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Paper No. 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.

IPR2023-00351
Patent 6,575,138 B2

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

IPPOLITO, *Administrative Patent Judge*.

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

I. INTRODUCTION

Mercedes-Benz USA, LLC ("Petitioner") filed a Petition (Paper 2, "Pet.") requesting an *inter partes* review of claims 1–3, 6, 13, 14, 16–22, 26–28, and 41 of U.S. Patent No. 6,575,138 B2 (Ex. 1001, "the '138 patent"). Westport Fuel Systems Canada Inc. ("Patent Owner") filed a Preliminary Response to the Petition (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 Petitioner would prevail in showing the unpatentability of at least one of the challenged claims. Accordingly, we do not institute *inter partes* review of claims 1–3, 6, 13, 14, 16–22, 26–28, and 41 of the '138 patent based on the grounds raised in the Petition.

II. BACKGROUND

A. Related Matters

The parties identify the following United States District Court actions as involving the '138 patent: *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.), filed April 4, 2022. Pet. 2–3; Paper 5, 2.[1]

In addition to the instant Petition, Petitioner filed a second petition challenging the '138 patent in IPR2023-00293. *See* Paper 3 ("Petition Ranking"). Petitioner also filed petitions challenging related U.S. Patent 6,298,829 B1 in IPR2023-00292 and IPR2023-00352.

B. Real Parties in Interest

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

Patent Owner notes that, in the petition filed in related IPR2023-00293, "Robert Bosch GmbH, Ford Motor Company, and General Motors LLC were also named as real parties-in-interest." Prelim. Resp. 33.

C. The '138 Patent

The '138 patent, titled "Directly Actuated Injection Valve," relates "to high pressure fuel injection valves or injectors for internal combustion engines." Ex. 1001, code (54), 1:16–18. The '138 patent discloses "an injection valve that is directly controllable by a position actuating material (such as, for example, a piezoelectric or magnetostrictive material) and which includes a passive hydraulic link." *Id.* at 1:18–21.

[1] Patent Owner's Mandatory Notices (Paper 5) do not include page numbers. We consider the title page as page 1 and proceed from there in numerical order.

Figure 1 of the ’138 patent, reproduced below, is a cross-section view of a directly actuated fuel injection valve according to a preferred embodiment. *Id.* at 8:36–38, 61–63.

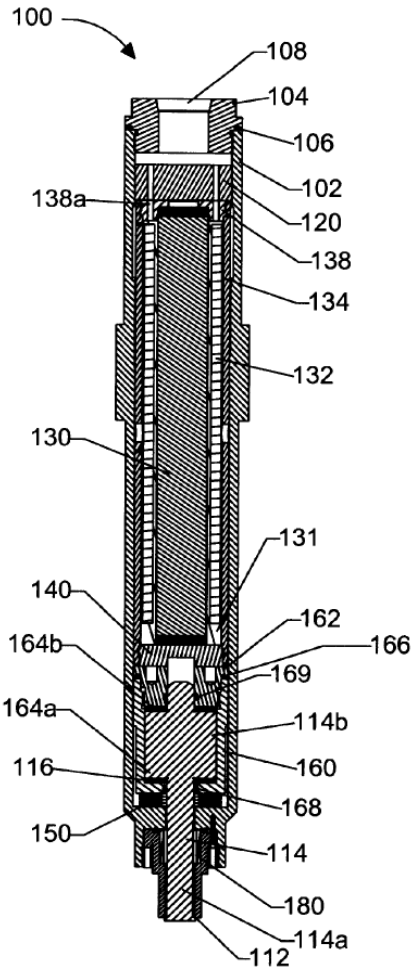

FIG. 1

Figure 1 of the ’138 patent depicts injection valve 100 including elongated valve housing 102 and valve cap 104, which includes inlet port 108 through which fuel enters. *Id.* at 9:4–6, 8–9. Valve member 114 extends through an opening in the tip of valve housing 102 and cooperates with valve seat 112 to provide a fluid tight seal. *Id.* at 9:23–27, 59–61. Valve member 114 includes valve stem 114*a* and valve piston 114*b*. *Id.* at 9:64–10:1, 10:7–9. A spring assembly comprising at least one valve spring 116 biases valve

member 114 in a closed position. *Id.* at 10:13–16. To open the valve, an actuator assembly provides an opening force that overcomes the closing force provided by the spring assembly. *Id.* at 9:32–34. In the embodiment shown in Figure 1, the actuator assembly is a magnetostrictive actuator comprising solid magnetostrictive member 130, bobbin 131, electric coil 132, and flux tube 134 disposed between magnetostrictive member 130 and valve housing 102. *Id.* at 10:41–46. Actuating the actuator assembly causes magnetostrictive member 130 to grow in length and push sliding pole 140 towards valve member 114 to provide force to open injection valve 100. *Id.* at 10:59–62.

Figure 2 of the '138 patent, reproduced below, is an enlarged cross-sectional view of a lower portion of a fuel injection valve in an open position and having the fuel inlet port in an alternate location. *Id.* at 8:40–43.

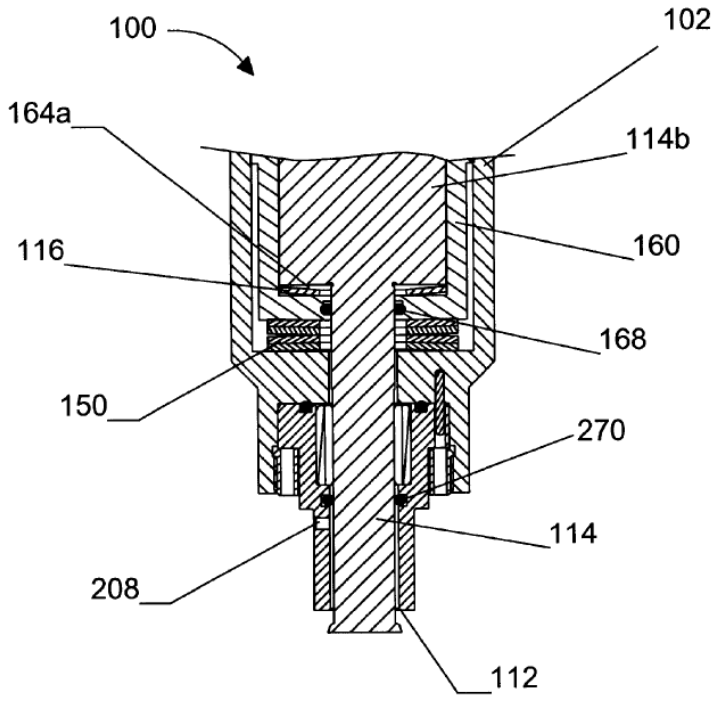

FIG. 2

Figure 2 of the ’138 patent depicts valve member 114 extending through an opening in the tip of valve housing 102 to an open position in which the sealing surface of valve member 114 is not in contact valve seat 112. *Id.* at 9:59–64. The opening force that extends the valve member 114 is transmitted through a hydraulic link assembly, which comprises hydraulic cylinder 160, cylinder cap 162, seals 166, 168, 169, and viscous hydraulic fluid 164*b*. *Id.* at 11:65–12:3, 12:7–11, 14:16–22. Hydraulic cylinder 160 is in a close-fitting relationship around piston 114*b*. *Id.* at 11:67–12:3. Viscous hydraulic fluid 164*b* is disposed in a space between cylinder cap 162 and a planar surface of piston 114*b*. *Id.* at 14:16–22. The ’138 patent explains that “the hydraulic fluid preferably has a sufficiently high viscosity and bulk modulus so that it acts as an incompressible solid when actuation 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 12:26–32. According to the ’138 patent,

> because valve actuation occurs suddenly (on the order of 200 μs), hydraulic fluid 164*b* 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 member 114 via piston 114*b*, causing valve member 114 to lift away from valve seat 112.

Id. at 14:26–33.

D. The Challenged Claims

Petitioner challenges claims 1–3, 6, 13, 14, 16–22, 26–28, and 41 of the ’138 patent. Pet. 1. Of the challenged claims, claims 1 and 41 are independent. Claim 1 is illustrative and reproduced below:

> 1. [1(A)] An injection valve for injecting fuel into a combustion chamber of an internal combustion engine, said injection valve comprising:
>
> [1(B)] (a) a valve housing comprising:
>
> a fuel inlet port;
>
> [1(C)] an interior chamber fluidly connected to said fuel inlet port; and
>
> [1(D)] a valve seat for cooperating with a valve member to seal said interior chamber from said combustion chamber when said injection valve is closed;
>
> [1(E)] (b) said valve member having one end disposed within said valve housing and an opposite end extendable from said valve seat toward said combustion chamber, wherein said valve member comprises a sealing surface that fluidly seals against said valve seat when said injection valve is closed and that is liftable away from said valve seat when said injection valve is open;
>
> [1(F)] (c) a biasing mechanism associated with said valve member, said biasing mechanism applying a closing force to said valve member when said valve member is in said closed position;
>
> [1(G)] (d) an actuator assembly associated with said valve member, wherein said actuator assembly may be actuated to apply an opening force to said valve member stronger than said closing force, for moving said valve member to said open position; and
>
> [1(H)] (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 to maintain a desired valve lift upon actuation of said actuator assembly.

Ex. 1001, 17:17–53 (bracketed designations added by Petitioner (*see* Pet. 28–45)).

E. Asserted Grounds of Unpatentability

Petitioner asserts the following grounds of unpatentability:

Claim(s) Challenged	35 U.S.C. §[2]	Reference(s)/Basis
1–3, 6, 13, 14, 16, 17, 19–21, 26–28, 41	102/103(a)	Gottlieb[3]
14, 18, 22	103(a)	Gottllieb, Gottlieb DE[4]

Pet. 4. In addition to the references listed above, Petitioner relies on the Declaration of Glenn Bower, Ph.D. Ex. 1002. Patent Owner relies on the Declarations of David Mumford (Ex. 2002) and Christopher Atkinson, Ph.D (Ex. 2003).

III. ANALYSIS

The '138 patent issued on June 10, 2003, from Application No. 09/863,187, filed on May 23, 2001 ("the '187 application"). Ex. 1001, codes (22), (45). The '138 patent claims priority as a continuation-in-part of Application No. 09/522,130, filed on March 9, 2000 ("the '130 application"), which eventually issued as U.S. Patent No. 6,298,829 B1 ("the '829 patent"). *Id.*, code (63), 1:5–8. The '138 patent also claims priority to Provisional App. No. 60/159,791, filed on October 15, 1999 ("the '791 provisional"). *Id.*, code (60), 1:8–11.

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[2] 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 '138 patent was filed before the effective date of the AIA. *See* Ex. 1001, code (22).

[3] US 6,530,273 B1, issued Mar. 11, 2003 (Ex. 1004, "Gottlieb").

[4] Certified translation of DE 19838862 A1, published Mar. 9, 2000 (Ex. 1006, "Gottlieb DE") and original German language version (Ex. 1005).

Petitioner contends that the challenged claims of the '138 patent are not entitled to the '791 provisional's October 15, 1999, priority date, and, instead, the claims are entitled only to the March 9, 2000, filing date of the '130 application. Pet. 17. According to Petitioner, 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 two limitations of the challenged claims. *See* Pet. 18–23.

First, Petitioner asserts independent claim 41 recites the "hydraulic fluid acts as an incompressible solid," but that the '791 provisional does not use this language or describe hydraulic fluid acing as an incompressible solid. Pet. 18 ("the Provisional acknowledges that there would be some compression of the hydraulic fluid—causing displacement—during an injection when forces are applied.") (citing Ex. 1007, 14:19–21).

Second, Petitioner 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. 18.

Patent Owner disputes Petitioner's contention that the '791 provisional lacks written support for the hydraulic link limitations of claims 1 and 41. *See* Prelim. Resp. 18–28. Instead, Patent Owner argues that one skilled in the art would have understood that, based on the '791 provisional's disclosure, the inventors of the '138 patent were in full possession of the claimed invention at the time the '791 provisional was filed. *Id.* at 28. As such, Patent Owner contends that the '138 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, Petitioner argues that the '791 provisional never describes that "the hydraulic fluid . . . acts as an incompressible solid." Pet. 18. According to Petitioner, "[e]ven though the Provisional acknowledges that there may be only "little" compression, it still acknowledges that there is some compression." *Id.* Petitioner contends that this teaching of some compression contradicts the language of claim 41 and indicates a change in hydraulic fluid thickness, during an injection when forces are applied, which also "is inconsistent with the 'thickness being substantially constant while said actuator assembly is activated,' as recited in claim 1." *Id.* at 18–20 (citing Ex. 1007, 14:19–21).

We disagree with Petitioner's contention that the '791 provisional lacks adequate written support for limitations recited in claims 1 and 41. Contrary to Petitioner's argument, the '791 provisional provides explicit support for these claim limitations 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. Ex. 1007, 20.

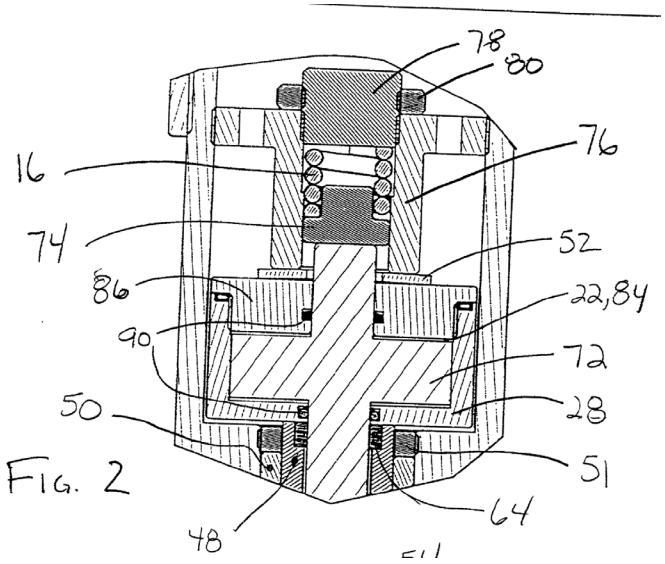

FIG. 2

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 a 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 14. 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.

Likewise, we observe that claim 41 recites that the "hydraulic fluid acts as an incompressible solid *so that movement caused by the actuation of said dimensionally responsive member is transmitted through said fluid layer*." Ex. 1001, 20:53–56 (emphases added). Again, the '791 provisional

discloses that 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). We find, based on this description of the hydraulic link, 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, it would act as an incompressible solid.

Petitioner 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 Petitioner 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 '138 patent is denied.

V. ORDER

Upon consideration of the record before us, it is:

ORDERED that, pursuant to 35 U.S.C. § 314(a), an *inter partes* review of claims 1–3, 6, 13, 14, 16–22, 26–28, and 41 of the '138 patent is denied.

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