

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ROBERT BOSCH LLC and MERCEDES-BENZ USA, LLC,
Petitioner,

v.

WESTPORT FUEL SYSTEMS CANADA INC.,
Patent Owner.

IPR2023-00292
Patent 6,298,829 B1

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

DEFRANCO, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining No Challenged Claims Unpatentable
35 U.S.C. § 318(a)

ORDER
Denying Patent Owner's Motion to Exclude
37 C.F.R. § 42.64(c)

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”). Robert Bosch LLC and Mercedes-Benz USA, LLC (collectively, “Bosch”) filed a petition requesting *inter partes* review of claims 1–3, 6, 11, 12, 14, 15, and 18–20 of the ’829 patent. Paper 1 (“Pet.”).

We originally denied the petition. Paper 8. But, on a request for rehearing by Bosch, we instituted an *inter partes* review of all the claims as challenged in the petition. Paper 10 (“Inst. Dec.”). In due course, Westport filed a patent owner response. Paper 19 (“PO Resp.”). Bosch filed a reply (Paper 23, “Pet. Reply”), and Westport followed with a sur-reply (Paper 26, “PO Sur-Reply”). Westport also filed a motion to exclude (Paper 30, “PO Mot.”), to which Bosch filed an opposition (Paper 32, “Pet. Opp.”) and Westport filed a reply (Paper 33, “PO. Reply”). We held a hearing on November 14, 2024, a transcript of which is in the record. Paper 36 (“Hrg. Tr.”).

We have jurisdiction pursuant to 35 U.S.C. § 6. To prevail, Bosch must prove that the challenged claims are unpatentable by a preponderance of the evidence. *See* 35 U.S.C. § 316(e) (2018); 37 C.F.R. § 42.1(d) (2021). For the reasons below, we determine that Bosch fails to demonstrate, by a preponderance of the evidence, that challenged claims 1–3, 6, 11, 12, 14, 15, and 18–20 are unpatentable. We also deny Westport’s motion to exclude certain evidence.

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.).

See Pet. 4–5; Paper 5.

The '829 patent was also the subject of a second petition filed by Bosch in IPR2023-00352, which was denied. Bosch also filed petitions challenging the claims of a related patent—U.S. Patent 6,575,138 B2—in IPR2023-00293, where we instituted *inter partes* review, and IPR2023-00351, where we denied institution.

B. Real Parties in Interest

Bosch identifies itself, Robert Bosch GmbH, Mercedes-Benz Intellectual Property GmbH & Co. KG, Mercedes-Benz AG, Ford Motor Company, and General Motors LLC as the real parties in interest. Pet. 4. Westport identifies only itself as the real party in interest. Paper 5.

C. The '829 Patent

The '829 patent relates to “high pressure fuel injection valves or injectors for internal combustion engines.” Ex. 1001, 1:12–14. In particular, the injection valve “is directly controllable by a position activating material (such as, for example, a piezoelectric or magnetostrictive material)” that “includes a passive hydraulic link.” *Id.* at 1:14–17.

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

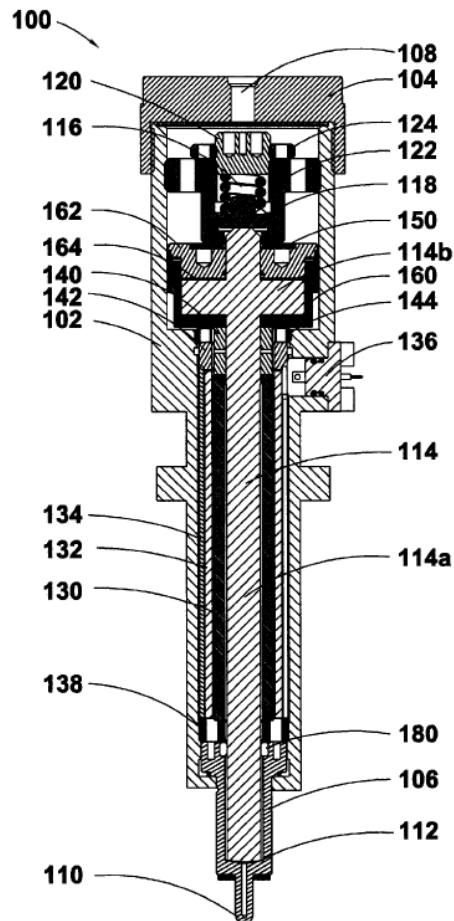


Figure 1

As shown in Figure 1, injection valve 100 includes elongated valve housing 102, valve cap 104, and valve tip 106, all of which cooperate to 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 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, thereby, closing injection valve 100. *Id.* at 8:59–65, 10:67–11:4. 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 spring 116. *Id.* at 9:36–38. In a preferred embodiment, the actuator assembly comprises 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. Notably, 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.

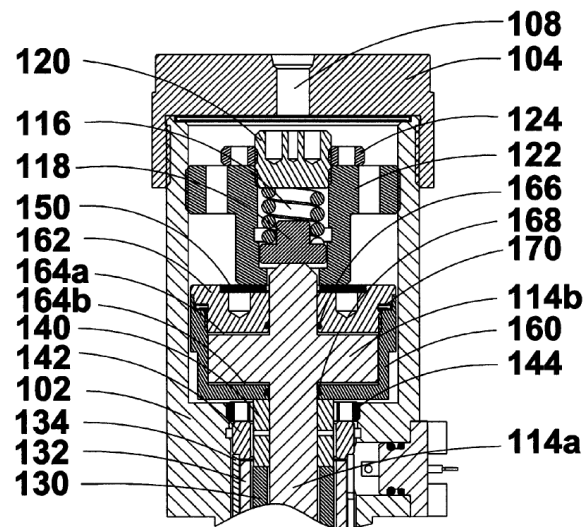


Figure 2

Figure 2 depicts hydraulic cylinder 160, cylinder cap 162, seals 166, 168, 169, and viscous hydraulic fluid 164b. *Id.* at 11:4–6. Hydraulic piston 114b is disposed in a close-fitting relationship within hydraulic cylinder 160 and is free to move in the longitudinal direction. *Id.* at 10:64–67. As described, “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 114b.” *Id.* at 11:21–26 (emphasis added). And,

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

Id. at 12:57–64 (emphases added).

D. The Challenged Claims

Bosch challenges claims 1–3, 6, 11, 12, 14, 15, 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. The Asserted Challenges

Bosch challenges independent claim 1 and dependent claims 2, 3, 6, 11, 12, 14, 15, and 18–20 on the following bases:

Claims Challenged	35 U.S.C. §	Basis
1–3, 6, 11, 12, 14, 15, 18, 19	103(a)	Wirbeleit, ¹ Klügl ²
20	103(a)	Wirbeleit, Klügl, Newcomb ³
1–3, 6, 11, 12, 14, 15, 18, 19	103(a)	Klügl, Hayes ⁴
20	103(a)	Klügl, Hayes, Newcomb

In further support of these challenges, Bosch submits the declaration of J. Matt Quinlan, Ph.D. *See* Exs. 1003, 1040. Westport submits the declaration of Christopher Atkinson, Ph.D. *See* Ex. 2022.

III. ANALYSIS

A. Level of Ordinary Skill in the Art

Bosch contends that one skilled in the art “would have had a degree in mechanical engineering or a similar discipline, along with 2 years of professional experience working with the design and development of fuel injection systems for internal combustion engines or an equivalent level of skill, knowledge, and experience” and “would be aware of and generally

¹ US 5,479,902, issued Jan. 2, 1996 (Ex. 1004, “Wirbeleit”).

² Certified translation of DE 19708304 A1, published Feb. 28, 1997 (Ex. 1006, “Klügl”) and original German language version (Ex. 1005).

³ US 4,284,263, issued Aug. 18, 1981 (Ex. 1014, “Newcomb”).

⁴ US 5,779,149, issued July 14, 1998 (Ex. 1024, “Hayes”).

knowledgeable about how fuel injector valves are structured and operate, and how they are used to deliver fuel to an engine’s combustion chambers.” Pet. 23 (citing Ex. 1003 ¶¶ 37–41).

Westport does not dispute Bosch’s proposed definition of the level of skill in the art. PO Resp. 4 (quoting Pet. 23). Based on our review, we see no reason not to adopt Bosch’s undisputed definition of the level of skill in the art, as it appears consistent with the prior art and the specification of the ’829 patent.

B. Claim Construction

Bosch contends that “the terms of the ’829 patent’s claims do not require further construction and can be afforded their plain and ordinary meaning.” Pet. 15. Westport likewise asserts that that it “does not seek construction of any term.” PO Resp. 5.

Only those claim terms “that are in controversy” need be construed and “only to the extent necessary to resolve the controversy.” *AstraZeneca AB v. Mylan Pharms. Inc.*, 19 F.4th 1325, 1345 (Fed. Cir. 2021) (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)). Here, there does not appear to be a dispute over the meaning of any claim terms. And, after reviewing the record, we do not perceive the need to expressly construe any particular claim term in order to determine patentability of the challenged claims.

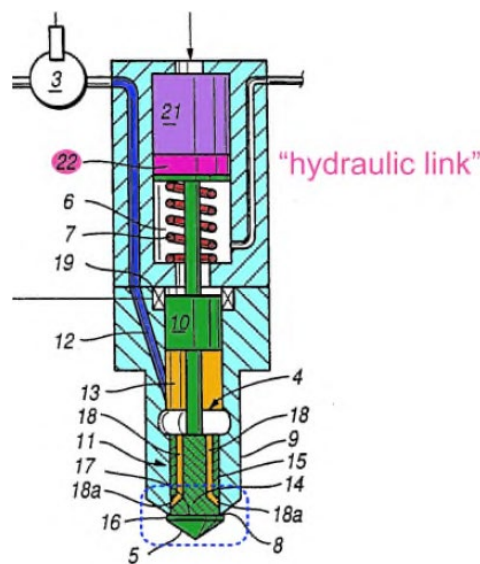
C. Obviousness Over Wirbeleit and Klügl

Bosch asserts that claims 1–3, 6, 11, 12, 14, 15, 18, and 19 are unpatentable as obvious over the combined teachings of Wirbeleit and Klügl. Pet. 24 (citing Ex. 1003 ¶¶ 142–144). We begin with claim 1, in particular, element 1(e), which is central to the parties’ dispute and recites—

(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 . . .

Ex. 1001, 17:42–53 (emphasis added).

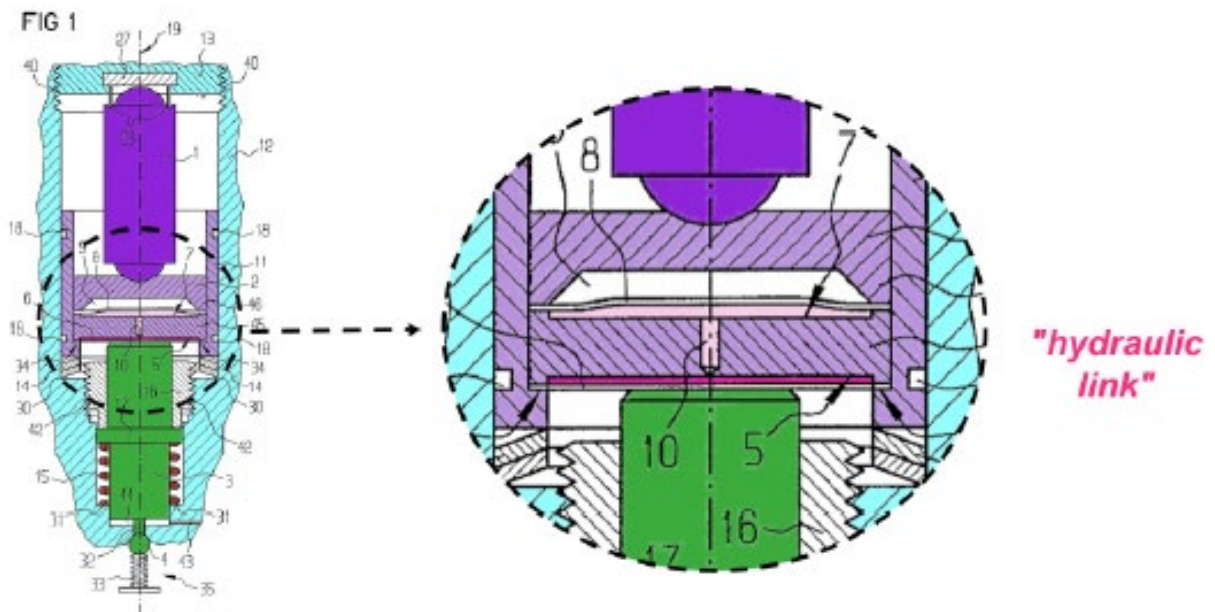
For this limitation, Bosch submits an annotated version of Wirbeleit's sole figure, reproduced below, to highlight where Wirbeleit teaches hydraulic transmission element 22 (pink) as part of a fuel injector system. *See* Pet. 34–35 (citing Ex. 1004, Fig.).



As shown above, Wirbeleit's fuel injector system includes *hydraulic transmission element 22 (pink)* that receives downward force from magnetostrictive actuator 21 (purple) to open orifice control needle 5 (green). *See id.* (citing Ex. 1004, 2:60–65). But Wirbeleit states that “hydraulic transmission element 22 . . . is not shown in detail.” Ex. 1004, 2:60–67. And, because Wirbeleit does not teach the details of its hydraulic link, Bosch relies on Klügl for teaching the remaining limitations of claim

element 1(e), namely, a hydraulic link that “acts substantially as a solid with said thickness being substantially constant while said actuator assembly is activated.” *See* Pet. 35–40 (citing Ex. 1003 ¶¶ 203–224); *see also* Ex. 1003 ¶ 293 (Bosch’s expert admitting that Wirbeleit “does not depict the specifics of its hydraulic element.”).

In support of showing that Klügl teaches claim element 1(e), Bosch annotates Figure 1 of Klügl, reproduced below, to illustrate Klügl’s fuel injector system, and blows-up the central portion of the figure to better illustrate Klügl’s hydraulic link. *See* Pet. 37.



Referring to Klügl’s annotated figures, Bosch explains that a signal is applied to “piezoelectric actuator 1” (dark purple), which causes the actuator to press “transmission module 2” (light purple) downwards toward “drive piston 3” (green) against the force exerted by “disk spring 14” (red) and, in turn, move the drive piston’s ball 4 off its valve seat to begin fuel injection. *See* Pet. 20–21 (citing Ex. 1006, 3:23–38, Fig. 1); *see also id.* at 35–37 (same). Bosch further explains that transmission module 2 (light purple)

includes pressure chamber 5 (dark pink) filled with a hydraulic fluid of “low compressibility,” as well as compensating chamber 7 (light pink) connected to the pressure chamber via connecting bore 10. *Id.* (citing Ex. 1006, 1:60–2:4, Fig. 1). That description by Bosch of Klügl’s fuel injector system does not appear to be in dispute. Rather, central to the parties’ dispute is the operation of Klügl’s hydraulic link, namely, “pressure chamber 5” (dark pink).

According to Bosch, the hydraulic fluid within pressure chamber 5 (dark pink) “is defined and sealed by a membrane 6” such that it is “incompressible.” Pet. 21 (citing 3:26–29 (emphasis added)); *see also id.* at 36 (“The hydraulic fluid is completely captured, contained, and sealed within the transmission module.”). Based on that description, as well as supporting testimony from its expert, Bosch surmises that “[i]n Figure 1, the dimensions of chamber 5—including its thickness—remain constant so that the movement of the actuator results in the same amount of movement of the piston.” *Id.* at 37 (citing Ex. 1003 ¶¶ 219–227). As additional support, Bosch argues that, in Klügl’s Figure 1 embodiment, “no stroke amplification occurs and chamber 5 does not change dimension during actuation,” and, “[a]s a result, the hydraulic link simply transmits force rather than generating it and its ‘thickness’ is ‘substantially constant.’” *Id.* at 39 (citing Ex. 1003 ¶¶ 230–234).

Westport responds that the hydraulic fluid within Klügl’s pressure chamber 5 neither “acts substantially as a solid” nor has a “thickness being

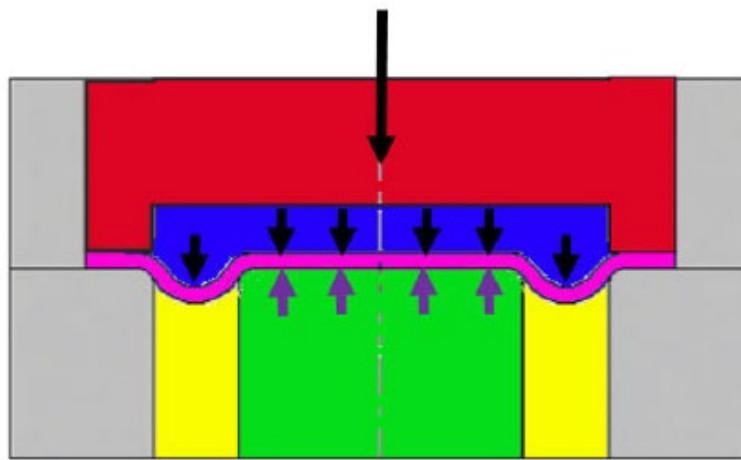
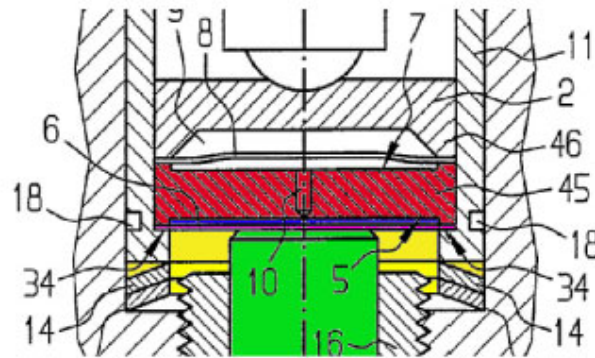
substantially constant,” as required by claim element 1(e).⁵ See PO Resp. 46 (referencing back to “Section VIII” of the response). Rather, according to Westport, Klügl teaches that membrane 6 is “flexible” and will “deform” inwardly and outwardly during operation—

Because Klügl’s membrane 6 is flexible, the incompressible transmission medium contained by membrane 6 will cause it to deform during actuation, causing the space in pressure chamber 5 to change. . . . Klügl’s transmission medium will redistribute within pressure chamber 5 by flowing from the higher pressure nearest the contact surface between membrane 6 and piston 3 toward the lower pressure unsupported annular areas of membrane 6.

Id. (emphasis added) (citations omitted). And because flexible membrane 6 deforms, Westport contends that “the incompressible transmission medium will redistribute to fill the changed shape of chamber 5, thereby not acting substantially as a solid during actuation, in addition to not maintaining substantially the same thickness.” *Id.* at 39.

More specifically, and with the help of its expert, Westport annotates various portions of Klügl’s Figure 1, reproduced below, to illustrate what happens to the hydraulic fluid within pressure chamber 5 during actuation of transmission module 2. See PO Resp. 35–36 (citing Ex. 2022 ¶¶ 78–82).

⁵ Westport also challenges Bosch’s translation of Klügl as “inaccurate.” PO Resp. 18, 25–27. Despite that challenge, Westport nonetheless addresses Klügl’s teachings as presented in Bosch’s translation, which we do as well.



As Westport’s expert explains, the upper figure is an annotated version of Figure 1, while the lower figure is a graphical representation of the forces applied during actuation of Klügl’s fuel injection system. *See* Ex. 2022 ¶¶ 78–79. During actuation, transmission module 2 (red) moves downward (large black arrow) and, in the process, applies a downward force (small black arrows) through pressure chamber 5 (blue) and flexible membrane 6 (pink). *Id.* ¶ 79. Drive piston 3 (green), in turn, exerts an opposite, upward force (purple arrows) on a portion of flexible membrane 6 (pink) that is in contact with drive piston 3. *Id.* As a result, according to Westport (and its expert), flexible membrane 6 “will tend to deform inward where it contacts the drive piston 3 (green) and bulge outward where unsupported by the drive piston into the empty spaces (yellow) because the

empty spaces provide less resistance to the downward force as compared to piston 3.” PO Resp. 35 (citing Ex. 2022 ¶¶ 78–79). And, because Klügl’s flexible membrane 6 bulges around the sides of the piston where it is unsupported, Westport argues that nothing in Klügl supports Bosch’s position that membrane 6 will act as a solid barrier of substantially constant thickness during actuation. *Id.* at 36–37.

We agree with Westport. That is because Bosch’s argument that Klügl’s hydraulic fluid maintains substantially constant thickness is premised on the erroneous belief that Klügl’s membrane 6 will *not* flex. But, as Westport correctly notes, Klügl expressly teaches that membrane 6 is “flexible.” *See, e.g.*, Ex. 1006, 7:45–47 (“[F]lexible membranes 6, 8, 26 . . . have a progressive characteristic curve of the spring force in relation to the spring deflection.”), 7:68–9:31 (repeatedly referencing “first flexible element (6)” and “first flexible membrane (6)”). Consistent with this flexibility, Klügl explains that membrane 6 flexes to maintain contact with drive piston 3, stating specifically that “in the rest position without being actuated due to thermal influences or signs of aging, . . . the first membrane 6 *is moved* in the direction of the drive piston 3” or “*is pushed* in by the drive piston 3 so that the transmission medium is pressed through the throttle 10 into the compensation chamber 7.” Ex. 1006, 3:63–4:10 (emphases added). And because Klügl’s membrane 6 flexes when transmission module 2 is unactuated, it follows that membrane 6 will also flex when transmission module 2 is actuated.

Indeed, Westport’s expert confirms that “[i]n all embodiments shown, Klügl only ever specifies and describes membrane 6 as a ‘flexible’ membrane or element acknowledging that this flexibility is a necessary and

desirable feature of its intended purpose and behavior.” Ex. 2022 ¶ 80. Notably, Westport’s expert opines, while referencing the above-annotated figures from Klügl, that—

[d]ue to the inherent flexibility and pliability of flexible membrane 6, the membrane will tend to deform longitudinally upward where it contacts the drive piston and bulge outward where unconstrained in the annular area (i.e., void space in yellow) between the edge of the drive piston 3 and the wall of transmission module 2 and guide sleeve 11 in order to accommodate the volume of the transmission fluid contained therein and the pressure differences created within the transmission fluid.

Id. ¶ 79.

Because membrane 6 is “flexible” and “is moved in” or “pushed in” by contact with the drive piston 3, as Klügl expressly teaches (and Westport’s expert confirms), we find that the hydraulic fluid in Klügl’s chamber 5 necessarily changes shape and thickness due to deflection of the flexible membrane during operation of actuator 1. Ex. 1006, 3:63–4:10, 7:45–46, 8:46. In this way, Klügl better supports Westport’s position that Klügl does *not* satisfy the claim 1(e) limitation that the hydraulic fluid “acts substantially as a solid with said thickness being substantially constant.”

We have considered Bosch’s arguments in reply. For instance, Bosch asserts that “the mere fact that Klügl sometimes labels its ‘membrane 6’ as ‘flexible’ does not end the analysis.” Pet. Reply 6. According to Bosch, “it is apparent that in the injector of Figure 1, membrane 6 does not *substantially flex* during actuation” and “[i]nsubstantial, meaningless changes in link thickness do not matter.” *Id.* at 6, 10. Bosch also faults Westport for failing “to quantify how much membrane flexing purportedly occurs when Klügl’s injector is actuated.” *Id.* at 10. In doing so, Bosch

notes the testimony of its expert that “a POSITA would readily be able to design Klügl’s injector such that any flexing of membrane 6 is immaterial during actuation.” *Id.* (citing Ex. 2025, 63:21–64:10).

Bosch does not persuade us on any of these points. First, Bosch’s characterization of Klügl’s changes in thickness as “insubstantial” or “meaningless” amounts to conclusory attorney argument, lacking any citation to the record or meaningful explanation. *See* Pet. Reply 10. Second, Bosch’s argument that *Westport fails to show* substantial flexing by Klügl’s membrane 6 ignores the fact that it is Bosch, as petitioner, who bears the burden of proving unpatentability of the challenged claims, with that burden of persuasion never shifting to patent owner. *See Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015). Thus, it is Bosch who must persuasively prove the operation of transmission module 2 and its associated flexible membrane 6, as depicted in Klügl’s Figure 1, given Bosch’s assertion that Klügl teaches or suggests the “hydraulic link assembly” recited in claim element 1(e).

Contrary to Bosch’s arguments, Westport has shown more than “the mere fact” that Klügl “sometimes labels” its membrane 6 as “flexible.” Pet. Reply 10. Rather, as discussed above, Westport provides ample evidence in the form of credible expert testimony that Klügl “only ever specifies and describes membrane 6 as a ‘flexible’ membrane or element,” and, thus, “the membrane will tend to deform longitudinally upward where it contacts the drive piston and bulge outward where unconstrained in the annular area . . . between the edge of the drive piston 3 and the wall of transmission module 2.” Ex. 2022 ¶¶ 79–80; *see also id.* ¶¶ 66–67, 77–78, 81, 87

(elaborating further on operation of transmission module 2 and associated flexible member 6).

In contrast, the testimony of Bosch's expert ignores Klügl's express teachings and is fraught with contradictions that undermine the weight of that testimony. While this case may be seen as a battle of the experts over their respective interpretations of Klügl, it is clear that Bosch's expert loses given his inability to credibly explain his opinions during cross-examination. For instance, despite opining in his declaration that Klügl satisfies claim element 1(e) because "the fluid in chamber 5 is *held in place by a membrane 6* and moves through a cylindrical space of constant width and unchanging shape" (Ex. 1003 ¶ 220 (emphasis added)), surprisingly, Bosch's expert could not, or would not, provide his opinion when asked on cross-examination about the meaning of "flexible" and "membrane" in the context of Klügl's disclosure—

Q. [By Westport's counsel] What's your understanding what flexible means in the context of the Klugl reference? . . .

A. [By Bosch's expert] Again, I haven't been asked to offer a formal opinion of what flexible means in light of this, but if you want to talk about a specific -- excuse me -- part of the document, I'd be happy to.

Q. What is a membrane?

A. Usually, it's a thin sheet of material but I haven't formed a formal opinion on it.

Q. What is a flexible membrane?

A. Again, I haven't offered a formal opinion what a flexible membrane is.

Ex. 2025, 47:14–48:1.

And when directed specifically to Klügl's teachings that "the transmission module (2) has a pressure chamber (5), which is filled with a

transmission medium and is delimited by a first *flexible* membrane (6)” (Ex. 1006, 8:44–46), Bosch’s expert continued to lack an opinion—

Q. [By Westport’s counsel] You would agree with me that multiple times in the Klugl reference, item number 6 is defined as a flexible membrane or flexible element, correct? . . .

Q. Specifically, if you look at column seven, line 69, column eight, line 46, column seven, line 45 --

A. [By Bosch’s expert] Let’s take the first one of those. Which line would you like me to look at?

Q. Sir, it’s throughout column seven, eight, and nine --

A. Okay. Well, you just gave me a specific reference. Can you give me the first one, please?

Q. Yeah. Sure. Column eight, line 46. First flexible membrane 6. Do you see that?

A. Okay. I see where --

Q. So my question -- my question, sir: In your opinion, is item 6 in Figure 1 of Klugl flexible or not? . . .

A. The device that Klugl teaches in Figure 1 is intended to have the same stroke, length from the bottom of the actuator as the same distance that component number three would change -- would move axially. Does that mean that it’s flexible or not? And when it’s not operating, whether that’s considered flexible or not? Then we have to talk about a specific time and when we’re looking at this thing, it’s --

Q. So -- so it’s your opinion that Figure 3 of Klugl discloses a flexible item number 6 and you can’t determine whether item number 6 in Figure 1 is flexible or not. Is that correct? . . .

A. So, figure -- in Figure No. 1, the flexibility of 6 would be dependent on how the design was used, right? I mean, there -- there’s two different functions here. One is during actuation and one is in the hydraulic link’s ability to make up for things like wear and thermal expansion.

Q. Is that your complete opinion on flexibility of item number 6 in Figures 1 and 3? . . .

A. *I -- I haven't formed a complete opinion on how [membrane] 6 specifically is flexible or is not flexible.*

Ex. 2025, 65:1–66:18 (emphases added).

Ultimately, as shown by the above exchange, Bosch's expert did not, or could not, provide his opinion on the key issue of whether Klügl's membrane 6 is flexible. Indeed, neither his declaration (Exs. 1003, 1040) nor his cross-examination testimony (Ex. 2025) addresses how the flexible nature of Klügl's membrane 6 affects the shape and thickness of the hydraulic fluid in Klügl's chamber 5 during actuation of transmission module 2.

Also, we are not persuaded by Bosch's attempt to rehabilitate its expert's cross-examination testimony by means of a later supplemental declaration. *See* Ex. 1040 ¶¶ 17–19, 31–35. There, Bosch's expert testifies, with respect to the actuation of the injector in Klügl's Figure 1, that—

there is *no mention* in Klügl of fluid flow, pressure increases, membrane deflection, or application of a stroke ratio. . . . A POSITA would understand that these omissions are purposeful: no fluid flow, pressure increases, membrane deflection, or stroke ratio application occurs in connection with Figure 1's injector.

Id. ¶¶ 17–18. That testimony, however, is contradicted by Klügl's express teaching that membrane 6, as shown in Figure 1, is flexible and can structurally deflect, and does so in at least the rest position. *See* Ex. 1006, 3:56–4:10. Klügl also teaches that there is fluid flow and pressure increases during actuation. *See id.* at 4:11–31. Though it may be “only so little” as not to impair activation of the drive piston, Klügl nonetheless teaches that fluid flow can and does occur between compensation chamber 7 and pressure chamber 5 via throttle 10. *Id.* at 4:11–24. Klügl also contemplates that

if there are long-lasting pressure differences between the pressure chamber 5 and the compensation chamber 7 lasting from one second to minutes, *the transmission medium is exchanged between the compensation chamber 7 and the pressure chamber 5 via the throttle 10*. This is especially the case in terms of thermal expansion differences and gradual wear.

Id. at 4:25–31 (emphasis added).

Notably, Bosch’s expert admits that “[a] POSITA would have understood that whether membrane 6 *meaningfully* flexes during injector actuation will depend on a variety of factors.” Ex. 1040 ¶ 31 (emphasis added). Although Bosch’s expert does not explain what meaningful flexing entails, he does opine that such factors may include “the various forces applied to the membrane, the inherent flexibility of the material the membrane is made from, the membrane’s thickness, how the edges of the membrane are supported, the fluid pressure in the chamber 5, and the size of the membrane/piston interface.” *Id.* ¶ 32. But, in noting those factors, Bosch’s expert fails to explain their role in the operation of Klügl’s “flexible” membrane 6 as specifically shown in Figure 1. Instead, Bosch’s expert opines generally that

a POSITA would have understood that *flexing during actuation can be avoided simply by choosing the correct (less flexible) membrane material and dimensioning it appropriately*. This would entail, for instance, simply making the membrane thicker and increasing the membrane/piston interface.

Id. ¶ 33 (emphases added).

That testimony, however, merely speculates as to how flexing of Klug’s membrane “can be avoided,” for example, by making the membrane “thicker” and/or “increasing” its interface with the piston. But, in doing so, Bosch’s expert contradicts, indeed, utterly ignores, Klügl’s express teaching

that membrane 6 is, in fact, *flexible*. And by speculating as to how one could avoid Klügl's express teachings, Bosch's expert improperly alters Klügl into something it clearly is not. As such, neither Bosch nor its expert persuades us that we can disregard the expressly taught flexibility of Klügl's membrane 6 and assume that it does not flex "meaningfully" or that the shape and thickness of the hydraulic fluid within chamber 5 does not change while the membrane is flexing during actuation.

In the end, Bosch (and its expert) fail to adequately address the flexibility of Klügl's membrane 6 and how it operates to delimit the hydraulic fluid within Klügl's pressure chamber 5. Indeed, Bosch's only evidence on the issue—the testimony of its expert—is either non-responsive or speculative at best, thereby entitling it to little, if any, weight. Thus, based on the entire record, we find that Bosch fails to demonstrate why one skilled in the art, reading Klügl's disclosure of a *flexible* membrane 6 for pressure chamber 5, would have understood that the hydraulic fluid within Klügl's pressure chamber "acts substantially as a solid with said thickness being substantially constant while said actuator assembly is actuated," as required by claim 1. As such, Bosch fails to prove that claim 1 is unpatentable.

Just to tie up one last loose end, we are not persuaded by Bosch's attempt to support its position by contrasting Klug's Figure 1 embodiment, which operates "without stroke translation," to Klügl's Figure 3 embodiment, which operates "with stroke translation." See Pet. Reply 6–7 (citing Ex. 1006, 1:41–42. 45–46). According to Bosch, "without stroke translation," as used in conjunction with Klügl's Figure 1, means that "the movement of the actuator results in the same amount of movement of the

piston *without amplification*,” in other words, “the actuator actuates, the transmission module moves, *the fluid in the transmission module does not flow*, and the piston is pushed by the transmission module such that it moves by the same amount as the actuator.” *Id.* at 6–7 (citing Ex. 1003 ¶ 208). And, in contrast, Bosch contends that “with stroke translation,” as used in conjunction with Klügl’s Figure 3, means that “*fluid flows*, pressure increases, and a stroke ratio is applied to piston movement.” *Id.* at 7–8.

Again, as discussed above, although the fluid flow in Klügl’s Figure 1 embodiment may be “only so little” as not to impair activation of drive piston 3, Klügl nonetheless teaches that flow can and does occur between compensation chamber 7 and chamber 5 via throttle 10. *See id.* at 4:11–31. And, while we acknowledge there are differences between the embodiments shown in Figures 1 and 3 of Klügl, neither Bosch nor its expert persuades us that the contrasting operation of those embodiments as “without stroke translation” versus “with stroke translation” necessarily precludes fluid flow or pressure differences in the embodiment of Figure 1. *See* Pet. Reply 6–9; *see also* Ex. 1003 ¶¶ 220–224. That is because Klügl’s disclosure expressly provides that fluid flow and pressure differences do, in fact, occur for the embodiment of Figure 1 during operation. *See* Ex. 1006, 4:25–31.

Moreover, like his testimony on the flexibility of Klügl’s membrane, Bosch’s expert testimony on the stroke translation of Klügl’s Figure 1 embodiment relative to its Figure 3 embodiment is undermined by incomplete and contradictory opinions. For instance, despite using the terms “stroke translation,” “stroke ratio,” and “stroke amplification” throughout his declaration (*see* Ex. 1003 ¶¶ 220–222, 224, 227, 232, 234; Ex. 1040 ¶ 22), Bosch’s expert could not articulate his opinion as to the meaning of

those same terms when asked on cross-examination, as indicated by the following exchange—

Q. [By Westport’s counsel] So is it your testimony that despite relying on the Klugl reference in every one of your opinions in this case, you don’t know whether there’s any difference between the term stroke translation, stroke transmission, and stroke ratio as those terms are used in the Klugl reference?

A. [By Bosch’s expert] Again, we can talk about what each word means in a specific light, but I think what that -- taking Klugl as a whole, what we see is that there are different ways of -- for example, treating that stroke ratio and whether or not that’s one or no[t] one, and the specific words as they got translated from German aren’t necessarily, you know, the whole thing. We’re taking the whole document, the embodiments that they teach, and using that to see what a POSITA would understand.

Ex. 2025, 28:22–29:12. Nor when asked once more on cross-examination to clarify the meaning of “stroke translation” versus “stroke ratio” as used in his declaration could Bosch’s expert do so—

A. So, again, I don’t know if they mean the same exact thing, but they’re referring to the same function and that’s why we have said -- *I have said that we’re saying that stroke translation is the same as maybe applying a stroke ratio. So, you know, can you say those things are the same? I’m not sure*, but it surely is talking about the same function whether or not the one side of the hydraulic link and the other side of the hydraulic link are traveling the same displacement.

Id. at 31:8–16 (emphasis added).

Also, despite using the terms “stroke amplification” and “without amplification” in his declaration to describe the operation of Klügl’s Figure 1 embodiment (*see* Ex. 1003 ¶¶ 220, 232, 234), Bosch’s expert could not explain their meaning when asked on cross-examination—

Q. [By Westport's counsel] My question was about stroke amplification. Does stroke amplification occur in Figure 1 of Klugl?

A. [By Bosch's expert] So, again, I haven't done any definition of, you know, any deep dive in thinking about the specific term, stroke amplification, so I can't offer an opinion about that, but I do understand how the -- the injector -- the components shown in Figure 1 of Klugl function.

Q. Do you have an understanding of what the word amplification means in the context of Klugl? . . .

A. *Seeing as how I don't see it in the document, I would not be able to form an opinion about it in that light.*

Q. Do you have an opinion as to what without amplification means in the context of Klugl? . . .

A. *Seeing as how I haven't had time to think about what amplification means in that light, I would say that I can't form an opinion on that.*

Ex. 2025, 39:16–40:11 (emphases added). Similarly, Bosch's expert reiterated in another exchange that he did not have an opinion on what “amplification” means—

Q. [By Westport's counsel] What does amplification mean in the context of the Klugl reference? . . .

A. [By Bosch's expert] I haven't studied that one specific word in terms of this -- in terms of that, so I can't offer a formal opinion on what that one word means.

Q. Okay. What does amplification mean to you?

A. Again, I haven't taken the time to do a formal analysis on what amplification means.

Id. at 34:3–12.

It is clear from his cross-examination testimony that Bosch's expert did not do a “formal analysis” on what “amplification” means and had no “formal” opinion on what “without amplification” means in the context of

Klügl. This contradicts and undercuts the testimony presented in his declaration where he opined that “[i]n the embodiment shown in Klügl’s Figure 1, the movement of the actuator results in the same amount of movement of the piston *without amplification*.” Ex. 1003 ¶ 208. As a result, we find that the testimony by Bosch’s expert as to the distinction between Klügl’s Figure 1 and Figure 3 embodiments is entitled to little or no weight.

Also, contrary to Bosch’s suggestion, neither claim element 1(e) nor any other element of claim 1 equates or relates the hydraulic fluid’s thickness to a particular “stroke translation,” “stroke ratio,” or “stroke amplification.” See Ex. 1001, 17:31–43. Thus, even if we agreed with Bosch and its expert that the embodiments of Klügl’s Figures 1 and 3 employ specific types of stroke translation, that alone is not dispositive. As discussed above, Bosch and its expert fail to persuasively account for the entire structure of Klügl’s pressure chamber 5, namely, “flexible” membrane 6, and the effect that the flexibility of the membrane has on the thickness of the hydraulic fluid within the pressure chamber during actuation. See, e.g., Ex. 2025, 66:17–18 (Bosch’s expert testifying that he has not “formed a complete opinion on how [membrane] 6 specifically is flexible or is not flexible.”).

Having failed to show that the asserted combination of Wirbeleit and Klügl teaches or suggests a hydraulic fluid thickness that “acts *substantially as a solid with said thickness being substantially constant while said actuator assembly is actuated*,” Bosch has not demonstrated by a preponderance of the evidence that claim 1 of the ’829 patent is unpatentable.

Bosch’s challenge of dependent claims 2, 3, 6, 11, 12, 14, 15, 18, and 19 relies on, and suffers from, the same flawed arguments that Bosch makes with respect to claim 1 from which those claims depend. *See* Pet. 40–47. Thus, for the same reasons discussed above with respect to claim 1, we determine that Bosch has not demonstrated by a preponderance of the evidence these dependent claims would have been obvious over the combined teachings of Wirbeleit and Klügl.

D. Bosch’s Additional Challenges

Bosch asserts several other grounds against the challenged claims, namely, that claims 1–3, 6, 11, 12, 14, 15, 18, and 19 are unpatentable as obvious over the combination of Klügl and Hayes (Pet. 55–73) and claim 20 is unpatentable as obvious over the combination of Wirbeleit, Klügl, and Newcomb and/or the combination of Klügl, Hayes, and Newcomb (*id.* at 53–55, 73–74, respectively). Bosch’s additional grounds, all of which rely on Klügl, suffer from the same deficient arguments as Bosch makes with respect to its challenge based on Wirbeleit and Klügl. *See, e.g., id.* at 73 (“Klügl teaches the claimed ‘hydraulic link’ for the same reasons explained above in Section VII.C.1.a.[1(e)] . . .”). Thus, for the same reasons discussed above with respect to that first challenge, we determine that Bosch has not demonstrated, by a preponderance of the evidence, these additional challenges fare any better than its challenge based on Wirbeleit and Klügl.

IV. MOTION TO EXCLUDE

Westport moves to exclude Exhibits 1006, 1025, 1029, 1031, 1033, 1035, and 1037, along with any testimony or argument relying on those exhibits. *See* PO Mot. 1. A party moving to exclude evidence bears the burden of proving that it is entitled to the relief requested, namely, that the

material sought to be excluded is inadmissible under the Federal Rules of Evidence (“FRE”). *See* 37 C.F.R. §§ 42.20(c), 42.62(a).

A. Exhibit 1006

Exhibit 1006 is an English translation of Klügl, which is a German reference (Ex. 1005). Bosch filed Exhibit 1006 with a certified translation of the German-language version of Klügl and an accompanying translator’s declaration. *See* Ex. 1006, at 11. Westport contends that Exhibit 1006 is a “fatally flawed” and “unreliable” English translation. PO Mot. 2. In particular, Westport asserts, with support from its own translator, that the word “Hubübersetzung” in Exhibit 1005 should be translated the same in all four places where it appears, but because Bosch’s translator interprets it differently in each of those places, Exhibit 1005 includes translation error and should be excluded. *Id.* at 3–5 (citing Ex. 2026 ¶¶ 4–5).

We note that Westport did not provide an alternative translation of Klügl, nor did Westport cross-examine Bosch’s translator on the *certified* English translation of Klügl. At best, we have nothing more than a difference of opinion between two translators as to the more accurate translation of a particular term in Klügl. And, based on our review, we do not think enough evidence exists in the record to show that the *certified* translation is unreliable with no probative value. As discussed above, the parties’ arguments and their experts’ opinions are premised on the only certified translation of Klügl in the record, namely, Exhibit 1006. And, based on the parties’ reliance on that certified translation in making their

arguments, we provide our detailed analysis of Klügl's disclosure.⁶ So, rather than excluding a translation that may include *some* allegedly confusing aspects, we instead give it the probative weight it deserves. *Cf. Donnelly Garment Co. v. NLRB*, 123 F.2d 215, 224 (8th Cir. 1941) ("One who is capable of ruling accurately upon the admissibility of evidence is equally capable of sifting it accurately after it has been received."). As such, we deny Westport's motion to exclude Exhibit 1006.

B. Exhibits 1025, 1029, 1031, 1033, 1035 and 1037

Exhibit 1025 is a copy of a discussion from a message board in which Bosch's translator seeks, and receives, the assistance of other translators in the translation of the term "Hubübersetzung" as used in Klügl. *See* Ex. 1025, 1–3. And Exhibits 1029, 1031, 1033, 1035 and 1037, according to Westport, are German references for which Bosch purportedly fails to submit the required certified translation. *See* PO Mot. 9–11 (citing 37 C.F.R. § 42.63).

Bosch submits these exhibits to rebut Westport's position that Exhibit 1006 should be excluded. *See* Pet. Opp. 9. But, as discussed above, we did not exclude Exhibit 1006, nor did we rely on these rebuttal exhibits in assessing the admissibility of Exhibit 1006. Thus, we deny Westport's motion to exclude Exhibits 1025, 1029, 1031, 1033, 1035 and 1037 as moot.

⁶ Indeed, the translation of "Hubübersetzung" may be of little relevance given that the crux of our analysis is Klügl's use of the term "flexible," for which the translation is undisputed.

V. CONCLUSION

Claims Challenged	35 U.S.C. §	Basis	Claims Shown Unpatentable	Claims Not Shown Unpatentable
1–3, 6, 11, 12, 14, 15, 18, 19	103(a)	Wirbeleit, Klügl		1–3, 6, 11, 12, 14, 15, 18, 19
20	103(a)	Wirbeleit, Klügl, Newcomb		20
1–3, 6, 11, 12, 14, 15, 18, 19	103(a)	Klügl, Hayes		1–3, 6, 11, 12, 14, 15, 18, 19
20	103(a)	Klügl, Hayes, Newcomb		20
Overall Outcome				1–3, 6, 11, 12, 14, 15, 18–20

VI. ORDER

It is hereby:

ORDERED that claims 1–3, 6, 11, 12, 14, 15, 18–20 of the '829 patent have not been shown to be unpatentable;

FURTHER ORDERED that Westport's Motion to Exclude is denied;
and

FURTHER ORDERED that because this Decision is final, a party to the proceeding seeking judicial review of the Decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

IPR2023-00292
Patent 6,298,829 B1

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