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Paper 10
Date: June 20, 2023

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

MERCEDES-BENZ USA, LLC,
Petitioner,

v.

WESTPORT FUEL SYSTEMS CANADA INC.,
Patent Owner.

IPR2023-00352
Patent 6,298,829 B1

Before NEIL T. POWELL, CARL M. DEFRANCO, and FRANCES L. IPPOLITO, *Administrative Patent Judges*.

DEFRANCO, *Administrative Patent Judge*.

DECISION
Denying Institution of *Inter Partes* Review
35 U.S.C. § 314

I. INTRODUCTION

Westport Fuel Systems Canada Inc. ("Westport") is the owner of U.S. Patent No. 6,298,829 B1 (Ex. 1001, "the '829 patent"). Mercedes-Benz USA, LLC ("Mercedes") filed a Petition requesting an *inter partes* review of claims 1–3, 6, 11, 12, 14–16, and 18–20 of the '829 patent. Paper 2 ("Pet."). Westport filed a Preliminary Response. Paper 8 ("Prelim. Resp.").

Under 35 U.S.C. § 314(a), an *inter partes* review may not be instituted unless the information presented in the Petition and any response thereto shows "there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition." Upon consideration of the Petition, Preliminary Response, and the evidence of record, we determine that the information presented in the Petition does not establish a reasonable likelihood that Mercedes would prevail in showing the unpatentability of at least one of the challenged claims. Accordingly, we do not institute *inter partes* review of challenged claims 1–3, 6, 11, 12, 14–16, and 18–20 as raised in the Petition.

II. BACKGROUND

A. Related Matters

The '829 patent is or was the subject of the following infringement actions: *Westport Fuel Systems Canada Inc. v. Ford Motor Company*, No. 2:21-cv-00453 (E.D. Tex.); *Westport Fuel Systems Canada Inc. v. Mercedes-Benz USA, LLC*, No. 2:21-cv-00454 (E.D. Tex.) (dismissed); *Westport Fuel Systems Canada Inc. v. Nissan North America, Inc.*, No. 2:21-cv-00455 (E.D. Tex.) (dismissed); *Westport Fuel Systems Canada Inc. v. General Motors, LLC*, No. 2:21-cv-00456 (E.D. Tex.); *Westport Fuel Systems Canada Inc. v. FCA USA LLC d/b/a FCA Group US LLC*, No. 2:21-

cv-00457 (E.D. Tex.) (dismissed); and *Robert Bosch, LLC v. Westport Fuel Systems Canada Inc.*, No. 1:22-cv-00370 (E.D. Va.). Pet. 2–3; Paper 5, 2.

The '829 patent is the subject of another petition filed by Mercedes in IPR2023-00292. *See* Paper 3 ("Petitioners Petition Ranking and Explanation of Material Differences Between Petitions"). The '829 patent is related to U.S. Patent 6,575,138 B2, certain claims of which are challenged in petitions filed by Mercedes in IPR2023-00293 and IPR2023-00351.

B. Real Parties in Interest

Mercedes identifies itself, Mercedes-Benz Intellectual Property GmbH & Co. KG, Mercedes-Benz AG, and Robert Bosch LLC as the real parties in interest. Pet. 2. Westport identifies only itself as the real party in interest. Paper 5, 2.

Westport notes that, in the petition filed in related IPR2023-00292, "Robert Bosch GmbH, Ford Motor Company, and General Motors LLC were also named as real parties-in-interest." Prelim. Resp. 32. Westport asserts "[i]t stands to reason that[,] if Robert Bosch GmbH, Ford Motor Company, and General Motors LLC were real parties-in-interest with Mercedes in the 292 IPR, they are likely real parties-in-interest in the present IPR." *Id.*

C. The '829 Patent

The '829 patent, titled "Directly Actuated Injection Valve," relates to "high pressure fuel injection valves or injectors for internal combustion engines." Ex. 1001, code (54), 1:12–14. The '829 patent discloses "an injection valve that is directly controllable by a position activating material (such as, for example, a piezoelectric or magnetostrictive material) and which includes a passive hydraulic link." *Id.* at 1:14–17.

Figure 1 of the '829 patent, reproduced below, is a cross-section view of a directly actuated fuel injection valve according to a preferred embodiment. *Id.* at 8:23–24.

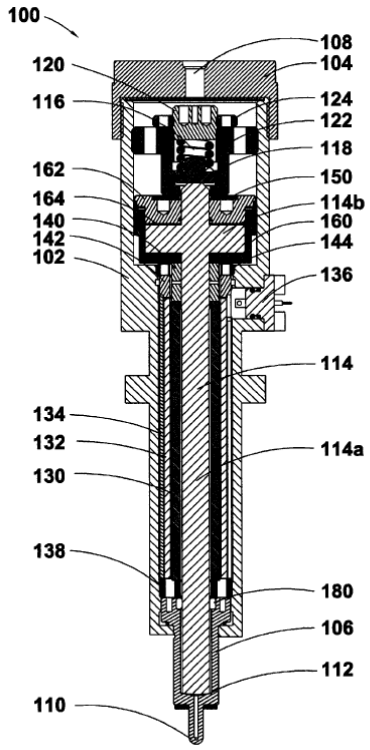

Figure 1

Figure 1 depicts injection valve 100 including elongated valve housing 102, valve cap 104, and valve tip 106, which together form a fluidly-sealed body. *Id.* at 8:39–43. Fuel enters the valve body through inlet port 108 in valve cap 104, and fuel exits the valve body through at least one nozzle orifice 110 in valve tip 106, which further comprises valve seat 112. *Id.* at 8:45–49. Valve needle 114, which includes integral valve stem 114*a* and hydraulic piston 114*b*, is located within the valve body and has one end that contacts valve seat 112 to prevent fuel from passing to valve orifice 110 and, thereby, closes injection valve 100. *Id.* at 8:59–65, 10:67–11:4. A spring assembly comprising at least one needle spring 116 biases valve

needle 114 in a closed position. *Id.* at 9:16–19. To open the valve, an actuator assembly provides an opening force that overcomes the closing force provided by the spring assembly. *Id.* at 9:36–38. In the preferred embodiment, the actuator assembly is a magnetostrictive actuator comprising magnetostrictive member 130, electric coil 132, and flux tube 134 disposed concentrically around valve stem 114*a*. *Id.* at 9:45–49, 10:54–58. The opening force generated by the actuator assembly is transmitted through a hydraulic link assembly to valve needle 114. *Id.* at 10:64–67.

Figure 2 of the '829 patent, reproduced below, is an enlarged view of an upper portion of the fuel injection valve shown in Figure 1. *Id.* at 8:25–26.

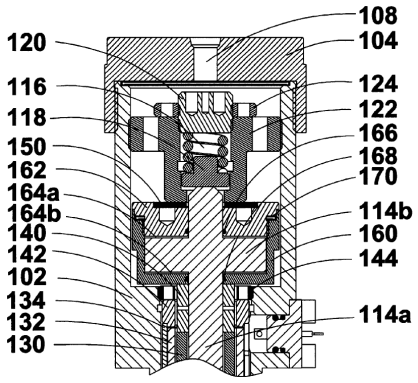

Figure 2

Figure 2 depicts hydraulic cylinder 160, cylinder cap 162, seals 166, 168, 169, and viscous hydraulic fluid 164*b*. *Id.* at 11:4–6. Hydraulic piston 114*b* is disposed within hydraulic cylinder 160 in a close-fitting relationship and is free to move in the longitudinal direction. *Id.* at 10:64–67. The '829 patent explains that "the hydraulic fluid preferably has a sufficiently high viscosity and bulk modulus so that it acts as an incompressible solid when activation of the actuator assembly causes a valve opening force to be quickly transmitted through the hydraulic fluid between the bottom of

cylinder 160 and hydraulic piston 114*b*." *Id.* at 11:21–26. According to the '829 patent,

> because valve actuation occurs suddenly (on the order of 200 μs), hydraulic fluid 164b does not have time to flow through the narrow clearance gap between piston 114*b* and hydraulic cylinder 160. Instead, hydraulic fluid 164*b* acts as a solid and transfers the movement of magnetostrictive member 130 to valve needle 114 via piston 114*b*, causing valve needle 114 to lift away from valve seat 112.

Id. at 12:57–64.

D. The Challenged Claims

Mercedes challenges claims 1–3, 6, 11, 12, 14–16, and 18–20 of the '829 patent. Pet. 1. Of the challenged claims, claim 1 is the only independent claim and is reproduced below:

> 1. An injection valve for injecting fuel into a combustion chamber of an internal combustion engine, said injection valve comprising:
>
> (a) a valve housing comprising:
>
> a fuel inlet port;
>
> an interior chamber fluidly connected to said fuel inlet port,
>
> a nozzle comprising a nozzle orifice providing a fluid passage from said interior chamber to said combustion chamber;
>
> (b) a valve needle disposed within said valve housing wherein said valve needle is movable between a closed position at which a sealing end of said valve needle contacts a valve seat to fluidly seal said interior chamber from said nozzle orifice, and an open position at which said sealing end of said valve needle is spaced apart from said valve seat whereby said interior chamber is fluidly connected with said nozzle orifice, wherein valve needle lift equals the distance traveled by said sealing end away from said valve seat;
>
> (c) a needle spring associated with said valve needle, wherein said needle spring applies a closing force to said valve needle for biasing said valve needle in said closed position;

> (d) a[n] actuator assembly associated with said valve needle, wherein said actuator assembly may be activated to apply an opening force to said valve needle stronger than said closing force, for moving said valve needle 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 activated and wherein said thickness of said hydraulic link is adjustable while said actuator is not activated* in response to changes in the dimensional relationship between components of said injection valve to maintain a desired valve needle lift upon activation of said actuator assembly.

Ex. 1001, 17:2–43 (emphasis added).

E. Asserted Grounds of Unpatentability

Claims Challenged	35 U.S.C. §[1]	Basis
1–3, 6, 11, 14, 15, 18–20	102/103(a)	Gottlieb[2]
12, 15, 16	103(a)	Gottlieb, Gottlieb DE[3]

In support of these challenges, Mercedes also submits the declaration of Glenn Bower, Ph.D. Ex. 1002. Westport submits the declarations of David Mumford and Christopher Atkinson, Ph.D. Exs. 2002, 2003, respectively.

[1] The Leahy-Smith America Invents Act ("AIA") included revisions to 35 U.S.C. § 103 that became effective on March 16, 2013. We apply the pre-AIA version of § 103 here because the application which became the '829 patent was filed before the effective date of the AIA. *See* Ex. 1001, code (22).
[2] US 6,530,273, issued Mar. 11, 2003 (Ex. 1004, "Gottlieb").
[3] Certified translation of DE 19838862 A1, published Mar. 9, 2000 (Ex. 1006, "Gottlieb DE") and original German language version (Ex. 1005).

III. ANALYSIS

Mercedes relies on Gottlieb in each of its challenges of the claims of the '829 patent. In doing so, Mercedes contends that "Gottlieb is prior art under at least pre-AIA 35 U.S.C. § 102(e) because it was filed before the filing date of the '829 [patent]." Pet. 23. As indicated on its face, Gottlieb has a filing date of November 24, 1999. Ex. 1004, code (22). The '829 patent has a filing date of March 9, 2000, but claims priority to U.S. Provisional Application 60/159,791 ("the '791 provisional"), which was filed October 15, 1999 and is earlier than Gottlieb's filing date. Ex. 1001, code (22), 1:5–7. But, according to Mercedes, the '829 patent is not entitled to the earlier priority date of October 15, 1999 because the '791 provisional lacks adequate written description support for a key limitation of the challenged claims. *See* Pet. 16–22. In support, Mercedes identifies the following limitation of claim 1 as purportedly lacking written support in the '791 provisional—"hydraulic fluid thickness . . . *with said thickness being substantially constant while said actuator assembly is activated* and wherein said thickness of said hydraulic link is adjustable while said actuator is not activated." Pet. 17 (emphasis added).

Westport disputes Mercedes's contention that the '791 provisional lacks written support for the hydraulic link limitation of claim 1. *See* Prelim. Resp. 17–28. Instead, Westport argues that one skilled in the art would have understood that, based on the '791 provisional's disclosure, the inventors of the '829 patent were in full possession of the claimed invention at the time the '791 provisional was filed. *Id.* at 20–21. As such, Westport contends that the '829 patent is entitled to claim priority to the October 15, 1999 filing date of the '791 provisional, which is earlier than the November 24, 1999

filing date of Gottlieb, thereby negating Gottlieb as prior art under 35 U.S.C. § 102.

For a patent to claim the benefit of the filing date of its provisional application, the provisional application must comply with the written description requirement of 35 U.S.C. § 112. *Dynamic Drinkware, LLC v. Nat'l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015). To show sufficient written description support, the provisional must reasonably convey to those skilled in the art that the inventor had possession of the later-claimed subject matter as of the provisional's filing date. *Ariad Pharms., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1351 (Fed. Cir. 2010) (en banc). The written description inquiry is a question of fact, and, as such, "the level of detail required to satisfy the written description requirement varies depending on the nature and scope of the claims and on the complexity and predictability of the relevant technology." *Ariad*, 598 F.3d at 1351.

Here, Mercedes argues that "[t]he Provisional never describes that 'the hydraulic fluid . . . acts as an incompressible solid,' one of the particular features in the Non-Provisional [i.e., the '130 application] specification that the Applicant pointed to [during prosecution] as supporting the thickness being substantially constant (presumably because an incompressible solid would not change thickness even when subjected to forces)." Pet. 18. On the other hand, according to Mercedes, "the Provisional acknowledges that there would be some compression of the hydraulic fluid, and therefore a change in thickness, during an injection when forces are applied," which "is inconsistent with the 'thickness being substantially constant while said

actuator assembly is activated,' as recited in claim 1." *Id.* (citing Ex. 14:19–21).

We disagree with Mercedes' contention that the '791 provisional lacks adequate written support for claim 1's requirement that the hydraulic fluid "acts substantially as a solid with said thickness being substantially constant" when the actuator assembly is activated. Contrary to Mercedes's argument, the '791 provisional provides explicit support for this claim limitation by explaining that the hydraulic fluid is trapped in a cavity with O-ring seals preventing fluid from flowing out of the cavity and around the needle piston.

More specifically, Figure 2 of the '791 provisional, reproduced below, illustrates the configuration of hydraulic link 22, 84 between needle piston 72 and chamber cap 86.

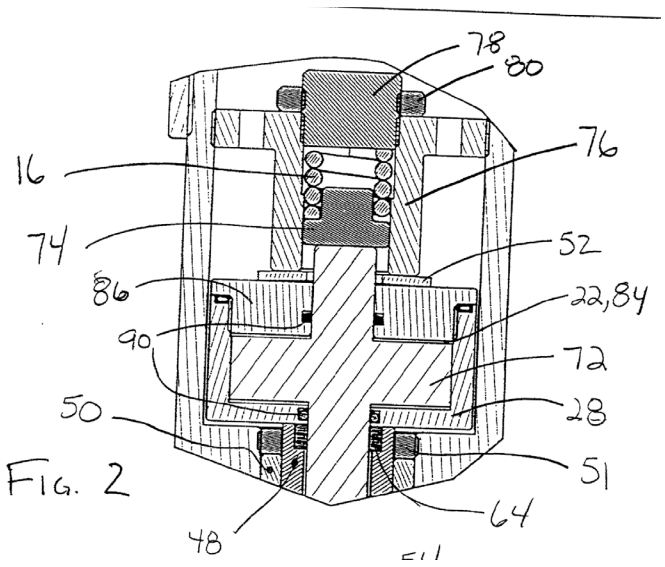

FIG. 2

Referring to Figure 2, the '791 provisional describes the hydraulic link as follows:

> The hydraulic link 22 consists of a hydraulic cavity 84 formed by hydraulic chamber 28 and hydraulic chamber cap 86. *The cavity 84 is filled with viscous fluid.* Within the chamber 28 is located the hydraulic piston part 72 of the needle valve 15. The

> chamber 28 is fitted around the hydraulic piston 72. *O-ring seals 90 are located in the hydraulic chamber cap 86 and in the bottom of the hydraulic chamber 28 to prevent the fluid from leaking out of the cavity 84.* The diametrical clearance between the outside diameter of the hydraulic piston 72 and the inside diameter of the hydraulic chamber 28 is extremely small (on the order of 50 to 250 microns). The exact clearance is dependent on the viscosity of the chosen fluid. *The hydraulic flow in this clearance . . . is very small. The hydraulic fluid . . . acts as a solid during fast motions, because there is little flow going around the needle piston.*
>
> Because the actuation occurs suddenly (on the order of 200 μs), *the hydraulic fluid between the hydraulic chamber 28 and the needle valve piston 72 does not have the time to flow around the piston 72. Instead, the trapped fluid acts as a solid and transmits the movement of the magnetostrictive material 40 to the needle valve 14*, causing it to lift against the needle spring 16.

Id. at 12:5–13:14 (emphases added).

Reading the '791 provisional's description of the hydraulic link in conjunction with Figure 2, one skilled in the art reasonably would have surmised that, in order for the trapped fluid within the cavity to act as a solid and transmit force, its thickness must remain unchanged, or, in the words of claim 1, be "substantially constant." Indeed, according to the '791 provisional, the fluid acts as a solid because O-ring seals and extremely small clearances between needle piston 72 and chamber cap 86 prevent the trapped fluid from flowing around the piston upon actuation of the force, which clearly supports that the thickness of the fluid must remain substantially constant. Those disclosures reasonably convey to one skilled in the art that the inventor had possession of the hydraulic link limitation of claim 1, including it having a substantially constant thickness, as of the '791 provisional's filing date.

Mercedes does not further dispute that the '791 provisional discloses the remaining limitations of the challenged claims. As such, the evidence of record demonstrates sufficient written description support in the '791 provisional for the challenged claims. Thus, the challenged claims are entitled to an effective filing date of October 15, 1999, which means that Gottlieb does not qualify as prior art. And because Gottlieb forms the basis of all the challenges, its exclusion is fatal to the Petition.

IV. CONCLUSION

For the foregoing reasons, we determine that Mercedes fails to demonstrate a reasonable likelihood of prevailing with respect to any of the claims challenged in the Petition. Accordingly, *inter partes* review of the '829 patent is denied.

V. ORDER

It is hereby:

ORDERED that, pursuant to 35 U.S.C. § 314(a), an *inter partes* review of claims 1–3, 6, 11, 12, 14–16, and 18–20 of the '829 patent is denied.

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