wanted to retain. The orientation on this detail led to the further assumption of the Patent Court that the skilled person would now design the valve spring 116 to be left at the upper end of the device in at least an unusual manner and, as the cross-appeal points out, in any case not easily realizable manner no longer

as a compression but as a tension spring. It was at least as obvious to the skilled person to arrange the valve spring, as shown by the first plaintiff, on a projection of the valve needle in such a way that he could work with a conventional compression spring to apply the closing force, as in the embodiment example shown in D2 and, for example, also in D3. When the skilled person considered this, it became immediately clear to him that it was no longer necessary for the valve element to pass through the actuator, but that the actuator, as expressly mentioned in D2 with regard to the valve needle, was expedient to be provided above the valve element (and the hydraulic connection assembly) as those components which it has to press downward to open the valve - also in this respect no different from D3, which in its embodiment likewise shows an outward-opening valve.

40 (2) If the actuator is accordingly arranged above the valve element and the hydraulic connection assembly, there is no longer any reason, from the point of view of the skilled person, to make it tubular rather than solid. The D2 expressly points out to the skilled person that the wall thickness of a tubular magnetostrictive element must be selected so that a force sufficient to overcome the closing force can be applied (p. 12 lines 25 to 32). He could satisfy this most easily with a solid element, especially since he was also able to recognize that such an element, as indicated in the patent specification, is easier and less expensive to manufacture. Moreover, the D3 offered a concrete example for this, which could be transferred without further ado in the given situation.

41 (3) The consideration of the defendant that the skilled person had to carry out a plurality of constructive steps in order to arrive at a device according to the invention in this way cannot call into question that an obvious path to the invention was thereby pointed out to the skilled person. For the constructive considerations follow one and the same basic idea and the next step results in each case from the preceding one.

42 d) The same applies to the other auxiliary requests II to IIIA.

43 IV. The Patent Court's assumption that the subject matter of auxiliary request IV is patentable in contrast to the above stands up to scrutiny, as does the denial of the ground for nullity of the inadmissible broadening.

44 1. The appeal of the second plaintiff and the cross-appeal of the first plaintiff unsuccessfully attack the assumption of the Patent Court that the patent in suit does not go beyond the content of the originally filed application documents.

45 a) The principles of novelty testing apply to the assessment of identical disclosure (Federal Court of Justice, judgment of 14 October 2003 X ZR 4/00, GRUR 2004, 133, 135 Elektronische Funktionseinheit). Accordingly, it is required that the skilled person can directly and unambiguously (Federal Court of Justice, judgment of 11 September 2001 X ZR 168/98, BGHZ 148, 383, 389 Luftverteiler) infer the technical teaching designated in the claim from the original documents as a possible embodiment of the invention (Federal Court of Justice, order of September 11, 2001 X ZB 18/00, GRUR 2002, 49, 51 Drehmomentübertragungseinrichtung). The requirement of a direct and unambiguous disclosure must be applied in a way that takes into account that the determination of what is disclosed to the skilled person as an invention and what is disclosed as an embodiment of the invention has an evaluative character and avoids an unreasonable restriction of the plaintiff in exhausting the disclosure content of the prior application. In this respect, it is to be taken as a basis that the interest of the plaintiff is regularly recognizably directed towards obtaining the broadest possible protection, i.e. to present the invention in as general a manner as possible and not to limit it to identified examples of application (Federal Court of Justice, judgment of 17 July 2012 X ZR 117/11, BGHZ 194, 107 marginal no. 52 Polymerschaum I; Federal Court of Justice, judgment of 11 February 2014 X ZR 146/12, BGHZ 200, 63 marginal no. 19 et seq. Communication Channel).

46 b) Accordingly, the Patent Court correctly assumed that it can be inferred from the originally filed application documents from a technical point of view that the actuating element is advantageously designed in a solid form.

47 Admittedly, the plaintiffs correctly point out that section 10 of the patent specification in dispute is not included in the description of the original application. However, it is stated in the application that Figure 1 (which corresponds to Figure 1 of the patent specification in suit) illustrates an embodiment whose actuating assembly consists of a solidly formed

magnetostrictive element 130 (K3, p. 13 lines 9 to 12).

48 The part of the injection valve provided with the reference sign 130 and shown hatched in the figure is therefore presented to the skilled person as a solidly formed element. Contrary to the opinion of the plaintiffs, the skilled person does not understand the corresponding design as a solid component as a special case limited to the magnetostrictive actuator illustrated in Figure 1. Rather, he takes from the preceding general description of the actuator assembly (p. 13 lines 1 to 8) that the expanding or contracting element of the actuator assembly can, for example, be made of magnetostrictive material or be designed as a piezoelectric stack. When the description then describes the element of magnetostrictive material as "solid" (p. 13 line 10), a more general technical teaching not limited to this example is made clear therein. Further on, it is pointed out as an advantage of the solid element made of magnetostrictive material that such an element is cheaper and easier to manufacture than hollow tubular elements (p. 14 lines 1 to 4). Thus, a solid embodiment of the actuating element without restriction to such an element made of magnetostrictive material is presented to the skilled person as advantageous, which he can also apply to other embodiments such as the alternatively proposed piezoelectric stack (p. 14 lines 32 to 34).

49 2. The subject matter of auxiliary claim IV is also patentable.

50 a) The Patent Court assumes without error of law that he is not affected by any of the publications introduced into the proceedings in a manner detrimental to novelty. This applies in particular to the publication of the US application 09/863 187 (published under No. 2001/0032612 - D8). For the Patent Court correctly stated that the patent in suit rightly claims the priority of this application. Contrary to the opinion of the plaintiffs, the teaching of the patent in suit is disclosed for the first time in this application and not already in the US patent application 09/522 130 (D14 = K19) within the meaning of Article 87 EPC.

51 Indeed, unlike the priority application, the D14 does not disclose a solidly formed actuating element according to feature 4. The actuating element 130 described in the D14 in one embodiment is hollow tubular in form, since the

valve element 114 opens inwardly and not outwardly as in the device claimed by the patent in suit, as shown in the drawing corresponding to Figure 1 of the D2 reproduced above. The Patent Court correctly decided that a solid design of the actuating element is in any case not directly and unambiguously disclosed even by the valve design mentioned in D14 (as in D2) which opens outwardly in the direction of the combustion chamber (D14, p. 22 lines 17 to 24).

52 It is true that the mention of this possible design, as explained under III 3 c with regard to the corresponding reference in D2, gave the skilled person cause to consider the design of an outward-opening valve. However, this does not yet directly and unambiguously disclose the specific design of such a valve. The direct disclosure of D14 merely states that the valve could also open outward and that in this case the actuating unit would preferably be arranged above the valve needle. The implementation of this basic idea requires constructive considerations by the skilled person based on his expertise. It is thus also not disclosed that, in such a valve design, the hollow tubular design of the actuating element could or even should be departed from and that the latter should be of solid design.

53 Nor does such a disclosure result from the fact that claim 1 of D14 only generally claims an actuating device which cooperates with the valve needle, and the tubular design is only the subject of subclaims. This is because even this does not directly and unambiguously disclose, as part of the teaching presented in D14, the possibility of forming the actuating element as a solid member. Accordingly, no claim could have been directed to this in a patent granted on D14.

54 In contrast, the priority application contains, word for word identical to the application of the patent in suit, the indication that a solid actuating element is inexpensive and easier to manufacture than a tubular form (D8, para. 83); its disclosure content thus corresponds to the application of the patent in suit.

55 b) The subject matter of auxiliary claim IV is also not obvious.

56 (1) The cross-appeal's view that features 4.3^{IV} and 5.7^{IV} are not originally disclosed and therefore not to be taken into account in the assessment

of patentability is incorrect. The cross-appeal does not take into account that the examination of an inadmissible extension must always be preceded by the determination of the meaning of the patent claim to be examined in this respect and that features 4.3^{IV} and 5.7^{IV} must be interpreted in accordance with the description explaining them (paras. 57 and 61) (cf, Federal Court of Justice, judgment of 12 May 2015 X ZR 43/13, juris para. 15 et seq. rotor elements). The relevant passages are literally identical with the application (K3, p. 17 line 26 to p. 18 line 2, p. 19 lines 9 to 19), so that no other disclosure content results from the latter.

57 (2) The plaintiffs' appeals do not dispute that the embodiment of the device according to auxiliary request IV does not result from a combination of D2 with D3 or vice versa. The Patent Court has correctly stated this. No other reason has been presented and nothing is apparent. Insofar as the appeal of the second plaintiff claims to be exempt from a further explanation in this regard, the requirements for this are not met (Federal Court of Justice, judgment of 11 March 2014 X ZR 139/10, GRUR 2014, 647 Farbversorgungssystem).

58 (3) The argument put forward by the plaintiffs at the appeal hearing that the arrangement and function of the valve spring and disc spring in accordance with the invention are modeled on the arrangement and function of these springs in citation D2 is also unhelpful. This does not lead anywhere, if only because in the above-mentioned obvious conversion of the device according to D2, it is precisely this spring arrangement that is deviated from. Why the design according to the invention should nevertheless have been obvious is not shown by the plaintiffs' appeals.

59 V. The cross-appeal of the first plaintiff successfully challenges the Patent Court's dismissal of the action also on the ground of nullity asserted by the first plaintiff, namely lack of practicability of the teaching according to the invention. In this respect, their attacks lead to the reversal of the contested judgment and to the remittal of the case to the Patent Court for a new hearing and decision. 1.

60 1. Without success, the defendant claims that the first plaintiff was late in introducing the further ground for nullity.

61 a) The question whether the requirements of Sec. 116(2) Patent Act for the admission of an amendment to the complaint are met does not arise, because the provision requires a ground for nullity only introduced at second instance, and the ground for nullity of lack of practicability was only asserted in the statement of claim of 25 October 2012, but already at first instance.

62 b) The question whether the Patent Court could have rejected the amendment of the complaint under Sec. 83(4) Patent Act or Sec. 99(1) Patent Act in conjunction with Sec. 263 Code of Civil Procedure does not arise either, because the Patent Court did not do so, but decided the amendment of the complaint on the merits. The fact that at the same time it said that it was not necessary to decide whether the admission of the amendment was relevant does not change this. A rejection of late submissions or late motions that was omitted in the first instance cannot be made up for in the appellate instance. The law does not provide a basis for this, and this is out of the question because the rejection, which is otherwise at the discretion of the Patent Court, requires, among other things, that the consideration of the new submission required an adjournment of the date of the hearing before the Patent Court (Sec. 83(4) sentence 1 lit. a, Patent Act), and this requirement cannot occur subsequently in the appeal proceedings.

63 2. On the merits, the cross-appeal rightly complains that the Patent Court did not deal with the first plaintiff's argument that the device according to the invention (according to auxiliary claim I and thus also according to auxiliary claim IV, which is now solely relevant) with an encapsulated hydraulic connection group requires, in view of the temperatures to be expected and the resulting expansion of the volume of the hydraulic fluid, a compensating space which is not available, at least in the construction described in the embodiment example, and which cannot be created by the skilled person with available means, in order to be functional and to prevent a "bursting" of the hydraulic connection group as a result of the seals not being designed and not being able to be designed for the resulting pressure.

64 This claim is not sufficiently overcome by the Patent Court's finding that it is sufficiently disclosed to the skilled person how the hydraulic connection assembly is to be designed in order to achieve the objective of absorbing

dimensional changes between the valve components and ensuring precise injection operations by a constant stroke of the valve seat at all times, since the specific dimensioning of the assembly is within the general skill of the skilled person. It cannot be inferred from it whether the problem alleged by the first plaintiff actually arises and whether and, if so, how it can be solved by the skilled person with the aid of his technical knowledge and expertise. However, this is relevant, because if the skilled person would not have at least one way how to get hold of a device according to patent claim 1 as amended by the contested judgment, which is not necessarily provided with all advantages attributed to it in the patent specification (Federal Court of Justice, judgment of 3 February 2015 X ZR 76/13, GRUR 2015, 472 Stabilization of water quality), but which is nevertheless practically usable, the invention would not be within the meaning of Art. II Sec. 6(1)sentence 1 No. 2 German Act on International Patent Conventions so clearly and completely disclosed that a skilled person could carry it out.

65 3. This leads to the reversal of the contested judgment and to the remittal of the case to the Patent Court, which is also to decide on the costs of the appeal (Sec. 119(2) and (3) Patent Act). A final decision by the Federal Court of Justice is not appropriate in this respect (Sec. 119(5) Patent Act).

66 With varying arguments, the defendant has taken the view that, on the one hand, there is no need for a compensation room and, on the other hand, it can be provided by the skilled person if necessary. The Senate is not able to judge whether this is correct without expert advice. On the other hand, the expertise of its technical members could allow the Patent Court to make such an assessment.

Meier-Beck

Gröning

Grabinski

Hoffmann

Kober-Dehm

Previous instance:

Federal Patent Court, judgment of 20 November 2012 – 1 Ni 16/11 (EP) –