

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 SUR-REPLY TO
PATENT OWNER’S REPLY TO
PETITIONER’S OPPOSITION TO
PATENT OWNER’S REVISED 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
1029	Transcript of Second Deposition of Dr. Charles Reinholtz (June 16, 2020)
1030	Third Declaration of Dr. Alfred Ducharme
1031	Final Written Decision in IPR2019-00343 against U.S. Patent 9,260,184 (May 21, 2020)
1032	U.S. Patent 4,477,228 to Duffy et al. (“Duffy”)

Petitioner showed that Patent Owner's (PO's) amendments are not patentable in the Opposition to the Revised Motion to Amend. In Reply, PO raises the same issues as its Motion, failing to rebut Petitioner's showing of obviousness based on four different prior art combinations. PO does not argue that the amendments impart patentability to the claims, but instead argues that claim 1, invalidated by the PTAB in an earlier IPR, provides patentable subject matter. PO's arguments fail to show any missing limitation in the prior art and fail to rebut Petitioner's motivations to combine Sasaki with Sokn, Philistine, EP067, and Obrist.

I. The prior art combinations disclose every limitation of the claims.

A. Sokn, Philistine, EP067, or Obrist disclose the engagement limitation when combined with Sasaki.

Petitioner has consistently relied on the lock mechanisms of Sokn, Philistine, EP067, and Obrist as disclosing the claimed engagement limitation when combined with Sasaki. (Opp., pp. 12, 21-23.) Sokn discloses directional, segmented threads, and PO's expert agrees Sokn "probably wouldn't work" if someone tried to screw a right-hand threaded ring into a left-hand threaded socket, as is shown in Figure 3 of Sokn. (DJI-1027, 166:22-167:16; DJI-1030, ¶40; DJI-1028, ¶34.) In other words, Sokn's threading prevents engagement of a clockwise ("CW") blade with a counterclockwise ("CCW") lock mechanism. PO now argues that Sokn is susceptible to mis-threading, but only points to its expert's testimony about mis-threading a conventionally-threaded mechanism like that of Sasaki. (Reply, pp. 6-7

(citing Ex. 2001, ¶¶52-54).) But PO's expert testimony that Sokn "probably wouldn't work" contradicts PO's position and is more relevant because it relates specifically to Sokn. (DJI-1027, 166:22-167:16.)

Philistine, EP067, and Obrist are not threaded designs, so there is no dispute about mis-threading in those references. (*See* Reply, pp. 8-9.) Petitioner showed that a POSITA would combine Sasaki with each of these references and would have been motivated to reverse or mirror these designs for two of the four lock mechanisms because of the widely known forces associated with propeller rotation and for directional mistake-proofing. (Opp., pp. 21-22.) PO does not dispute that these combinations, as asserted by Petitioner, disclose every limitation of the substitute claims. (Reply, pp. 8-9.) Instead, PO attacks a strawman combination where Philistine, EP067, and Obrist are used, unmodified, as the lock mechanisms for all four propellers, such that all propellers locked with the same direction of rotation. (Reply, pp. 8-9.) This is a hidden motivation-to-combine argument, which Petitioner demonstrates is meritless below in Section II.D. There is no dispute that, if a POSITA mirrored the designs of Philistine, EP067, and Obrist, the combination would disclose every limitation of the substitute claims.

B. It is irrelevant whether Sasaki discloses the engagement limitation.

PO continues to attack Sasaki in isolation as allegedly not disclosing the engagement limitation. (Reply, p. 3.) PO argues that the amended claims are patent-

ble “[f]or this reason alone.” (Reply, p. 3.) To the contrary, even if PO were correct about Sasaki with respect to the engagement limitation, the substitute claims would still not be patentable.

First, as discussed in the previous section, Petitioner relies on Sokn, Philistine, EP067, and Obrist, each in combination with Sasaki, as disclosing this limitation. (Opp., 18-24.) Any alleged failure of Sasaki to disclose the engagement limitation is therefore not a deficiency of the combinations that render the claims unpatentable. Second, the motivation to combine Sasaki with Sokn, Philistine, EP067, and Obrist is not defeated by Sasaki’s alleged non-disclosure of the engagement limitation. As discussed below in Section III.A, there is no dispute that a POSITA would have been motivated to modify Sasaki in a way that was mistake-proof. Whether Sasaki’s prior art itself was mistake-proof does not affect that fact.

Third, PO’s argument that Sasaki’s prior art is not mistake-proof is incorrect. Both experts agree that mis-installation can destroy propeller threads, and that the susceptibility for cross-threading depends significantly on the materials involved. (DJI-1028, ¶49; Ex. 2016, ¶22 (“I agree [with Dr. Ducharme] that this is one possible result when a blade is screwed onto the wrong driveshaft”)) PO has no basis for arguing that mistake-proofing must prevent the user from installation-by-destruction. Under this theory, nothing could be mistake-proof, because any mechanism could be damaged or deformed with enough pressure.

PO's expert uses a bottle cap as an example of a soft material that can be mis-threaded without destroying the threads. (Ex. 2016, ¶22.) But a lock mechanism for a propeller is not a bottle cap and would not be made of the same materials. More notable, however, is what PO's expert did not assert. Specifically, PO's expert does not assert that threaded propellers would survive mis-installation, despite the fact that he submitted a video of him mis-installing them. (*See* Ex. 2006.) PO's expert also does not assert that a bottle cap can be installed with counter-clockwise rotation. (Ex. 2016, ¶22.) Instead, PO's expert submitted a video of propeller mis-installation and a picture of threads from a bottle cap.

Finally, Patent Owner's attempt to frame its argument as a claim construction issue of the engagement limitation is improper. (Reply, p. 2.) The Reply shows that PO's argument is about the concept of mistake-proofing, not a claim construction of the engagement limitation. (Reply, p. 1.)

Sasaki's prior art threaded design is mistake-proof. But even if it isn't, PO's substitute claims are still unpatentable. A POSITA would have been motivated to combine Sasaki with mistake-proof designs in Sokn, Philistine, EP067, and Obrist.

II. Motivation to combine

PO does not dispute a motivation to improve Sasaki in a way that was simple and mistake-proof. Instead, PO disputes whether a POSITA would have looked to Sokn, Philistine, EP067, or Obrist for such an improvement, and if so, whether a

POSITA would have combined those references with Sasaki to have clockwise and counterclockwise lock mechanisms.

The record shows a POSITA would have looked to each of Sokn, Philistine, EP067, and Obrist. A POSITA also would have had significant motivation to mirror the designs of each of these references to result in both clockwise and counterclockwise lock mechanisms.

A. There is no dispute that a POSITA was motivated to modify Sasaki in a way that was mistake-proof.

PO does not dispute that a POSITA would have been motivated to improve Sasaki in a way that was simple and mistake-proof. (*See, e.g.*, Reply, p. 9.) Rather than disputing this motivation, PO attempts to spin it as a long-felt need that was unresolved until the '184 patent. (Reply, pp. 9-12.) For example, PO states that testimony on a POSITA's motivation to modify Sasaki "illustrates precisely why a need for a fast and mistake-proof rotor attachment mechanism existed for several decades prior to 2013." (*Id.*)

The lack of any dispute on this issue is unsurprising because PO's expert testified that a POSITA, "reading the Sasaki patent, would have seen that there's still problems with the design, the not being mistake-proof." (DJI-1029, 103:15-19.) Dr. Ducharme noted this drawback of Sasaki's solution to overtightening in his first declaration: "By replacing the directionally threaded screw coupling mecha-

nism with a non-directional coupling mechanism, Sasaki's solution is no longer 'mistake-proof' from an end-user's perspective." (DJI-1003, ¶100.) The experts and parties do not dispute that a POSITA would have been motivated to improve Sasaki in a mistake-proof way.

B. A POSITA would have looked to Philistine, EP067, and Obrist.

Petitioner showed that Philistine, EP067, and Obrist are analogous prior art, and PO no longer appears to dispute that fact. (Opp., pp. 20-21; Reply, pp. 7-8.) PO also fails to dispute that Philistine, EP067, and Obrist are not susceptible to overtightening, or that they are simple and mistake-proof. (Reply, pp. 7-8; DJI-1017, 1:6-10; DJI-1018, ¶4.) Instead, PO relies on its allegations that *Sasaki* is not mistake-proof. (Reply, p. 7.) Petitioner showed above that this incorrect allegation, even if true, would not defeat any combination of prior art because a POSITA was motivated to modify Sasaki in a mistake-proof way.

PO also repurposes its teaching-away argument, stating that Sasaki teaches "towards non-directionally specific lock mechanisms." (Reply, p. 7.) PO fails to point to any specific teaching that would influence a POSITA against a directionally-specific lock mechanism. Sasaki's disclosure that its non-directional mechanism prevents overtightening (DJI-1006, 3:32-36) does not teach "towards" non-directional mechanisms, it merely describes one feature that also undisputedly appears in the directionally-specific mechanisms of Philistine, EP067, and Obrist. Sa-

saki's disclosure that its non-directional mechanism does not require manufacture of two different mechanisms (i.e., a CW and CCW mechanism) (DJI-1006, 3:28-30) does not overcome the undisputed motivation for a POSITA to modify Sasaki in a mistake-proof way.

C. A POSITA would have looked to Sokn.

Petitioner showed that a POSITA would look to Sokn to improve Sasaki's prior art design in a simple, mistake-proof way. (Opp., pp. 2-5, 13-18.) For example, Petitioner showed that Sokn is analogous art, which PO appears to no longer dispute. (Opp., pp. 3-4, 15-16.) Petitioner discussed "numerous reasons" why a POSITA would combine Sasaki with Sokn, such as increased design flexibility and improved usability, most of which PO does not dispute. (Opp., p. 2.) Petitioner provided a list of facts that a POSITA would have understood that support the combination. (Opp., pp. 2-3.) PO does not dispute these facts or that a POSITA would have understood them.

Instead, PO rehashes the same arguments it made in its Motion, which Petitioner has already rebutted. PO repeats its argument that Sokn is susceptible to overtightening for the mere fact that it discloses axial stops instead of radial stops. (Reply, p. 4.) Petitioner has already rebutted this argument. (Opp., pp. 17-18.) And, PO does not dispute that a POSITA would have known of the use of radial stops to prevent overtightening—PO's own expert testified that this was "common

knowledge” and “common sense.” (Opp., p. 18; DJI-1029, 67:7-25.) Instead, PO argues that Sokn does not disclose radial stops. This is false. Figure 5 of Sokn illustrates radial stops within the “bayonet”-style connection within the socket. (See DJI-1007, 4:49-50.) And although Figure 5 is a different embodiment than Figure 3, if Sokn had viewed overtightening to be an issue, it would have placed radial stops in Figure 3. A POSITA would also have been motivated to do so if it viewed Sokn’s Figure 3 to be susceptible to overtightening. (DJI-1030, ¶¶37, 42.) This motivation is not “hindsight” (Reply, p. 5), as PO alleges, but is based on “common knowledge” and “common sense” as of the date of the alleged invention according to PO’s own expert. (DJI-1029, 67:7-25.)

Additionally, PO’s backdoor teaching away argument remains invalid for the same reasons Petitioner discussed in its Opposition and above for the Philistine, EP067, and Obrist grounds. (Opp., pp. 14-15.) PO also appears to acknowledge that each of its arguments are insufficient but argues that its insufficient arguments synergize into a sustainable theory against a motivation to combine. (Reply, pp. 5-6.) But contrary to PO’s allegations, Petitioner would not “have the Board discard” any fact in this proceeding. (Reply, p. 6.) Rather, each of PO’s arguments fail to rebut the rationale for combining Sasaki and Sokn.

D. PO does not dispute a POSITA's motivations for mirroring the designs resulting in clockwise and counterclockwise lock mechanisms.

Petitioner showed that a POSITA would have been motivated to combine Sasaki with Sokn, Philistine, EP067, and Obrist to produce CW and CCW lock mechanisms. (Opp., pp. 21-23.) Such a design prevents inadvertent disassembly in directionally-specific lock mechanisms. (Opp., pp. 4, 21-22; Pet., pp. 34-35; DJI-1003, ¶109; DJI-1028, ¶59; DJI-1027, 37:1-14.) PO does not dispute these motivations.

Instead, PO merely argues that Sokn, Philistine, EP067, and Obrist do not explicitly disclose CW and CCW lock mechanisms. This argument ignores Sasaki, which explicitly discloses the motivations for CW and CCW lock mechanisms, and the knowledge and creativity of a POSITA, who would understand that these rotational lock mechanisms would inadvertently disengage if used on a motor rotating the wrong direction. (See DJI-1028, ¶59.) The record shows that a POSITA had motivation and the capability to mirror the prior art designs when combining them with Sasaki to create CW and CCW lock mechanisms.

III. The '184 patent did not resolve any long-felt unmet need in the industry.

PO argues that the claims are not obvious because they solved “a need for a fast, simple, and mistake-proof rotor attachment mechanism [that] existed in the UAV industry for a long time.” (Reply, p. 9.) This is wrong. PO has insufficient

evidence to establish a long-felt need in this ill-defined industry, relying primarily on Petitioner's expert opinions on the motivation to modify Sasaki and the date of Sasaki. Furthermore, Petitioner showed that any such need was met several years before the '184 patent, and PO failed to rebut that showing. Finally, PO failed to show any nexus between the solution to the need and the claims.

Petitioner already showed that the motivation to modify Sasaki, and the date of Sasaki, are insufficient to show a long-felt unmet need in the UAV industry. (Opp., p. 24.) PO conflates a POSITA's motivation to modify one reference with an unmet need in the industry. (Reply, pp. 9-10.) PO further errs by defining the "UAV industry" based on experiments performed in the early 20th century, or by two failed quadcopters from the 1990s. (Reply, p. 10.) But the exhibit on which PO relies actually corroborates Dr. Ducharme's testimony that the "industry" really began in 2010. (See Ex. 2012, 36:1-19; Ex. 2015.) The Smithsonian's "Brief History of Quadrotors" states that "[i]n 2010, the French company Parrot released their 'AR.Drone,' *the first commercially successful ready-to-fly consumer drone*, and the first able to be controlled solely by a Wi-Fi connection." (Ex. 2015, p. 2 (emphasis added).) In fact, PO's expert, who received his Ph.D. in 1983, never even saw a quadcopter in operation until about 2000 and did not begin using them in his research until 2007. (DJI-1029, 23:25-24:4; 103:21-104:9.)

Nevertheless, even if a couple of failed products created an “industry,” there is nothing in the record to support a finding of any long-felt need in that industry. There is no evidence that customers (to the extent they existed) really wanted a simple, mistake-proof blade attachment in 1920 or 1992. There is no evidence that skilled artisans were unable to come up with simple, mistake-proof blade attachments during that timeframe, either. PO has no evidence from that timeframe.

The record shows that as the industry was burgeoning, skilled artisans recognized the need for simple, mistake-proof blade attachments, and they met the need. Petitioner showed that Microdrones is simple and mistake-proof. (DJI-1030, ¶48.) PO argues that Microdrones has not been established as prior art. (Reply, p. 10 n.2.) But the Microdrones Manual does not need to be established as publicly accessible to demonstrate that the drone it describes met any need for a simple and mistake-proof attachment mechanism. PO also argues that Microdrones is not mistake-proof based on interpretation of an ambiguous figure, but Microdrones itself teaches that its design “avoid[s] accidental misplacement” of blades on the wrong driveshaft. (DJI-1016, p. 27.) PO argues that Microdrones is not easy to use, but this argument is based solely on their expert’s testimony about prop savers, which are distinct from the O-ring design of Microdrones. Nevertheless, PO’s expert testified that “[a] POSA would be familiar with tools and techniques used to ease installation of a prop when using a prop saver.” (Ex. 2009, ¶32.)

Finally, PO argues that partial rotation resolved the long-felt need for a simple lock mechanism, and the engagement limitation of claim 1 met the long-felt need for a mistake-proof mechanism. But the Board has already determined that claim 1 is invalid and that Microdrones discloses the engagement limitation. (DJI-1031, pp. 39-42, 62.) PO cannot cite to a limitation of an invalid claim as nexus for secondary considerations of nonobviousness.

IV. The amendments broaden the scope of the claims.

Petitioner showed that the proposed amendments broaden the claims because they remove the requirement that the blades are rotated, replacing them with the mere capability for rotation. (Opp., pp. 24-25.) PO's Reply offers nothing new to rebut this argument. (Reply, p. 12.)

V. 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 SUR-
REPLY TO PATENT OWNER'S REPLY TO PETITIONER'S
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UNDER 37 C.F.R. § 42.121** was served via electronic mail on August 7, 2020, in
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