UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

MYLAN PHARMACEUTICALS INC.,
Petitioner,

v.

SANOFI-AVENTIS DEUTSCHLAND GMBH,
Patent Owner

Case No. IPR2018-01680
U.S. Patent No. 9,526,844

PATENT OWNER'S RESPONSE

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I. INTRODUCTION

The 844 Patent concerns a novel and non-obvious pen injector that permits a user to set the appropriate dosage from a multi-dose cartridge and self-administer the injection. The unique combination of mechanisms and functionality described and claimed in the 844 Patent was the result of a successful effort by the inventors to improve upon existing, but flawed, insulin pen injectors on the market in the 2003 timeframe. The inventions are embodied in the SoloSTAR® pen that was released in 2007 and has been a significant commercial success.

Patent Owner respectfully submits that challenged claims 21-30 of the 844 Patent are patentable over Grounds 1-3 presented in this Petition. Each ground is based on Giambattista (U.S. Patent No. 6,932,794) (Ex. 1016) ("Giambattista), either as an anticipatory reference (Ground 1) or a primary reference for obviousness (Grounds 2 and 3). The challenged claims are patentable over Giambattista for at least the following reasons.

First, Giambattista is not prior art. The application leading to Giambattista was filed on April 3, 2003, whereas the 844 Patent claims priority to the filing date of Great Britain Application No. 03 04822.0 ("GB Application"), filed a month before, on March 3, 2003. Ex. 1026 at 1. Petitioner, however, argues that the GB Application does not provide written description support for an internally threaded piston rod and thus the 844 Patent is not entitled to the priority date of the GB

Application. Petitioner is incorrect because the GB Application broadly discloses a threaded piston rod, which is sufficient to reasonably convey that the inventors had possession of an internally threaded piston rod as of the GB Application's filing date.

Second, even accepting that Giambattista is prior art, Petitioner's anticipation argument with respect to dependent claims 22 and 24-29 fails because Giambattista does not disclose a piston rod with a circular cross-section (claim 22), audible and tactile feedback (claims 24-28), or audible clicks corresponding to a unit dose (claims 25 and 29).

Third, with respect to Ground 2 asserting obviousness of claims 24-29 directed to audible or tactile feedback, the combination of Giambattista in view of Steenfeldt-Jensen does not render these claims obvious because Petitioner does not articulate any reason for making the combination beyond impermissible hindsight.

Fourth, in Ground 3 Petitioner challenges dependent claim 30 as being obvious over Giambattista in view of Klitgaard. Petitioner's combination, however, does not result in a device that satisfies the limitations of claim 30. Moreover, a POSA would not have been motivated to make the proposed combination because it would result in a wider pen, which, as both Petitioner's and Patent Owner's experts agree, a POSA would want to avoid when designing a pen injector.

Finally, secondary indicia of non-obviousness confirm that the challenged claims of the 844 Patent are not obvious. Sanofi's SoloSTAR® pen injector, which

practices claims 21 and 30 of the 844 Patent, satisfied a long-felt need in the industry for an easy-to-use, disposable pen that administered a long acting insulin or insulin analog with a stable pharmacokinetic profile. *See, e.g.*, Ex. 2101. The improved ease of use provided by the pen injector design of the 844 Patent contributed directly to the overwhelming commercial success of the SoloSTAR®.

For the reasons, as detailed further below, Patent Owner respectfully requests that the Board find all challenged claims of the 844 Patent to be patentable over the asserted grounds of the invalidity.

II. BACKGROUND OF THE TECHNOLOGY

At the time of the inventions set forth in the 844 Patent, there were already several pen-type injectors known in the art. For example, relevant to this proceeding, the Steenfeldt-Jensen reference describes five pen injector embodiments, and its fifth embodiment closely corresponds to the Novo Nordisk FlexPen device that was commercially available at the time. *See* Ex. 1014, Figs. 1-17; Ex. 2107, ¶ 28.

There were, however, problems and limitations with the prior art injection pens, including the Novo Nordisk FlexPen (*i.e.*, Steenfeldt-Jensen's commercial embodiment), which suffered from a relatively high injection force resulting at least partially from having to overcome the ratchet mechanism between the driver tube and the housing. *See* Ex. 2107, ¶ 29. A higher injection force is problematic for patients lacking dexterity and strength, particularly for certain diabetic patients

suffering from hand and wrist conditions. *Id*., ¶¶ 47-53 (discussing diabetic neuropathy and other conditions that limit a diabetic's hand strength and flexibility); *see* Ex. 2101.

Developing a new pen injector to address prior art limitations is not as simple as substituting one component or feature for another. *See* Ex. 2107 ¶ 55. A substitution or change intended to improve one aspect of a device can negatively impact some other aspect, and one must consider whether these tradeoffs will result in an overall poor or flawed design. *See id*. In the pen injector context, changes that increase the required injection force would impair the ease of use of the device; and thus, would not be worth pursuing as it would worsen the patient's experience and decrease the likelihood that the patient would remain in strict compliance with their prescribed medication regime. This in turn accelerates the progress of their disease. *See* Ex. 2107, ¶ 36, 44.

The FlexPen, for example, required a high injection force to dispense the medication. Ex. 2175. It took Novo Nordisk several years to introduce a modified FlexPen that addressed this particular issue. Indeed, the original Novo Nordisk FlexPen was introduced in 2001 (*see* Ex. 2137 at 53, 66; Ex. 2136 at 22), but it was not until late 2008, five years after the 844 Patent's priority date and a year after the launch of the SoloSTAR®, that Novo Nordisk introduced the New Generation

FlexPen (NGFP), which had reduced injection force requirements (*see* Ex. 2101 at 6-7 (Tables 2 and 3)).

The inventors of the 844 Patent successfully balanced these competing design considerations and produced a novel, non-obvious mechanical arrangement that results in an improved pen injector. Patent Owner's pen injector, SoloSTAR®, which practices claims 21 and 30 of the 844 Patent, has been a successful product because of these improvements. Indeed, numerous studies have touted its ease of use, particularly its low injection force. *See, e.g.*, Ex. 2116; Ex. 2123; Ex. 2126.

III. THE 844 PATENT

A. Overview

Pen injectors are regularly used by patients without formal medical training, such as diabetic patients who manage their condition through self-treatment. Ex. 1004, 1:30-34. The 844 Patent teaches that pen injectors should meet several criteria, including being robust in construction while being easy to manipulate and understand by the user, who in many cases may be physically infirm and have impaired vision. *Id*., 1:35-40; Ex. 2107, ¶ 64. The 844 Patent discloses a pen injector having a novel arrangement of mechanisms that meets these criteria. *Id*.

In particular, the 844 Patent is specifically targeted at reducing the injection force needed for dispensing medicine. *Id.,* 4:7-9 ("The illustrated embodiment . . . helps reduce the overall force required for a user to cause medicinal product to be

dispensed."); *see also* Ex. 1005, 1:66-2:3 ("Surprisingly it was found that the drive mechanism according to instant invention without having a unidirectional coupling provides a valuable technical alternative for drive mechanisms, wherein reduced force is needed to actuate the mechanism.").[1] The figures below depict an embodiment of an improved injection pen. Additionally, an animation of the embodiment's operation has been submitted as Ex. 2117. *See* 2107, ¶ 65 (explaining animation).

[1] This description is from the 008 Patent, which is related to the 844 Patent since they both claim priority to the same foreign application—GB 0304822.

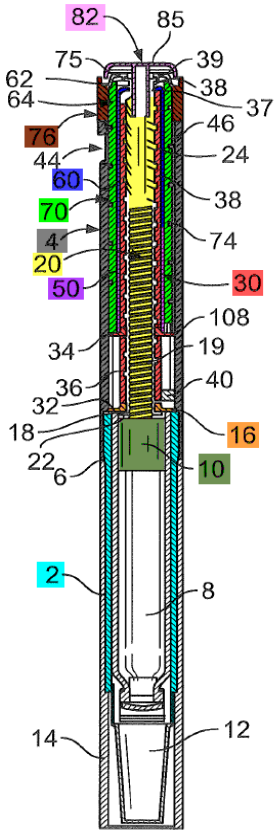


FIG. 1

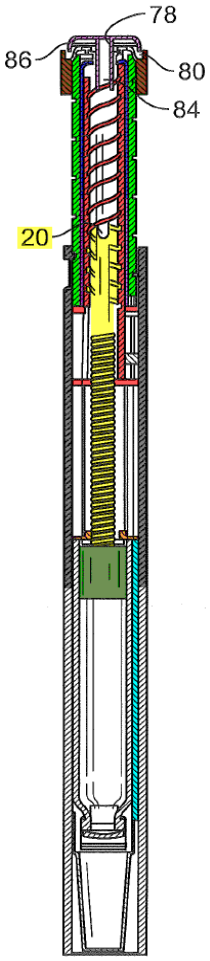


FIG. 2

Ex. 1004, Figs. 1 and 2

The injection pen of the shown embodiment comprises a cartridge retaining part 2 (light blue), an internally threaded main housing 4 (grey), a medicament cartridge 8 (not colored), a cartridge piston 10 (dark green), an insert 16 (orange), a piston rod 20 (yellow), a drive sleeve 30 (red), a clicker 50 (purple), and clutch 60 (dark blue), an externally-grooved dose dial sleeve 70 (light green), a dose dial grip 76 (brown), and a button 82 (pink).

In this embodiment, the dose value is selected by rotating the dial grip portion 76 (brown) of a dose dial sleeve 70 (light green), which winds out of the main housing 4 (grey) on a helical path defined by a threaded engagement between a helical groove on the surface of the dose dial sleeve and a helical rib 46 inside the housing. *Id.*, 5:60-6:13, Figs. 9-10.

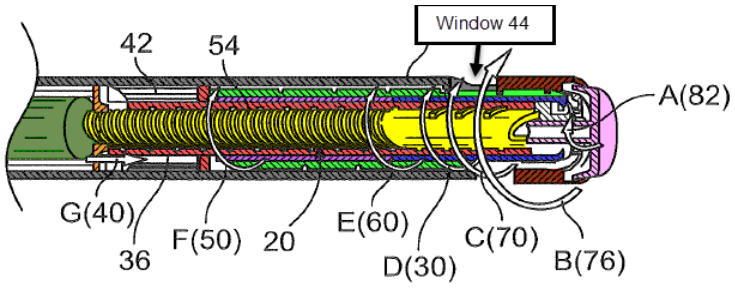


FIG. 9

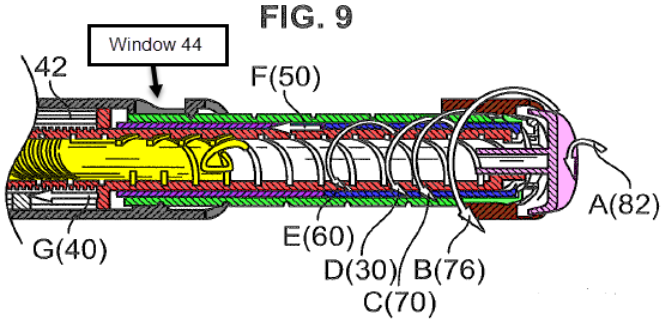


FIG. 10

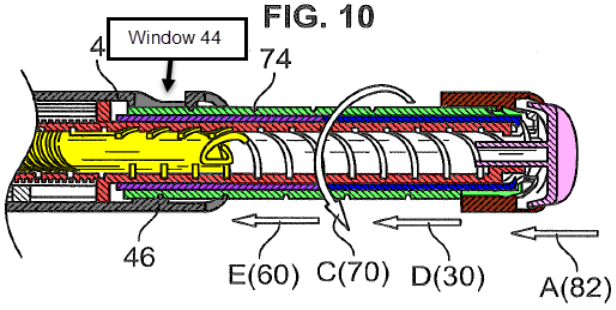


FIG. 11

Ex. 1004, Figs. 9 – 11

Dose markings (numbers) printed on an external surface of the dose dial sleeve 70 indicate the dosage. *Id.*, 5:27-31. A clicker 50 detents the dose dial sleeve

relative to the housing at each fixed dosage unit and provides audible feedback (*e.g.*, one click for every unit dialed) to assist in dose selection. *Id.*, 4:42-53, 5:64-4:3.

The arrangement of components in this embodiment also enables the user to correct a selected dosage if it is higher than the user intended. The user can dial the dose dial grip 76 (brown) in the opposite direction without wastefully dispensing medication. *Id.*, 6:27-37. During this operation, the system essentially acts in reverse. *Id.*

Once the correct dose is selected, the user delivers a dose by pressing the dose button 82 (pink) with his or her finger or thumb, as shown in Figure 11. *Id.*, 6:38-39. This user action returns the dose dial sleeve into the housing and delivers the dose by causing the drive sleeve 30 (red) to move toward the distal end of the pen, as indicated by the arrow D in Figure 11. This in turn causes a piston rod 20 (yellow) to advance a piston 10 (dark green) into the cartridge to dispense the stored medication. *Id.*, 6:55-57. *See also* Ex. 2162 (animation of the depicted embodiment to show the interaction of the drive sleeve and piston rod during dose injection). During this dose-injection process the dose button and drive sleeve are not rotationally coupled to the dose dial sleeve, allowing the dose dial sleeve to rotate back into the housing along the path defined by the helical groove (arrow C in Figure 11), while the dose button and drive sleeve travel on an axial path without rotating (arrows A and D in Figure 11). *Id.*, 6:38-45, Fig. 11.

Once the dose is administered, the dose dial sleeve returns to the starting or "zero dose" position and is prevented from rotating further into the device. *Id*., 6:58-62. The user then releases the dose button, which returns the internal mechanism of the device into the dose dialing state. *Id*., 6:50-54.

B. 844 Patent Family

The application leading to the 844 Patent (Application No. 15/156,616) was filed on May 17, 2016. Ex. 1004 at Cover. The '616 Application "is a continuation of U.S. Application No. 14/946,203, filed Nov. 19, 2015, now U.S. Patent No. 9,408,979, which is a continuation of U.S. Application No. 14/635,573, filed Mar. 2, 2015, now U.S. Patent No. 9,233,211, which is a continuation of U.S. Patent Application No. 13/919,251, filed Jun. 17, 2013, now U.S. Patent No. 9,011,391, which is a divisional of U.S. Application No. 13/040,198, filed Mar. 3, 2011, now U.S. Patent No. 8,512,297, which is a continuation of U.S. Application No. 11/483,546, filed Jul. 11, 2006, now U.S. Patent No. 7,918,833, which is a continuation of U.S. Application No. 10/790,225, filed Mar. 2, 2004, which claims priority to GB 0304822.0 (the "GB Application") filed Mar. 3, 2003, the entire contents of which are incorporated herein by reference." Ex. 1004 at 1:6-21; Ex. 2157.

IV. CLAIM CONSTRUCTION

As stated in the Institution Decision, "only those claim terms in controversy and only to the extent necessary to resolve the controversy" need to be construed. Paper 22 at 21 (citations omitted). Patent Owner asserts that no express constructions are required to demonstrate that the challenged claims 21-30 are patentable over Giambattista, Steenfeldt-Jensen and Klitgaard.

V. LEVEL OF ORDINARY SKILL

The correct level of ordinary skill is defined by a person who understands the mechanical elements (e.g., lead screws, clutches, gears) used in drug injection delivery devices as well as the principles governing the interactions of such mechanical elements, and further understands the basics of device design and manufacturing. That person will have a bachelor's degree in mechanical engineering or an equivalent degree. Ex. 2107, ¶ 102. Patent Owner's proposed level of ordinary skill reflects the educational level of workers in the field and the sophistication of the technology. *Id.*; *In re* GPAC, 57 F.3d 1573, 1579 (Fed. Cir. 1995); *see* M.P.E.P. 2141.03. Patent Owner's level of ordinary skill is similar to that proposed by the Petitioner. Regardless, the slight differences between Patent Owner and Petitioner's level of ordinary skill do not affect the arguments made below.

VI. THE PRIOR ART

A. U.S. Patent No. 6,932,794 ("Giambattista") (Ex. 1016)

Giambattista discloses a pen injector. According to Giambattista, in existing pen injectors, if a user dials a dose beyond the desired dose, "a waste of time or medication results in correcting to the desired amount." Ex. 1016, 1:22-23. For example, dialing back the dose will result in wasteful expulsion of medicine or will reset the pen, which will result in additional time required to dial the desired dose. *Id*., 1:28-37.

Giambattista purports to solve this problem by providing a pen having a dose knob that "can be dialed freely in both directions, without causing medicine to be administered, particularly upon 'dialing back'" and without resetting the device. *Id*., 1:56-60. Figure 2 of Giambattista is an exploded view of its medication delivery pen:

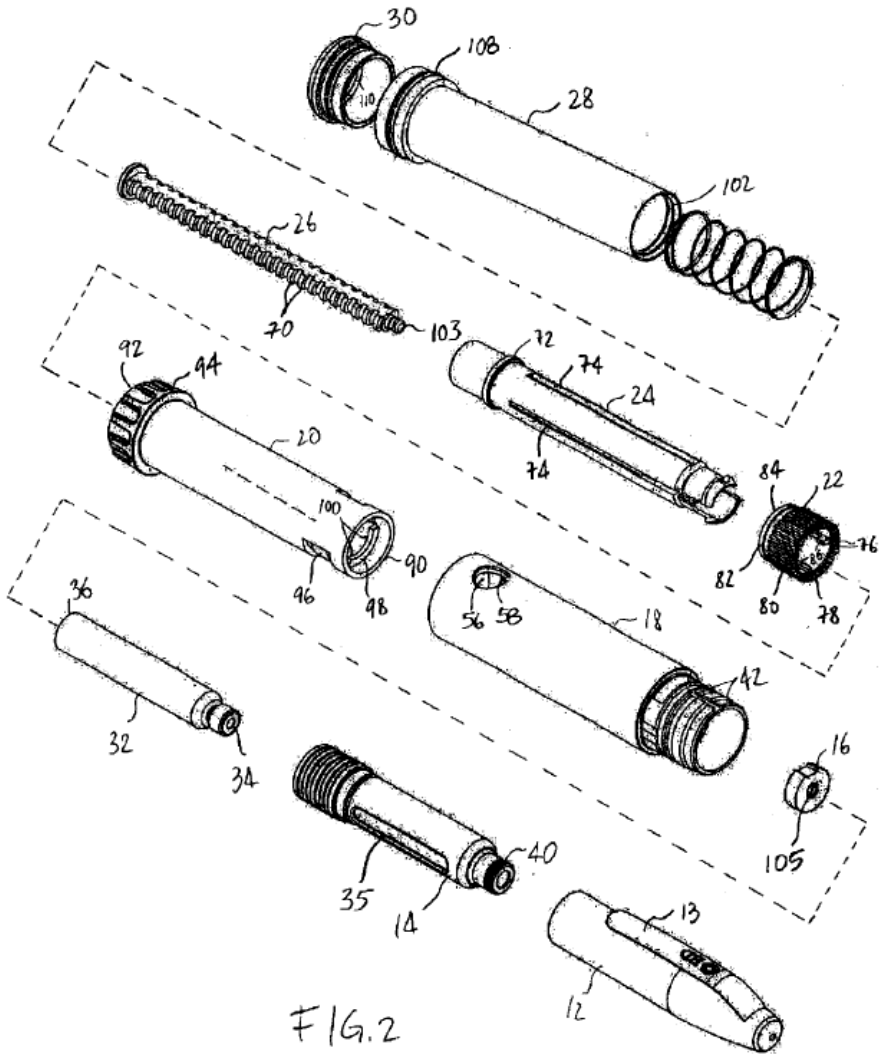


FIG. 2

As shown above, Giambattista's pen 10 includes a cap 12, a cartridge holder 14, a spinner 16, a body 18, a dose knob 20, a dosing ring 22, a driver 24, a leadscrew 26, a dosing ring adaptor 28, and a thumb button 30. Ex. 1016, 2:35-40. The cartridge holder 14 accommodates a drug cartridge 32, and the spinner 16 is configured to engage a plunger 38 (shown in figure 7) to expel drug from the drug cartridge 32. *Id*., 2:45-50. The body 18 has threads or detents 42 onto which the cartridge holder 14 is formed to be mounted. *Id*., 2:66-3:3. A bulkhead 44 extends

across the interior of the body 18 through which an aperture 46 is formed. *Id*., 3:1-3.

Relevant to this IPR, the leadscrew 26 is designed with two flat sides to correspond to a rectangular aperture through which the leadscrew 26 axially moves. According to Giambattista, the "aperture 46 is defined to allow the passage therethrough of the leadscrew 26, yet the aperture 46 is shaped (e.g., being rectangular) to prevent rotation of the leadscrew 26 therewithin." *Id*., 3:3-6. During dose dispensing, because the leadscrew 26 cannot rotate, the leadscrew 26 axially translates in a proximal direction to expel the medication from the cartridge 32. *Id*., 5:20-24.

Further relevant to this IPR, Giambattista discloses dose knob 20 coaxially disposed about the dosing ring 22. Dose knob 20 includes ratchet arms 96, which are aligned with the ribs 80 of the dosing ring 22. Giambattista discloses that the purpose of arms 96 is to act on the ribs 80 in a ratcheting manner giving the user an audible signal when dose knob 20 rotates. *Id*., 4:2-8. Giambattista does not disclose or suggest any relationship between the audible signal and the unit doses of medicament.

B. U.S. Patent No. 6,235,004 ("Steenfeldt-Jensen") (Ex. 1014)

Steenfeldt-Jensen is a U.S. patent. Its PCT counterpart application, WO 99/38554 (Ex. 2153), was disclosed in an IDS during prosecution of the 844 Patent

and is cited on the face of the 844 Patent. *See* Ex. 1014 (claiming priority to DK 1998 00130), Ex. 2153 (same), Ex. 1007 at 0234 (listing WO 99/38554). The Petition relies on an aspect of Steenfeldt-Jensen's to argue that Giambattista in view of Steenfeldt-Jensen renders claims 24-29 obvious.

Steenfeldt-Jensen discloses five distinct pen injector embodiments. *See* Ex. 1014, Figs. 1-17. The first, second, third, fourth, and fifth embodiments are depicted in figures 1-5, figures 6-10, figures 11-13, figure 14, and figures 15-17, respectively. *See* Ex. 1014, 5:33-37, 7:48-49, 8:34-35, 10:14-15, 11:6. These pen injectors comprise different components and arrangements, as shown below, and are configured to operate differently. *See, e.g.*, Ex. 2148 (animation of the first embodiment), Ex. 2149 (animation of the second embodiment), Ex. 2150 (animation of the fifth embodiment); *see also* Ex. 2017, ¶ 137 (explaining Steenfeldt-Jensen animations).

Petitioner primarily relies on the fifth embodiment (Ex. 1014 at 11:6-12:16, Figs. 15-17) to support its arguments that claims 24-29 are invalid as obvious over Giambattista in view of Steenfeldt-Jensen. *See, e.g.*, Ex. 1011, ¶¶ 597-602. The fifth embodiment, depicted in an exploded view below, comprises an ampoule holder 2 (turquoise), an ampoule (or cartridge) 89 (dark blue), pressure foot 9, member 40 (orange), driver tube 85 (red), piston rod 6 (yellow), housing 1 (grey), scale drum 80 (light green), bushing 82 (light blue), and injection button 88 (purple).

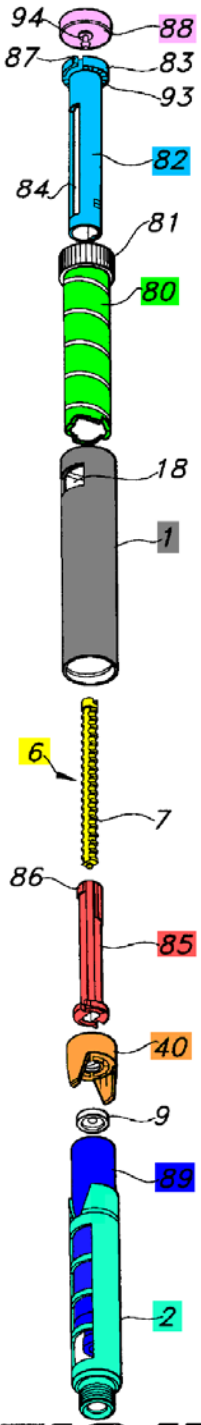


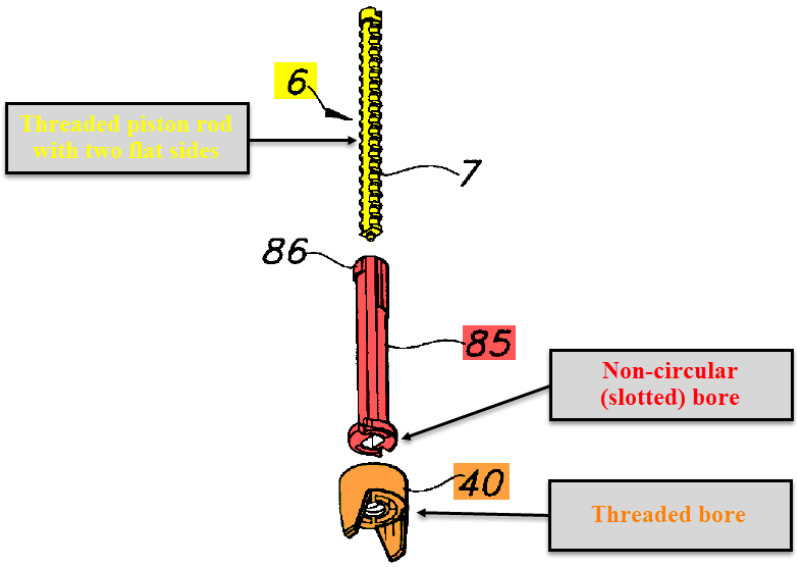
FIG 17

Ex. 1014, Fig. 17.

Referring to Figure 17, depicted above, to set a dose, the user rotates the dose setting button 81 on the proximal end of scale drum 80 in the clockwise direction (viewed from the proximal end). This causes the scale drum 80 to screw out of the housing. Ex. 1014, 11:43-49. The bushing 82, driver tube 85, and piston rod 6 remain stationary during the clockwise rotation of dose setting because the pawls on the distal end of the driver tube 85 engage with the teeth in the member 40 and prevent movement in that direction, and also because the hooks 86 on the driver tube engage with the longitudinal slots 84 on the bushing. *Id*., 11:52-67. Bushing 82 also includes a flange 83 having radial protrusions 87. *Id*., 11:37-40. Dose setting button 81 also includes axial recesses in its inner wall. *Id*., 11:62-67. Rotation of the dose setting button 81 causes the radial protrusion 87 on the flange 83 of the bushing 82 to click from one axial recess in the inner wall of the dose setting button 81 to the next one, with the recesses spaced so that one click corresponds to a chosen change of the set dose, e.g., one unit or half a unit. *Id*.

Relevant to the issues raised in this Response, Steenfeldt-Jensen's fifth embodiment includes non-threaded driver tube 85 and a threaded piston rod 6 having two flat sides—*i.e.,* a non-circular threaded piston rod. "The piston rod has a not round cross-section and fits through the driver tube bore which has a corresponding not round cross-section. This way rotation is transmitted [from the driver tube to the piston rod] whereas the piston rod is allowed to move longitudinally through the

driver tube." Ex. 1014, 11:15-19. This non-circular cross-section shape is necessary in the fifth embodiment because the piston rod 6 (yellow) rotates with driver tube 85 (red). The non-circular shape of the piston rod fits within the same non-circular bore of the driver tube, thus rotationally coupling the components while allowing them to move axially relative to one another. *See* Ex. 2150 (animation depicting the threaded opening of member 40 and slotted opening of driver tube 85); *see also* Ex. 2107, ¶ 145.



Ex. 1014, Fig. 17 (cropped and annotated)

C. U.S. Patent No. 6,582,404 ("Klitgaard") (Ex. 1017)

Klitgaard is a U.S. patent that is listed on the face of the 844 Patent. Klitgaard is titled "Dose Setting Limiter" and discloses an embodiment showing a dose setting member 30 surrounding a driver 31. Ex. 1017, 4:16-17, FIG. 3. Between the dose setting member 30 and the driver 31 is a nut member 32 that when rotated relative

to the driver 31, moves axially along the driver on a helical track 33. *Id*., 4:26-28. During setting of a dose, the nut member 32 is rotated with the dose setting member 30 relative to the driver 31 so that the position of the nut member 32 on the driver 31 reflects the dose set. *Id*., 4:33-37. Klitgaard states that during the delivery of the dose, the driver 31 is forced to be rotated with the dose setting member 30 and during this rotation the nut member 32 will maintain its position on the driver 31. *Id*., 4:49-52.

VII. THE CITED ART DOES NOT ANTICIPATE OR RENDER OBVIOUS THE CHALLENGED CLAIMS

A. Grounds 1-3 Should Be Denied Because Giambattista Is Not Prior Art

Giambattista (Ex. 1016) is not prior art. The application leading to Giambattista was filed on April 3, 2003. The 844 Patent, however, properly claims priority to the filing date of the GB Application, which was filed on March 3, 2003, a month before the Giambattista application. Accordingly, Giambattista cannot anticipate any claim of the 844 Patent as Petitioner contends in Ground 1, and Giambattista is not available for obviousness as Petitioner contends in Grounds 2 and 3

1. The Law Requires Sufficient Detail to Conclude That the Inventor had Possession of the Claimed Invention

The test under the written description requirement is "whether the disclosure of the application relied upon reasonably conveys to those skilled in the art that the

inventor had possession of the claimed subject matter as of the filing date." *Ariad Pharm., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1351 (Fed. Cir. 2010) (*en banc*) (internal citation omitted); *Hynix Semiconductor Inc. v. Rambus Inc.*, 645 F.3d 1336, 1351 (Fed. Cir. 2011); Institution Decision at 25. It is well established that a claim does not lack written description "simply because the embodiments of the specification do not contain examples explicitly covering the full scope of the claim language." *Falkner v. Inglis*, 448 F.3d 1357, 1366 (Fed. Cir. 2005) (quoting *LizardTech, Inc. v. Earth Resource Mapping, PTY, Inc.*, 424 F.3d 1336, 1345 (Fed. Cir. 2005) (citing *Union Oil Co. v. Atl. Richfield Co.*, 208 F.3d 989, 997 (Fed. Cir. 2000))). This is because "the patent specification is written for a person of skill in the art, and such a person comes to the patent with the knowledge of what has come before. Placed in that context, it is unnecessary to spell out every detail of the invention in the specification." *Id.* The disclosure needed to satisfy written description "varies with the nature and scope of the invention at issue," and "with the scientific and technologic knowledge already in existence." *Capon v. Eshhar*, 418 F.3d 1349, 1357 (Fed. Cir. 2005). And "[s]ince the law is applied to each invention in view of the state of relevant knowledge, its application will vary with differences in the state of knowledge in the field and differences in the predictability of the science." *Id.* As a result, "written description questions are intensely factual,

and should be dealt with on a case-by-case basis, without the application of wooden rules." *Union Oil*, 208 F.3d at 1000.

2. The GB Application Provides Written Description Support for Claims 21-30 of the 844 Patent

Petitioner argues that the 844 Patent is not entitled to claim priority to the GB Application because the GB Application does not specifically disclose "'a piston rod' comprising an internal fourth thread that is engaged with a third thread of a 'driving member.'" Petition at 16. Petitioner further argues that "the '203 application[2] and each of the applications to which it claims priority repeatedly and uniformly describe the piston rod having external threads adapted to engage internal threads of two components (the drive sleeve and insert) that are 'located' between the piston rod and the housing." *Id.* at 17.

The Board determined that "Mylan has sufficiently demonstrated that the '844 patent is not entitled to a priority claim prior to . . . May 17, 2016." Inst. Dec. at 26. The Board noted that, "[w]e read the Great Britain patent application as disclosing a single embodiment with an externally-threaded piston rod." *Id*. Yet the Board acknowledged that "Sanofi does not provide any evidentiary support for its contention that a person having ordinary skill in the art would have recognized that

[2] '203 Application refers to U.S. Application No. 14/946,203, which is in the 844 patent's priority chain.

the inventors were in possession of the genus of internal and external threaded piston rods. We appreciate that . . . patent owner may be less inclined to provide declaration testimony with a preliminary response." *Id.* at 27.

Patent Owner Sanofi herewith submits expert testimony confirming that the GB Application reasonably conveys to those skilled in the art that the inventors of the 844 Patent had possession of a piston rod with an internal fourth thread that engages with a third thread of a driving member, such that the piston rod and driving rod are configured to rotate relative to one another during dose dispensing. Ex. 2107, ¶¶ 86-100.

3. The GB Application Discloses to a POSA Internally or Externally Threaded Piston Rods Engaged with a Threaded Driving Member

The GB Application broadly discloses threaded piston rods engaged with a driving member, and thus provides written description support for the claimed "piston rod comprising either an internal or an external fourth thread that is engaged with the third thread [of the driving member]." As a threshold matter, the GB Application discloses:

According to a first aspect of the present invention, a pen-type injector comprises
a housing;
a piston rod adapted to operate through the housing;
a dose dial sleeve located between the housing and the piston rod, the dose dial sleeve having a helical thread of first lead;
a drive sleeve located between the dose dial sleeve and the piston rod, the drive sleeve having a helical groove of second lead;
characterised in that the first lead of the helical thread and the second lead of the helical groove are the same.

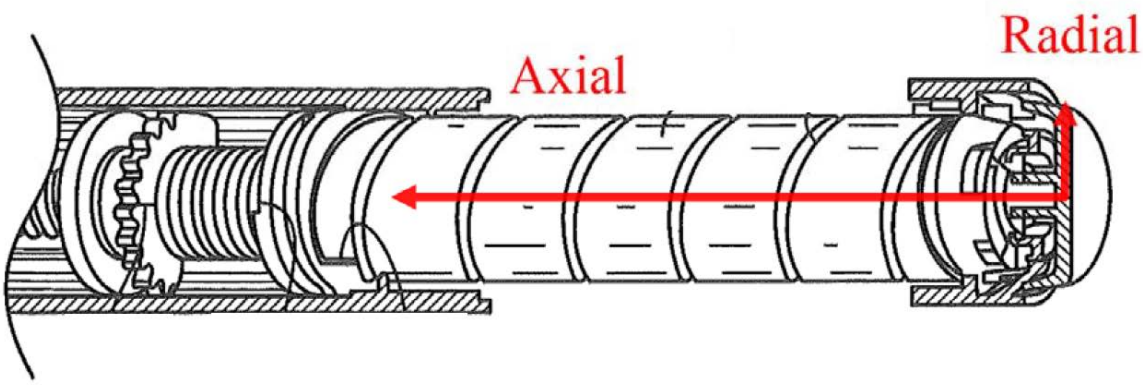
Preferably, the piston rod has a first threaded portion at a first end and a second threaded portion at a second end;
an insert or radially inwardly extending flange is located in the housing and through which the first threaded portion of the piston rod may rotate;
the dose dial sleeve being rotatable with respect to the housing and the insert;
the drive sleeve being releasably connected to the dose dial sleeve and connected to the piston rod for rotation with respect thereto along the second threaded portion of the piston rod;

Ex. 1026 at 0007-0008 (annotated). Nowhere in this broad disclosure does the GB Application limit itself to an externally threaded piston as Petitioner contends. Rather, the GB Application discloses a piston rod that "preferably. . . has a first threaded portion at a first end and a second threaded portion at a second end." An internally threaded piston rod falls within this broad disclosure, demonstrating to a POSA that the inventors were in possession of the genus of threaded piston rods (internally and externally) that engage with threads of a drive sleeve. Ex. 2107, ¶ 92.

The Board, however, seems to suggest that the GB Application discloses "a single embodiment with an externally-threaded piston rod," and thus the GB Application does not provide written description support for an internally threaded piston rod. Institution Decision at 26. First, it is wrong as a matter of law that the

specification must have an embodiment with an internally-threaded piston rod. *See LizardTech*, 424 F.3d at 1345 ("A claim will not [lack written description support] simply because the embodiments of the specification do not contain examples explicitly covering the full scope of the claim language.") (internal citation omitted). The externally threaded piston rod embodiment is expressly described as an "illustrated embodiment," not the only embodiment.

Additionally, Petitioner argues, and the Board provisionally agreed, that because the dose dial sleeve is located ***between*** the housing and the piston rod, the GB Application's broad disclosure is not actually broad, but limited to an externally threaded piston rod. This argument, however, is predicated on "between" being restricted to the radial direction – *i.e.*, from the center out. That interpretation is unduly narrow, however, particularly in view of the GB Application's use of the term "between." Specifically, the GB Application uses "between" to refer to the relationship of components in the axial direction (*i.e.*, lengthwise). *See, e.g.*, Ex. 1026 at 0012 (6:8-12) (using "between" in the axial direction when discussing threading "extending between the first flange 32 and the second flange 34."). The figure below illustrates the difference between the axial and radial directions:



A POSA, reading the GB Application, would understand that "between" includes axial and radial directions. Ex. 2107, ¶¶ 93-94. This plain meaning of "between" simply requires that one must encounter B as one goes from A to C: "between" by itself does not imply direction. Thus, where the passage above states that "a drive sleeve located between the dose dial sleeve and the piston rod," this includes the situation where the drive sleeve is located ***axially between*** the dose dial sleeve and the piston rod – particularly because the drive sleeve and dose dial sleeve may include flanges. *See*, *e.g.*, Ex. 1026 at 0008 (2:19-24), 0014 (8:23-24). Accordingly, a POSA would understand that the arrangement of a drive sleeve "between" a dose dial sleeve and a piston rod ***does not foreclose*** an internally threaded piston rod. Rather, a POSA would understand that the GB Application's disclosure of a threaded piston rod engaged to a drive sleeve would encompass both internally and externally threaded piston rods. Ex. 1026 at 8 (2:1-9).

Having established that the GB Application discloses a threaded piston rod, the relevant inquiry is whether this disclosure reasonably conveys to a POSA that the inventors had possession of an internally threaded piston rod – *i.e.*, whether the disclosure of the genus (threaded piston rod) includes disclosure of a particular species (internally threaded piston rod). The written description inquiry indisputably requires looking at what was known and available to a POSA. *Falkner v. Inglis*, 448 F.3d at 1366. Moreover, "[i]n order to satisfy the written description requirement, the disclosure as originally filed ***does not have to provide in haec verba support*** for the claimed subject matter at issue." *Purdue Pharma L.P. v. Faulding Inc.*, 230 F.3d 1320, 1323 (Fed. Cir. 2000).

At the time of the filing of the GB Application, driving mechanisms implementing an internally threaded piston rod driven by an externally threaded driver were well known to a POSA. Ex. 2107, ¶ 95. For example, U.S. Patent No. 4,648,872 ("872 Patent"), which was filed on November 15, 1983, discloses a medical infusion pump where the medicine delivery means comprises an externally threaded drive screw 14 that drives an internally threaded piston member 12. Ex. 2169 at 1:6-10, 2:55-61. *Id*. Below, left, is FIG. 1B from the 872 Patent showing the arrangement and operation of the pump, and below to the right is FIG. 3A, showing a cross-sectional view of the piston member 12 showing internal threads 31:

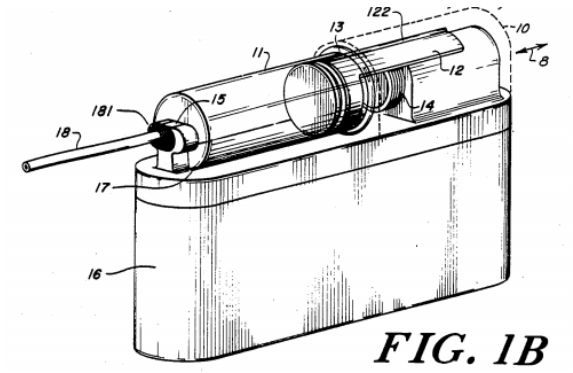


FIG. 1B

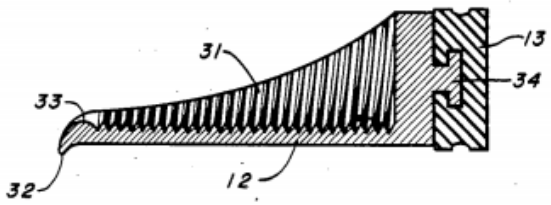


FIG. 3A

Ex. 2169 at Figs. 1B and 3A

Other patents before the filing date of the GB Application also disclose a driving mechanism whereby an internally threaded piston rod is driven by an externally threaded driver. U.S. Patent No. 4,747,824, which was filed on May 30, 1986, is directed to a hypodermic anesthetic injection method that includes an axially slidable "piston rod [that] is internally threaded to receive a drive screw 23." Ex. 2170 at 6:33-41, FIG. 5; Ex. 2107, ¶ 96.

Thus, at the time the GB Application was filed, a POSA would have been well aware of driving mechanisms where an internally threaded piston rod was driven by an externally threaded driver. Ex. 2107, ¶ 97. In fact, by the late 1990s, these mechanisms were described in the art as a "conventional lead-screw drive mechanism." *See* Ex. 2171 at Cover (showing 1999 filing date), 5:17-21, FIGS. 3a, 3b. Because this mechanism was conventional, it is enough that the GB Application discloses the genus, and not explicitly the species. *Falkner*, 448 F.3d at 1365 ("[a]

patent need not teach, and preferably omits, what is well known in the art.") (quoting *Spectra-Physics, Inc. v. Coherent, Inc.*, 827 F.2d 1524, 1534 (Fed. Cir. 1987).

The fact that internally and externally threaded piston rods were conventional distinguishes it from cases like *Ariad* where the patent lacked written description because the state of the art there was "primitive and uncertain." *Ariad*, 598 F.3d at 1336 ("The state of the art at the time of filing was primitive and uncertain, leaving Ariad with an insufficient supply of prior art knowledge with which to fill the gaping holes in its disclosure.") (internal citation omitted). A POSA would have understood that the disclosure in the GB Application of a threaded piston rod engaged to a driver provides adequate written description support for the claimed "piston rod comprising either an internal or an external fourth thread that is engaged with the third thread [of the driving member]." Ex. 2107, ¶¶ 97-100.

4. Petitioner's Expert Failed to Account for the Knowledge of a POSA When Forming His Opinion on Written Description

In forming his opinion on the issue of written description support for an internally threaded piston rod, Petitioner's expert, Mr. Leinsing, did not take into account whether such arrangements were already well known and conventional in the art. Mr. Leinsing's declaration is silent as to whether the prior art discloses internally threaded piston rods that engage with an externally threaded driver. Furthermore, when asked at his deposition about internally threaded piston rods, Mr. Leinsing stated, "[e]ven if it did show up in maybe one or two prior art [*sic*], I should

not have to rely on other prior art to teach me how to do the threads on the inside of a piston rod. I would expect the '844 patent to teach that." Ex. 2163 at 172:11-173:6. Thus, it is apparent that Mr. Leinsing's analysis was contrary to the law because it was confined to looking for *in haec verba* disclosure in the GB Application to support the claim limitation.

Mr. Leinsing's opinion testimony in this IPR proceeding is also inconsistent with his prior opinions in *Hologic, Inc. and Cytyc Surgical Prods, LLC v. Minerva Surgical, Inc*., Case No. 15-1031-JFB-SRF (D. Del.), which also involved the issue of written description support. In *Hologic*, where Mr. Leinsing was the expert for the patentee, Mr. Leinsing opined that, "a patentee ***does not need to include that which is already known to and available to a [POSA]***;" or that "[a] specification may contain a written description of a broadly claimed invention ***without describing all species that the claim encompasses***." Ex. 2172 at ¶¶ 36-37 (emphasis added). Yet in this case, Mr. Leinsing offers no analysis of what was "already known to and available to a [POSA]." Rather, Mr. Leinsing affirmatively stated in his deposition that he gave the prior art no regard in his analysis. Ex. 2163 at 172:11-173:6.

In contrast, Prof. Slocum has considered the disclosure of the GB Application as well as what was known, conventional, and available to a POSA. *See, e.g.*, Ex. 2107, ¶¶ 95-97. Understanding that the mechanical arts are predictable, Prof. Slocum concludes that the GB Application reasonably conveys to a POSA that the

inventors had possession of an internally threaded piston rod. According to Prof. Slocum, when the GB Application broadly discloses a drive sleeve connected to the second threaded portion of the piston rod, a POSA would have understood that the second threaded portion refers to internal or external threads engaging corresponding threads of a drive sleeve, as both configurations were well known and did not have to be explicitly shown to satisfy the written description requirement. Ex. 2107, ¶¶ 95-100. Thus, the GB Application provides written description for the 844 Patent claim.

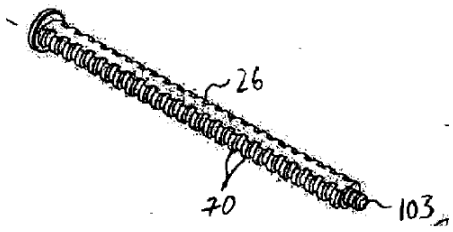
B. Ground 1 as to Claim 22 Should be Denied Because Giambattista Does Not Disclose a Piston Rod With a Circular Cross Section

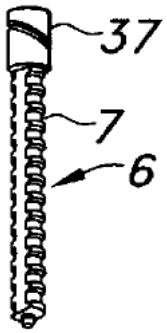
Challenged dependent claim 22 adds the limitation that the piston rod "has a circular cross-section." Petitioner argues that Giambattista's leadscrew 26 satisfies the "piston rod" limitation of the challenged claims. Petition at 54-55. Leadscrew 26, however, has a ***non***-circular cross-section and cannot satisfy claim 22. As seen in Giambattista at Figure 2, leadscrew 26 has two flat sides and thus the cross-section of the leadscrew is not circular. Ex. 2107, ¶¶ 414-415.

Notably, if Giambatistta's leadscrew were to have a circular cross-section, it would not work for its intended purpose. Ex. 2107, ¶ 415. Specifically, the flat sides of the leadscrew 26 (which make it non-circular) permit the leadscrew 26 to axially pass through the ***rectangular*** aperture 46 but not rotate, which is critical for the system to operate in the mode of a rotating nut driving a non-rotating leadscrew.

Id. When the leadscrew 26 moves axially, aperture 46 prevents rotation of the leadscrew 26. *See* Ex. 1016, 3:3-6 ("aperture 46 is defined to allow the passage therethrough of the leadscrew 26, yet the aperture 46 is shaped (e.g., ***being rectangular***) to prevent rotation of the leadscrew 26 therewithin.") (emphasis added).

The fact that Giambattista's leadscrew has a non-circular cross-section is confirmed by other prior art. Specifically, Steenfeldt-Jensen discloses a piston rod (below right) having essentially the same shape as that of Giambattista's lead screw 26 (below left):





Giambattista (Ex. 1016) **Steenfeldt-Jensen (Ex. 1014)**

Steenfeldt-Jensen describes its piston rod as having a "***not*** round cross-section" and a "***non***-circular cross section." Ex. 1014; *see also id*., Abstract. The non-circular cross-sectional shape serves the same purpose in Steenfeldt-Jensen – it can fit "through the driver tube bore which has a corresponding not round cross-section." *Id*., 11:16-17; Ex. 2107, ¶ 416

Notwithstanding this evidence to the contrary, Petitioner argues that leadscrew 26 has a circular cross-section because "[c]laim 22 does not recite that the piston rod has a uniformly circular cross section along its entire length." Petition at 54-55. Petitioner then relies on the very ends of Giambattista's leadscrew 26 to argue that the limitation is satisfied. This interpretation of the claim is not reasonable and the categorization of Giambattista's lead screw is incorrect.

The claim requires that "the piston has a circular cross-section," and nowhere in the claim or specification is it suggested or described that the cross-section of the piston rod is defined by the very ends (e.g., the head) of the piston rod. Rather, the specification shows that the piston rod has a circular cross-section over its length because it is adapted to engage with and move rotationally and axially relative to the cylindrical bore in the drive sleeve. *See* Ex. 1004 at 3:65-66, 4:13-14, 6:55-58, Figs. 9-11; Ex. 2107, ¶¶ 418-19.

In contrast, a POSA would understand that the cross-section of the leadscrew in Giambattista is non-circular over the entire length of the screw so that it can slot through and is rotationally constrained to the ***rectangular*** aperture 46 of the bulkhead 44. Ex. 2107, ¶ 420. Furthermore, the description in Steenfeldt-Jensen again supports Patent Owner's position. Steenfeldt-Jensen's piston rod has an upper portion 37 as well as a bottom tip that are circular, but the description clearly states that leadscrew has a "not round cross-section" / "non-circular cross section." Ex.

1016, Abstract, 11:15-17. The description in Steenfeldt-Jensen is exactly how a POSA would categorize the cross-section of the Giambattista leadscrew—***non-circular***.

Petitioner's expert offers an additional argument that even though the leadscrew 26 has two flat sides, "the piston rod has circular helical threads along the majority of its length so it is understood to have a 'generally circular cross-section' with flat sides." Ex. 1011, ¶ 577. First, a POSA would understand that the cross-section of the Giambattista leadscrew with two flat sides is not circular, and is instead shaped to fit through a generally rectangular slot. Ex. 2107, ¶ 421. Second, the claim calls for a piston rod with a *circular* cross section, not a *generally circular* cross section. There is no basis for Mr. Leinsing's proposed revision to the claim language, particularly where a circular and a non-circular cross-section would not perform the same function. The circular cross section would not restrain the rotation of the leadscrew which is critical for the operation of Giambattista. Ex. 2107, ¶ 420-21.

Giambattista therefore does not anticipate claim 22.

C. Ground 1 as to Claims 24-29 Should Be Denied Because Giambattista Does Not Disclose Any Kind of Feedback or Clicks Indicative of Unit Doses

Giambattista does not anticipate dependent claims 24-29. Claim 24 requires that the clutch provide audible and tactile feedback indicative of unit doses of

medicament.[3] Claim 25 further requires that the clutch provide audible clicks during dose cancelling, where each click is equal to a unit dose of medicament. Claim 29, which depends from claim 21, requires a clicker that provides audible clicks during dose setting, where each click is equal to a unit dose of medicament. Nowhere does Giambattista disclose the requirement that the audible and tactile feedback (claim 24) or audible clicks (claims 25 and 29) be indicative of unit doses of medicament.

Instead, Petitioner simply assumes that because the action of the ratchet arms 96 moving over the ribs 80 creates sound and because Giambattista discloses that the ratchet arms 96 provide a holding force to maintain the radial position of dose knob 20 relative to dosing ring 22, Giambattista discloses "each audible signal (i.e., click) as a unit dose of medicament." Ex. 1011, ¶ 594. But nowhere does Giambattista disclose audible or tactile feedback ***indicative of unit doses***. Petitioner is reading into Giambattista disclosures that are not there. *In re Arkley*, 455 F.2d 586, 589 (C.C.P.A. 1972) ("We do not read into references things that are not there."); *TF3 Ltd. v. Tre Milano*, LLC, 894 F.3d 1366, 1374 (Fed. Cir. 2018) ("Claims cannot be 'anticipated' by devices that are not the same. Invalidity for anticipation requires that the identical invention must be shown in as complete detail as contained in the patent claim.") (internal citation omitted).

[3] Claims 25-28 depend from claim 24.

At best, Petitioner is making an inherency argument that because there is an audible / tactile signal during dose dialing, the audible / tactile signal is necessarily indicative of unit doses. But there is no support for that argument. Giambattista has no disclosure that one click corresponds to one unit dose or, for example, that five clicks correspond to one unit dose. And in fact, Giambattista discloses that the number of ribs 80 of the dosing ring 22 over which the ratchet arms 96 move is not based on unit doses, but rather based on grooves 76 positioned around the entire periphery of the dosing ring 22. Ex. 1016, FIG. 9, 3:49-51. Giambattista discloses that these grooves, which correspond to the number of ribs (*see* FIG. 9), are numerous because they are designed to facilitate alignment with teeth 100 of the dose knob 20. Ex. 1016, Ex. 4:29-30; FIG. 9. Thus, Giambattista does not disclose that the number of ribs 80 corresponds to unit doses. As a result, Giambattista does not disclose these limitations.

D. Ground 2 Should be Denied Because the Combination of Giambattista and Steenfeldt-Jensen is Based on Hindsight

In Ground 2, Petitioner challenges claims 24-29 of the 844 Patent as obvious over Giambattista in view of Steenfeldt-Jensen. More specifically, Giambattista fails to disclose, as discussed above, audible or tactile feedback, or audible clicks indicative of a unit dose as required by claims 24, 25 and 29. *See supra* § VII(C). Petitioner thus argues that these claims are obvious when Giambattista is combined

with Steenfeldt-Jensen.[4] Petition at 66-69. Petitioner, however, fails to provide a motivation for a POSA to modify Giambattista in view of Steenfeldt-Jensen, which is required to support obviousness.

Specifically, Petitioner argues that Steenfeldt-Jensen discloses a clicking system where a protrusion extended into a number of depressions with "[t]he angular spacing of the depressions are appropriately made so that a dose of one unit is set when the protrusion is moved from one depression to the neighbouring depression so that the number of clicks heard and felt during the dose setting rotation corresponds to the size of the set dose." Petition at 66-67 (quoting Ex. 1014, 6:48-53). Based on this passage from Steenfeldt-Jensen, Petitioner concludes that a POSA would have modified the arrangement of the ribs 80 of the dosing ring 22 such that a dose of one unit would be heard when the ratchet arms 96 moved across each rib 80. Petition at 67-68.

Petitioner's argument fails for several reasons. First, the pen in Giambattista was designed to solve the issue of prior art pens when a user inadvertently dialed too large a dose and was then faced with either having to dial back, and wastefully

[4] Claims 26-28 are included in this Ground presumably because they depend from claim 24.

dispense medicine, or reset the dose dialing operation thereby wasting the user's time. Ex. 1016, 1:20-37, 1:56-60.[5] The Giambattista pen was not designed to solve the problem of providing audible or tactile feedback indicative of unit doses. Thus, Giambattista, while concerned about being able to cancel a dose, does not disclose or suggest that its pen could be modified to provide audible or tactile feedback indicative of unit doses.

Second, the only reasoning Petitioner provides for making this modification is "so that the number of clicks heard and felt during dose setting rotation corresponds to the size of the set dose." Petition at 68. This statement, however, reflects what Petitioner believes Steenfeldt-Jensen discloses (*see id*.), not a reason ***why*** a POSA would modify Giambattista to arrive at the claim limitation. The only apparent justification for the modification is the limitation itself. Petitioner has the burden to demonstrate that a POSA would be ***motivated*** to make this modification, not that a POSA ***was able to*** make this modification. *Polaris Indus. v. Arctic Cat,*

[5] Giambattista's achieves this by providing a spring 106 that is disposed between the ledge 72 of the driver 24 and the shoulder 104 of the dosing ring adaptor 28. Ex. 1016, 4:36-42. The spring allows the grooves 76 of the dosing ring 22 to be spaced from teeth 100 of the dose knob 20, which allows for dose canceling without dispensing medicament. *Id*., 4:49-64.

Inc., 882 F.3d 1056, 1068 (Fed. Cir. 2018) (reversing a finding of obviousness because "the Board focused on what a skilled artisan would have been *able* to do, rather than what a skilled artisan would have been *motivated* to do at the time of the invention.") (emphasis in original) (citing *InTouch Techs., Inc. v. VGO Commc'ns, Inc*., 751 F.3d 1327, 1352 (Fed. Cir. 2014) (concluding that a party's expert "succumbed to hindsight bias in her obviousness analysis" where such analysis "primarily consisted of conclusory references to her belief that one of ordinary skill in the art could combine these references, not that they would have been motivated to do so."). Thus, because the Petitioner did not provide any reasoning for making this combination, Petitioner has not met its burden.

E. Ground 3 Should be Denied Because the Proposed Combination Does Not Fall Within the Scope of Claim 30 and a POSA Would Have Been Dissuaded From Making the Combination

In Ground 3, Petitioner argues that it would have been obvious to modify Giambattista in view of Klitgaard to include a nut that tracks each set dose of medicament delivered, as required by claim 30 of the 844 patent. Petition at 69-72. Petitioner's argument fails for two reasons. First, the modification proposed by Petitioner would not satisfy claim 30. Second, a POSA would not modify Giambattista in view of Klitgaard, because it would undesirably widen the pen, making it difficult for patients to use—a result that is contrary to pen design considerations.

1. Petitioner's Proposed Modification Would Not Satisfy Claim 30

Petitioner states that Giambattista could be modified as follows: "nut member 32 as described in Klitgaard [FIG. 3] could be easily adapted and disposed between dosing ring adapter 28 and dose knob 20 to track each set dose of medicament delivered." Petition at 72. A POSA, however, would have understood that if Klitgaard's nut member is positioned between the dosing ring adapter 28 and dose knob 20 of Giambattista, it would not operate to track each set dose of medicament because a user could still dial a dose beyond the amount of medicament remaining in Giambattista's drug cartridge 32. The proposed modification to Giambattista would not satisfy claim 30 because the proposed adapted nut member would not "track[] each set dose of medicament delivered."

a) Klitgaard Prevents Dose Dialing Beyond the Amount of Medicament Remaining in the Cartridge

Klitgaard's nut member does not allow a user to dial a dose beyond the amount of medicament remaining in a cartridge. More specifically, FIG. 3 of Klitgaard (shown below) discloses that between dose setting member 30 (shown in yellow) and the driver 31 is a nut member 32 (shown in red) having internal threads that engage a helical track 33 that extends all along the length of the driver 31. Ex. 1017, 4:26-28.

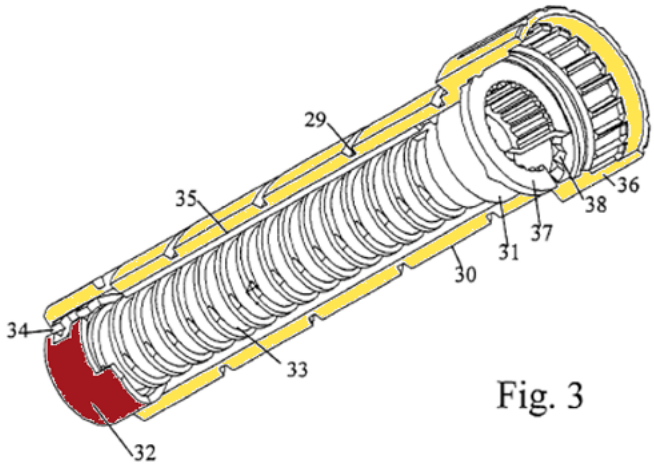


Fig. 3

Ex. 1017, Fig. 3

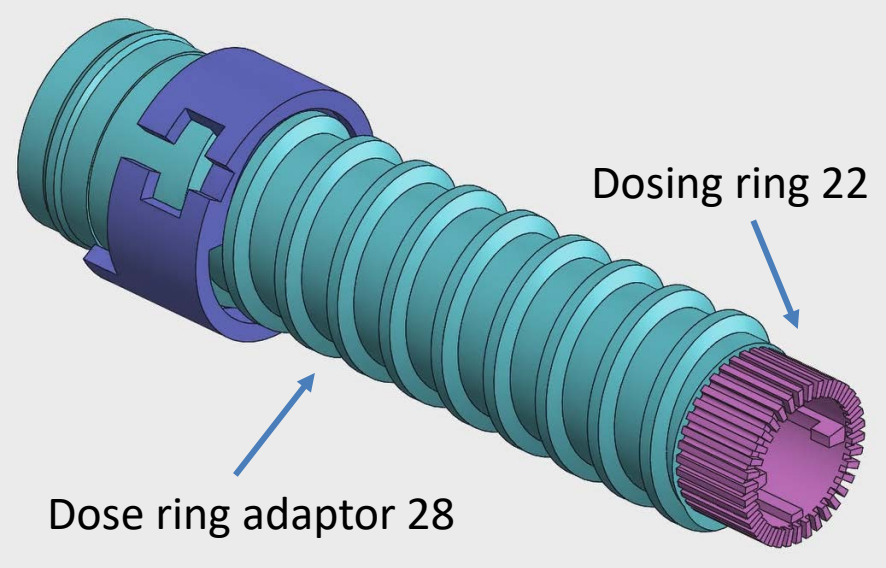
To set a dose, a user rotates the dose setting member 30, which rotates relative to the driver 31. *Id*., 4:23-25. During this time, a ridge 35 of the dose setting member 30 engages with a recess 34 of the nut member 32 so that the nut member 32 rotates with the dose setting member 30 causing the nut member 32 to move along the helical track 33. *Id*., 4:33-37. As a result, in Klitgaard, the position of the nut member 32 on the helical track 33 reflects the dosage dialed by the dose setting member 30. *Id*.

In Klitgaard, during dose dispensing, the driver 31 and the dose setting member 30 engage so that they do not rotate relative to one another causing the nut member 32 to maintain its position. *Id*., 4:37-52. When a subsequent dose is dialed, the nut member 32 will again advance on the helical track 33. *Id*., 4:26-29. The position of the nut member 32 on the helical track is thus indicative of the amount of medicament dispensed. Ex. 2107, ¶ 427; *see also* Ex. 1017, 4:52-54. When the

nut member 32 gets to the end of the helical track 33, no more doses can be dialed because the nut member 32 prevents dose setting member 30 from rotating to dial a dose. Ex. 1017, 4:54-58.

b) In Petitioner's Proposed Modification, a User Could Dial a Dose Beyond the Amount Remaining in the Cartridge

The modification proposed by Petitioner attempts to adapt Klitgaard's nut member 32 for use in Giambattista. The problem with the modification is that Giambattista's dose ring 22 and dose ring adaptor 28 (components not present in Kiltgaard) would interfere with the operation of nut member 32 and prevent it from dose tracking. According to Petitioner's modification, Klitgaard's helical track 33 is added on Giambattista's dose ring adaptor 28. Ex. 2107, ¶ 428. The nut member 32 is rotated by the dose knob 20 during dose dialing which moves the nut member 32 along the added helical track. *Id*. A screenshot from the animation submitted with Patent Owner's Response depicting the dose ring adaptor 28 with a helical track, the dosing ring 22, and the nut member 32 is shown below:



Ex. 2167

Petitioner's proposed modification would not work because when the nut member 32 gets to the end of the helical track on dose ring adaptor 28, the dose knob 20 (*i.e.*, the component that dials a dose) will still be able to rotate to dial a dose, even when there is no medicament remaining. Ex. 2107, ¶¶ 429-432. This is because the dose ring adaptor 28 and dosing ring 22 would interfere with the operation of the nut member 32. Specifically, Giambattista discloses that the dose ring adaptor 28 and dosing ring 22 can be snap fit or in an alternative embodiment, formed unitarily.

In the embodiment where dose ring adaptor 28 is snap fitted to dosing ring 22, dose ring adaptor 28 rotates during dose dialing, whereas dosing ring 22 cannot, because dose ring 22 is rotationally fixed to the driver tube 24. Ex. 2107, ¶¶ 429-430. As a result, when the proposed added nut member reaches the end of the helical track on dose ring adaptor 28, the dose knob 20 (not shown above) would continue

to rotate. *Id*. Thus, the proposed nut member would not prevent rotation of the dose knob 20 even when there was no medicine remaining to be dispensed. This is not an issue in Klitgaard because Klitgaard's driver 31 is rotationally fixed during dose dialing. That is not the case in Giambattista – the dose ring adaptor 28 is not rotationally fixed during dose dialing. *Id*. Exhibit 2167 is an animation of Petitioner's proposed modification to Giambattista illustrating this point. *Id*., ¶ 430.

In the alternative embodiment where dose ring adaptor 28 is formed unitarily with dose ring 22, dose ring adaptor 28 still would not be rotationally fixed when the nut member reached the end of the helical track. As described above, the driver 24 of Giambattista is designed not to rotate in the dose dialing direction. Ex. 1016, 3:26-37. The driver 24 includes ratchet fingers 66 that cooperate with ratchet teeth 52 to "provide a measure of protection against unwanted rearward movement of the leadscrew 26." Ex. 1016, 3:32-37.

A POSA would have understood that the "measure of protection" is actually low given that only a nominal torque is applied on the driver 24 during dose dialing. Ex. 2107, ¶¶ 431-32. This is evidenced by the small size of ratchet teeth 52 relative to the diameter of the channel 50 shown in FIG. 4 of Giambattista. *Id*. The torque applied by a user on the dose knob 20 to dial a dose, however, is much greater. *Id*. In Petitioner's modification of Giambattista, when the nut member reaches the end of the helical thread, if a user continued to dial a dose, the applied torque would

overcome the "measure of protection" provided by ratchet fingers 66 and ratchet teeth 52, thereby causing the dose ring adaptor 28 to rotate during dose dialing. Thus, the proposed nut member would not prevent rotation of the dose knob 20 even when there was no medicine remaining to be dispensed. Ex. 2168 is another animation of Petitioner's proposed modification to Giambattista illustrating this point. Ex 2107, ¶ 432.

Thus, regardless of whether dose ring adaptor 28 is snap fitted with dosing ring 22 or formed unitarily, the resulting pen could not comprise a nut that tracks each set dose of medicament delivered, as required by claim 30.

2. A POSA Would Not Be Motivated to Make Petitioner's Modification

Putting aside that Petitioner's modification would not meet the claim limitations, the modification would markedly increase the diameter of the device, thereby impairing the user's ability to handle and operate the pen – which both experts agree is undesirable. A POSA would therefore not have been motivated to make Petitioner's modification to Giambattista.

As described above, Klitgaard's nut member 32 is positioned between the driver 31 and the dose setting member 30. Ex. 1017, 4:25-32. In Petitioner's modification, the nut member is not positioned on Giambattista's driver 24, but on dose ring adaptor 28. Because dose ring adaptor 28 is larger in diameter than driver 24, a larger nut member is required, as well as a helical track, both of which must be

positioned on the exterior of the dose ring adaptor 28. Ex. 2107, ¶ 434. Because a helical track and nut member are now positioned on the exterior of dose ring adapter 28, the diameter of dose knob 20 and body 18 must also increase. This would proportionally increase the overall diameter of the pen by approximately 25%, which is not ergonomic and would impair the user's ability to handle and operate the dispensing apparatus. Ex. 2107, ¶ 435. Moreover, in addition to the undesirable size increase, the proposed modification would increase the force required to inject a dose because the increased diameter causes increased frictional torque between the internal thread of body 18 and external thread of dose knob 20 (*i.e.*, the backdriving function). A POSA would understand that the increased size and resulting undesirable ergonomics, in combination with the increased frictional torque, would decrease the usability of the injection pen and make it harder for patients to use, especially in view of the various hand and wrist conditions frequently experienced by diabetic patients. Ex. 2107, ¶¶ 44-61, 435.

Mr. Leinsing confirmed at his deposition that a wider pen would be undesirable, not only because it would be difficult for patients to use, but also because the resulting increased frictional forces would increase the force the user needs to exert to dispense their medication. Ex. 2163 at 169:2-170:11. He also confirmed that it would increase the cost of manufacture because more material and more parts would be needed to make the modified pen. *Id*. Because Petitioner's

modification would result in an undesirably wider, more complex, costly, and difficult to use pen, a POSA would not have been motivated to make this modification.

VIII. OBJECTIVE INDICIA OF NONOBVIOUSNESS

The PTAB has recognized that "objective evidence of nonobviousness[] may lead to a conclusion that the claimed invention would not have been obvious to one with ordinary skill in the art." *Lupin Ltd. v. Senju Pharm. Co*., No. IPR2015-01100, Paper 70 at 20 (P.T.A.B. Sep. 12, 2016) (holding patent nonobvious in view of objective evidence of nonobviousness, despite prior art evidence of obviousness). Objective indicia help "guard against slipping into use of hindsight, and to resist the temptation to read into the prior art the teachings of the invention in issue." *Graham v. John Deere Co. of Kan. City*, 383 U.S. 1, 36 (1966). Objective indicia of nonobviousness may include long-felt but unresolved need for the invention, commercial success of embodying products, and industry praise, among other factors, which the PTAB must evaluate before reaching an obviousness determination. *Id*. at 35-36; *see also Transocean Offshore Deepwater Drilling Inc. v. Maersk Drilling USA, Inc*., 699 F.3d 1340, 1349-50 (Fed. Cir. 2012) (objective indicia must be considered). The Federal Circuit has held that evidence of objective indicia "may often be the most probative and cogent evidence in the record." *WBIP, LLC v. Kohler Co.*, 829 F.3d 1317, 1328 (Fed. Cir. 2016).

A nexus must exist between the objective indicia and the claimed invention. *WBIP*, 829 F.3d at 1331. The nexus inquiry is directed to the invention as a whole and not to individual limitations. *Id*. at 1330. A nexus is presumed to exist "when the patentee shows that the asserted objective evidence is tied to a specific product and that product 'is the invention disclosed and claimed in the patent.'" *Id*. at 1329. Here, the objective indicia and nexus to the claimed invention confirm the non-obviousness of the 844 Patent.

A. LANTUS® SoloSTAR® Practices Claims 21 and 30 of the 844 Patent

As an initial matter, Sanofi's LANTUS® SoloSTAR®[6] product practices claims 21 and 30 of 844 Patent. Ex. 2107, ¶¶ 551-610. As explained by Prof. Slocum, the inventions in the challenged claims describe a set of components that elegantly work together to provide the user a mechanical device that is easy to use and includes a combination of desirable features and properties, such as (i) low injection force, (ii) short injection stroke length or higher maximum dose per injection, and (iii) a relatively small number of components that decrease the complexity of the device. Ex. 2107, ¶ 651. For example, Prof. Slocum confirms that

[6] LANTUS® is the commercial name for Sanofi's insulin glargine formulation, and LANTUS® SoloSTAR® is the commercial name for LANTUS® packaged in the SoloSTAR® pen injector.

the claimed components and interfaces, such as the threaded engagements, piston rod and driving members configured to rotate relative to one another during dose dispensing, and nut that tracks each set dose of medicament delivered, are reflected in the LANTUS® SoloSTAR®. *Id*.

B. The LANTUS® SoloSTAR® Satisfied Previously Unresolved Needs for Pen Injectors Due To the Inventions of the 844 Patent

As set forth below, due to the contributions of the above features described by Prof. Slocum, the LANTUS® SoloSTAR® satisfied long-felt, but unresolved needs existing in commercially available pen injectors.

Dr. Robin Goland, a leading endocrinologist and co-director of the Naomi Berrie Diabetes Center at Columbia University, explains that for patients dealing with a lifelong condition that requires daily medication/care, as with diabetes, anything that can be done to reduce the burden of living with such a condition is a huge benefit. Ex. 2111 ¶ 22. For example, people suffering from diabetes experience higher rates of deterioration of fine motor skills that impact hand–eye coordination, balance, and dexterity, among other basic skills. Ex. 2111 ¶ 23. These problems can be especially pronounced with the elderly. *Id.* Moreover, people with diabetes suffer from higher rates of carpal tunnel syndrome (diabetic hand), stiff hand syndrome, shoulder-hand syndrome (reflex dystrophy), and limited joint mobility, the latter of which is especially common with younger patients. Ex. 2111 ¶ 24. Each of these conditions interferes with the patient's basic life activities, in particular, with the

ability to administer diabetic medications. Ex. 2111 ¶ 25. Accordingly, diabetic patients need an easy-to-use injection device with a low injection force to reduce the burden on the patient and increase the likelihood of the patient adhering to their prescribed therapy. Ex. 2111 ¶¶ 24-26.

Prior to the launch of LANTUS® SoloSTAR®, there were multiple injection pens on the market for administering insulin or an insulin analog – *e.g.*, Levemir FlexPen and Lantus OptiClik in the long-acting category, and the Humalog KwikPen in the rapid-and intermediate-acting categories, among many others. These injection pens, however, had numerous shortcomings and design flaws that resulted in significant injection force. A 2007 study, for example, found that FlexPen ranked far below SoloSTAR in injection force. Ex. 2143; *see also* Ex. 2144. The OptiClik likewise had many deficiencies, including a direct drive system that resulted in a high injection force. Ex. 2107, ¶ 646. Numerous other studies confirmed the relatively high injection force of each of the pens on the market at the time of and prior to the launch of SoloSTAR. Ex. 2111 ¶¶ 23-25 (discussing studies); Ex. 2109 ¶¶ 52-55 (discussing studies). As Dr. Goland explains, the high injection force of these prior art pens made the devices difficult to use and thus increased the risk of patients not adhering to their insulin and insulin-analog therapy. Ex. 2111 ¶¶ 33-35.

The LANTUS® SoloSTAR® revolutionized the injection pen market, in large part because the LANTUS® SoloSTAR® was easy to use. *See*, *e.g.*, Ex. 2142, Press

Release, Prix Galien, 2009 (naming DCA as a candidate for the prestigious Best Medical Device for SoloSTAR®). As Dr. Goland explains, "the pen is so easy-to-use because of the low injection force, or the amount of pressure a patient needs to apply to the injection button in order to inject the dose." Ex. 2111 ¶ 33. This is reflected in literature at the time that demonstrates that the LANTUS® SoloSTAR® required a greatly reduced injection force. *See, e.g.*, Ex. 2116 at 7 (explaining the challenge of combining low injection force with the need for a short dial extension and large dose injections). Moreover, these papers confirm that injection force was a primary concern.

And, as recited in the 844 Patent, the primary intent of the invention is to address these specific problems in the prior art – "The illustrated embodiment . . . helps reduce the overall force required for a user to cause medicinal product to be dispensed." Ex. 1004, 4:7-9. Indeed, as reflected in a related patent, "[s]urprisingly it was found that the drive mechanism according to instant invention without having a unidirectional coupling provides a valuable technical alternative for drive mechanisms, wherein reduced force is needed to actuate the mechanism."[7] Ex. 1005, 1:66-2:3.

[7] This description is from the 008 Patent, which is related to the 844 Patent. *See* footnote 1, *supra*.

The industry extensively recognized SoloSTAR for solving the problem of needing to deliver high doses with a short dial extension and with low injection force. *See, e.g.*, Ex. 2128 (discussing SoloSTAR's unique characteristics that "overcome existing unmet needs," specifically, the short dial extension, larger maximum dose, low injection force, simplicity of use); *see also* Ex. 2117; Ex. 2123 at 6; Ex. 2184 at 2 (containing a statement by endocrinologist Sjoberg Kho of the University of Santo Tomas Hospital that "self-injection can be a barrier to acceptance of insulin therapy. However, the Lantus® SoloSTAR operates with a low injection force 31 percent less than other insulin pens that allows a gentle injection."); Ex. 2185 at 1 (containing a statement by Denis Raccah, Professor of Endocrinology, University Hospital Sainte Marguerite, France, that, "Insulin injection with SoloSTAR® brings flexibility, satisfaction for the patients, and an opportunity for earlier initiation of insulin therapy which may contribute to better long term glycemic control".).

Patients likewise expressed a preference for SoloSTAR for its low injection force. *See, e.g.*, Ex. 2143; Ex. 2121 at 2, 9 (finding that 7 out of 10 patients now prefer the lower injection force of SoloSTAR® to competitor products and in 2008 it accounted for "41% of all growth in the global injectable insulin market"); Ex. 2144.

The product has thus satisfied a long-felt but unmet need for an easy-to-use pen that was particularly well suited to administer medication with a low injection force.

C. The Lantus® SoloSTAR® Received Industry Praise for its Patented Features

The nonobviousness of the 844 patent is further demonstrated by the high level of praise and industry recognition that Sanofi and DCA, the design firm with whom Sanofi partnered in creating SoloSTAR®, received for the designs embodied in the SoloSTAR® device. In 2009, for example, SoloSTAR won the Gold, International Export, and Grand Prix awards at the Design Business Association (DBA) Design Effectiveness Awards. *See* Ex. 2121. The DBA is a design organization based in the UK that is interested in how a design commercially impacts a company's business. The case study of SoloSTAR for the DBA Awards describes the SoloSTAR's inventiveness as "suitably ambitious" and explains that "SoloSTAR® is the first disposable insulin pen to combine very low injection force (which provides a smooth injection experience for patients) with 80 units maximum dose capability, an important breakthrough." *Id*. at 3. SoloSTAR also won the Good Design Award by the Chicago Athenaeum Museum of Architecture and Design. Ex. 2201. In connection with this award, and as recognition of its inventiveness, the Lantus® SoloSTAR® device was put into the permanent Design Collection of the Chicago Athenaeum Museum of Architecture and Design. Ex. 2109 ¶ 73.

Additionally, in 2007, SoloSTAR® won the Good Design Award by the Chicago Athenaeum Museum of Architecture and Design. *Id*. The criteria for this award are "quality design of the highest form, function, and aesthetics a standard beyond ordinary consumer products and graphics." *Id*. Christian K. Narkiewicz-Laine, President of the Chicago Athenaeum Museum of Architecture and Design noted that "SoloSTAR represents a design for social good and for humanitarian concerns." *Id*. In connection with this award, the Lantus® and Apidra® SoloSTAR® devices were put into the permanent Design Collection of the Chicago Athenaeum Museum of Architecture and Design, as recognition of its inventiveness. *Id*.

Finally, at the Prix Galien USA 2009 Award, which "recognize[s] innovative biopharmaceutical drugs and medical technologies" and "is considered the industry's highest accolade for pharmaceutical research and development — equivalent to the Nobel Prize," Sanofi and DCA were both finalists. *Id*. ¶ 74.

In sum, Sanofi and DCA received a high level of acclaim for the design of the SoloSTAR® device.

D. The Commercial Success of the LANTUS® SoloSTAR® is Attributable to the Inventions in the 844 Patent

The tremendous commercial success of LANTUS® SoloSTAR® is further objective evidence of non-obviousness. The commercial success is demonstrated by the contribution of LANTUS® SoloSTAR® to the growth of the LANTUS®

franchise overall, and by the strong performance of LANTUS® SoloSTAR® when compared to other long-acting insulin and insulin analog pens.[8]

As explained by Dr. Grabowski, LANTUS® SoloSTAR® has enjoyed fast and long-sustained growth in terms of dollar sales, new prescriptions, and total prescriptions. *Id*. ¶ 12. The commercial success of LANTUS® SoloSTAR® is also demonstrated by the overall levels and shares of dollar sales, new prescriptions, and total prescriptions, as well as the profitability and formulary placement achieved by LANTUS® SoloSTAR®. *Id*. This success is notable because sales and prescriptions for LANTUS® SoloSTAR® remained strong despite the entry of several competing long-acting insulin and insulin analog drugs (all in pen form) starting in 2015. *Id*. Furthermore, the LANTUS® SoloSTAR® achieved the highest level of sales among long-acting insulin and insulin analog pens even though it launched after several other long-acting insulin and insulin analog pens, including the Levemir® FlexPen® (the commercial embodiment of Steenfeldt-Jensen), which was the first long-acting insulin or insulin analog product available in a disposable pen. *Id*.

[8] Although Patent Owner's commercial success evidence focuses on the long-acting insulin and insulin-analog market in which LANTUS® SoloSTAR® competes, the device satisfied long-felt needs left unresolved by inferior injection pen devices in other markets, such as the rapid-acting and intermediate acting markets.

The success of LANTUS® SoloSTAR® is further evidenced by its substantial growth relative to LANTUS® OptiClik®, which is an older pen injector product that included the same insulin glargine formulation as LANTUS® SoloSTAR®. *Id*.¶ 12. For example, new prescriptions of LANTUS® OptiClik® totaled 461 thousand in the third year after its launch, and total prescriptions amounted to 1.2 million by this time. By comparison, new prescriptions of LANTUS® SoloSTAR® (using the exact same insulin formula) totaled 1.6 million in the third year after its launch, and total prescriptions amounted to 3.9 million by this time. *Id*. at ¶ 37.

As explained by Prof. Slocum and Dr. Grabowski, each of the features of the device disclosed and claimed in the 844 Patent and used in LANTUS® SoloSTAR® contributed to its commercial success. Ex. 2109 ¶ 53; Ex. 2107, ¶¶ 551-610, 651. For example, there was a long-felt but unfulfilled need for an easy-to-use pen device with low injection force. As explained in the supporting declaration of Dr. Goland, the SoloSTAR® device satisfied that need and drove patient adoption. Additionally, as explained in the supporting declaration of Dr. Grabowski, the SoloSTAR® device won numerous design awards, and achieved significant industry praise. Finally, as explained above and in the supporting declaration of Prof. Slocum, the SoloSTAR® device embodies the challenged claims of the 844 patent. Thus, there is a nexus between the claimed invention in the 844 patent and the commercial success of LANTUS® SoloSTAR®.

To the extent Petitioner argues that Patent Owner's evidence of commercial success is not due to the claimed invention, but rather, to factors beyond the claimed invention such as, *e.g.*, marketing, such arguments should be rejected. In particular, Dr. Grabowski analyzed marketing expenditures for long-acting insulin products and determined that sales of LANTUS® SoloSTAR® exceeded sales for other well-marketed long-acting insulin products despite the fact that total marketing expenditures for LANTUS® SoloSTAR® were in line with, or were lower than, many other long-acting insulin products. Ex. 2109 ¶¶ 16, 64-69. Patent Owner's marketing of LANTUS® SoloSTAR® therefore does not explain the commercial success of LANTUS® SoloSTAR®.

Moreover, to the extent Petitioner argues that Patent Owner's evidence of commercial success is due to alleged "blocking patents" covering the glargine molecule that is used in the production of the active ingredient in Lantus®, any such argument would be misplaced. First, the law does not mandate across-the-board-discounting of commercial success simply because other patents cover components of the product. Rather, the PTAB is directed to weigh the evidence on a case-by-case basis, in light of the specific commercial success argument being made. *Acorda Therapeutics, Inc. v. Roxane Labs., Inc.*, 903 F.3d 1310, 1339 (Fed. Cir. 2018), *pet. for cert filed*, No. 18-1280 (U.S. Apr. 8, 2019) (noting that while a blocking patent "can be evidence that can discount the significance of evidence that nobody but the

blocking patent's owners or licensees arrived at, developed, and marketed the invention covered by the later patent," the "magnitude of the diminution … is a fact-specific inquiry").

Second, as described above, the success of Lantus® SoloSTAR® cannot be attributed solely to the insulin glargine molecule because Lantus® OptiClik® used the exact same Lantus® formulation and failed to achieve the success of SoloSTAR®. Thus, the success of SoloSTAR® is attributable at least in part to its unique design covered by the 844 patent.

Third, Sanofi's earlier patents on the insulin glargine molecule did not prevent others from entering the market for non-glargine, long-acting insulin products and competing with Lantus® SoloSTAR®. Indeed, as explained above, numerous other competitive pen devices existed prior to Lantus SoloSTAR®. The Levemir FlexPen, for example, was a disposable pen device that delivered long-acting insulin. Sanofi's patents on the insulin glargine molecule do not cover the Levemir formulation and did not prevent competition between those devices. The tremendous success of Lantus® SoloSTAR®, as compared to pens with long-acting insulins that failed to address the long-felt but unfilled need for a low injection force device, therefore shares a strong nexus with the claimed invention.

Thus, the commercial success of LANTUS® SoloSTAR®, which practices claims 21 and 30 of the 844 Patent, confirms the nonobviousness of the 844 Patent.

IX. CONCLUSION

For the reasons set forth above, Patent Owner respectfully requests that the Board find challenged claims 21-30 patentable over the art cited in Grounds 1-3.

Dated: June 24, 2019

Respectfully submitted,

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CERTIFICATE OF COMPLIANCE

1. The undersigned certifies that this brief complies with the type volume limitations of 37 CFR § 42.24(a)(1)(i). This brief contains 12,019 words (excluding the table of contents, the table of authorities, mandatory notices under 37 CFR § 42.8, the certificate of service, certificate of compliance, and appendix of exhibits), as calculated by the "Word Count" feature of Microsoft Word 2016, the word processing program used to create it.

2. The undersigned further certifies that this brief complies with the typeface requirements of 37 CFR § 42.6(a)(2)(ii) and typestyle requirements of 37 CFR § 42.6(a)(2)(iii). This brief has been prepared in a proportionally spaced typeface using Microsoft Word 2016 in Times New Roman 14 point font.

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