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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

LG ELECTRONICS, INC., and
LG ELECTRONICS U.S.A., INC.,
Petitioner,

v.

TOSHIBA SAMSUNG STORAGE TECHNOLOGY KOREA CORPORATION,
Patent Owner.

Case IPR2015-01644
Patent 6,785,065 B1

Before KALYAN K. DESHPANDE, MICHAEL R. ZECHER, and TREVOR M. JEFFERSON, *Administrative Patent Judges*.

ZECHER, *Administrative Patent Judge.*

FINAL WRITTEN DECISION
Inter Partes Review
35 U.S.C. § 318(a) and 37 C.F.R. § 42.73

I. BACKGROUND

Petitioner, LG Electronics, Inc. and LG Electronics U.S.A., Inc. (collectively, "LG"), filed a Petition requesting an *inter partes* review of claims 1–9 of U.S. Patent No. 6,785,065 B1 ("the '065 patent," Ex. 1001). Paper 1 ("Pet."). Patent Owner, Toshiba Samsung Storage Technology Korea Corporation ("Toshiba"), filed a Preliminary Response. Paper 7 ("Prelim. Resp."). Taking into account the arguments presented in Toshiba's Preliminary Response, we determined that the information presented in the Petition established that there was a reasonable likelihood that LG would prevail in challenging claims 1–9 of the '065 patent as unpatentable under 35 U.S.C. § 103(a). Pursuant to 35 U.S.C. § 314, we instituted this *inter partes* review on January 29, 2016, as to all the challenged claims. Paper 8 ("Dec. on Inst.").

During the course of trial, Toshiba filed a Patent Owner Response (Paper 21, "PO Resp.") and LG filed a Reply to the Patent Owner Response (Paper 24, "Pet. Reply"). A consolidated oral hearing was held on October 6, 2016, and a transcript of the hearing is included in the record. Paper 38 ("Tr.").

We have jurisdiction under 35 U.S.C. § 6. This decision is a Final Written Decision under 35 U.S.C. § 318(a) as to the patentability of claims 1–9 of the '065 patent. For the reasons discussed below, we hold that LG has demonstrated by a preponderance of the evidence that these claims are unpatentable under § 103(a).

A. Related Matters

The ’065 patent is involved in the following district court cases: (1) *LG Electronics, Inc. v. Toshiba Samsung Storage Technology Korea Corp.*, No. 1:12-cv-01063 (LPS) (D. Del.); and (2) *Toshiba Samsung Storage Technology Korea Corp. v. LG Electronics, Inc.*, No. 1:15-cv-0691 (LPS) (D. Del.). Pet. 4; Paper 6, 1. In addition to this Petition, LG filed another petition challenging the patentability of a certain subset of claims in U.S. Patent No. 6,721,110 B2 (“the ’110 patent”), which is a parent of the ’065 patent. Pet. 5. In that case, we instituted an *inter partes* review as to claims 40–45, 47, and 48 of the ’110 patent. *LG Elecs., Inc. v. Toshiba Samsung Storage Tech. Korea Corp.*, Case IPR2015-01642 (PTAB Jan. 29, 2016) (Paper 8).

B. The ’065 Patent

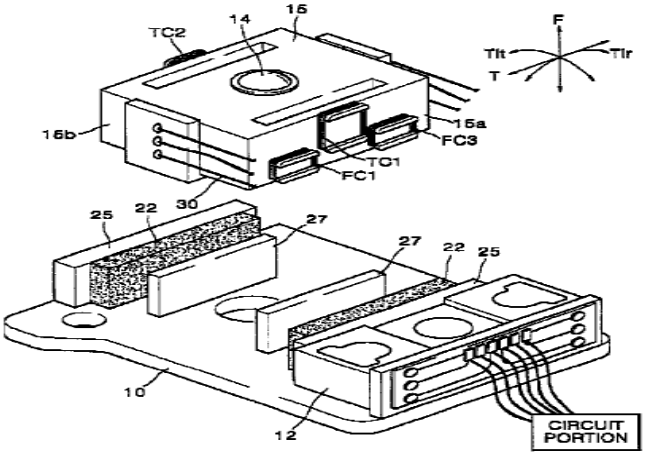
The ’065 patent, titled “Optical Pickup Actuator Driving Method and Apparatus Therefor,” issued August 31, 2004, from U.S. Patent Application No. 10/772,339, filed on February 6, 2004. Ex. 1001, at [54], [45], [21], [22]. The ’065 patent is a continuation of U.S. Patent Application No. 10/173,958, filed on June 19, 2002—now the ’110 patent. *Id*. at [63]. The ’065 patent also claims foreign priority to Korean Patent Application No. 2001-34687, filed on June 19, 2001. *Id*. at [30].

As the title suggests, the ’065 patent generally relates to an apparatus and method of driving an optical pickup actuator in which focus, track, and tilt coils drive the optical pickup actuator in focus, track, and tilt directions, respectively. Ex. 1001, 1:16–21. These coils are provided at two sides of a

bobbin to secure the remaining sides of the bobbin, and also to allow the focus coil to be used as the tilt coil. *Id*. at 1:22–24. According to the ’065 patent, a conventional optical pickup actuator is very small and uses all four side surfaces of the bobbin to install the focus, track, or tilt coils. *Id*. at 2:57–59, Fig. 1. Consequently, it becomes very difficult to install the necessary wiring in such a small space. *Id*. at 2:60–63, Fig. 1. In addition, when these coils are arranged on all four side surfaces of the bobbin, the wiring of the coils becomes more complicated. *Id*. at 2:65–66, Fig. 1.

The ’065 patent addresses these problems by arranging the focus, track, and tilt coils on just two side surfaces of the bobbin in a manner that secures a sufficient space provided at the other side surfaces of the bobbin, and also allows the focus and tilt direction to be controlled together by a single coil. Ex. 1001, 3:10–18. Figure 3 of the ’065 patent, reproduced below, illustrates an optical pickup actuator according to one embodiment of the invention. *Id*. at 4:44–46, 5:9–10.

FIG. 3



As shown in Figure 3, the optical pickup actuator includes base 10, holder 12 located on one side of the base, bobbin 15 suspended over the base, objective lens 14 mounted on the bobbin, and a magnetic driving portion that drives the bobbin in focus, tilt, and track directions. Ex. 1001, 5:10–15. The magnetic driving portion further includes at least one focus and tilt coil FC1–FC4 and at least one track coil TC1, TC2 at each of opposite side surfaces 15a of bobbin 15. *Id*. at 5:16–18. Magnets 22 are installed to face the at least one focus and tilt coil and at least one track coil provided on each of the opposite side surfaces. *Id*. at 5:18–21.

C. Illustrative Claim

Of the challenged claims, claim 1 is the only independent claim at issue. Independent claim 1 is directed to an optical recording or reproducing apparatus for use with transferring information with respect to a recording medium. Claims 2–9 directly or indirectly depend from independent claim 1. Independent claim 1 is illustrative of the challenged claims and is reproduced below:

> 1. An optical recording and/or reproducing apparatus for use with transferring information with respect to a recording medium, comprising:
>
> a spindle motor rotating the recording medium;
>
> an optical pickup including an objective lens and an actuator which actuates the objective lens so as to transfer the information with respect to the recording medium; and
>
> a control unit driving the spindle motor and the optical pickup to transfer information with respect to the recording medium and controlling the actuator of the optical pickup in the radial, track, tilt and focusing directions;
>
> wherein the actuator comprises:

> a bobbin movably arranged on a base of actuator;
>
> at least one focus and tilt coil which drives the bobbin in the focus and tilt directions and at least one track coil which drives the bobbin in the track direction arranged on each of opposite side surfaces of the bobbin;
>
> support members which move the bobbin and are provided to the other side surfaces of the bobbin, wherein the focus and tilt coils and the track coils are not arranged on the other side surfaces of the bobbin; and
>
> magnets arranged to face corresponding sides of the opposite side surfaces of the bobbin.

Ex. 1001, 8:39–65.

D. Prior Art Relied Upon

LG relies upon the following prior art references:

Inventor[1]	**U.S. Patent No.**	**Relevant Dates**	**Exhibit No.**
Akanuma	6,343,053 B1	issued Jan. 29, 2002, filed Aug. 25, 1999	1002
Ikegame	5,428,481	issued June 27, 1995, filed Nov. 1, 1990	1005
Wakabayashi	5,905,255	issued May 18, 1999, filed Jan. 14, 1998	1007

[1] For clarity and ease of reference, we only list the first named inventor.

Admitted Prior Art ("APA") [2]	**Exhibit No.**
"Description of the Related Art" section spanning column 1, line 25, through column 3, line 7, as well as Figures 1, 2A, 2B (each labeled Prior Art)	1001

E. Instituted Grounds of Unpatentability

We instituted a trial based on the asserted grounds of unpatentability ("grounds") set forth in the table below. Dec. on Inst. 27–28.

References	**Basis**	**Claims Challenged**
Akanuma and APA	§ 103(a)	1, 2, and 5–9
Akanuma, APA, and Ikegame	§ 103(a)	1, 2, and 5–9
Akanuma, APA, Wakabayashi	§ 103(a)	3 and 4
Akanuma, APA, Ikegame, and Wakabayashi	§ 103(a)	3 and 4

II. ANALYSIS

A. Claim Construction

In an *inter partes* review proceeding, claim terms of an unexpired patent are given their broadest reasonable interpretation in light of the specification of the patent in which they appear. 37 C.F.R. § 42.100(b); *Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 2131, 2142–46 (2016) (upholding the use of the broadest reasonable interpretation standard as the

[2] As we explained in the Decision on Institution (Dec. on Inst. 6 n.1), we consider APA as a relevant admission by Toshiba of the background knowledge of a person of ordinary skill in the art at the time of the invention of the '065 patent. For simplicity, we refer to APA and its disclosure generally in our analysis that follows.

claim construction standard to be applied in an *inter partes* review proceeding). Absent any special definitions, claim terms are generally given their ordinary and customary meaning, as would be understood by one of ordinary skill in the art, in the context of the entire disclosure. *In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007).

1. "bobbin" (all challenged claims)

In its Petition, LG contended that the broadest reasonable interpretation of the claim term "bobbin" is "a structure where an objective lens is mounted." Pet. 16. To support its proposed construction, LG directed us to various disclosures in the specification and certain figures of the '065 patent, as well as the supporting testimony of its expert witness, Masud Mansuripur, Ph.D. *Id*. (citing Ex. 1001, 1:59, 5:12–13, Figs. 1, 3, 4; Ex. 1011 ¶ 54). In its Patent Owner Preliminary Response, Toshiba did not propose an alternative construction for this claim term. For purposes of the Decision on Institution, we agreed with LG's construction of the claim term "bobbin" because it was consistent with the ordinary and customary meaning of this claim term, as would be understood by one with ordinary skill in the art, in light of the specification and figures of the '065 patent. Dec. on Inst. 7 (citing Ex. 1001, 1:59, 5:12–13, Figs. 3, 4).

In its Patent Owner Response, Toshiba does not address separately our initial construction of the claim term "bobbin" as "a structure where an objective lens is mounted." In its Reply, LG did not present additional arguments or evidence as to the construction of this claim term. Consequently, we discern no reason to further address or alter our initial

construction of the claim term "bobbin" for purposes of this Final Written Decision.

2. "radial, track, tilt and focusing directions" (all challenged claims)

In its Petition, LG did not propose an alternative construction for the claim phrase "radial, track, tilt and focusing directions," even though LG asserted that it is unclear what is meant by this claim phrase. Pet. 28–29. In its Preliminary Response, Toshiba contended that the claim phrase "radial, track, tilt and focusing directions" should be construed as "radial track, tilt, and focusing directions." Prelim. Resp. 7, 9. According to Toshiba, its proposed construction would fix a purported typographical error in independent claim 1 of the '065 patent. *Id*. at 7 (citing Ex. 1001, 8:50–51). Toshiba further asserted that its proposed correction is consistent with the specification and claims of the '065 patent, and the prosecution history did not suggest a different interpretation of the claims. *Id*. at 7–8 (citing Ex. 1001, Abstract, 1:26–31, 1:50–52, 3:9–17). For purposes of the Decision on Institution, we declined Toshiba's invitation to fix a purported typographical error in the claim phrase "radial, track, tilt and focusing directions" because each occurrence of the claim term "radial" in the specification of the '065 patent is not used to describe explicitly the "track direction." Dec. on Inst. 8–9 (citing Ex. 1:26–31, 1:51–53).

During the course of trial, neither Toshiba nor LG presented additional arguments or evidence as to the construction of the claim phrase "radial, track, tilt and focusing directions." Consequently, we discern no

reason to further address this claim phrase for purposes of this Final Written Decision.

3. "on each of opposite side surfaces" (all challenged claims)

In its Patent Owner Response, Toshiba contends that the broadest reasonable interpretation of the claim phrase "on each of opposite side surfaces" is "over and in contact with each of opposite side surfaces." PO Resp. 3. Relying on the testimony of its expert witness, David B. Bogy, Ph.D., Toshiba presents the following arguments: (1) Figures 3 and 4 of the '065 patent illustrate that focus and tilt coils FC1–FC4 and track coils TC1, TC2 are arranged "over and in contact with" each of opposite side surfaces 15a of bobbin 15; (2) the '065 patent consistently uses the word "on" to describe relationships that indicate a position "over and in contact with," and consistently avoids using this word to refer to non-contact positional relationships; (3) the patentees knew how to avoid indicating a contacting relationship, as evidenced by their use of a "non-contact" positional relationship in the specification of the '065 patent; (4) the use of the word "surfaces" in independent claim 1 is significant because it further emphasizes the existence of actual contact with the surfaces, and any construction that does not take into account actual contact would render the claim term "surfaces" superfluous; and (5) at least one dictionary definition of the word "on" (Ex. 2001) supports a construction of "over and in contact with." PO Resp. 3–10 (citing Ex. 2003 ¶¶ 25–39).

In its Reply, LG contends that Toshiba's proposed construction of the claim phrase "on each of opposite side surfaces" is overly narrow and does

not comply with the broadest reasonable interpretation standard. Pet. Reply 2. In particular, LG counters with the following arguments: (1) the specification of the '065 patent does not disclose explicitly that focus and tilt coils FC1–FC4 and track coils TC1, TC2 must be "in contact with" each of opposite side surfaces 15a of bobbin 15; (2) Toshiba ignores that the use of the claim term "on" in independent claim 1, particularly with respect to the claimed "bobbin," does not indicate actual contact; (3) the specification uses the words "on" and "at" interchangeably to describe proximity that could include, but does not require, actual contact with each of opposite side surfaces 15a of bobbin 15; (4) the problem addressed by the '065 patent—namely, moving coils to two opposite side surfaces of a bobbin in order to free up space on the other opposite side surfaces of the bobbin—has nothing to do whatsoever with whether the coils are "over and in contact with" the two opposite side surfaces of the bobbin; and (5) Toshiba's reliance on at least one hand-picked dictionary definition for the word "on" should be ignored because it does not comply with the broadest reasonable interpretation standard (i.e., this dictionary definition does not comport with how the claim term "on" should be understood by one of ordinary skill in the art in light of the specification and claims). *Id.* at 2–9.

We note that the parties' dispute regarding the claim phrase "on each of opposite side surfaces" centers on the scope and meaning of the word "on." Based on the record developed during trial, we agree with LG that there are a number of reasons to adopt its proposed construction of the word "on" to mean proximity with respect to each of the opposite side surfaces of

the bobbin, and decline to adopt Toshiba's proposed construction of this word as "over and in contact with" each of the opposite side surfaces of the bobbin.[3]

As an initial matter, the parties agree that the specification of the '065 patent does not set forth an explicit definition of the word "on." *See, e.g.*, Tr. 7:10 (counsel for LG states that "[there is] no specific definition" for the word "on"), 19:20–21 (counsel for Toshiba agrees that "[there is] no your own lexicographer issue here"). We, therefore, determine the ordinary and customary meaning of the word "on," as would be understood by one of ordinary skill in the art, in the context of the entire disclosure of the '065 patent. *See Translogic*, 504 F.3d at 1257.

Beginning with the intrinsic record, the parties direct us to Figures 3 and 4 of the '065 patent, along with the corresponding description of these figures in the specification. *See* PO Resp. 3–4; Pet. Reply 4–5. Figure 3, reproduced above (*see supra* Section I.B), illustrates an optical pickup actuator according to one embodiment of the invention. Ex. 1001, 4:44–46, 5:9–10. Figure 4, reproduced below, further illustrates a plan view of the optical pickup actuator depicted in Figure 3. *Id.* at 4:47–48, 5:9–10.

[3] Adopting LG's proposed construction of the word "on" to mean proximity with respect to each of opposite side surfaces of the bobbin also is consistent with independent claim 1, which does not require that the coils be arranged on the same surface level of the bobbin in a side-by-side configuration. *See* Dec. on Inst. 14–15, 19–20.

FIG. 4

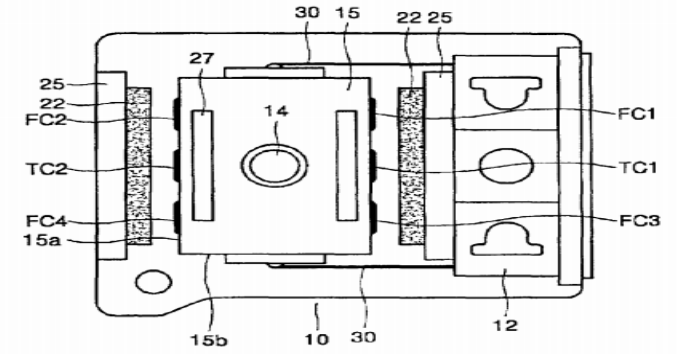


Figure 4 shown above is similar to Figure 3 because it illustrates that the optical pickup actuator includes base 10, holder 12 provided at one side of the base, bobbin 15 on which objective lens 14 is mounted, and a magnetic driving portion that drives the bobbin in focus, tilt, and track directions. *Id.* at 5:10–15. The '065 patent further describes Figures 3 and 4 as follows:

> The magnetic driving portion includes at least one focus and tilt coil and at least one track coil *provided at each of opposite side surfaces 15a of the bobbin 15*, and a magnet 22 installed to face each combination of the focus and tilt coil and the track coil *provided on each of the opposite side surfaces*. For example, the focus and tilt coils may include first, second, third, and fourth focus and tilt coils FC1, FC2, FC3, and FC4 and the track coils may include first and second track coils TC1 and TC2 *each of which is provided at the corresponding opposite side surfaces of the bobbin 15*, as shown in FIG. 4. Here, the first through fourth focus and tilt coils FC1, FC2, FC3, and FC4 and the first and second track coils TC1 and TC2 are *all arranged at the opposite side surfaces 15a of the bobbin 15*. A support member 30 is arranged at each of the other opposite side surfaces 15b of the bobbin (where the focus and tilt coils FC1-FC4 and the tracks coils TC1-TC2 are not arranged).

Id. at 5:16–32 (bolding omitted; emphases added).

Given this description of Figures 3 and 4 in the specification, Toshiba's reliance on these figures to support its assertion that focus and tilt coils FC1–FC4 and track coils TC1 and TC2 are arranged "over and in contact with" each of opposite side surfaces 15a of bobbin 15 is inconclusive, at best. *See* PO Resp. 3–4. In other words, Toshiba's reasoning solely based on the positional relationship of the coils and bobbin as illustrated in Figures 3 and 4 is problematic, especially considering there is nothing in the specification that assigns significance to the positional relationship of these components. *See Advanced Cardiovascular Sys., Inc. v. Scimed Life Sys., Inc.*, 261 F.3d 1329, 1339 (Fed. Cir. 2001) ("[Because] nothing in the specification assigns significance to the fact that the drawings align [certain elements in the claims], we will not allow this aspect of the drawings to be imported into the claims as a limitation."); *see also TI Grp. Auto. Sys. (N. Am.), Inc. v. VDO N. Am., L.L.C.*, 375 F.3d 1126, 1136 (Fed. Cir. 2004) ("The drawings, without more, are insufficient to cabin the scope of the ordinary and customary meaning of [a claim term].").

Notably absent from the description of Figures 3 and 4 in the specification is a disclosure that focus and tilt coils FC1–FC4 and track coils TC1, TC2 are arranged "over and in contact with" each of opposite side surfaces 15a of bobbin 15. Instead, the corresponding description of Figures 3 and 4 uses the words "on" and "at" interchangeably (i.e., the specification explicitly discloses that focus and tilt coils FC1–FC4 and track coils TC1, TC2 are "provided at," "provided on," or "arranged at" each of opposite side surfaces 15a of bobbin 15). Ex. 1001, 5:16–32. Given the specification's

silence as to how the coils are configured in relation to each of opposite side surfaces 15a of bobbin 15, we decline to limit the positional relationship between these components to direct, physical contact.

We do not agree with Toshiba's argument that the specification of the '065 patent consistently uses the word "on" to describe relationships that indicate a position "over and in contact with," and consistently avoids using this word to refer to non-contact positional relationships. *See* PO Resp. 5; *see also id.* at 6 (arguing the patentees knew how to avoid indicating a contacting relationship, as evidenced by their use of a "non-contact" positional relationship in the specification). The word "contact" appears just once in the specification. The relevant portion of the specification states that "[a]n optical pickup performs recording and/or reproduction of information with respect to a recording medium, such as an optical disk, placed *on* a turntable *in a non-contact manner* while moving in a radial direction of the optical disk." Ex. 1001, 1:27–31 (emphases added). Contrary to Toshiba's assertions, this cited disclosure in the specification uses the word "on" to reference a "non-contact" positional relationship. Toshiba, therefore, is incorrect when it asserts that the specification consistently avoids using the word "on" to refer to non-contact positional relationships.

Toshiba also ignores the use of the word "on" in the context of the claims. *See* Pet. Reply 3–4. Independent claim 1 recites, in relevant part, "a bobbin moveably arranged *on* a base of the actuator." Ex. 1001, 8:53 (emphasis added). In this independent claim, although the word "on" is used to describe the positional relationship between bobbin 15 and base 10, it is

undisputed that the bobbin does not contact the base directly. *See* Ex. 1012, 109:18–110:22 (In response to a question posed by LG's counsel during cross-examination as to whether bobbin 15 is on the surface of base 10, Toshiba's expert witness Dr. Bogy, confirmed that "[y]ou couldn't focus it up -- you couldn't move it up and down relative to the base if it were already on the base . . . . It has to have some space between the bobbin and the base [] in order for it to be able to move in the focus direction both ways.").

We also note that the objective of the invention disclosed in the '065 patent supports adopting LG's proposed construction of the word "on" as a broad, but reasonable interpretation. *See* Pet. Reply. 6–7. As LG explains, the '065 patent addresses the problem associated with conventional optical pickup actuators that include focus, track, and tilt coils on all four sides of a bobbin by arranging these coils on just two side surfaces of the bobbin in order to free up space at the other two side surfaces of the bobbin. *See* Pet. 8–10 (citing Ex. 1001, 2:57–3:7); Pet. Reply 6–7 (citing the same). Given that the primary objective of the '065 patent is the location of coils on only two of the four side surfaces of a bobbin, LG asserts—and we agree—that there is no explanation in the specification as to the importance of the coils being arranged "over and in contact" with each opposite side surface of the bobbin. *See* Pet. Reply 6; *see also* Ex. 1012, 96:22–97:6 (In response to a question posed by LG's counsel regarding the "important part" of the invention disclosed and claimed in the '065 patent, Dr. Bogy stated that "I think the inventors thought it was important that [the coils] be in contact *for some reason which is not revealed here*." (emphasis added)).

Lastly, we do not agree with Toshiba's argument that any construction that does not take into account actual contact would render the claim term "surfaces" superfluous. *See* PO Resp. 9. As we have explained above, based on the use of the word "on" in the specification and claims of the '065 patent, one of ordinary skill in the art would have understood that this word is used interchangeably with the word "at," and that both of these words focus on proximity and not contact. Consequently, the claim phrase "on each of opposite side surfaces" does not require necessarily that the coils make direct, physical contact with each of the opposite side surfaces of the bobbin, but instead merely requires that the coils are located proximate to each of opposite side surfaces of the bobbin.

In summary, upon consulting the intrinsic evidence in its entirety, we reach the following conclusions: (1) the description of Figures 3 and 4 in the specification does not state explicitly that focus and tilt coils FC1–FC4 and track coils TC1, TC2 are arranged "over and in contact with" each of opposite side surfaces 15a of bobbin 15, but rather this corresponding description uses the words "on" and "at" interchangeably to indicate proximity and not contact; (2) contrary to Toshiba's assertions, the specification and claims do not use the word "on" to delineate clearly between a positional relationship that is "over and in contact with" versus one that focuses on proximity and not contact; and (3) the primary objective of the '065 patent is the location of coils on only two of the four side surfaces of a bobbin—not whether the coils must be arranged "over and in contact" with each of the opposite side surfaces of the bobbin. For all these

reasons, we agree with LG that the intrinsic evidence supports adopting its proposed construction of the word "on" to mean proximity with respect to each of the opposite side surfaces of the bobbin. *See* Pet. Reply 2–8.

Turning now to the extrinsic evidence, although the U.S. Court of Appeals for the Federal Circuit has instructed that this type of evidence may be useful in determining the meaning of a claim term to one of ordinary skill in the art, it is "less significant than the intrinsic [evidence] in determining the 'legally operative meaning of disputed claim language.'" *C.R. Bard, Inc. v. U.S. Surgical Corp.*, 388 F.3d 858, 862 (Fed. Cir. 2004) (quoting *Vanderlande Indus. Nederland BV v. Int'l Trade Comm'n*, 366 F.3d 1311, 1318 (Fed. Cir. 2004)). Toshiba directs us to at least one dictionary definition of the word "on" to support its assertion that focus and tilt coils FC1–FC4 and track coils TC1, TC2 are arranged "over and in contact with" each of opposite side surfaces 15a of bobbin 15. PO Resp. 10. Toshiba asserts that WEBSTER'S THIRD NEW INTERNATIONAL DICTIONARY (2002) defines "on" as "used as a function word to indicate position *over and in contact* with that which supports from beneath." *Id.* (emphasis omitted) (quoting Ex. 2001, 1574).

Although Toshiba asserts that this particular definition "appears first" in the dictionary it introduced as extrinsic evidence (PO Resp. 10), the scope of the word "on" must encompass "*all* consistent meanings." *TI Grp. Auto. Sys. (N. Am.), Inc.*, 375 F.3d at 1136. This same dictionary provides the following additional definitions of the word "on": (1) "used as a function word to indicate position with regard to place, direction, or time; esp. . . .

position near a specified part of something"; and (2) "in or into the position of being in contact with the upper surface of something or *of being supported from beneath by the upper surface <the plates are ~>*." Ex. 2001, 1574–75 (emphases added). Arguably, these particular definitions of the word "on" could be used to support LG's assertion that this word means proximity with respect to each of the opposite side surfaces of the bobbin. For instance, using the "plates" example associated with the latter definition of the word "on," a plate would be on the surface of a table even if the plate only made contact with a table cloth situated between the table surface and the plate because the plate is "supported from beneath by the upper surface." *Id.* at 1575. Consequently, because the dictionary introduced as extrinsic evidence by Toshiba includes multiple definitions for the word "on" that reasonably could be read to support both parties' claim construction positions, we do not view the particular dictionary definition relied upon by Toshiba as dispositive in ascertaining the scope and meaning of this word.

Lastly, we note that Toshiba directs to us to the decision by the Federal Circuit in *Senmed, Inc. v. Richard-Allan Medical Industries, Inc.*, 888 F.2d 815 (Fed. Cir. 1989) as support for its assertion that the word "on," in the context of the specification and claims of the '065 patent, means "over and in contact with." *See* PO Resp. 6. The *Senmed* case, however, is distinguishable from the circumstances presented here because it is based on a different record that involves different claim language, a different

specification, and a unique prosecution history that allowed for a different construction of the word "on." *See id.* at 819–20.

Accordingly, upon weighing all the evidence bearing on the construction of the word "on," the extrinsic evidence is inconclusive and does not overcome the intrinsic evidence. Applying the broadest reasonable interpretation, we adopt LG's proposed construction of the word "on" and, as a result, we construe the claim phrase "on each of opposite side surfaces" to mean proximity with respect to each of the opposite side surfaces of the bobbin.

4. "in order to drive the actuator in the focus and tilt directions, a first input signal is applied to a first set and a second input signal is applied to a second set" (claims 3 and 4)

In its Patent Owner Response, Toshiba contends that the claim phrase "in order to drive the actuator in the focus and tilt directions, a first input signal is applied to a first set and a second input signal is applied to a second set" should be construed to require simultaneously controlling the driving of the actuator "in ***both*** the focus direction ***and*** the tilt direction when the recited first and second input signals are applied to the first and second coil sets, respectively." PO Resp. 10–11. To support its proposed construction, Toshiba directs us to an embodiment disclosed in the specification of the '065 patent, as well as the supporting testimony from Dr. Bogy. *Id.* at 11 (citing Ex. 1001, 7:21–35, Figs. 7C, 8C, Ex. 2003 ¶¶ 40–43).

In its Reply, LG contends that Toshiba's proposed construction for this claim phrase improperly imports a limitation into dependent claim 3 that is not found in the claim itself. Pet. Reply 10. According to LG, when

applying the broadest reasonable interpretation standard, this claim phrase does not require simultaneously controlling the driving of the actuator in both the focus and tilt directions. *Id.*

We understand Toshiba to argue that the disputed claim phrase includes a specific temporal requirement—namely, simultaneously controlling the driving of the actuator in both the focus and tilt directions. We agree with LG that there is no temporal requirement explicitly recited in dependent claim 3. *See* Pet. Reply 10. Nor are we inclined to read such a temporal requirement into dependent claim 3. The Federal Circuit has instructed that,

> [although] understanding the claim language may be aided by the explanations contained in the written description, it is important not to import into a claim limitations that are not a part of the claim. For example, a particular embodiment appearing in the written description may not be read into a claim when the claim language is broader than the embodiment.

Superguide Corp. v. DirecTV Enters., Inc., 358 F.3d 870, 875 (Fed. Cir. 2004). In this case, we recognize that the specification of the '065 patent discloses at least one embodiment that involves simultaneously controlling the driving of the actuator in both the focus and tilt directions. Ex. 1001, 7:21–35, Figs. 7C, 8C. The specification, however, likewise discloses other embodiments that independently control the driving of the actuator in the focus and tilt directions. *Id.* at 6:37–7:23. Consequently, we decline to limit dependent claim 3 to one embodiment because the claim language at issue is broader in scope.

Instead, we determine that the claim phrase "in order to drive the actuator in the focus and tilt direction, a first input signal is applied to a first set and a second input signal is applied to a second set" is broad enough to encompass either independently or simultaneously controlling the driving of the actuator in the focus and tilt directions when the first and second input signals are applied to the first and second coil sets, respectively. Our construction also is consistent with the ordinary and customary meaning of this claim phrase, as would be understood by one of ordinary skill in the art, in light of the various embodiments disclosed in the specification of the '065 patent. *See, e.g.*, Ex. 1001, 6:37–8:21, Figs. 7A–7C, 8A–8C (disclosing various methods for driving an optical pickup actuator, including independently or simultaneously controlling the driving of the actuator in the focus and tilt directions).

B. Obviousness Based on the Combination Akanuma and APA

LG contends that claims 1, 2, and 5–9 of the '065 patent are unpatentable under § 103(a) over the combination of Akanuma and APA. Pet. 24–52. LG explains how this proffered combination purportedly teaches the subject matter of each challenged claim. *Id.* LG also relies upon the Declaration of Dr. Mansuripur to support its positions. Ex. 1011 ¶¶ 75–123, 137–68. In its Patent Owner Response, Toshiba presents two arguments with respect to independent claim 1. PO Resp. 13–23. Toshiba relies upon the Declaration of Mr. Bogy to support its positions. Ex. 2003 ¶¶ 48–64.

We begin our analysis with the principles of law that generally apply to a ground based on obviousness, followed by an assessment of the level of skill in the art, proceeded by brief overviews of Akanuma and APA, and, last but not least, we address the parties' contentions with respect to independent claim 1.

1. Principles of Law

A claim is unpatentable under § 103(a) if the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. *KSR Int'l Co. v. Teleflex Inc*., 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations, including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of skill in the art; and (4) when in evidence, so-called secondary considerations. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966). We analyze this asserted ground based on obviousness with the principles identified above in mind.

2. Level of Skill in the Art

There is sufficient evidence in the record before us that reflects the knowledge level of a person of ordinary skill in the art. LG's expert witness, Dr. Mansuripur, attests that a person of ordinary skill in the art in the relevant time frame would be an individual who (1) has familiarity with optical data storage and retrieval devices, including optical recording or

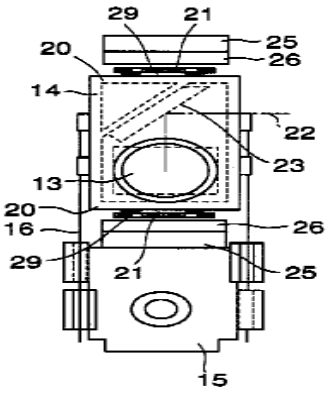
reproducing apparatuses having optical pickup actuators; (2) possesses a bachelor of science degree in electrical engineering, computer engineering, or physics; and (3) has at least two to five years of experience in the field of optical data storage and retrieval. Pet. 14–15 (citing Ex. 1011 ¶ 35). Patent Owner's expert witness, Dr. Bogy, essentially agrees with Dr. Mansuripur's assessment. Ex. 2003 ¶ 17 (testifying that a person of ordinary skill in the art in the relevant time frame would be an individual who possesses "a bachelor's degree in electrical engineering, mechanical engineering and/or physics with two to five years of teaching or work experience in the relevant field").

3. Akanuma Overview

Akanuma generally relates to an objective lens driving apparatus of an optical disk drive and, in particular, to an objective lens driving apparatus that includes an actuator for moving an objective lens in focusing, tilt, and tracking directions. Ex. 1002, 1:7–11, 7:42–52, 10:45–49. According to Akanuma, one objective of the disclosed invention is to arrange a focus coil and a track coil in a parallel relationship with a thin, flat shape so that both coils may be moved by a single, flat magnet. *Id*. at 2:35–40.

Figure 5A of Akanuma, reproduced below, illustrates an objective lens driving apparatus according to one embodiment. Ex. 1002, 5:26–29, 6:41–43.

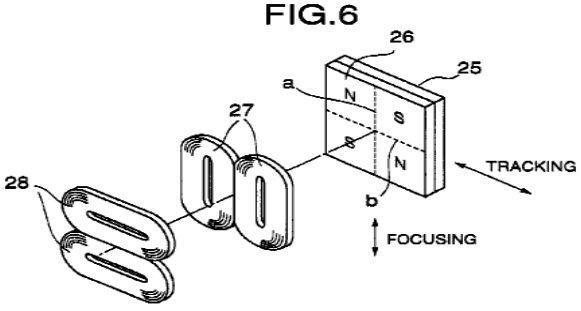
FIG.5A



As shown in Figure 5A, objective lens 13 is supported by objective lens supporting member 14, which, in turn, is supported elastically by four wire springs 16 extending from stem 15. Ex. 1002, 6:51–55. Objective lens supporting member 14 includes side walls 20 on opposite sides in an extending direction of wire springs 16. *Id*. at 6:61–63. Each of side walls 20 serves as a base board for mounting drive coil assembly 21. *Id*. at 6:63–64. Yoke 25 and drive magnet 26 are provided on each side of side walls 20 such that the drive magnet faces drive coil assembly 21 with a small air gap there between. *Id*. at 7:13–16.

Figure 6 of Akanuma, reproduced below, illustrates the relationship between drive magnet 26, a focusing coil, and a tracking coil. Ex. 1002, 5:30–33, 6:41–43.

FIG.6

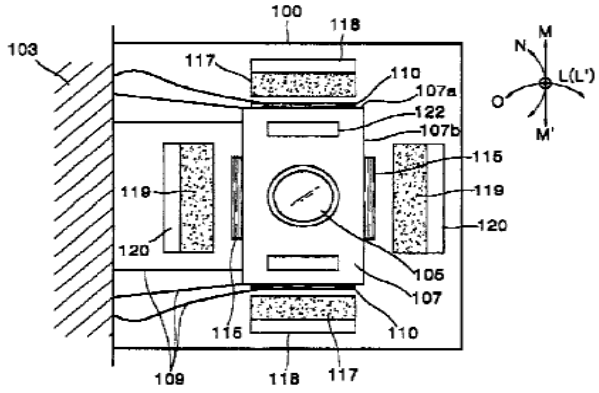


As shown in Figure 6, drive coil assembly 21 (not illustrated) includes two focusing coils 27 and two tracking coils 28. Ex. 1002, 7:25–27. Focusing coils 27, tracking coils 28, and drive magnet 26 collectively form drive motor or actuator 29. *Id*. at 7:37–39.

4. APA Overview

Figure 1 of APA, reproduced below, illustrates a conventional optical pickup actuator. Ex. 1001, 1:57, 4:39–40.

FIG. 1 (PRIOR ART)



As shown in Figure 1, the conventional optical pickup actuator includes, among other things, base 100, holder 103 fixed to the base, and bobbin 107 with objective lens 105 mounted thereon. Ex. 1001, 1:56–58. APA further discloses a spindle motor (not illustrated) that rotates a disc. *Id*. at 3:3–7.

5. Claim 1

In its Petition, LG contends that Akanuma's objective lens driving apparatus teaches all the limitations recited in independent claim 1, except "a spindle motor rotating a recording medium," and "a base." Pet. 24–40.

LG then turns to APA's disclosure of a spindle motor that rotates a disc to teach the claimed "spindle motor." *Id*. at 26 (citing Ex. 1001, 2:7–12, 3:3–7, Figs. 1, 2). LG also turns to APA's disclosure of a conventional optical pickup actuator that includes base 100 to teach the claimed "base." *Id*. at 34 (citing Ex. 1001, 1:57–63, Fig. 1).

LG argues that inserting APA's spindle motor into the disk drive of Akanuma's objective lens driving apparatus would have been well within the skill level of an ordinary skilled artisan, and would have yielded the predictable result of rotating Akanuma's optical recording medium 30. Pet. 26 (citing Ex. 1011 ¶ 81). LG also argues that it would have been obvious to one of ordinary skill in the art at the time of the invention to include APA's base 100 in Akanuma's objective lens driving apparatus so that its objective lens supporting member 14 may be arranged moveably. *Id*. at 35 (citing Ex. 1011 ¶ 107). LG asserts that one of ordinary skill in the art would have had a sufficient reason to include such a base in Akanuma's objective lens driving apparatus to provide support for at least yokes 25, and one of ordinary skill in the art would have had a reasonable expectation that including this base in Akanuma's objective lens driving apparatus would successfully support yokes 25. *Id*. at 36 (citing Ex. 1011 ¶ 108). LG further asserts that one of ordinary skill in the art would have recognized that applying APA's base 100 to support Akanuma's yokes 25 would have yielded the predictable result of supporting these yokes. *Id*.

In its Patent Owner Response, Toshiba presents the following two arguments: (1) the combination of Akanuma and APA does not teach coils

over and in contact with each of the opposite side surfaces of the bobbin, as Toshiba asserts is required by independent claim 1; and (2) modifying Akanuma's objective lens driving apparatus to account for the positional relationship of the coils and bobbin would change Akanuma's principle of operation, which, according to Toshiba, requires a single flat magnet divided into four magnetization areas that is capable of moving the coils. PO Resp. 13–23. We address each of Toshiba's arguments in turn.

a. Akanuma teaches coils on each of the opposite side surfaces of the bobbin

Independent claim 1 recites, in relevant part, "at least one focus and tilt coil which drives the bobbin in focus and tilt directions and at least one track coil which drives the bobbin in a track direction arranged on each of opposite side surfaces of the bobbin." Ex. 1001, 8:54–58 ("the disputed limitation").

In its Petition, LG argues that Akanuma's focusing coils 27, tracking coils 28, and side walls 20 on each opposite side 20 of objective lens supporting member 14 teach the claimed "at least one focus and tilt coil," "at least one track coil," and "opposite side surfaces of the bobbin," respectively. Pet. 37 (citing Ex. 1002, 6:63–65, 7:24–27, Figs. 5A, 5B; Ex. 1011 ¶¶ 112, 113). LG then asserts that Akanuma's objective lens driving apparatus teaches the disputed limitation because it includes focusing coils 27 that drive objective lens supporting member 14 in the focus and tilt directions, and tracking coils that drive objective lens supporting member 14 in the track direction, each arranged on the opposite

side surfaces 20 of objective lens supporting member 14. *Id.* (citing Ex. 1011 ¶ 113).

In its Patent Owner Response, Toshiba essentially repeats its claim construction argument that independent claim 1 requires coils that must be "over and in contact" with each of the opposite side surfaces of the bobbin. *See* PO Resp. 13–18. According to Toshiba, Akanuma only discloses that its objective lens driving apparatus includes focusing coils 27 and tracking coils 28 arranged in a stacked/aligned configuration on each of opposite side surfaces 20 of objective lens supporting member 14 and, therefore, does not teach the disputed limitation. *Id.* at 16–18 (citing Ex. 1002, 7:27–47, 8:31–47, Figs. 6, 8; Ex. 2003 ¶¶ 53–56).

In its Reply, LG counters that, if we adopt its proposed construction of the word "on" to mean proximity with respect to each of the opposite side surfaces of the bobbin, Akanuma's focusing coils 27 and tracking coils 28 are arranged on each of opposite side surfaces 20 of objective lens supporting member 14 simply because these coils are located at each of opposite side surfaces 20. Pet. Reply 10–11 (citing Ex. 1002, Figs. 5A–6; Ex. 1011 ¶¶ 109–13). In addition, LG argues that Akanuma's focusing coils 27 and tracking coils 28 are arranged on each of opposite side surfaces 20 of objective lens supporting member 14 because these coils are part of drive coil assembly 21, which, in turn, is mounted to each of opposite side surfaces 20 of objective lens supporting member 14. *Id.* at 11 (citing Ex. 1002, 6:63–64, 7:24–25, Figs. 5A, 5B). According to LG, everything that is part of Akanuma's drive coil assembly 21 mounted to each of

opposite side surfaces 20 of objective lens supporting member 14 is "on each of opposite side surfaces of the bobbin," as required by the disputed limitation. *Id.*

In our claim construction section above, we adopted LG's proposed construction of the word "on" and, as a result, we construed the claim phrase "on each of opposite side surfaces" to mean proximity with respect to each of the opposite side surfaces of the bobbin. *See supra* Section II.A.3. Consistent with this construction, Akanuma discloses that focusing coils 27 and tracking coils 28 are arranged on each of opposite side surfaces 20 of objective lens supporting member 14 because these coils are located proximate to each of opposite side surfaces 20. Ex. 1002, 6:61–65, 7:24–27, 7:42–52, Figs. 5A–6. We also credit Dr. Mansuripur's supporting testimony on this particular issue because it is consistent with the aforementioned disclosures in Akanuma. *See* Ex. 1011 ¶¶ 112, 113. We, therefore, agree with LG and its expert witness, Dr. Mansuripur, that Akanuma teaches the disputed limitation. *See* Pet. 37; Ex. 1011 ¶¶ 109–13.

b. Modifying Akanuma's coils, as proposed by Toshiba, is predicated on an improper claim construction and mischaracterizes LG's asserted ground based on Akanuma and APA

In its Patent Owner Response, Toshiba contends that one of ordinary skill in the art would have understood that moving Akanuma's focusing coils 27 and tracking coils 28 next to one another, i.e., in a side-by-side configuration, on each of opposite side surfaces 20 of objective lens supporting member 14 would require significant changes to the magnet structure and coils of Akanuma. PO Resp. 21 (citing Ex. 2003 ¶ 61).

Toshiba asserts that modifying Akanuma in this way would change its principle of operation, which, according to Toshiba, requires a single flat magnet divided into four magnetization areas that is capable of moving the focusing and tracking coils. *Id.* at 21–23 (citing Ex. 1002, 2:35–40, 3:5–7, 3:9–14, 7:15–20; Ex. 2003 ¶¶ 61–63).

There are two reasons as to why we do not agree with Toshiba's change in principle of operation argument. First, we note that Toshiba's argument in this regard is predicated on us adopting its proposed construction of the word "on" as "over and in contact" with each of the opposite side surfaces of the bobbin. As we explained previously, we declined to adopt Toshiba's proposed construction for the word "on." Instead, we adopted LG's proposed construction of the word "on" and, as a result, we construed the claim phrase "on each of opposite side surfaces" to mean proximity with respect to each of the opposite side surfaces of the bobbin. *See supra* Section II.A.3.

Second, Toshiba's change in principle of operation argument mischaracterizes LG's asserted ground based on Akanuma and APA. In its Petition, LG contends that Akanuma's objective lens driving apparatus teaches all the limitations recited in independent claim 1, except "a spindle motor for rotating a recording medium," and "a base." Pet. 24–40. LG then turns to APA's spindle motor that rotates a disc and base 100 to teach the claimed "spindle motor" and "base," respectively *Id*. at 26, 34 (citing Ex. 1001, 1:57–63, 2:7–12, 3:3–7, Figs. 1, 2). Put simply, we understand LG to assert that the only modification required to Akanuma's objective lens

driving apparatus to teach all the limitations recited in independent claim 1 is the addition of APA's spindle motor and base 100. We do not understand LG to argue that Akanuma's focusing coils 27 and tracking coils 28 must be modified or arranged in a different manner in order to teach coils on each of the opposite side surfaces of the bobbin, as asserted by Toshiba. *See* PO Resp. 21. For at least these reasons, we do not agree with Toshiba's change in principle of operation argument.

c. Remaining limitations

In its Patent Owner Response, Toshiba does not address separately whether the combination of Akanuma and APA teaches the remaining limitations recited in independent claim 1. *See generally* PO Resp. 13–23. We have reviewed LG's explanations and supporting evidence as to how this proffered combination teaches these remaining limitations, including its argument as to why a person of ordinary skill in the art would have had a sufficient reason to combine or modify the teachings of Akanuma with those of APA, and we agree with and adopt LG's analysis. *See* Pet. 24–36, 38–40.

d. Summary

Based on the record developed during trial, we conclude that LG has demonstrated by a preponderance of the evidence that independent claim 1 would have been obvious over the combination of Akanuma and APA.

6. Claims 2 and 5–9

Toshiba does not address separately LG's explanations and supporting evidence with respect to dependent claims 2 and 5–9. *See generally* PO Resp. 13–23. We have reviewed LG's explanations and supporting

evidence, and we agree with and adopt LG's analysis. Pet. 40–52. Based on the record developed during trial, we conclude that LG has demonstrated by a preponderance of the evidence that dependent claims 2 and 5–9 would have been obvious over the combination of Akanuma and APA.

C. Obviousness Based on the Combination of Akanuma, APA, and Ikegame

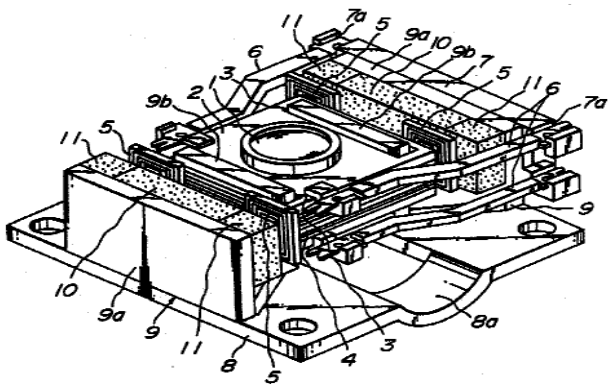
LG contends that claims 1, 2, and 5–9 of the '065 patent are unpatentable under § 103(a) over the combination of Akanuma, APA, and Ikegame. Pet. 24–52. LG explains how this proffered combination purportedly teaches the subject matter of each challenged claim. *Id.* LG also relies upon the Declaration of Dr. Mansuripur to support its positions. Ex. 1011 ¶¶ 75–123, 137–68. In its Patent Owner Response, Toshiba relies upon essentially the same arguments it presented against LG's asserted ground based on obviousness over the combination of Akanuma and APA to rebut LG's explanations and supporting evidence as to how the combination of Akanuma, APA, and Ikegame teaches all the limitations of independent claim 1. PO Resp. 23 (citing Ex. 2003 ¶ 65).

We begin our analysis with a brief overview of Ikegame, and then we address the parties' contentions regarding independent claim 1.

1. Ikegame Overview

Ikegame generally relates to an optical system supporting device for use in an optical information recording apparatus. Ex. 1005, 1:6–11. Figure 3 of Ikegame, reproduced below, illustrates an optical system supporting device according to one embodiment. *Id*. at 3:6–8, 3:24–26.

FIG. 3



As shown in Figure 3, the optical system supporting device includes, among other things, objective lens 1 arranged in lens holder 2, focusing coil 4, tracking coils 5, springs 6, fixing member 7, base plate 8, inner yokes 9b, and outer yokes 9a. Ex. 1005, 3:27–50. In particular, Ikegame discloses that fixing member 7 is located at one side of base plate 8. *Id*. at 3:44–45. Four springs 6 extend from fixing member 7 to lens holder 2 so that the lens holder is supported by springs in a manner that enables it to move in at least two directions. *Id*. at 3:45–48.

2. Claim 1

In its Petition, LG contends that Akanuma's objective lens driving apparatus teaches all the limitations recited in independent claim 1, except "a spindle motor rotating a recording medium," and "a base." Pet. 24–40. LG then turns to APA's disclosure of a spindle motor that rotates a disc to teach the claimed "spindle motor." *Id*. at 26 (citing Ex. 1001, 2:7–12, 3:3–7, Figs. 1, 2). LG turns to Ikegame's disclosure of an optical system supporting device that includes base plate 8 to teach the claimed "base." *Id*. at 34–35 (citing Ex. 1005, 3:27–28, 3:34–37, 3:44–48, Fig. 3).

LG argues that inserting APA's spindle motor into the disk drive of Akanuma's objective lens driving apparatus would have been well within the skill level of an ordinary skilled artisan, and would have yielded the predictable result of rotating Akanuma's optical recording medium 30. Pet. 26 (citing Ex. 1011 ¶ 81). LG also argues that it would have been obvious to one of ordinary skill in the art at the time of the invention to include Ikegame's base plate 8 in Akanuma's objective lens driving apparatus so that its objective lens supporting member 14 may be arranged moveably. *Id*. at 35 (citing Ex. 1011 ¶ 107). LG asserts that one of ordinary skill in the art would have had a sufficient reason to include such a base in Akanuma's objective lens driving apparatus to provide support for at least yokes 25, and one of ordinary skill in the art would have had a reasonable expectation that including this base in Akanuma's objective lens driving apparatus would successfully support yokes 25. *Id*. at 36 (citing Ex. 1011 ¶ 108). LG further asserts that one of ordinary skill in the art would have recognized that applying Ikegame's base plate 8 to support Akanuma's yokes 25 would have yielded the predictable result of supporting these yokes. *Id*.

Apart from asserting that Ikegame does not remedy the deficiencies in Akanuma identified above in the context of LG's asserted ground based on the combination of Akanuma and APA, Toshiba does not address separately LG's explanations and supporting evidence as to how the combination of Akanuma, APA, and Ikegame teaches the limitations recited in independent claim 1. PO Resp. 23. As we explained previously, there are no such deficiencies in either Akanuma or APA for Ikegame to remedy. *See supra*

Sections II.B.5.a–c. We have reviewed LG's explanations and supporting evidence as to how this proffered combination teaches all the limitations of independent claim 1, including its argument as to why a person of ordinary skill in the art would have had a sufficient reason to combine or modify the teachings of Akanuma with those of APA and Ikegame, and we agree with and adopt LG's analysis. *See* Pet. 24–40. Based on the record developed during trial, we conclude that LG has demonstrated by a preponderance of the evidence that independent claim 1 would have been obvious over the combination of Akanuma, APA, and Ikegame.

3. Claims 2 and 5–9

Toshiba does not address separately LG's explanations and supporting evidence with respect to dependent claims 2 and 5–9. *See generally* PO Resp. 23. We have reviewed LG's explanations and supporting evidence, and we agree with and adopt LG's analysis. Pet. 40–52. Based on the record developed during trial, we conclude that LG has demonstrated by a preponderance of the evidence that dependent claims 2 and 5–9 would have been obvious over the combination of Akanuma, APA, and Ikegame.

D. Obviousness Based on the Combination of Akanuma, APA, and Wakabayashi

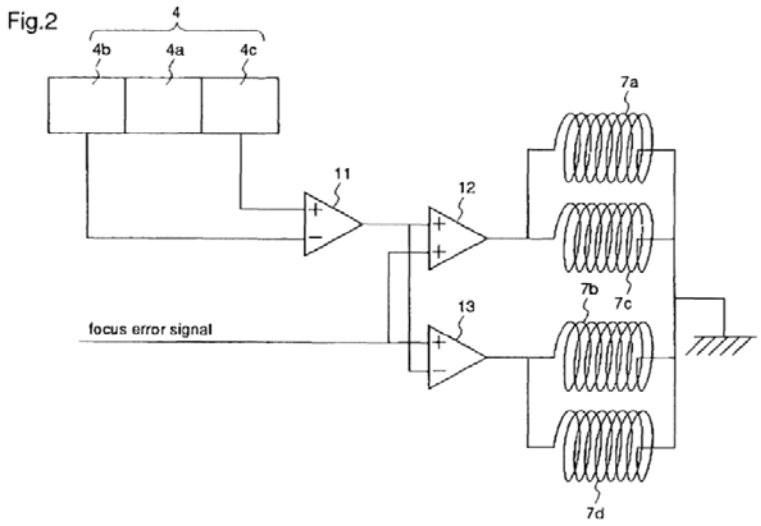
LG contends that dependent claims 3 and 4 of the '065 patent are unpatentable under § 103(a) over the combination of Akanuma, APA, and Wakabayashi. Pet. 53–59. LG explains how this proffered combination purportedly teaches the subject matter of each challenged claim. *Id.* LG also relies upon the Declaration of Dr. Mansuripur to support its positions. Ex. 1011 ¶¶ 124–36. In its Patent Owner Response, Toshiba presents three

arguments with respect to dependent claim 3. PO Resp. 23–38. Toshiba relies upon the Declaration of Mr. Bogy to support its positions. Ex. 2003 ¶¶ 66–88.

We begin our analysis with a brief overview of Wakabayashi, and then we address the parties' contentions regarding dependent claim 3.

1. Wakabayashi

Wakabayashi generally relates to an objective lens driver employed in an apparatus for optically recording and reproducing information in recording media. Ex. 1007, 1:4–6. Figure 2 of Wakabayashi, reproduced below, illustrates one embodiment of the objective lens driver that includes a tilt control circuit. *Id.* at 4:32–34, 6:38–40.



As shown in Figure 2, the tilt control circuit includes amplifier 11, normal rotation driving amplifier 12, and reverse rotation driving amplifier 13. Ex. 1007, 6:40–49. The output from normal rotation driving amplifier 12 is applied to focusing coils 7a and 7c, while the output from reverse

rotation driving amplifier 13 is applied to focusing coils 7b and 7d. *Id.* at 6:49–52.

2. Claim 3

Claim 3 directly depends from claim 2 and recites that, "in order to drive the actuator in the focus and tilt directions, the first input signal is applied to a first set and a second input signal is applied to a second set, and the first and second sets include corresponding ones of the first through fourth focus and tilt coils." Ex. 1001, 9:5–10.

In its Petition, LG contends that Akanuma's objective lens driving apparatus and focusing coils 27 teach the claimed "actuator" and "first through fourth focus and tilt coils," respectively. Pet. 54–55. LG turns to Wakabayashi's disclosure of applying a first input signal (i.e., the output of normal rotation driving amplifier 12) to a first set of coils (i.e., focusing coils 7a and 7c), and applying a second input signal (i.e., the output of reverse rotation driving amplifier 13) to a second set of coils (i.e., focusing coils 7b and 7d), to teach the claimed "the first input signal is applied to a first set and a second input signal is applied to a second set." *Id.* at 55 (citing Ex. 1007, 6:38–52, 6:61–67, 7:21–33; Ex. 1011 ¶¶ 127–29).

LG argues that it would have been obvious to one of ordinary skill in the art to apply currents to Akanuma's focusing coils 27 in the manner suggested by Wakabayashi to drive Akanuma's objective lens driving apparatus in both the focus and tilt directions. Pet. 56 (citing Ex. 1011 ¶ 130). LG also argues that one of ordinary skill in the art would have recognized that applying Wakabayashi's technique to Akanuma's focusing

coils 27 would have yielded the predictable result of driving Akanuma's objective lens driving apparatus in both the focus and tilt directions, thereby resulting in an improved system in which the focusing coils also may be used for tilting. *Id*. (citing Ex. 1011 ¶ 131). In addition, LG argues that it would have been obvious to one of ordinary skill in the art to use Wakabayashi's known actuator driving technique to drive Akanuma's actuator in the same way to yield the predictable result of driving Akanuma's actuator in both the focus and tilt directions. *Id*.

a. The combined teachings of Akanuma and Wakabayashi properly account for the limitation recited in dependent claim 3

In its Patent Owner Response, Toshiba essentially repeats its claim construction argument that dependent claim 3 requires simultaneously controlling the driving of the actuator in both the focus and the tilt directions when the first and second input signals are applied to the first and second coil sets, respectively. *See* PO Resp. 24–26. According to Toshiba, Wakabayashi merely discloses that tangential tilt may be controlled using a first and second input signal. *Id.* at 26 (citing Ex. 1007, 7:21–33; Ex. 2003 ¶ 75). Toshiba asserts that Wakabayashi is not configured to control simultaneous movement of its actuator in both the focus and tilt directions. *Id.* At best, Toshiba asserts that Wakabayashi suggests simultaneous movement in the tracking and tilt directions. *Id.*

In its Reply, LG contends that Toshiba's argument in this regard is based on an improper construction of dependent claim 3 as requiring driving the actuator in the focus and tilt directions simultaneously. Pet. Reply 15. LG also disagrees with Toshiba's assertion that Wakabayashi does not

disclose controlling movement in the focusing direction, but instead only discloses controlling movement in the tracking and tilt directions. *Id.* at 18. According to LG, Wakabayashi is replete with disclosures of controlling movement in the focusing direction. *Id.* at 18–19.

In our claim construction section above, we declined to read a temporal requirement into dependent claim 3 and, as a result, we construed the claim phrase "in order to drive the actuator in the focus and tilt directions, a first input signal is applied to a first set and a second input signal is applied to a second set" as encompassing either independently or simultaneously controlling the driving of the actuator in the focus and tilt directions when the first and second input signals are applied to the first and second coil sets, respectively. *See supra* Section II.A.4. Consistent with this construction Akanuma discloses an objective lens driving apparatus that includes focusing coils 27 capable of driving the apparatus in the focus and tilt directions. Ex. 1002, 7:42–52. Wakabayashi, however, teaches the specific technique required by dependent claim 3—namely, it discloses controlling the driving of its objective lens driver in the focus and tilt directions by applying a first input signal (i.e., the output of normal rotation driving amplifier 12) to a first set of coils (i.e., focusing coils 7a and 7c), and applying a second input signal (i.e., the output of reverse rotation driving amplifier 13) to a second set of coils (i.e., focusing coils 7b and 7d). Ex. 1007, 6:38–52, 6:61–67, 7:21–33.

We also credit Dr. Mansuripur's supporting testimony on this issue, particularly his testimony that it would have been obvious to one of ordinary

skill in the art to apply Wakabayashi's technique to Akanuma's focusing coils 27. *See* Ex. 1011 ¶¶ 129, 130. We, therefore, agree with LG and its expert witness, Dr. Mansuripur, that the combined teachings of Akanuma and Wakabayashi properly account for the limitation recited in dependent claim 3. *See* Pet. 55–56; Ex. 1011 ¶¶ 127–31.

To the extent Toshiba asserts that Wakabayashi does not disclose controlling movement in the focusing direction, but instead only discloses controlling movement in the tracking and tilt directions, we disagree. *See* PO Resp. 26. Instead, we agree with LG that Wakabayashi is replete with disclosures of moving its objective lens driver in the focusing direction. *See* Pet. Reply 18–19. For instance, when describing Figure 2, which is the particular embodiment that LG relied upon in its Petition (*see* Pet. 55), Wakabayashi discloses "*focusing coils 7a to 7d*," and explicitly contemplates "driving the objective lens in the *focusing direction F*." Ex. 1007, 6:38–67, Fig. 2 (emphases added).

b. LG provides a sufficient rationale to combine the teachings of Akanuma and Wakabayashi

As we explained previously, LG provides numerous reasons in its Petition as to why one of ordinary skill in the art would have had a sufficient reason to combine or modify the teachings of Akanuma and Wakabayashi. *See supra* Section II.D.2. For instance, LG argues that one of ordinary skill in the art would have recognized that applying Wakabayashi's technique to Akanuma's focusing coils 27 would have yielded the predictable result of driving Akanuma's objective lens driving apparatus in both the focus and tilt

directions, thereby resulting in an improved system in which the focusing coils also may be used for tilting. Pet. 56 (citing Ex. 1011 ¶ 131).

In its Patent Owner Response, Toshiba contends that it is difficult to ascertain which of the *KSR* rationales that LG was trying to invoke in this case, but nonetheless it asserts that the factual findings needed to support each rationale are missing. PO Resp. 31. For instance, Toshiba asserts that LG fails to establish the factual findings needed to support the *KSR* rationale of using a known technique to improve a similar device in the same way for the following three reasons: (1) LG has not made a factual finding that the prior art at issue contains a base device upon which an improvement may be made; (2) LG has not made a factual finding that the prior art at issue contains a comparable device that has been improved in the same way as the invention covered by dependent claim 3; and (3) LG has not made a factual finding that one of ordinary skill in the art could have applied the known technique in the same way to the base device to yield a predictable result. *Id.* at 35–37 (citing Ex. 2003 ¶¶ 86–88).

The U.S. Supreme Court has held that an obviousness evaluation "cannot be confined by a formalistic conception of the words teaching, suggestion, and motivation, or by overemphasis on the importance of published articles and the explicit content of issued patents." *KSR*, 550 U.S. at 419. Instead, the relevant inquiry is whether LG has set forth "some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness." *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006), *cited with approval in KSR*, 550 U.S. at 418. When describing examples of

what may constitute a sufficient rationale to combine, the Supreme Court elaborated that, "if a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill." *KSR*, 550 U.S. at 417.

When considering the record in its entirety, we are satisfied that LG's rationales for combining the teachings of Akanuma and Wakabayashi suffice as articulated reasoning with rational underpinnings to justify the legal conclusion of obviousness. In particular, we agree with LG that, when, as here, a technique has been used to improve one device (i.e., Wakabayashi discloses controlling the driving of its objective lens driver in the focus and tilt directions by applying a first input signal to a first set of coils, and applying a second input signal to a second set of coils), and one of ordinary skill in the art would have recognized that it would improve similar devices in the same way (i.e., applying Wakabayashi's technique to Akanuma's focusing coils 27), using the technique is obvious unless its actual application is beyond the skill level of an ordinary skilled artisan. *See* Pet. 56; Ex. 1011 ¶ 131. The record does not include credible evidence explaining why the application of Wakabayashi's technique to Akanuma's focusing coils 27 would have been uniquely challenging or otherwise beyond the skill level of an ordinary skilled artisan.

Turning now to Toshiba's arguments that LG fails to make the factual findings necessary to support the *KSR* rationale of using known techniques to improve a similar device in the same way, we disagree with those

arguments. As we explained previously, LG begins its analysis of dependent claim 3 by arguing that the base device upon which an improvement can be made is Akanuma's objective lens driving apparatus that includes focusing coils 27. Pet. 54–55. LG then turns a comparable device—namely, Wakabayashi's objective lens driver—as evidence that the specific technique required by dependent claim 3 was old and well known. *Id.* at 50 (citing Ex. 1007, 1:5–7). In particular, LG relies upon Wakabayashi's disclosure of controlling the driving of its objective lens driver in the focus and tilt directions by applying a first input signal (i.e., the output of normal rotation driving amplifier 12) to a first set of coils (i.e., focusing coils 7a and 7c), and applying a second input signal (i.e., the output of reverse rotation driving amplifier 13) to a second set of coils (i.e., focusing coils 7b and 7d). *Id.* at 55 (citing Ex. 1007, 6:38–52, 6:61–67, 7:21–33). Finally, as discussed above, LG concludes—and we agree—that one of ordinary skill in the art would have recognized that applying Wakabayashi's technique to Akanuma's focusing coils 27 would have yielded the predictable result of driving Akanuma's objective lens driving apparatus in both the focus and tilt directions, thereby resulting in an improved system in which the focusing coils also may be used for tilting. *Id.* at 56 (citing Ex. 1011 ¶ 131).

c. Modifying Akanuma with the teachings of Wakabayashi would not render Akanuma's objective lens driving apparatus inoperable for its intended purpose or otherwise change its principle of operation

In its Patent Owner Response, Toshiba contends that Akanuma discloses achieving tilt control by providing separate currents to each of focusing coils 27. PO Resp. 28 (citing Ex. 1002, 7:48–52). Toshiba,

however, argues that applying Wakabayashi's technique, which Toshiba coins as a "combined current approach," to Akanuma's focusing coils 27 would have been inconsistent and fundamentally irreconcilable with Akanuma's disclosure of providing separate currents to each of focusing coils 27. *Id.* (citing Ex. 2003 ¶¶ 78, 79). Toshiba also argues that this proffered combination would render certain aspects of Akanuma's objective lens driving apparatus inoperable for its intended purpose or otherwise would have changed its principle of operation. *Id.* at 28–30 (citing Ex. 2003 ¶¶ 80, 81).

For at least three reasons, we do not agree with Toshiba's argument that applying Wakabayashi's technique to Akanuma's focusing coils 27 would render Akanuma's objective lens driving apparatus inoperable for its intended purpose or otherwise change its principle of operation. First, we note that Toshiba's argument in this regard is predicated on us adopting its proposed construction of the claim phrase "in order to drive the actuator in the focus and tilt directions, a first input signal is applied to a first set and a second input signal is applied to a second set" as requiring simultaneously controlling the driving of the actuator in both the focus and tilt directions. *See* PO Resp. 28–29. As we explained previously, we declined to adopt Toshiba's proposed construction for this claim phrase. Instead, we determined that this claim phrase does not include a specific temporal requirement and, therefore, it was broad enough to encompass either independently or simultaneously controlling the driving of the actuator in the

focus and tilt directions when the first and second input signals are applied to the first and second coil sets, respectively. *See supra* Section II.A.4.

Second, Toshiba's argument focuses on one aspect disclosed in Akanuma for providing separate currents to each of focusing coils 27. Ex. 1002, 7:48–52. Contrary to Toshiba's assertion, we are not convinced that this particular aspect qualifies as a fundamental principle of operation of Akanuma's objective lens driving apparatus. Nonetheless, even if we were to assume that this aspect of Akanuma is a fundamental principle of operation, applying Wakabayashi's technique to Akanuma's focusing coils 27 would not change the operation or intended purpose of Akanuma's objective lens driving apparatus because Akanuma and Wakabayashi each operate by providing separate currents to focusing coils to achieve a tilting function. *Compare* Ex. 1002, 7:48–52, *with* Ex. 1007, 7:21–29.

Lastly, we note that a proper obviousness evaluation requires us to consider the teachings of Akanuma and Wakabayashi together with the background knowledge of a person of ordinary skill in the art at the time of the invention of the '065 patent (e.g., APA). *See In re Paulsen*, 30 F.3d 1475, 1480 (Fed. Cir. 1994). This includes, among other things, considering Akanuma and Wakabayashi for everything they teach by way of technology. *See EWP Corp. v. Reliance Universal Inc.*, 755 F.2d 898, 907 (Fed. Cir. 1985). With this in mind, there is sufficient evidence in the record before us that one of ordinary skill in the art would have appreciated that applying Wakabayashi's technique to Akanuma's focusing coils 27 would result in an

operable objective lens driving apparatus that is capable of moving in both the focus and tilt directions. *See* Pet. 56; Ex. 1011 ¶¶ 130, 131.

d. Summary

Based on the record developed during trial, we conclude that LG has demonstrated by a preponderance of the evidence that dependent claim 3 would have been obvious over the combination of Akanuma, APA, and Wakabayashi.

3. Claim 4

Toshiba does not address separately LG's explanations and supporting evidence with respect to dependent claim 4. *See generally* PO Resp. 23–38. We have reviewed LG's explanations and supporting evidence, and we agree with and adopt LG's analysis. Pet. 57–59. Based on the record developed during trial, we conclude that LG has demonstrated by a preponderance of the evidence that dependent claim 4 would have been obvious over the combination of Akanuma, APA, and Wakabayashi.

E. Obviousness Based on the Combination of Akanuma, APA, Ikegame, and Wakabayashi

LG contends that claims 3 and 4 of the '065 patent are unpatentable under § 103(a) over the combination of Akanuma, APA, Ikegame, and Wakabayashi. Pet. 53–59. LG explains how this proffered combination purportedly teaches the subject matter of each challenged claim. *Id.* LG also relies upon the Declaration of Dr. Mansuripur to support its positions. Ex. 1011 ¶¶ 124–36.

Apart from asserting that Ikegame does not remedy the deficiencies in Akanuma and Wakabayashi identified above in the context of LG's asserted

ground based on the combination of Akanuma, APA, and Wakabayashi, Toshiba does not address separately LG's explanations and supporting evidence as to how the combination of Akanuma, APA, Ikegame, and Wakabayashi teaches limitations recited in dependent claims 3 and 4. PO Resp. 38. As we explained previously, there are no such deficiencies in Akanuma or Wakabayashi for Ikegame to remedy. *See supra* Sections II.D.2–3. We have reviewed LG's explanations and supporting evidence as to how this proffered combination teaches all the limitations of dependent claims 3 and 4, including its argument as to why a person of ordinary skill in the art would have had a sufficient reason to combine or modify the teachings of Akanuma with those of APA, Ikegame, and Wakabayashi, and we agree with and adopt LG's analysis. *See* Pet. 53–59.

Based on the record developed during trial, we conclude that LG has demonstrated by a preponderance of the evidence that dependent claims 3 and 4 would have been obvious over the combination of Akanuma, APA, Ikegame, and Wakabayashi.

III. CONCLUSION

LG has demonstrated by a preponderance of the evidence that (1) claims 1, 2, and 5–9 of the '065 patent are unpatentable under § 103(a) over the combination of Akanuma and APA; (2) claims 1, 2, and 5–9 of the '065 patent are unpatentable under § 103(a) over the combination of Akanuma, APA, and Ikegame; (3) claims 3 and 4 of the '065 patent are unpatentable under § 103(a) over the combination of Akanuma, APA, and

Wakabayashi; and (4) claims 3 and 4 of the ’065 patent are unpatentable under § 103(a) over the combination of Akanuma, APA, Ikegame, and Wakabayashi.

IV. ORDER

In consideration of the foregoing, it is

ORDERED that claims 1–9 of the ’065 patent are held to be unpatentable; and

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

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