

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SZ DJI TECHNOLOGY CO., LTD.,
Petitioner

v.

AUTEL ROBOTICS USA LLC,
Patent Owner

IPR2019-00846
U.S. Patent No. 9,260,184

**PETITIONER'S OPPOSITION TO
PATENT OWNER'S MOTION TO AMEND**

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EXHIBIT LIST

DJI Exhibit No.	Description
1001	U.S. Patent 9,260,184 to Olm <i>et al</i>
1002	U.S. Patent 9,260,184 File History
1003	Declaration of Dr. Alfred Ducharme
1004	Curriculum Vitae of Dr. Alfred Ducharme
1005	JP Unexamined Utility Model Application Publication H06-17511 to Ryoichi Sasaki
1006	English Language Translation of H06-17511 and Certification of Translation
1007	U.S. Patent No. 5,133,617 to Sokn
1008	U.S. Patent No. 8,052,081 to Olm
1009	Design and Construction of a Quadrotor-type Unmanned Aerial Vehicle: Preliminary Results” by Sa
1010	Design of a Four Rotor Hovering Vehicle by Nice
1011	The JAviator Quadrotor – An Aerial Software Testbed by Trummer
1012	U.S. Patent No. 135,655 to Miller <i>et al.</i>
1013	U.S. Patent No. 821,534 to Perkins
1014	Contra Rotating Propeller Drive System User Guide
1015	KitchenAid – Hand Mixer Instructions
1016	User Manual for the Microdrones md4-200, Version 2.2
1017	U.S. Patent No. 2,470,517 to Obrist
1018	European Patent Application EP 0 921 067 to Peter Muller
1019	IPR2019-00343, Patent Owner Preliminary Response, Paper 6
1020	American Heritage Dictionary
1021	McGraw-Hill Dictionary of Scientific and Technical Terms, Fifth Edition
1022	The New Oxford American Dictionary, Second Edition
1023	Webster’s Ninth New Collegiate Dictionary
1024	Transcript of deposition of Dr. Charles Reinholtz in <i>SZ DJI Technology Co., Ltd. v. Autel Robotics USA LLC</i> , PTAB proceeding nos. IPR2019-00343, IPR2019-00014, IPR2019-00016 (Nov. 15, 2019)

DJI Exhibit No.	Description
1025	Transcript of hearing before the International Trade Commission, <i>In the Matter of: Certain Unmanned Aerial Vehicles And Components Thereof</i> , 337-TA-1133 (Oct. 23, 2019)
1026	U.S. Patent 6,929,226 to Philistine
1027	Transcript of Deposition of Dr. Charles Reinholtz (Apr. 3, 2020)
1028	Second Declaration of Dr. Alfred Ducharme

Patent Owner's ("PO's") substitute claims 12 and 13 fail to meet the procedural requirements for a Motion to Amend. The Board should deny PO's Motion to Amend ("Motion") for this reason alone. The Board should also deny PO's Motion because the claims are not patentable over the prior art of record in this proceeding or Sasaki in combination with numerous prior art twist-lock coupling mechanisms.

I. The substitute claims fail to meet the Board's procedural requirements.

In a motion to amend, a patent owner must demonstrate that its amendments meet a set of four statutory and regulatory requirements: (1) propose a reasonable number of substitute claims; (2) respond to a ground of unpatentability involved in the trial; (3) do not seek to enlarge the scope of the claims of the patent; and (4) do not add new subject matter. *See Lectrosonics, Inc. v. Zaxcom, Inc.*, IPR2018-01129, Paper 15 at *4 (PTAB Feb. 25, 2019) (precedential). The Board should reject PO's proposed substitute claims because they enlarge the scope of the claims and do not respond to a ground of unpatentability in the trial.

A. The amendments broaden the scope of the claims.

Original claims 3 and 4 are mixed apparatus/method claims,¹ each requiring

¹ Mixed apparatus/method claims such as claims 3 and 4 are indefinite. *IPXL Holdings, L.L.C. v. Amazon.com, Inc.*, 430 F.3d 1377, 1384 (Fed. Cir. 2005); Exhibit 2004 at 26 (finding claims 3 and 4 indefinite). However, *IPXL*-type indefi-

the step of rotating the blade lock portion: “*blade lock portion of the [] lock mechanism is rotated.*” PO’s amendment removes this requirement and replaces it with a broader requirement that the blade lock portion be “*configured to engage by partial [] rotation.*” (Mot., p. 2.) PO contends that the new language, “*configured to engage,*” adds “structural requirements to the claimed lock mechanism.” (Mot., p. 3.) However, PO does not identify what those added structural requirements are, nor are any structures recited in the substitute claims. Regardless, even if PO’s contention is true, PO makes no attempt to establish how these implied “structural requirements” of substitute claims 12 and 13 narrow the original claims.

PO’s silence is not surprising because claims 12 and 13 no longer require that the blade lock portion “is rotated,” and therefore, improperly enlarge the scope of claims 3 and 4. As PO’s expert concedes, claim 12 encompasses systems where the blade lock portion is “*configured*” to rotate, but is not rotated. (DJI-1027, 117:21-119:18.) These systems would not infringe deleted claim 3’s requirement that the blade lock portion “*is rotated,*” rendering substitute claim 12 broader than claim 3. *In re Cuozzo Speed Techs., LLC*, 793 F.3d 1268, 1283 (Fed. Cir. 2015) (“[A] claim is broader in scope than the original claims if it contains within its

nitensness is not an impediment to an obviousness analysis. *Samsung Elecs. Am., Inc. v. Prisua Eng’g Corp*, 948 F.3d 1342, 1355 (Fed. Cir. 2020).

scope any conceivable apparatus or process which would not have infringed the original patent.”) (quotations omitted). Any narrowing due to unclaimed “structural requirements” or “*partial*” rotation is not relevant. *In re Bennett*, 766 F.2d 524, 526 (Fed. Cir. 1985) (en banc) (“[A] claim is broadened if it is broader in any respect than the original claim, even though it may be narrowed in other respects.”)

Claim 13 depends from claim 12 and therefore inherits a broader scope than original claim 4. Additionally, like claim 12, claim 13 removes claim 4’s requirement that the blade lock portion “*is rotated*.” (Mot., pp. 2-4.) Claim 13 is therefore broader than claim 4 for the same reasons that claim 12 is broader than claim 3.

B. The amendments do not respond to a ground of unpatentability.

PO’s arguments expose that it’s Motion is merely a pretext to fix the fatal indefiniteness issues which doomed enforcement of claims 3 and 4 in the ITC. PO’s claim 12 amendments add a “*configured to engage*” limitation and a “*partial*” rotation limitation. Similarly, in addition to the “*configured to engage*” and “*partial*” rotation limitations, the claim 13 amendments include a structural limitation, added solely to “provide[] antecedent basis for the claimed shaft lock and blade lock portions of the counterclockwise lock mechanism.” (Mot., p. 4.)

PO admits that the “*configured to engage*” limitations of both substitute claims were added to “resolve[] an indefiniteness issue with respect to original” claims 3 and 4. (Mot., pp. 3-4.) Therefore, only the “*partial rotation*” limitation

could possibly be responsive to the instituted ground; yet, the instituted ground as set forth in the Petition, shows exactly how the combined system discloses partial rotation. A motion to amend can only address §112 issues “once a proposed claim includes amendments to address a prior art ground in the trial.” *Lectrosonics* at *6. Because nothing in the amendment is responsive to the instituted ground, PO’s attempt to use this proceeding to fix its indefiniteness problem is improper.

Petitioner presented a combination of Sasaki and Sokn that renders original claims 3 and 4 obvious. The Petition repeatedly stresses that the locking mechanism of the proposed combination requires only partial rotation. (Pet., pp. 32, 36-37, 50-51.) PO does not argue that the proposed and instituted **combination** lacks any amended limitation, including the “partial” limitation. (Mot., pp. 9-14.) PO only alleges that a POSITA would not have combined Sasaki and Sokn, but this argument fails to establish responsiveness because it does not relate to the proposed amendments. (Mot., pp. 15-19.) PO instead contends that “neither of the prior art references—Sasaki and Sokn—disclose clockwise and counterclockwise UAV blade lock mechanisms that are configured to engage by partial rotation of a blade lock portion with respect to a shaft lock portion” and therefore its amendments “are responsive to a ground of unpatentability.” (Mot., pp. 10-12.) PO attacks the references individually relying on *Intuitive Surgical, Inc. v. Ethicon LLC* to support this approach. (Mot., pp. 10-11; citing IPR2018-00933, Paper 31 at *9 (PTAB Dec. 3,

2019).) Unlike *Intuitive Surgical*, in the present proceeding, both Sokn and the proposed combination of Sasaki and Sokn, as presented in the Petition, disclose the added “partial rotation” limitation.

PO argues that Sasaki rotates “several full revolutions” and therefore does not disclose “partial” rotation. (Mot., pp. 11-12.) PO does not argue, nor could it, that Sokn fails to disclose “partial” rotation of a twist-lock coupling mechanism. Further, the Petition repeatedly explains that the proposed **combination** discloses this limitation. (See Pet., pp. 32, 36-37, 50-51.) Because the “partial” rotation limitation is the only amendment presented as meeting the responsiveness requirement, PO’s amendment fails to meet the procedural requirements. See *Incyte Corp. v. Concert Pharm., Inc.*, IPR2017-01256, Paper 119 at 50.

PO’s remaining arguments are irrelevant. PO’s argument that Sasaki teaches away from “directionally specific rotational lock mechanisms” is unrelated to PO’s proposed amendments in claims 12 and 13. (Mot., p. 12). PO’s argument that Sokn, standing alone, is deficient because it is not directed to “UAVs,” “UAV rotor blades,” and “clockwise or counterclockwise rotating blades” is also not tied to the proposed amendments. (Mot., p. 14.)

PO does not present any argument that the proposed amendments are responsive to patentability arguments associated with the proposed combination set forth in the Petition. For these reasons, PO’s Motion should be denied.

II. The substitute claims are unpatentable.

PO's amendments do not render the substitute claims patentable. Petitioner repeatedly stressed in the Petition that the twist-lock coupling mechanism of the combined system only required partial rotation. (Pet., pp. 32, 36-37, 50-51.) Petitioner explains below how the original combination, presented in the Petition, renders claims 12 and 13 obvious. Petitioner then demonstrates that PO's patentability arguments lack merit. Finally, Petitioner presents additional reasons why the substitute claims are unpatentable.

A. The combination of Sasaki and Sokn discloses claims 12 and 13.

The Petition established that the combination of Sasaki and Sokn discloses the limitations of independent claim 1 and original claims 3 and 4. PO did not challenge the grounds of unpatentability against original claims 3 and 4, making its motion to amend non-contingent. (Mot., p. 1.) Petitioner therefore does not repeat its detailed and uncontested ground here but instead highlights how the Petition also establishes that the substitute claims are unpatentable. *Lectrosonics* at *4 (“[T]he Board determines whether substitute claims are unpatentable by a preponderance of the evidence based on the entirety of the record.”)

1. PO construction for the “engagement” limitation is improper.

Like claims 3 and 4, claims 12 and 13 each depend from claim 1, which recites that “*the clockwise rotor blade is engageable only with the clockwise lock*

mechanism and cannot be engaged in the counterclockwise lock mechanism” (the “engagement limitation”). PO argues that the “engagement limitation” of claim 1 requires preventing a rotor blade from being **attached** to the wrong drive. (Mot., p. 13.) PO’s construction is improper because it rewrites the plain language of the claim and is unsupported by the intrinsic record.

The claims use both “attach” and “engage”² and therefore intentionally distinguish “attachment” from “engagement.” *Amgen Inc. v. Sandoz Inc.*, 923 F.3d 1023, 1031 (Fed. Cir. 2019) (“[D]ifferent claim terms are presumed to have different meanings.”). There are many ways to attach one thing to another. (DJI-1028, ¶128.) Claim 1, however, recites that the “*clockwise rotor blade is releasably **attached** to the first driveshaft by **engagement** in a clockwise lock mechanism.*” By making each blade **engageable** only with the correct lock mechanism, the claims do not prevent **attachment** by some other means—e.g., duct tape or other forceable attachment that does not require **engagement**. Additionally, the claim language itself provides insight into the meaning of “engage,” reciting that “*the shaft lock portion defining notches configured to engage corresponding lugs on the blade*

² If Patentee intended to limit the “*engagement*” to attachment, the claim would have recited: “rotor blade is **attachable** only to [one] mechanism and cannot be **attached** to [another] mechanism.” Patentee did not draft the claims in this manner.

lock portion.” Throughout the specification, Patentee referred to the receipt of lugs into associated notches as “engagement.”

Moreover, the only embodiment disclosed in the specification does not **pre-****vent** attachment of a rotor blade to the wrong driveshaft. *Vitronics Corp. v. Con-*
ceptronic, Inc., 90 F.3d 1576, 1583 (Fed. Cir. 1996) (constructions that exclude the only embodiment are “rarely, if ever, correct and would require highly persuasive evidentiary support”). In fact, Figure 8 illustrates a blade attached to the wrong motor. In this figure, the blade is partially inserted into the slots 23. When deposited in a related case, Dr. Reinholtz acknowledges that nothing about the configuration prevents the motor from starting and the blade from spinning. (DJI-1024, 124:1-16.) PO’s construction reads the term “engage” out of the claim, replacing it with “attach.” The Board should reject it and apply the plain meaning.

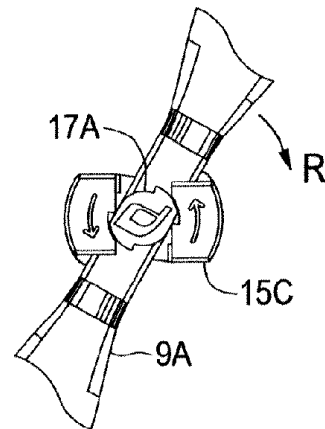


FIG. 8

2. The combination renders claim 12 obvious.

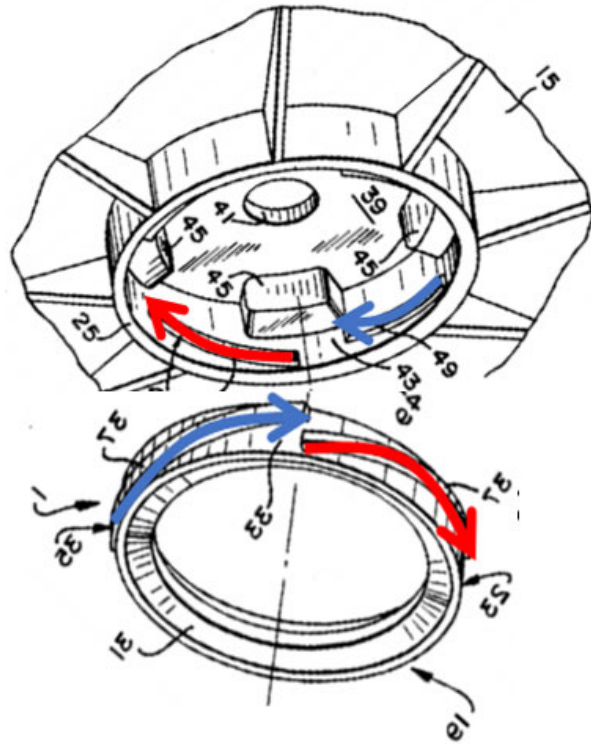
The combination of Sasaki and Sokn discloses a “*blade lock portion of the clockwise lock mechanism [that] is configured to engage by partial counterclockwise rotation*” (substitute claim 12). (DJI-1028, ¶37.) In the proposed and instituted ground, the directionally, continuous-threaded, screw coupling mechanism of Sasaki’s UAV is replaced with the segmented coupling mechanism of Sokn. (Pet.,

pp. 26-36; DJI-1003, ¶¶93-110.) Sasaki discloses that directional threaded coupling mechanisms were known and used in UAVs, but had limitations, including over-tightening. (Pet., pp. 28-29.) Sokn's coupling mechanism solves these and other problems by using both a plurality of thread segments and stop members that resist further rotation after installation and only require a 90° rotation. (Pet., p. 36.)

In the combined coupling mechanism, Sokn's ring assembly (first engagement portion 35) (the claimed "*shaft lock portion*"), scaled for use with Sasaki's UAV, includes openings between thread segments defining notches. (Pet., pp. 32-34, 47-50.) Sokn's socket (stop members 45 and second engagement portion 47) (the claimed "*blade lock portion*"), scaled for use with Sasaki's UAV, includes protruding thread segments constituting lugs configured to engage the notches of the shaft lock portion. (*Id.*) In the combined coupling mechanism, the blade lock portion is configured to engage the shaft lock portion (e.g., the lugs of the blade lock portion engage the notches of the shaft lock portion) by rotating the blade lock portion with respect to the shaft lock portion. (Pet., pp. 50-51.) This rotation releasably attaches the blade to the driveshaft. (Pet., pp. 44-46; DJI-1028, ¶37.)

The Petition explains repeatedly that the blade lock portion of the combined coupling mechanism is configured to engage by **partial** rotation because of its multi-thread and stop member design. (Pet., pp. 32, 36-37, 50-51.) Sokn's ring assembly design preferably has "four segments 37 . . . equally spaced at 90° from

each other around surface 33.” (Sokn, 3:32-34.) The socket has “four corresponding thread segments 49 . . . [that] are equally and circumferentially spaced 90° around surface 43.” (Sokn, 3:49-52.) Therefore, the blade lock portion of the combined coupling mechanism is configured to engage by partial (90°) rotation—one quarter of a full rotation—to releasably attach the blade. (Sokn, 3:57-60; Pet., p. 32 (“During the mounting process, ring assembly 19 is rotated 90°.”); DJI-1003, ¶105; DJI-1028, ¶37.) As shown in annotated Figure 3 at right,³ the 90° rotation results in each of the multiple threads on the blade lock portion engaging their respective slots on the shaft lock portion. (DJI-1028, ¶37.)



³ Figure 3 contains an error that is readily apparent to a POSITA in that the threading of the ring does not match the assembly. Both Dr. Reinholtz and Dr. Ducharme acknowledge this mistake, which a POSITA would recognize is easily fixed by reversing one of the threads. (DJI-1028, ¶¶33-35; DJI-1027, 167:1-16.)

The Petition mentioned this partial rotation multiple times, stating that the combination of Sasaki and Sokn results in “engagement portions . . . [that] release like a screw but require **fractional rotation** rather than multiple rotations to fully disengage the components.” (Pet., pp. 50-51 (emphasis added); *see also* pp. 32, 36-37 (90° rotation for assembly/disassembly).) This allows for faster installation and deinstallation than a conventionally-threaded mechanism. (DJI-1028, ¶37.)

The 90° rotation of coupling mechanism of the combined system constitutes “partial rotation,” based on PO’s definition of the term, because it is less than a full 360° rotation. (DJI-1028, ¶37; DJI-1027, 127:1-3.) In fact, the lock mechanism in the ’184 specification uses a 90° rotation, like the coupling mechanism of Sokn. (DJI-1028, ¶37.) Accordingly, based on the arguments in the Petition and the above, the combination of Sasaki and Sokn renders claim 12 obvious.

3. The combination of Sasaki and Sokn renders claim 13 obvious.

PO’s claim 13 adds a limitation to address antecedent basis issues of original claim 4: “*wherein the counterclockwise lock mechanism comprises a shaft lock portion attached to the second driveshaft and a blade lock portion attached to the counterclockwise rotor blade.*” (Mot., p. 2.) The Petition showed that the coupling mechanism of the combined system Sasaki and Sokn has a counterclockwise lock mechanism with a shaft lock portion attached to the second driveshaft and a blade lock portion attached to the counterclockwise rotor blade. (Pet., pp. 34-36, 50-51.)

PO's claim 13 further amends original claim 4 to recite that "*blade lock portion of the counterclockwise lock mechanism is configured to engage by partial clockwise rotation.*" (Mot., p. 2.) This limitation is identical to the proposed amendment of claim 12 except that it applies to the **counterclockwise** lock mechanism and therefore recites partial **clockwise** rotation. Petitioner demonstrated in the Petition that the combination of Sasaki and Sokn discloses a counterclockwise lock mechanism where the blade lock portion is rotated clockwise to releasably attach the counterclockwise blade to the second driveshaft. (Pet., pp. 34-36.) Sasaki teaches a directional threading where blades designed to rotate in different directions are installed with opposite directions of rotation. (Pet., pp. 34-36; DJI-1006, 2:5-8.) Using opposite-threaded blades achieves the well-known design goal of "mistake-proofing" the lock mechanism so that the wrong blade is not installed on the wrong propeller. (Pet., pp. 34-36; DJI-1014, p. 3; DJI-1003, ¶¶54-57, 64; DJI-1027, 37:1-13.) As shown in the previous section, this combination results in a blade lock portion that is configured to engage by partial rotation. (DJI-1028, ¶¶37-41.) Accordingly, based on the Petition and above arguments, the combination of Sasaki and Sokn renders claim 13 obvious.

4. PO's patentability arguments lack merit.

PO does not argue that the proposed combination of Sasaki and Sokn fails to teach or suggest any limitations of claim 1, original claims 3 and 4, or substitute

claims 12 and 13. Instead, PO attacks each reference individually, contending that each reference fails to disclose one or more limitations. PO's argument is legally improper. *In re Merck & Co., Inc.*, 800 F.2d 1091, 1097 (Fed. Cir. 1986). Regarding the combination, PO contends that a POSITA would not have been motivated to combine Sasaki and Sokn. In addition to not responding to a ground of patentability, PO's motivation to combine arguments are legally and factually incorrect.

a) No missing limitations in the proposed combination.

PO generally contends that Petitioner "has not cited a **single** prior art reference that . . . includes the convenient twist-lock mechanism that utilizes partial rotation to attach a blade to a drive." (Mot., p. 19 (emphasis added).) First, the claims do not recite or require that the "twist-lock" mechanism be convenient. Second, the Petition establishes that both Sokn and the combined coupling mechanism of Sasaki and Sokn utilizes partial rotation. (*See also* DJI-1027, 35:12-36:4.)

Petitioner addresses PO's Sasaki arguments first. PO argues that because Sasaki teaches a continuous threaded coupling mechanism requiring several full rotations, Sasaki fails to disclose "*clockwise and counterclockwise UAV blade lock mechanisms that are configured to engage by partial rotation of a blade lock portion with respect to a shaft lock portion.*" (Mot., p. 12.) However, the Petition relies on **Sokn's** segmented threaded coupling mechanism, which results in partial rotation. (*See also* Pet., pp. 50-51 (discussing fractional rotation).)

PO next argues that “Sasaki lacks the unique and novel convenient twist-lock and mistake-proofing features of the ’184 patent” and therefore does not disclose the “*engagement*” limitation of claim 1. (Mot., p. 13.) Specifically, PO contends that Sasaki’s “conventional screw-on type blade attachment mechanism does not prevent the attachment of a blade on the wrong drive,” relying on a video of its expert forcing a blade from a UAV utilizing a conventional screw-on attachment mechanism onto the wrong driveshaft. (Mot., p. 13.) PO’s argument is irrelevant because the Petition does not rely on a conventional screw-on attachment coupling mechanism. (Pet., pp. 44-47.) PO did not contest that the combination discloses the limitations of claims 3 and 4 (which include the “*engagement*” limitation) and presents no evidence or argument that the combined system lacks this feature. PO’s argument further fails on its merits because it relies on an improper construction for the “*engagement*” limitation. When a blade is forced onto the driveshaft and the threads are “stripped”, the blade is not, and cannot be, “engaged” with the lock mechanism. (Ducharme II, ¶49.) Rather, the metal threads on the shaft lock portion are likely carving out new notches in the blade lock portion. (*Id.*)

Turning to Sokn, PO argues that Sokn does not disclose UAVs or UAV rotor blades or lock mechanisms that depend on direction of rotation. (Mot., p. 14.) PO’s argument is irrelevant because the instituted ground explicitly relies on Sasaki for this teaching. (Pet., pp. 34-35.) PO further contends that there is “no consideration

in Sokn for creating an attachment mechanism where rotor blades can be easily detached for transport or storage.” (Mot., p. 14.) Again, the combination discloses a coupling mechanism permitting rotor blades to be easily detached. Sokn’s coupling mechanism, integrating with Sasaki’s UAV, requires only a quarter turn to attach and detach a blade to a driveshaft—it is as easy for a user to detach as the coupling mechanism disclosed in the ’184 patent. (DJI-1028, ¶46.)

b) A POSITA would have combined Sasaki and Sokn.

The Petition presented numerous reasons why a POSITA would have combined Sasaki and Sokn, resulting in a system that renders claims 3 and 4 obvious. (Pet., pp. 32-38.) For example, the Petition explained that the combination maintains the “mistake-proof” design of the prior art (i.e., by having directionally-threaded screw fasteners) without suffering from the overtightening problem of the continuously threaded coupling mechanism disclosed in Sasaki. (Pet., p. 36; DJI-1003, ¶111.) The Petition further explained that Sokn’s connection mechanism provides increased design flexibility by allowing for use with a wider range of aircraft (including larger UAVs) than Sasaki’s continuously threaded connection, improves usability because “a user can assemble and disassemble the propellers with only ½ turn as compared with 3-4 turns,” and has “improved mechanical alignments.” (Pet., pp. 36-38.) PO did not contest Petitioner’s motivation to combine arguments regarding original claims 3 and 4. (Mot., p. 1.)

In arguing patentability of its substitute claims, PO presents five different theories why a POSITA would not have combined Sasaki and Sokn: (1) Sasaki lacks an explicit motivation to combine; (2) Sasaki teaches away from the proposed combination; (3) Sokn is non-analogous art; (4) a POSITA would not have combined Sasaki and Sokn; and (5) the time difference between Sasaki and Sokn demonstrate claims are not obvious. None of PO's theories have merit.

In **Theory 1**, PO argues that there is no explicit need, motivation, or desire in Sasaki for a lock mechanism that depends on rotational direction or engages with partial rotation. PO's argument is contrary to the law. The reference need not explicitly recite a motivation. A "motivation to combine may be found explicitly or implicitly in market forces; design incentives; the 'interrelated teachings of multiple patents'; 'any need or problem known in the field of endeavor at the time of the invention and addressed by the patent', and the background knowledge, creativity, and common sense of the person of ordinary skill." *Zup LLC v. Nash Manufacturing, Inc.*, 896 F.3d 1365, 1371 (Fed. Cir. 2018). Furthermore, this motivation was well-known in the art as documented in the Petition. (Pet., p. 16-20; DJI-1003, ¶¶45, 49-66, 100, 111; DJI-1027, 37:1-14; DJI-1028, ¶43.)

In **Theory 2**, PO argues that Sasaki teaches away from directionally-specific lock mechanisms because it addressed issues (including the overtightening problem) with the prior art with a design not dependent on the direction of rotation.

(Mot., p. 15.) PO misapplies the law.

A reference may be said to teach away when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the applicant. A reference does not teach away, however, **if it merely expresses a general preference for an alternative invention but does not criticize, discredit, or otherwise discourage investigation into the invention claimed.**

DePuy Spine, Inc. v. Medtronic Sofamor Danek, Inc., 567 F.3d 1314, 1327 (Fed. Cir. 2009) (emphasis added). Sasaki never disparages directionally-specific lock mechanisms per se; rather, its design improves several perceived issues with previous designs. Sasaki's nondirectional solution does not teach away from all directional solutions, e.g., directional solutions that do not similar issues such as the instituted combination of Sasaki and Sokn. (DJI-1027, 151:18-153:5 (Sasaki solves other problems unrelated to directionality); DJI-1028, ¶44.) Sasaki therefore does not teach away from the combination.

In **Theory 3**, PO argues that a POSITA would not look to Sokn when designing an attachment mechanism for UAV blades because Sokn is in “a different field than UAVs.” (Mot., p. 15.) However, PO's argument is contrary to the law. If the reference is not within the field of the inventor's endeavor, “we proceed to determine whether the reference is reasonably pertinent to the particular problem

with which the inventor was involved.” *In re Deminski*, 796 F.2d 436, 442 (Fed. Cir. 1986). PO never alleges that Sokn is not reasonably pertinent to the coupling mechanism addressed by the ’184 patent. As established in the Petition, Sokn’s coupling mechanism is reasonably pertinent because it provides a secure coupling mechanism with precise mechanical alignment. *See In re ICON Health and Fitness*, 496 F.3d 1374, 1380 (Fed. Cir. 2007) (finding that a folding bed reference was reasonably pertinent to a treadmill with a folding base); *In re Paulsen*, 30 F.3d 1475, 1481-82 (Fed. Cir. 1994) (finding that references employing hinges, latches and springs are reasonably pertinent to a latch mechanism for a portable computer). Additionally, Dr. Reinholtz’s POSITA definition requires experience with generic coupling mechanisms and is not limited to the field of UAVs. (Ex. 2001, ¶28.)

In **Theory 4**, PO presents three alleged reasons why a POSITA would not have been motivated to combine Sasaki and Sokn. PO first argues that a POSITA would not look to Sokn when designing a “twist-lock mechanism” because Sokn does not discuss disassembly and its electric motor does not require easy disassembly. (Mot., p. 15.) PO fails to explain why Sokn’s coupling mechanism is not easy to detach. (*Id.*) PO speculates that a user would likely not need to detach the blade fan mount. (*Id.*) Petitioner’s expert explains, contrary to PO’s implication, that Sokn’s coupling mechanism is easy to use, regardless of the use expected. (DJI-1028, ¶¶45-46.) Nevertheless, the claims do not require “easy” disassembly.

Second, PO argues a POSITA would not look to Sokn to “achieve directionally specific lock mechanisms” because Sokn does not discuss different directional configurations. (Mot., pp. 16.) However, Sasaki explicitly teaches directionally specific lock mechanisms and the instituted ground relies on “the teachings of Sasaki regarding directionality of threading” for this motivation. (Pet., pp. 34-35.) Contrary to PO’s mischaracterizations, Petitioner explained that Sokn’s engagement portions and stop members can be configured to provide a predetermined orientation for engagement and interlock. (Pet., p. 34.) This teaching would have motivated a POSITA to orient the threads in the combined system for directional engagement. (Pet., pp. 34-35.)

Third, PO argues that Sokn’s lock mechanism would not solve the overtightening problem described in Sasaki because it is similar to the nut component of the prior art and similar to a jar lid. These arguments have no merit. Unlike Sasaki’s nut or a jar lid, Sokn has four separate stops and four separate thread segments. The use of the term “stop members” informs a POSITA that they stop rotation. (DJI-1007, 3:40-42; DJI-1003, ¶109; DJI-1028, ¶48.) PO’s argument is based on nothing more than speculation and should be disregarded.

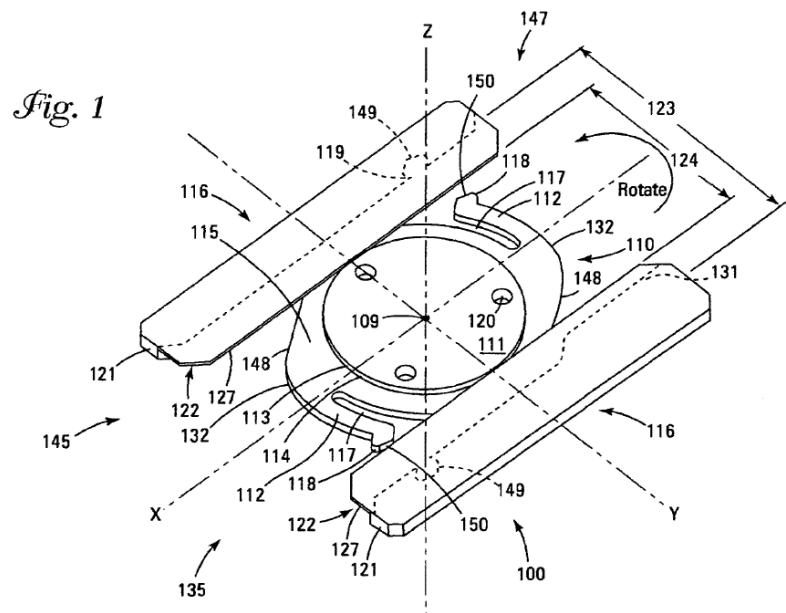
In **Theory 5**, PO finally argues that the “vast time difference” between the prior art and the ’184 patent supports patentability of the invention. (Mot., p. 19.) This argument has no basis in obviousness law and is irrelevant to the analysis.

Obviousness is judged from the standpoint of a POSITA as of the effective filing date. 35 U.S.C. §103. To the extent PO insinuates a long-felt need, such a need is not judged by the date of the prior art. *Iron Grip Barbell Co., Inc. v. USA Sports, Inc.*, 392 F.3d 1317, 1324-25 (Fed. Cir. 2004) (mere passage of time does not show long-felt need). Nevertheless, PO failed to show any nexus with the claims.

B. Directional lock mechanisms using partial rotation were well-known.

Sokn is not the only prior art reference using partial rotation, with lugs and notches, to install one component onto another component. (See Pet., pp. 13-20.) Such mechanisms were known for over a century. (Pet., pp. 13-16; DJI-1027, 96:6-15.) One example is U.S. Patent 6,929,226 to Philistine (DJI-1026), which discloses a “twist lock mount for quick mounting and positioning a device to a support.”

(DJI-1026, Abstract.) Philistine’s system is not application-specific, but rather allows “secure attachment and detachment of a variety of devices to various surfaces.” (DJI-1026, 1:10-14.) Philistine’s mecha-



nism includes a “mounting member 110 that is secured to or integrated with a device to be mounted, and a receiving member 116 that is secured to or integrated

with a mounting surface or support.” (DJI-1026, 2:33-44.) The mounting member 110 slides into the channel 123 and securely locks in place with a 90° (“one-quarter turn” (DJI-1026, 4:24-27)) rotation of the mounting plate relative to the receiving member, engaging “lugs 150” on the mounting plate with notches (“recesses 119”) on the receiving member. (DJI-1026, Figure 2, 2:33-44; 3:10-22; *see also* Figure 1.) The mechanism is not susceptible to overtightening because “the mounting member 110 is locked into position and will resist further rotation in the counterclockwise direction.” (DJI-1026, 4:27-29; DJI-1028, ¶51.)

Similarly, U.S. Patent No. 2,470,517 to Obrist (“Obrist”) and EP 0921067 (“EP067”) each describes a directional “twist-lock” mechanism for a propeller. (See Pet., pp. 19-20; DJI-1017; DJI-1018.) Obrist describes a directional twist-lock coupling mechanism for a variable-pitch marine propeller. (DJI-1003, ¶59.) Obrist’s design includes lugs that are introduced through recesses 8, and the blade root is turned about 90° for engagement and installation. (DJI-1017, 2:44-54; DJI-1028, ¶52.) EP067 describes a directional coupling mechanism for use with propeller assemblies. (DJI-1003, ¶61.) For mounting a blade, “the base of the new blade is fitted onto the plate so that the claws engage in the cutouts and the blade is then rotated through a fraction of a full revolution about its radial axis until the claws engage in the groove and the projections engaged beneath the claws.” (EP067, ¶8.)

Both Obrist and EP067 explain that the force in rotation of the propeller

maintains the lugs in position. (*See* Pet., pp. 19-20; DJI-1017, 2:55-3:4; DJI-1018, ¶11.) Although the forces are different with the UAV connection, a POSITA would understand how to apply the teachings of Obrist and EP067 to the rotational forces experienced by the blades in a UAV, such as Sasaki. (DJI-1028, ¶56.) For example, a POSITA would have been motivated to modify Sasaki to include two radially-opposite cutouts between which radial projections are disposed and to locate stops 6 at different positions based on the rotation of the propeller. (*Id.*, ¶62.)

A POSITA would have been motivated to use Philistine or Obrist or EP067 to mount a UAV blade onto a driveshaft for several reasons. First, the mechanisms of Philistine, Obrist, and EP067 each solves the overtightening problem of Sasaki's prior art threads while maintaining the well-known "mistake-proof" design. Second, the mechanism allows for easy installation and de-installation while being secure enough for "harsh environments where extreme vibration and shock loading is expected" as explained by Philistine. (DJI-1026, 1:25-28; DJI-1028, ¶57.) Philistine is analogous art to Sasaki because it discloses a general-purpose twist-lock mechanism, which is reasonably pertinent to the problem of attaching a blade to a UAV driveshaft. (DJI-1028, ¶57.) Obrist and EP067 are analogous art because each relates to coupling a blade to a rotating member. (DJI-1028, ¶57.)

The Petition showed that Sasaki discloses the preamble and the UAV structure components recited in limitations [1A]-[1D], and PO does not dispute those

teachings. (Pet., pp. 39-43.) The combined system of Sasaki and Philistine also teaches the lock mechanism limitations of claim 1 in a similar manner as the combination of Sasaki and Sokn. (DJI-1028, ¶59.) In the combination, Philistine's mounting plate is attached or integrated onto the blade, forming the "*blade lock portion*," and Philistine's receiving member is attached or integrated onto the shaft, forming the "*shaft lock portion*." (*Id.*) As shown in Figure 1, Philistine's mounting plate is attached by rotating it counterclockwise relative to the receiving member. (*Id.*) It can be detached by rotating in the opposite direction. (DJI-1026, 2:44-49.) This embodiment is the "*clockwise lock mechanism*" of claim 1. Based on the directionally-threaded design of Sasaki's prior art and the well-known "mistake-proof" design goal of directional or keyed attachment mechanisms for UAV blades, a POSITA would have been motivated to mirror the design (e.g., the lugs and notches) of Philistine's Figure 1 embodiment to form a "*counterclockwise lock mechanism*" for blades that spin counterclockwise. (DJI-1028, ¶59; DJI-1027, 37:1-14.) For example, Philistine's lock mechanism is uninstalled with a rotational force in the opposite direction of the force used for installation, so a mirrored design would be necessary to keep the mechanism engaged when applying it to UAV blades rotating in different directions. (DJI-1028, ¶59.) Such a design would be a mirror image of Figures 1 and 2, with the lugs and notches being on opposite sides of their respective components, and it would lock with clockwise rotation. (*Id.*)

When applied to blade attachments of a UAV such as Sasaki's, Obrist and EP067 would also form a "*clockwise*" and "*counterclockwise lock mechanism*" for similar reasons, each locking with rotation in the opposite direction. (*Id.*, ¶¶59-62.) For example, the portion of the blade foot integrated into the propeller in the combined UAV of Sasaki and EP067 that has cutouts 11 and projections is the "*blade lock portion*." Projections 12 are "*lugs on the blade lock portion*." Support plate 1 integrated into the driveshaft in the combined UAV of Sasaki and EP067 is the recited "*shaft lock portion*" and gaps 5 are the recited "*notches*." (*Id.*, ¶62.)

The combined system results in the blade being "releasably attached" to the driveshaft because each reference's teaching that its mechanism is detachable. (DJI-1026, ¶60.) Each is releasably attached by engagement of the blade (the blade lock portion) with the lock mechanism, as recited in claim 1. Moreover, the blade lock portions are keyed such that they can engage only with their corresponding lock mechanism—i.e., lugs of a counterclockwise blade will not engage with the notches of the clockwise lock mechanism. For example, as shown in Figs. 1 and 2 of Philistine, the blade lock portion includes lugs that engage with notches on the corresponding shaft lock portion. Moreover, the blade lock portion is configured to engage by partial rotation ("one-quarter turn") for clockwise and counterclockwise mechanisms. (DJI-1026, 4:24-27.) The mechanisms of Obrist and EP067 would also releasably attach the blades to the driveshaft by engagement, with lugs engag-

ing notches, via partial rotation of the blade lock portion. (DJI-1028, ¶61.)

The combination of Sasaki with any of Philistine, Obrist or EP067 renders claims 12 and 13 obvious. (DJI-1028, ¶¶50-62.)

C. The substitute claims are indefinite.

Substitute claims 12 and 13 each requires that the “*blade lock portion of the [] lock mechanism is **configured to engage** by partial counterclockwise rotation with respect to the shaft lock portion thereof . . .*” “Engage” is a transitive verb requiring a direct object, i.e., something for it to engage—engaging requires **two components** that mate together. (DJI-1028, ¶63; *see* DJI-1025, 435:11-14.) In other words, the blade lock portion must be configured to engage **something**. The phrase “*configured to engage*” is indefinite in the context of claims 12 and 13 because nothing in the claim informs a POSITA about what the blade lock portion is configured to engage. (DJI-1027, 105:14-106:1.) Claims 12 and 13 are further indefinite because it is unclear what constitutes sufficient “partial rotation” to achieve “engagement.” A 1° rotation is a partial rotation but would not result in engagement based on the embodiments disclosed in the specification. (*See* DJI-1027, 127:4-15 (requiring a “reasonable rotation” to satisfy the claims).)

For these reasons, the Board should deny claims 12 and 13 as indefinite.

III. Conclusion.

For the above reasons, the Board should deny the Motion to Amend.

Respectfully submitted,

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CERTIFICATE OF SERVICE

The undersigned hereby certifies that the foregoing **PETITIONER'S OPPOSITION TO PATENT OWNER'S MOTION TO AMEND UNDER 37 C.F.R. § 42.121** served via electronic mail on April 6, 2020, in its entirety on the following:

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