

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

Case IPR2019-00846

Patent 9,260,184

**PATENT OWNER'S REVISED MOTION TO AMEND
UNDER 37 C.F.R. § 42.121**

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LIST OF EXHIBITS

Exhibit	Description
2001	Declaration of Dr. Charles F. Reinholtz
2002	U.S. Pat. Appl. Pub. No. 2014/0339355 (application publication of U.S. Pat. Appl. No. 14/277,370) (“the ’370 application”)
2003	Canadian Pat. Appl. No. 2815885 (“the ’885 priority application”)
2004	Order 15: Construing the Terms of the Asserted Claims of the Patents at Issue, ITC Inv. No. 337-TA-1133
2005	Excerpts from Hearing Transcript, Oct. 22, 2019, ITC Inv. No. 337-TA-1133
2006	Video of Rotor Blade Installation
2007	Second Declaration of Dr. Charles F. Reinholtz
2008	Declaration of Dr. Alfred Ducharme in IPR2019-00343
2009	Declaration of Dr. Charles F. Reinholtz in IPR2019-00343
2010	Excerpts from Expert Report of Juan J. Alonso Regarding Invalidity of U.S. Patent Nos. 9,260,184 and 10,044,013 in 337-TA-1133
2011	Excerpts from Initial Determination in Inv. No. 337-TA-1133

TABLE OF ABBREVIATIONS

Description	Abbreviation
Paper No. 15, Petitioner's Opposition to Patent Owner's Motion to Amend	"Opposition"
Paper No. 16, Preliminary Guidance to Patent Owner's Motion to Amend	"PG"
Paper No. 2, Petition	"Petition"

I. INTRODUCTION

Patent Owner Autel Robotics USA LLC (“Patent Owner” or “Autel”) submits this revised motion to amend (“revised MTA”) in response to Petitioner SZ DJI Technology Co., Ltd.’s (“Petitioner’s” or “DJI’s”) Opposition to Patent Owner’s Motion to Amend (Paper No. 15) and the Board’s Preliminary Guidance (Paper No. 16). Patent Owner proposes revised claims 12 and 13 as substitutes to claims 3 and 4, respectively. Patent Owner submits that the instant motion to amend is not contingent on the unpatentability of the original claims.

As explained herein, Patent Owner has met the requirements for a motion to amend, and Petitioner has not met its burden of establishing that the substitute claims are unpatentable.

II. LISTING OF REVISED PROPOSED SUBSTITUTE CLAIMS

Revised Proposed Claims 12 and 13 are included in Appendix A hereto.

III. NUMBER OF SUBSTITUTE CLAIMS

Revised proposed claims 12 and 13 include one substitute claim for each cancelled claim (claims 3 and 4). Thus, Patent Owner has satisfied 37 C.F.R. § 42.121(a)(3). *See Intuitive Surgical, Inc. v. Ethicon LLC*, Case No. IPR2018-00933, Final Written Decision, Paper No. 31 at 9 (Dec. 3, 2019).

IV. SCOPE OF THE SUBSTITUTE CLAIMS

As described below, revised substitute claims 12 and 13 narrow and do not broaden claims 3 and 4, respectively. Accordingly, Patent Owner has satisfied 37 C.F.R. § 42.121(a)(2)(ii).

In substitute claim 12, the amendment adds the limitation that the clockwise lock mechanism is “configured to engage with the shaft lock portion of the clockwise lock mechanism” in a particular manner. This limitation adds further structural requirements to the claimed lock mechanism and therefore does not broaden the claim. In addition, as explained below, this limitation resolves an indefiniteness issue with respect to the “is rotated” language of original claim 3. The claim 12 amendment also further narrows the scope of the claim with the addition of the “partial” limitation to the scope of claimed rotation. The Board preliminarily agreed that “configured to engage by partial [] rotation” narrowed the scope of the claims. PG at 4-5. Thus, substitute claim 12’s recitation of “configured to engage with the shaft lock portion of the clockwise lock mechanism by partial [] rotation” also narrows, and does not broaden the scope of original claim 3.

In substitute claim 13, the amendment adds the limitation “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.” This limitation adds further structural components and provides antecedent

basis for the claimed shaft lock and blade lock portions of the counterclockwise lock mechanism. The amendment also adds the limitation that the counterclockwise lock mechanism is “configured to engage with the shaft lock portion of the counterclockwise lock mechanism” in a particular manner. This limitation adds further structural requirements to the claimed lock mechanism and therefore does not broaden the claim. In addition, as explained below in section VI.B., this limitation resolves an indefiniteness issue with respect to original claim 4. The claim 13 amendment also further narrows the scope of the claim with the addition of the “partial” limitation to the scope of claimed rotation. The Board preliminarily agreed that “configured to engage by partial [] rotation” narrowed the scope of the claims. PG at 4-5. Thus, substitute claim 13’s recitation of “configured to engage with the shaft lock portion of the counterclockwise lock mechanism by partial [] rotation” narrows, and does not broaden the scope of original claim 4.

In its Opposition, Petitioner argues that substitute claims 12 and 13 as previously proposed broaden the scope of original claims 3 and 4 because of the removal of the “is rotated” claim language. Opposition at 1-3. Petitioner’s argument lacks merit in light of its position that original claims 3 and 4 are indefinite due to the “is rotated” language. In an ITC proceeding involving the ‘184 patent, Petitioner argued, and the ITC found, that original claims 3 and 4 were indefinite as mixed apparatus/method claims. Ex. 2004, pp. 25-26. Petitioner, thus, successfully argued

that original claims 3 and 4 had a scope that could not be ascertained. The amendments in the substitute claims add narrowing structural limitations and resolve the indefiniteness problem. Accordingly, the amendments do not broaden the original claims, and Petitioner has not established otherwise.

V. SUPPORT FOR THE SUBSTITUTE CLAIMS

As shown below, no new matter is added by way of the revised substitute claims. Support for the revised substitute claims is found in the disclosure of U.S. Pat. Appl. No. 14/277,370 (“the ’370 application”) (Ex. 2002), which issued as the ’184 patent, as well as Canadian Pat. Appl. No. 2815885 (“the ’885 priority application”) (Ex. 2003) (also available at Ex. 1001, pp. 158-178), to which the ’370 application claims priority. *See* 37 C.F.R. §§ 42.121(b)(1)-(2). The ’370 application and the ’885 priority application have the same figures and written description.

Claim	Exemplary Support in the ’370 Application (Ex. 2002) and the ’885 Priority Application (Ex. 2003) ¹
12. The apparatus of claim 1 wherein the blade lock portion of the clockwise lock mechanism <u>is configured to engage with the shaft lock portion of the clockwise lock mechanism by partial</u>	“A clockwise rotor blade is releasably attached to the first driveshaft by engagement in a clockwise lock mechanism and generates a vertical lift force when rotated in the clockwise direction, and a counterclockwise rotor blade is releasably attached to the second driveshaft by engagement in a counterclockwise lock mechanism and generates a vertical lift force when rotated in the counterclockwise direction.” Ex. 2002 at [0008]; <i>see also</i> Ex. 2003 at 3:19-24.

¹ Emphasis added throughout unless otherwise noted.

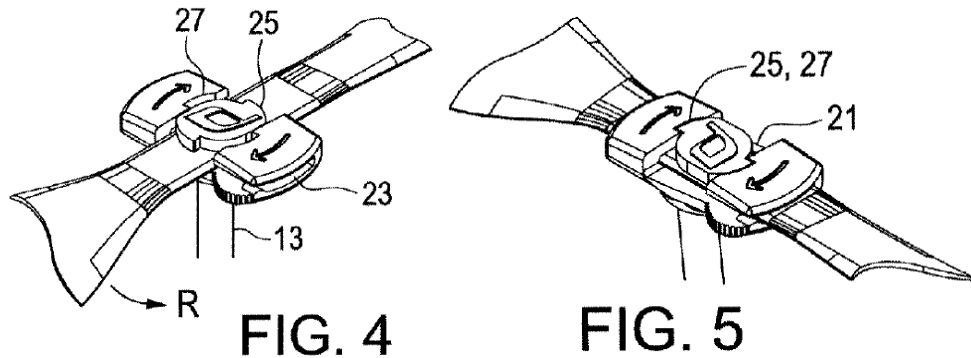
<p>is rotated counterclockwise <u>rotation</u> with respect to the shaft lock <u>portion thereof of the</u> <u>clockwise lock</u> <u>mechanism</u> to releasably attach the clockwise rotor blade to the first driveshaft.</p>	<p>“Each clockwise rotor blade 9A, 9B is releasably attached to the corresponding driveshaft 13 by engagement in a clockwise lock mechanism 11AB and each counterclockwise rotor blade 9C, 9D is releasably attached to the corresponding driveshaft 13 by engagement in a counterclockwise lock mechanism 11CD.” Ex. 2002 at [0030]; <i>see also</i> Ex. 2003 at 7:10-14.</p> <p>“The blade lock portion 17A of the clockwise lock mechanisms 11A are rotated counterclockwise with respect to the shaft lock portion 15A thereof to push the blade into the slots 23 to releasably attach the clockwise rotor blade 9A to the shaft lock portion 15A and thus to the driveshaft 13. During operation the shaft lock portion 15A exerts a force in the direction of the arrows on the rotor blade to rotate same, and this force keeps the blade engaged in the slots 23. The counterclockwise lock mechanism 11C operates in a similar fashion with an opposite spin direction. ... FIG. 7 shows the blade lock portion 17C of the counterclockwise rotor blade 9C successfully installed in the shaft lock portion 15C to form a counterclockwise lock mechanism 11CD.” Ex. 2002 at [0034-0035]; <i>see also</i> Ex. 2003 at 8:14-26.</p>
<p>13. The apparatus of claim 12 <u>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, and</u></p>	<p>“FIG. 6 shows the shaft lock portion 15C, with recess 21, of a counterclockwise lock mechanism with a counterclockwise rotor blade 9C, with blade lock portion 17C, on one side and a clockwise rotor blade 9A, with blade lock portion 17A, on the other side. FIG. 7 shows the blade lock portion 17C of the counterclockwise rotor blade 9C successfully installed in the shaft lock portion 15C to form a counterclockwise lock mechanism 11CD.” Ex. 2002 at [0035]; <i>see also</i> Ex. 2003 at 8:22-26.</p>
<p>wherein the blade lock portion of the counterclockwise lock mechanism <u>is configured to engage with the shaft lock</u></p>	<p>“A clockwise rotor blade is releasably attached to the first driveshaft by engagement in a clockwise lock mechanism and generates a vertical lift force when rotated in the clockwise direction, and a counterclockwise rotor blade is releasably attached to the second driveshaft by engagement in a counterclockwise lock mechanism</p>

<p><u>portion of the counterclockwise lock mechanism by partial</u> is rotated clockwise <u>rotation</u> with respect to the shaft lock portion of <u>the counterclockwise lock mechanism thereof</u> to releasably attach the counterclockwise rotor blade to the second driveshaft.</p>	<p>and generates a vertical lift force when rotated in the counterclockwise direction.” Ex. 2002 at [0008]; <i>see also</i> Ex. 2003 at 3:19-24.</p> <p>“Each clockwise rotor blade 9A, 9B is releasably attached to the corresponding driveshaft 13 by engagement in a clockwise lock mechanism 11AB and each counterclockwise rotor blade 9C, 9D is releasably attached to the corresponding driveshaft 13 by engagement in a counterclockwise lock mechanism 11CD.” Ex. 2002 at [0030]; <i>see also</i> Ex. 2003 at 7:10-14.</p> <p>“The blade lock portion 17A of the clockwise lock mechanisms 11A are rotated counterclockwise with respect to the shaft lock portion 15A thereof to push the blade into the slots 23 to releasably attach the clockwise rotor blade 9A to the shaft lock portion 15A and thus to the driveshaft 13. During operation the shaft lock portion 15A exerts a force in the direction of the arrows on the rotor blade to rotate same, and this force keeps the blade engaged in the slots 23. The counterclockwise lock mechanism 11C operates in a similar fashion with an opposite spin direction. ... FIG. 7 shows the blade lock portion 17C of the counterclockwise rotor blade 9C successfully installed in the shaft lock portion 15C to form a counterclockwise lock mechanism 11CD.” Ex. 2002 at [0034-0035]; <i>see also</i> Ex. 2003 at 8:14-26.</p>
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In addition to the exemplary disclosures noted above, FIGS. 4-5 of the '370 application² provide additional support for the “partial” limitation. The written description accompanying these figures explain that they illustrate how the clockwise rotor blade is releasably attached to the corresponding driveshaft by

² The same figures appear in the '885 priority application. Ex. 2003 at 17.

counterclockwise rotation. Ex. 2002 at [0033]-[0034]; *see also* Ex. 2003 at 8:4-20. These figures illustrate that this counterclockwise rotation is a *partial* counterclockwise rotation, *i.e.*, less than a full rotation of 360 degrees. Ex. 2001 ¶¶ 35-37.



The written description further explains that “[t]he counterclockwise lock mechanism 11C operates in a similar fashion with an opposite spin direction.” Ex. 2002 at [0034]; *see also* Ex. 2003 at 8:19-20. Accordingly, these figures provide additional support for the “partial counterclockwise rotation” and “partial clockwise rotation” limitations that appear in revised proposed claim 12 and 13, respectively.

Furthermore, claims 12 and 13 depend directly or indirectly from claim 1. Below is a chart showing written description support for claim 1.

Claim	Exemplary Support in the '370 Application (Ex. 2002) and the '885 Priority Application (Ex. 2003)
1. A rotary wing aircraft apparatus comprising:	Ex. 2002 at Figs. 1-3, [0008], [0012]-[0014], [0027]-[0029].

	Ex. 2003 at Figs. 1-3, 3:14-28, 4:19-4:2, 6:16-7:8.
a body;	Ex. 2002 at Figs. 1-3, [0008], [0012]-[0014], [0027]-[0029]. Ex. 2003 at Figs. 1-3, 3:14-28, 4:19-4:2, 6:16-7:8.
a plurality of arms extending laterally from the body, and a rotor assembly attached to an outside end of each arm;	Ex. 2002 at Figs. 1-3, [0008], [0012]-[0014], [0027]-[0029]. Ex. 2003 at Figs. 1-3, 3:14-28, 4:19-4:2, 6:16-7:8.
each rotor assembly comprising a rotor blade releasably attached to a driveshaft by a lock mechanism, and a drive rotating the driveshaft;	Ex. 2002 at Figs. 1-3, [0008], [0012]-[0014], [0027]-[0029]. Ex. 2003 at Figs. 1-3, 3:14-28, 4:19-4:2, 6:16-7:8.
wherein a first driveshaft rotates in a clockwise direction and a second driveshaft rotates in a counterclockwise direction;	Ex. 2002 at [0008], [0027]-[0029]. Ex. 2003 at 3:14-28, 6:16-7:8.
wherein a clockwise rotor blade is releasably attached to the first driveshaft by engagement in a clockwise lock mechanism and generates a vertical lift force when rotated in the clockwise direction, and a counterclockwise rotor blade is releasably attached to the second driveshaft by engagement in a counterclockwise lock mechanism and generates a vertical lift force when rotated in the counterclockwise direction;	Ex. 2002 at Figs. 4-10, [0008], [0015]-[0021], [0027]-[0034]. Ex. 2003 at Figs. 4-10, 3:14-28, 5:4-25, 6:16-7:20.
wherein the clockwise rotor blade is engageable only with the clockwise lock mechanism and cannot be engaged in the counterclockwise lock mechanism, and the counterclockwise rotor blade is engageable only with the counterclockwise lock mechanism and cannot be engaged in the clockwise lock mechanism; and	Ex. 2002 at Fig. 8, [0008], [0019], [0036], [0043]. Ex. 2003 at Fig. 8, 3:14-28, 5:18-19, 9:1-6, 10:22-26.

wherein the clockwise lock mechanism comprises a shaft lock portion attached to the first driveshaft and a blade lock portion attached to the clockwise rotor blade, the shaft lock portion defining notches configured to engage corresponding lugs on the blade lock portion.	Ex. 2002 at Figs. 4-6, 9-10, [0015]-[0017], [0020]-[0021], [0033]-[0035], [0037]. Ex. 2003 at Figs. 4-6, 9-10, 5:4-13, 5:21-25, 8:4-26, 9:8-11.
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Based at least on these disclosures, a person of ordinary skill in the art (“POSA”) would have understood that the inventors of the ’184 patent were in possession of revised claims 12 and 13. *See* 37 C.F.R. §§ 42.121(b)(1)-(2); *Vas-Cath Inc. v. Mahurkar*, 935 F.2d 1555, 1563–64 (Fed. Cir. 1991).

VI. THE REVISED SUBSTITUTE CLAIMS RESPOND TO AND OVERCOME THE PATENTABILITY GROUND IN THIS IPR

A. Claim Construction

Claim 1 requires that “the clockwise rotor blade is engageable only with the clockwise lock mechanism and cannot be engaged in the counterclockwise lock mechanism, and the counterclockwise rotor blade is engageable only with the counterclockwise lock mechanism and cannot be engaged in the clockwise lock mechanism.” (the Engagement Limitation”). As Petitioner has acknowledged, the lock mechanism is the component that attaches the rotor blade to the UAV. IPR2019-00343, paper 2 at 33. Thus, the “Engagement Limitation”, which prevents the **engagement** of a **rotor blade** with the wrong **lock mechanism**, means that the claimed lock mechanisms prevent a rotor blade from being attached to the wrong

drive. Ex. 2001 ¶¶ 42-44. Petitioner opposes this construction based on several assertions.³

First, Petitioner incorrectly asserts that the Engagement Limitation requires the engagement of lugs and notches. But the Engagement Limitation does not mention lugs and notches, and those limitations should not be imported into the claims. Petitioner confuses the Engagement Limitation with a different and separate limitation that requires engagement of lugs and notches. Ex. 2009 ¶ 73. The ‘184 patent does not use the word “engage” exclusively with respect to lugs and notches, and Petitioner has not suggested that the plain meaning of the word engage is limited to lugs and notches. Ex. 1001 at 1:64-67; 3:5-6; 4:15-16; 5:5-6 (‘184 patent use of “engage” regarding various different components).

Second, Petitioner asserts that “attach” and “engage” have different meanings. But Patent Owner is not substituting one word for the other. Instead, as explained above, the result of engaging a blade with a lock mechanism is the attachment of a blade. Preventing engagement of the blade with the lock mechanism thus prevents attachment of the blade via the lock mechanism.

Third, Petitioner asserts, relying on Figure 8, that the embodiment disclosed in the specification does not prevent attachment of a rotor blade to the wrong

³ The same claim construction arguments were raised in IPR2019-00343.

driveshaft. Opposition at 8. But there is no evidence, including no statements in the ‘184 patent, indicating that the blade in Figure 8 is attached to the driveshaft. Further, Petitioner’s argument is directly contrary to its own admissions, made in briefs and by its own experts, that the ‘184 patent teaches a lock mechanism “to **prevent clockwise rotor blades from being attached to counterclockwise driveshafts**, and vice versa.” IPR2019-00343, paper 2 at 15-16 (emphasis added); Ex. 2005 at 281:5-22 and 285:16-24; Ex. 2008 ¶ 22.

B. Revised Substitute Claims 12 and 13 Are Patentable Over Sasaki and Soken

The ‘184 patent is directed to a locking mechanism for rotor blades in an unmanned aerial vehicle (“UAV”). Ex. 1001 (‘184 patent) at Abstract, claims. The invention of the ‘184 patent includes a unique and novel twist-lock mechanism for attaching UAV rotor blades that (1) allows for quick and easy detachment of the blades and (2) prevents a user from attaching a rotor blade to the wrong driveshaft (i.e., a clockwise rotor blade cannot be attached to a counterclockwise spinning driveshaft and vice versa.) Ex. 1001 at 2:16-18; Ex. 2001 ¶¶ 33, 37, 70.

Revised substitute claims 12 and 13 require 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. This partial rotation provides the UAV with the convenient twist-lock feature described above, and is a distinct improvement over conventional threaded screw-on type attachment mechanisms

that require multiple full revolutions to attach a rotor blade. Ex. 2001 ¶¶ 27, 37, 70. As explained more fully below, 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.

Petitioner argued in its Opposition that Patent Owner’s Motion to Amend was “merely a pretext to fix the fatal indefiniteness issues which doomed enforcement of claims 3 and 4 in the ITC.” Opposition at 3. The Board preliminarily rejected that argument because Patent Owner argued that neither Sasaki nor Sokn disclosed the lock mechanisms as claimed. PG at 4. On that basis, the Board preliminarily found that Patent Owner’s motion responded to the grounds of unpatentability at issue in the trial. PG at 4. Accordingly, revised substitute claims 12 and 13 respond to the patentability ground involving those prior art references for the same reason. *See Intuitive Surgical, Inc. v. Ethicon LLC*, Case No. IPR2018-00933, Final Written Decision, Paper No. 31 at 9 (Dec. 3, 2019).

Petitioner asserts that the only claim amendment responsive to the instituted ground is the “partial rotation” limitation, and because Sokn, its secondary reference, discloses a connection mechanism that uses partial rotation, that the amendments are not responsive to the patentability ground. Opposition at 3-5. But as explained below, in addition to the fact that Sasaki and Sokn do not disclose the lock

mechanisms as claimed, a POSA would not be motivated to combine Sasaki with Sokn for numerous reasons, including those related to the “partial rotation” limitation. Ex. 2007 ¶¶ 24-32, 39. The logical extension of Petitioner’s argument is that in order for an amendment to be related to a ground of unpatentability in the trial, the amendment must add a claim limitation that is not found in any of the references that form the section 103 ground. There is no support for such a proposition, and it is inconsistent with the standard for obviousness, which includes numerous elements beyond the disclosure of claim limitations in the references themselves, including the requirement for a motivation to combine. *See, e.g., Apple Inc. v. Samsung Elecs. Co.*, 839 F.3d 1034, 1051 (Fed. Cir. 2016). Here, revised proposed claims 12 and 13 both include elements not disclosed in the prior art and support the fact that a person of skill in the art would not combine the prior art to arrive at the claims. Revised proposed claims 12 and 13 thus respond to the obviousness ground in the trial.

1. Sasaki

Sasaki discloses a prior art conventional screw-on type blade attachment mechanism for a UAV. Ex. 1006 at 1:49-2:4; Figures 8 and 9. The Sasaki design includes a threaded nut in the propeller blade that screws onto a threaded driveshaft. Ex. 1006 at 1:49-2:4. A drawback of this screw-on type mechanism is that a user

must rotate the blade several full revolutions in order to attach the blade to the driveshaft. Ex. 2005 at 313:16-315:24; Ex. 2001 ¶¶ 45-47.

Sasaki explains that in a design of this type, it is necessary to ensure that a propeller that rotates to the right uses a left threaded nut and a propeller that rotates to the left utilizes a right threaded nut. Ex. 1006 at 2:5-16. With this type of arrangement, the directional force caused by rotation of the propeller blades will have a tightening effect on the blades. *Id.* If the screw directions were reversed, the directional force would have a loosening effect, which would be an untenable design due to the danger of a prop releasing. Ex. 2005 at 315:25-317:4; Ex. 2001 ¶ 46. A drawback of the screw-on design is that the connections become tightened more than necessary, and the props are difficult to remove and replace. Ex. 1006 at 2:9-16; Ex. 2001 ¶ 48. Sasaki overcomes the overtightening problem by using a connection mechanism that is not dependent on the direction in which the prop rotates. Ex. 1006 at 2:24-28; Ex. 2001 ¶ 49. Sasaki then describes a blade connection mechanism that is (1) independent of the direction of the blade rotation and (2) does not require any rotation. Ex. 1006 at 5:31-7:28; Ex. 2001 ¶¶ 50-51.

Thus, Sasaki does not 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. Ex. 2001 ¶ 60.

In addition, Petitioner’s assertions of unpatentability are based on the false premise that Sasaki discloses the Engagement Limitation. Petition at 28 (“Sasaki’s directionally threaded coupling mechanism is ‘mistake-proof.’”), 29, 36. But the conventional screw-on type blade attachment mechanism does not prevent the attachment of a blade to the wrong drive. Ex. 2001 ¶¶ 52-54, 59. In fact, it is relatively easy to attach a blade on the wrong drive on a UAV that utilizes the conventional screw-on type connection mechanism. Ex. 2001 ¶¶ 52-54. Patent Owner’s expert, Dr. Reinholtz, created a video demonstrating that a blade can be attached to the wrong drive using a screw-on type attachment mechanism. Ex. 2006; Ex. 2001 ¶ 54; *see also* Ex. 2005 at 332:23-337:20.

2. Sokn

Sokn is directed to a motor mount assembly for a domestic clothes dryer. Ex. 1007 at Abstract. It discloses a mounting system used to mount a fan motor to a housing that contains the fan in a clothes dryer. Ex. 1007 at 1:9-11; Ex. 2001 ¶¶ 55-56. Since Sokn is directed at a mounting system for connecting a motor to a fixed housing, there is no consideration in Sokn for creating an attachment mechanism where rotor blades can be easily detached for transport or storage. Ex. 2001 ¶¶ 57. It is likely that the mounting solution provided by Sokn will never need to be disassembled or transported by a user, and there is no discussion in Sokn regarding disassembly. Ex. 2001 ¶ 57.

There is no disclosure in Sokn of UAVs or UAV rotor blades. Ex. 2001 ¶ 57.

There is no disclosure in Sokn regarding clockwise or counterclockwise rotating blades and accordingly no disclosure of lock mechanisms that depend on direction of rotation. Ex. 2001 ¶¶ 57, 61, 63-65. There is no disclosure in Sokn of clockwise or counterclockwise lock mechanisms or different configurations of its mounting system that depend on the direction of blade rotation. *Id.* Accordingly, Sokn does not 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.

3. No Motivation To Combine

A person of ordinary skill in the art (“POSA”) would not be motivated to combine Sasaki with Sokn to achieve the inventions claimed in the ‘184 patent. There is no disclosure in Sasaki that indicates a need, motivation, or desire to utilize lock mechanisms for the propeller blade and driveshaft that (1) depend on the rotational direction of the propeller blade or (2) are configured to engage with partial rotation. Ex. 2001 ¶ 62. As previously explained, the problem identified in Sasaki – overtightening – was resolved with a design that (1) did not depend on the direction of rotation and (2) did not require rotation of a blade lock portion with respect to a shaft lock portion in order to attach the blade. Ex. 2001 ¶ 62. Sasaki teaches away from directionally specific lock mechanisms. Ex. 2001 ¶ 59. Even if the statements

in Sasaki do not rise to the level of a teaching away, they are relevant to the lack of a motivation to combine because they, at the very least, discourage the use of directionally specific lock mechanisms.

Further, a POSA would not look to Sokn when designing an attachment mechanism for UAV blades. Ex. 2001 ¶ 63. Sokn relates to domestic clothes dryers, a different field than UAVs. *Id.*

A POSA would not look to Sokn to achieve the novel twist-lock mechanism for attaching UAV rotor blades that allows for quick and easy detachment of the blades. Ex. 2001 ¶ 63. There is no consideration in Sokn for creating an attachment mechanism such that rotor blades can be easily detached. Ex. 2001 ¶¶ 57, 63. It is likely that the clothes dryer fan blade mounting solution provided by Sokn will never need to be disassembled or transported by a user. *Id.* Sokn discusses only assembly and does not mention disassembly of its system. *Id.* Thus, a POSA would not look to Sokn to achieve the quick and convenient partial rotation lock mechanisms of revised claims 12 and 13. Ex. 2007 ¶ 27.

A POSA would also not look to Sokn to achieve directionally specific lock mechanisms that prevent a user from attaching a rotor blade to the wrong driveshaft. Ex. 2001 ¶¶ 63-65. There is no discussion in Sokn regarding clockwise and counterclockwise rotating rotor blades or the critical need to prevent interchangeably mounting such blades in a rotorcraft. Ex. 2001 ¶ 57. Sokn is concerned with

accurate assembly of a motor to a housing to allow minimum clearance between the fan blades and the fan housing. Ex. 2001 ¶¶ 56, 63. Nowhere does Sokn mention the direction of rotation being a consideration in the mounting of an electric fan motor to an associated fan housing. Ex. 2001 ¶ 63. Thus, Sokn does not depict or discuss different configurations for its lock mechanism to accommodate the proper fitting of components based on the direction of rotation. Ex. 2001 ¶ 63.

Petitioner implies that Sokn teaches clockwise and counterclockwise engagement mechanisms. Petition at p. 34. But this is incorrect. Ex. 2001 ¶ 64. In both embodiments in Sokn, the motor assembly is rotated clockwise to tighten it into the dryer housing. Ex. 2001 ¶ 64. As previously noted, there is no discussion in Sokn regarding the direction of rotation or the relevance of clockwise versus counterclockwise rotation when installing a fan motor to a housing.

Petitioner's argument is based on a misreading of Sokn's discussion of the importance of achieving precise alignment between components. Petitioner relies on language from Sokn that "stop members can be configured to provide a predetermined orientation for engagement and interlock connection." Petition at 34. But reading further in the same passage of Sokn, it is clear that Sokn's reference to providing a "predetermined orientation" is referring to the accurate alignment of components and not to a clockwise and counterclockwise assembly direction. Ex.

2001 ¶ 65 (citing Ex. 1007, Sokn at 3:66-4:4). This understanding is also supported elsewhere in Sokn. Ex. 2001 ¶ 65 (citing Ex. 1007, Sokn at Abstract, 5:10-24).

Petitioner also incorrectly asserts that its proposed combination of Sasaki and Sokn will solve the overtightening problem described in Sasaki. Petition at 35. But Petitioner's proposed combination of Sasaki and Sokn would lead to the same basic self-tightening screw and nut combination that Sasaki is teaching away from. Ex. 2001 ¶¶ 67-69. As explained by Dr. Reinholtz, in Petitioner's proposed combination, the interaction of Sokn's stops 45 and the face of ring 19 would be just like threading a lid onto a jar. Ex. 2001 ¶ 68. As the closed end of the lid (stops 45) contacts the top of the jar (face of ring 19), further rotation may become more difficult, but it would not prevent the lid from being overtightened. *Id.* In Petitioner's combination, the face of Sokn's ring assembly 19 simply becomes the distal end face of the driveshaft 73 in Sasaki. Ex. 2001 ¶ 69. The face of ring 19 abuts the stops 45 just as the end of Sasaki's drive shaft would abut the closed end of nut 8. Ex. 2001 ¶ 69. Thus, just like the jar and lid example mentioned above, cylindrical socket 25 and ring 19 can be overtightened. Ex. 2001 ¶ 69.

Petitioner's expert asserts that Sokn would solve the overtightening problem because Sokn includes stop members. Ex. 1028 ¶ 48. The assertion is not based on refuting the detailed explanation to the contrary from Dr. Reinholtz; it is instead based on the fact that the components are called "stop" members. Ex. 1028 ¶ 48.

But Dr. Reinholtz explains how non-frictional stops require stop elements that abut radially, rather than axially, and that the mechanism in Sokn requires frictional contact between the stops and the resilient ring of Sokn. Ex. 2007 ¶¶ 28-30. Accordingly, Petitioner's proposed combination would not solve the overtightening problem and would result in a design that Sasaki specifically criticizes. Ex. 2001 ¶ 69; Ex. 2007 ¶¶ 28-30.

Further, Sokn's connection mechanism uses a resilient ring for absorbing vibration. Ex. 2007 ¶¶ 25-27. A POSA would not be motivated to use a resilient mounting in a UAV application because it would inhibit precise control of rotor rotation needed to balance lift and maintain stable flight. Ex. 2007 ¶ 26. In addition, shrinking the mechanism of Sokn, as proposed by Petitioner, would eliminate the advantage provided by the resilient ring. The result of Petitioner's proposed combination would be a small diameter screw-on blade that has only approximately 90 degrees of thread engagement, which would not be an improvement over Sasaki. Ex. 2007 at ¶¶ 31-32.

Petitioner has not shown that a POSA would be motivated to combine Sasaki, which provides no motivation itself to achieve the features of the '184 patent lock mechanism (and instead discourages a POSA from directionally specific lock mechanisms), with the connection mechanism from a clothes dryer that would not solve the overtightening problem identified in Sasaki.

Further, Sokn does not disclose multiple configurations for its connection mechanism, so even if Sasaki and Sokn were combined, it would not lead to clockwise and counterclockwise lock mechanisms as required by the claims. Ex. 2007 ¶ 39. Also, as previously explained, Dr. Reinholtz established that threaded connection mechanisms do not prevent attachment of the wrong blade. Ex. 2001 at ¶¶ 52-54. Thus, even if one were to combine Sasaki and Sokn, and further modify Sokn to achieve clockwise and counterclockwise connection mechanisms, such a combination would still be a threaded-type design that would not prevent attachment of the wrong blade. Ex. 2007 ¶ 39. The revised substitute claims are patentable over Sasaki and Sokn.

C. Revised Substitute Claims 12 and 13 Are Patentable Over Sasaki and any of Philistine, EP067, and Obrist

Petitioner cites additional references to support the notion that lock mechanisms using partial rotation were known in the art. Opposition at 20. But Petitioner has failed to establish that a POSA would combine these references with Sasaki, or that, even if combined, that they would render the revised substitute claims unpatentable.

Philistine relates to a twist-lock mount for a blower motor for a system that provides filtered air. Ex. 2007 ¶ 18; Ex. 1026. EP067 and Obrist relate to pitch-control for propeller blades. Ex. 2007 ¶¶ 20-22; Ex. 1028, 1017. None of Philistine, EP067, and Obrist disclose or relate to UAVs, UAV propellers, or UAV lock

mechanisms. Ex. 2007 ¶ 34. Each of Philistine, EP067, and Obrist disclose only single configuration for their connection mechanisms. Ex. 2007 ¶¶ 19-23. As a result, even if Sasaki were combined with any of those references there would still be a lack of a device that has clockwise and counterclockwise lock mechanisms and that prevents the engagement of a clockwise rotor in a counterclockwise lock mechanism (and vice versa) as required in revised claims 12 and 13. Ex. 2007 ¶¶ 39-42. As to Philistine, DJI and Dr. Ducharme rely on a mirror image in an attempt to argue that Philistine discloses multiple configurations. Opposition at 23; Ex. 1028 ¶ 59. That mirror image is not a part of Philistine's actual disclosure and there can be no conclusion other than that Philistine entirely lacks disclosure of directionally specific lock mechanisms. Ex. 2007 ¶ 40. In ITC Investigation No. 337-TA-1113, the Administrative Law Judge dismissed the same "mirror image" arguments as to Philistine and EP067. Ex. 2011 at 105-107; Ex. 2005 at pp. 328-332.

For reasons similar to those associated with Sokn, a POSA would not be motivated to combine Sasaki with any of Philistine, EP067, or Obrist. Ex. 2007 ¶¶ 33-38. In particular, none of those references relate to UAVs and none of those references disclose more than one configuration for their connection mechanisms. *Id.* ¶ 34. None discuss mechanisms for securing components based on the direction of rotation or the critical need to prevent interchangeably mounting clockwise and counterclockwise rotor blades. *Id.* ¶¶ 33-37. A POSA would not be motivated to

modify Sasaki with those references to achieve directionally specific lock mechanisms. *Id.*

D. Secondary Considerations

There has been a need in the UAV industry for many years for UAV rotor blade attachment mechanisms that can be quickly and easily detached and that prevent the misplacement of rotor blades. Ex. 2007 ¶ 44; Ex. 2009 ¶ 95; Ex. 2010 at Appendix A.2, p. 26. DJI has recognized that a POSA would have understood the need, since as early as the Sasaki reference, which was published in 1991, for simpler, faster, and mistake proof rotor blade attachment mechanisms. *Id.* DJI's expert, Dr. Ducharme, agrees. Ex. 1003 ¶ 100. Revised claims 12 and 13 solved those two long-felt needs. Ex. 2007 ¶¶ 43-45. The lock mechanisms of claims 12 and 13, which include blade lock portions and shaft lock portions configured to engage by partial rotation, are simple and fast. *Id.* In addition, claims 12 and 13 require clockwise and counterclockwise lock mechanisms that prevent the attachment of a blade on the wrong drive shaft. *Id.* Thus, there is a nexus between the novel elements of revised claims 12 and 13 and the solutions to the long-felt needs acknowledged by DJI.

E. Revised Substitute Claims 12 and 13 Satisfy 35 U.S.C. § 112

“[O]nce a proposed claim includes amendments to address a prior art ground in the trial, a patent owner also may include additional limitations to address

potential § 101 or § 112 issues, if necessary.” *Lectrosonics, Inc. v. Zaxcom, Inc.*, Case No. IPR2018-01129, Paper No. 15 at 5-6 (Feb. 25, 2019).

1. The Indefiniteness Arguments Raised In Petitioner’s Opposition Fail

In its Opposition, Petitioner argues that “engage” requires mating of two components and faults originally proposed claims 12 and 13 for allegedly failing to recite the second component. Opposition at 25. Although the Board preliminarily rejected Petitioner’s argument, Patent Owner has further amended claims 12 and 13 to clarify that the engagement occurs “with the shaft lock portion.” Revised substitute claims 12 and 13 thus moot the argument raised by Petitioner.

Petitioner additionally argues that the claims are indefinite because it is unclear what degree of “partial [] rotation” achieves “engagement.” Opposition at 25. The Board preliminarily disagreed with that argument, explaining that “[t]he claims recite how a component engages another component, i.e., by ‘partial’ rotation and there is no ambiguity in this respect.” PG at 10. Dr. Reinholtz confirmed the lack of ambiguity by indicating that partial rotation includes anything less than 360 degrees. Ex. 1027 at 126:18-24. Petitioner asserts that it is unclear what degree of rotation is required to achieve engagement, but Petitioner does not assert that there is anything indefinite about the term “engagement”. In addition, Petitioner asserts that a one (1) degree would not result in engagement with the embodiments disclosed

in the specification but the claims are not limited to the embodiments disclosed in the specification.

2. Substitute Claim 13 Provides Antecedent Basis

Substitute claim 13 and original claim 4 both recite the terms “*the* blade lock portion of the counterclockwise lock mechanism” and “*the* shaft lock portion thereof.” The limitation “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” is added to revised substitute claim 13 to provide antecedent basis for these two terms.

VII. CONCLUSION

Substitute claims 12 and 13 satisfy the requirements of 37 C.F.R. § 42.121 and are patentable over the ground asserted by Petitioner in this IPR. Patent Owner requests that claims 3 and 4 be replaced with substitute claims 12 and 13, respectively.

Respectfully Submitted,

Date: May 15, 2020

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APPENDIX A**LISTING OF REVISED PROPOSED CLAIMS**

Claim 12. (Proposed substitute for claim 3) The apparatus of claim 1 wherein the blade lock portion of the clockwise lock mechanism is configured to engage with the shaft lock portion of the clockwise lock mechanism by partial is rotated counterclockwise rotation with respect to the shaft lock portion ~~thereof~~ of the clockwise lock mechanism to releasably attach the clockwise rotor blade to the first driveshaft.

Claim 13. (Proposed substitute for claim 4) The apparatus of claim 12 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, and wherein the blade lock portion of the counterclockwise lock mechanism is configured to engage with the shaft lock portion of the counterclockwise lock mechanism by partial is rotated clockwise rotation with respect to the shaft lock portion of the counterclockwise lock mechanism ~~thereof~~ to releasably attach the counterclockwise rotor blade to the second driveshaft.

CERTIFICATION UNDER 37 C.F.R. §42.24

Under the provisions of 37 C.F.R. §42.24, the undersigned hereby certifies that the foregoing document contains 25 pages, and thus complies with the page limits of 37 C.F.R. § 42.24.

Date: May 15, 2020

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CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. §§ 42.6(e), the undersigned hereby certifies that a copy of the foregoing PATENT OWNER'S REVISED MOTION TO AMEND UNDER 37 C.F.R. § 42.121 was served on the counsel of record for the Petitioners by filing this document through the Patent Trial Appeal Board End to End system as well as by delivering an electronic copy to the following email address:

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