

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

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

v.

TOSHIBA SAMSUNG STORAGE TECHNOLOGY KOREA
CORPORATION,
Patent Owner.

Case IPR2015-01642
Patent 6,721,110 B2

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 40–45, 47, and 48 of U.S. Patent No. 6,721,110 B2 (“the ’110 patent,” Ex. 1001). Paper 1 (“Pet.”). Patent Owner, Toshiba Samsung Storage Technology Korea Corporation (“Toshiba”), timely 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 40–45, 47, and 48 of the ’110 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 36 (“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 40–45, 47, and 48 of the ’110 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 '110 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. 6,785,065 B1 (“the '065 patent”), which is a continuation of the '110 patent. Pet. 4. In that case, we instituted an *inter partes* review as to claims 1–9 of the '065 patent. *LG Elecs., Inc. v. Toshiba Samsung Storage Tech. Korea Corp.*, Case IPR2015-01644 (PTAB Jan. 29, 2016) (Paper 8).

B. The '110 Patent

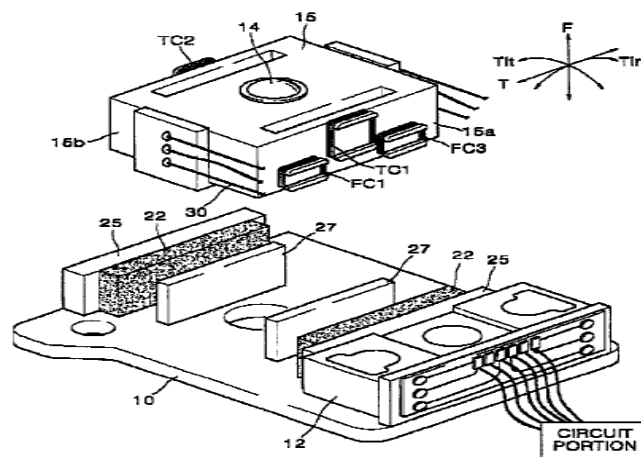
The '110 patent, titled “Optical Pickup Actuator Driving Method and Apparatus Therefor,” issued April 13, 2004, from U.S. Patent Application No. 10/173,958, filed on June 19, 2002. Ex. 1001, at [54], [45], [21], [22]. The '110 patent claims foreign priority to Korean Patent Application No. 2001-34687, filed on June 19, 2001. *Id.* at [30].

As the title suggests, the '110 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, 1:15–20. 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 1:21–23. According to the '110 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 2:56–58, Fig. 1. Consequently, it becomes very difficult to install the necessary wiring in such a small space. *Id.* at 2:59–62, 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 2:64–65, Fig. 1.

The '110 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, 3:9–17. Figure 3 of the '110 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 Claims

Of the challenged claims, claims 40 and 48 are the only independent claims at issue. Independent claim 40 is directed to an optical pickup actuator, whereas independent claim 48 is directed to a method of driving an optical pickup actuator. Claims 41–45 and 47 directly depend from independent claim 40. Independent claims 40 and 48 are illustrative of the challenged claims and are reproduced below:

40. An optical pickup actuator comprising:
a bobbin movably arranged on a base of the optical pickup actuator;
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;
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, 11:10–22.

48. A method of driving an optical pickup actuator comprising a support member, a bobbin having at least one focus

and tilt coil and at least one track coil on each of opposite side surfaces of the bobbin, wherein the focus and tilt coils and the track coils are not arranged on other sides of the bobbin, and magnets arranged to face corresponding sides of the opposite side surfaces of the bobbin, the method comprising:

applying an input signal to the focus and tilt coils to drive the optical pickup actuator in focus and tilt direction, wherein the applying of the input signal comprise one of:

inputting the input signal to each of sets, wherein the focus and tilt coils are divided into at least two sets of coils, and

inputting the input signal independently to each focus and tilt coil.

Id. at 11:49–65.

D. Prior Art Relied Upon

LG relies upon the following prior art references:

Inventor¹	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	1004
Wakabayashi	5,905,255	issued May 18, 1999, filed Jan. 14, 1998	1005

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 6, 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. 26.

Reference(s)	Basis	Claim(s) Challenged
Akanuma and APA	§ 103(a)	40–45 and 47
Akanuma and Ikegame	§ 103(a)	40–45 and 47
Akanuma	§ 103(a)	48
Akanuma and Wakabayashi	§ 103(a)	48

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 claim construction standard to be applied in an *inter partes* review

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 ’110 patent. For simplicity, we refer to APA and its disclosure generally in our analysis that follows.

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. 17. To support its proposed construction, LG directed us to various disclosures in the specification and certain figures of the ’110 patent, as well as the supporting testimony of its expert witness, Masud Mansuripur, Ph.D. *Id.* (citing Ex. 1001, 1:58, 5:12–13, Figs. 1, 3, 4; Ex. 1006 ¶ 53). 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 ’110 patent. Dec. on Inst. 7 (citing Ex. 1001, 1:58, 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. *“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 ’110 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 ’110 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 ’110 patent; (4) the use of the word “surfaces” in each of independent claims 40 and 48 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 '110 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 40, 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 '110 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 '110 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 '110 patent. *See Translogic*, 504 F.3d at 1257.

Beginning with the intrinsic record, the parties direct us to Figures 3 and 4 of the '110 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 40, 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. 12, 17.

FIG. 4

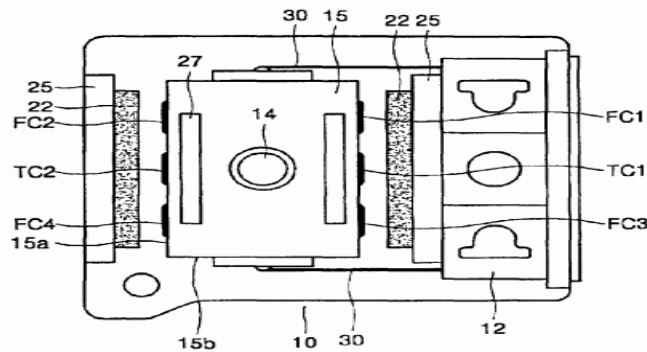


Figure 4 shown above is similar to Figure 3 because it illustrates that the optical pickup actuator includes base 10, holder 12 provided at one side of the base, bobbin 15 on which objective lens 14 is mounted, and a magnetic driving portion that drives the bobbin in focus, tilt, and track directions. *Id.* at 5:10–15. The '110 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 '110 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, 1:26–30 (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 40 recites, in relevant part, "a bobbin moveably arranged *on* a base of the optical pickup actuator." Ex. 1001, 11:11–12 (emphasis added). Independent claims 1 and 24, which are not challenged in this proceeding, each recite a similar limitation. *Id.* at

8:41–42 (“arranging the bobbin on a base of the optical pickup actuator”), 10:1–2 (reciting the same). In these independent claims, 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. 1007, 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 [the bobbin] 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 ’110 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 ’110 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, 2:56–3:17); Pet. Reply 6–7 (citing the same). Given that the primary objective of the ’110 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. 1007, 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 '110 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 '110 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 '110 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 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 ’110 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.

3. “*focus and tilt coils*” and “*optical pickup actuator*”
(preamble of independent claim 48)

In its Petition, LG contends that the preamble of independent claim 48 includes certain statements relating to the structural elements of the optical pickup actuator for performing the method steps recited in the body of this claim that should not be treated as limiting. Pet. 50. Alternatively, LG contends that, even if these statements in the preamble were treated as limiting, Akanuma discloses all the structure elements of the optical pickup actuator recited in the preamble of independent claim 48. *Id.* at 51 (citing Ex. 1006 ¶ 130). In its Patent Owner Response, Toshiba contends that the “focus and tilt coils” and “optical pickup actuator” language recited in the preamble of independent claim 48 should be treated as limiting because the

method steps recited in the body of this claim require the operation or manipulation of these particular structural elements. PO Resp. 22–23.

In considering whether a preamble is limiting, we analyze the preamble to ascertain whether it states a necessary and defining aspect of the invention, or whether it is simply an introduction to the general field of the claim. *On Demand Machine Corp. v. Ingram Indus., Inc.*, 442 F.3d 1331, 1343 (Fed. Cir. 2006); *see also Bicon, Inc. v. Straumann Co.*, 441 F.3d 945, 950 (Fed. Cir. 2006) (whether a preamble limits a claim is determined on a claim-by-claim basis). We construe a preamble as limiting “if it recites essential structure or steps, or if it is ‘necessary to give life, meaning, and vitality’ to the claim.” *Catalina Mktg. Int’l, Inc. v. Coolsavings.com, Inc.*, 289 F.3d 801, 808 (Fed. Cir. 2002) (quoting *Pitney Bowes, Inc. v. Hewlett-Packard Co.*, 182 F.3d 1298, 1305 (Fed. Cir. 1999)). A preamble, however, is not limiting “‘where a patentee defines a structurally complete invention in the claim body and uses the preamble only to state a purpose or intended use for the invention.’” *Id.* (quoting *Rowe v. Dror*, 112 F.3d 473, 478 (Fed. Cir. 1997)).

We agree with Toshiba that certain language recited in the preamble of independent claim 48 is limiting because it states necessary and defining aspects of the invention embodied in this challenged claim. Indeed, “[w]hen [the] limitations in the body of the claim rely upon and derive antecedent basis from the preamble, then the preamble may act as a necessary component of the claimed invention.” *Eaton Corp. v. Rockwell Int’l Corp.*, 323 F.3d 1332, 1339 (Fed. Cir. 2003). Here, the “focus and tilt coils”

language recited in the preamble of independent claim 48 provides antecedent basis for the same claim phrase recited in the body of this claim. We also view the “optical pickup actuator” language recited in the preamble of independent claim 48 as reciting an essential element of the invention embodied in this claim because it provides the necessary structure for performing one of the two “inputting” method steps. *See* Dec. on Inst. 19 (determining that the asserted prior art need only satisfy one of the two “inputting” steps in order to render obvious independent claim 48).

B. Obviousness Based on the Combination Akanuma and APA

LG contends that claims 40–45 and 47 of the ’110 patent are unpatentable under § 103(a) over the combination of Akanuma and APA. Pet. 24–46. In particular, 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. 1006 ¶¶ 69–125. In its Patent Owner Response, Toshiba presents two arguments with respect to independent claim 40. PO Resp. 11–21. Toshiba relies upon the Declaration of Mr. Bogy to support its positions. Ex. 2003 ¶¶ 40–56.

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 40.

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

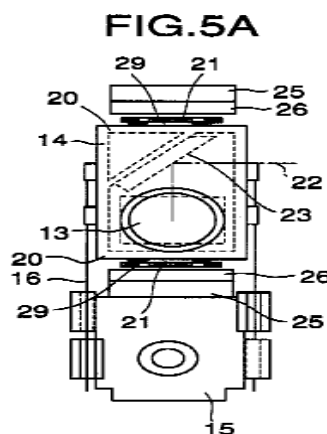
There is sufficient evidence in the record before us that reflects the knowledge level of a person of ordinary skill in the art. LG's expert witness, Dr. Mansuripur, attests that a person of ordinary skill in the art in the relevant time frame would be an individual who (1) has familiarity with optical 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. 16 (citing Ex. 1006 ¶ 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

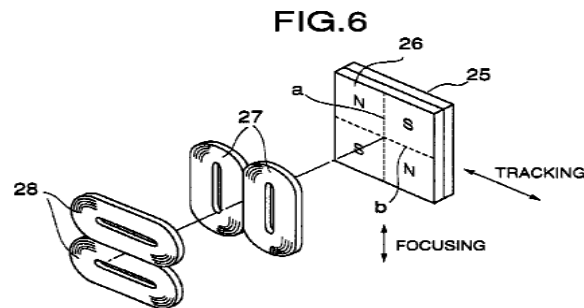
Akanuma generally relates to an objective lens driving apparatus of an optical disk drive and, in particular, to an objective lens driving apparatus that includes an actuator for moving an objective lens in focusing, tilt, and tracking directions. Ex. 1002, 1:7–11, 7:42–52, 10:45–49. According to Akanuma, 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.



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.

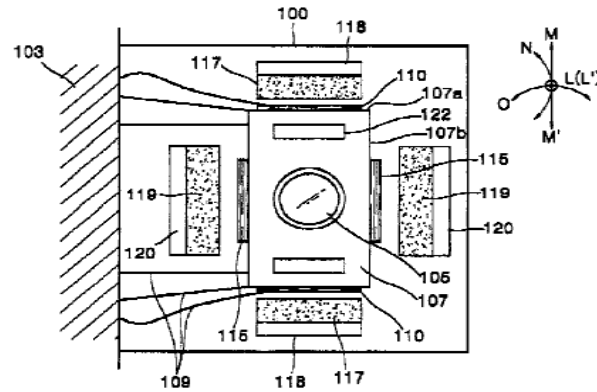


As shown in Figure 6, drive coil assembly 21 (not illustrated) includes two focusing coils 27 and two tracking coils 28. Ex. 1002, 7:25–27. Focusing coils 27, tracking coils 28, and drive magnet 26 collectively form drive motor or actuator 29. *Id.* at 7:37–39.

4. APA Overview

Figure 1 of APA, reproduced below, illustrates a conventional optical pickup actuator. Ex. 1001, 1:56, 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.

5. Claim 40

In its Petition, LG contends that Akanuma’s objective lens driving apparatus teaches all the limitations recited in independent claim 40, except “a base.” Pet. 24–32. LG then turns to APA’s disclosure of a conventional optical pickup actuator, which includes base 100, to teach this particular feature. *Id.* at 26 (citing Ex. 1001, 1:56–62, Fig. 1). LG argues that it would have been obvious to one of ordinary skill in the art 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 27 (citing Ex. 1006 ¶ 78). LG further 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 27–28 (citing Ex. 1006 ¶ 79). In addition, LG 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 40; 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. 12–21. We address each argument in turn.

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

Independent claim 40 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, 11:13–16 (“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. 28–29 (citing Ex. 1002, 6:61–63, 7:25–27, 7:42–52, Figs. 5A–6; Ex. 1006 ¶¶ 80–82). LG then asserts that Akanuma’s objective lens driving apparatus teaches the disputed claim 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.* at 29–30 (citing Ex. 1002, 6:63–65, 7:24–27, Figs. 5A, 5B; Ex. 1006 ¶¶ 83, 84).

In its Patent Owner Response, Toshiba essentially repeats its claim construction argument that independent claim 40 requires coils that must be “over and in contact” with each of the opposite side surfaces of the bobbin. *See* PO Resp. 12–16. 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 14–16 (citing Ex. 1002, 7:27–47, 8:31–47, Figs. 6, 8; Ex. 2003 ¶¶ 45–48).

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 9–10 (citing Ex. 1002, Figs. 5A–6; Ex. 1006 ¶¶ 80–84). 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 10 (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.

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.2. 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. 1006 ¶¶ 83, 84. We, therefore, agree with LG and its expert witness, Dr. Mansuripur, that Akanuma teaches the disputed limitation. *See* Pet. 28–30; Ex. 1006 ¶¶ 80–84.

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. 19 (citing Ex. 2003 ¶ 53). 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 19–21 (citing Ex. 1002, 2:35–40, 3:5–7, 3:9–14, 7:15–20; Ex. 2003 ¶¶ 53–55).

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.2.

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 40, except "a base." Pet. 24–32. LG then turns to APA's disclosure of a conventional optical pickup actuator, which includes base 100, to teach this particular feature. *Id.* at 26 (citing Ex. 1001, 1:56–62, Fig. 1). 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 40 is the addition of APA's 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. 19. 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 40. *See generally* PO Resp. 12–21. 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. 24–28, 30–32.

d. Summary

Based on the record developed during trial, we conclude that LG has demonstrated by a preponderance of the evidence that independent claim 40 would have been obvious over the combination of Akanuma and APA.

6. Claims 41–45 and 47

Toshiba does not address separately LG’s explanations and supporting evidence with respect to dependent claims 41–45 and 47. *See generally* PO Resp. 12–21. We have reviewed LG’s explanations and supporting evidence, and we agree with and adopt LG’s analysis. Pet. 32–46. Based on the record developed during trial, we conclude that LG has demonstrated by a preponderance of the evidence that dependent claims 41–45 and 47 would have been obvious over the combination of Akanuma and APA.

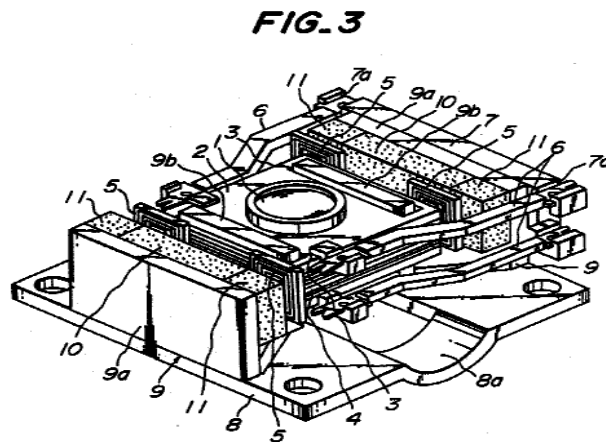
C. Obviousness Based on the Combination of Akanuma and Ikegame

LG contends that claims 40–45 and 47 of the ’110 patent are unpatentable under § 103(a) over the combination of Akanuma and Ikegame. Pet. 24–46. In particular, 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. 1006 ¶¶ 69–125. 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 and Ikegame teaches all the limitations of independent claim 40. PO Resp. 21 (citing Ex. 2003 ¶ 57).

We begin our analysis with a brief overview of Ikegame, and then we address the parties' contentions regarding independent claim 40.

1. Ikegame Overview

Ikegame generally relates to an optical system supporting device for use in an optical information recording apparatus. Ex. 1004, 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.



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. 1004, 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 40

In its Petition, LG contends that Akanuma's objective lens driving apparatus teaches all the limitations recited in independent claim 40, except "a base." Pet. 24–32. LG then turns to Ikegame's disclosure of an optical system supporting device, which includes base plate 8, to teach this particular feature. *Id.* at 26 (citing Ex. 1004, 3:27–28, 3:34–37, 3:44–48, Fig. 3). LG 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 27 (citing Ex. 1006 ¶ 78). LG further 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 27–28 (citing Ex. 1006 ¶ 79). In addition, LG 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.* at 28.

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 and Ikegame teaches all the limitations recited in independent claim 40. PO Resp. 21. As we explained previously, there are no such deficiencies in Akanuma 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 40, 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 Ikegame, and we agree with and adopt LG’s analysis. *See* Pet. 24–32. Based on the record developed during trial, we conclude that LG has demonstrated by a preponderance of the evidence that independent claim 40 would have been obvious over the combination of Akanuma and Ikegame.

3. Claims 41–45 and 47

Toshiba does not address separately LG’s explanations and supporting evidence with respect to dependent claims 41–45 and 47. *See generally* PO Resp. 21. We have reviewed LG’s explanations and supporting evidence, and we agree with and adopt LG’s analysis. Pet. 32–46. Based on the record developed during trial, we conclude that LG has demonstrated by a preponderance of the evidence that dependent claims 41–45 and 47 would have been obvious over the combination of Akanuma and Ikegame.

D. Obviousness Over Akanuma

LG contends that independent claim 48 of the ’110 patent is unpatentable under § 103(a) over Akanuma. Pet. 49–58. In particular, LG explains how Akanuma purportedly teaches the subject matter of this

challenged claim. *Id.* LG also relies upon the Declaration of Dr. Mansuripur to support its positions. Ex. 1006 ¶¶ 127–47. 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 Akanuma teaches all the limitations of independent claim 48. PO Resp. 21–22 (citing Ex. 2003 ¶ 57). Toshiba also argues that, contrary to LG’s assertion that certain statements recited in the preamble of independent claim 48 should not be treated as limiting, the “focus and tilt coils” and “optical pickup actuator” language recited in this preamble is limiting because the method steps recited in the body of this claim require the operation or manipulation of these particular structural elements. *Id.* at 22–23.

We address the parties’ arguments regarding independent claim 48 in turn.

1. LG’s Contentions

In its Petition, LG contends that, even if we treat certain language in the preamble of independent claim 48 as limiting, Akanuma discloses all the structure elements of the optical pickup actuator recited in the preamble of independent claim 48. Pet. 51 (citing Ex. 1006 ¶ 130). In particular, LG relies upon a claim chart to explain how Akanuma’s objective lens driving apparatus, which includes wire springs 16, at least one focusing coil 27 and at least one tracking coil 28 on each of opposite side surfaces 20 of objective lens supporting member 14, and magnets 26 arranged to face the

corresponding sides of opposite sides surfaces 20 of objective lens supporting member 14, teaches all the structural elements recited in the preamble of independent claim 48. *Id.* at 51–52 (citing Ex. 1002, 6:51–7:52, Figs. 5A–6; Ex. 1006 ¶ 132).

In addition to LG’s explanations and supporting evidence as to how Akanuma teaches all the structural elements recited in the preamble of independent claim 48, LG contends that Akanuma’s objective lens driving apparatus teaches all the method steps recited in this claim. Pet. 49–55. In particular, LG argues that Akanuma’s disclosure of providing currents, separately or independently, to each of focusing coils 27 to tilt objective lens 13 with respect to a recording surface of optical recording medium 30 teaches “inputting the input signal independently to each focus and tilt coil,” as claimed. *Id.* at 53–54 (citing Ex. 1002, 7:48–52, 10:45–59; Ex. 1006 ¶ 136); *see also id.* at 57–58 (further arguing that Akanuma teaches this limitation) (citing Ex. 1002, 7:48–52; Ex. 1006 ¶¶ 143–44).

2. *Toshiba’s Contentions*

As an initial matter, 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 Akanuma teaches all the limitations of independent claim 48. PO Resp. 21–22 (citing Ex. 2003 ¶ 57). For the same reasons discussed above with respect to independent claim 40, we do not agree with Toshiba’s arguments. *See supra* Sections II.B.5.a–c.

Turning to Toshiba's argument that certain language recited in the preamble of independent claim 48 is limiting (PO Resp. 22–23), in our claim construction section above, we agree with Toshiba that the “focus and tilt coils” and “optical pickup actuator” language recited in this preamble is limiting because it states necessary and defining aspects of the invention embodied in independent claim 48. *See supra* Section II.A.3. Nonetheless, even when we treat this particular language as limiting, LG has taken an alternative position that Akanuma properly accounts for these structural elements. That is, LG contends—and we agree—that Akanuma's objective lens driving apparatus, which includes focusing coils 27 and tracking coils 28, teaches the “optical pickup actuator” and “focus and tilt coils,” as recited in the preamble of independent claim 48. *See* Pet. 51. We have reviewed LG's explanations and supporting evidence as to how Akanuma teaches the remaining limitations of independent claim 48, and we agree with and adopt LG's analysis. *See* Pet. 49–58.

3. Summary

Based on the record developed during trial, we conclude that LG has demonstrated by a preponderance of the evidence that independent claim 48 would have been obvious over Akanuma.

E. Obviousness Based on the Combination of Akanuma and Wakabayashi

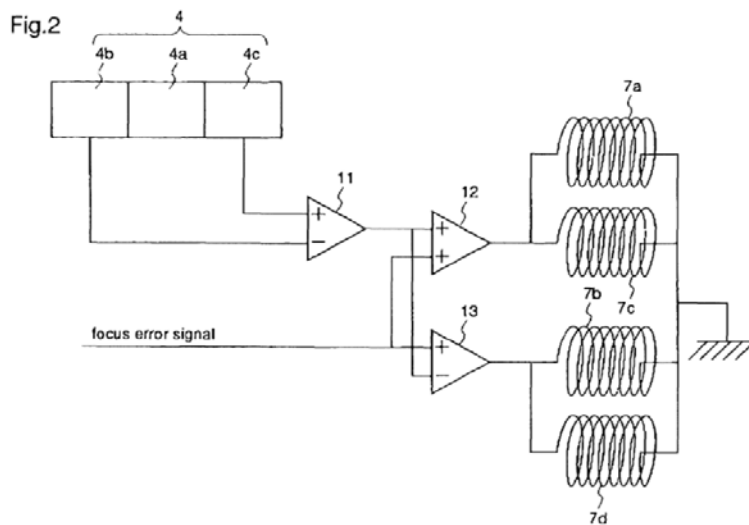
LG contends that claim 48 of the '110 patent is unpatentable under § 103(a) over the combination of Akanuma and Wakabayashi. Pet. 49–58. In particular, LG explains how this proffered combination purportedly teaches the subject matter of this challenged claim. *Id.* LG also relies upon

the Declaration of Dr. Mansuripur to support its positions. Ex. 1006 ¶¶ 127–47. In its Patent Owner Response, Toshiba relies upon essentially the same arguments it presented against LG’s asserted ground based on obviousness over Akanuma to rebut LG’s explanations and supporting evidence as to how the combination of Akanuma and Wakabayashi teaches all the limitations of independent claim 48. PO Resp. 23 (citing Ex. 2003 ¶ 57).

We begin our analysis with a brief overview of Wakabayashi, and then we address the parties’ arguments regarding independent claim 48 in turn.

1. Wakabayashi

Wakabayashi generally relates to an objective lens driver employed in an apparatus for optically recording and reproducing information in recording media. Ex. 1005, 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. 1005, 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 48

In its Petition, LG contends that, even if we treat certain language in the preamble of independent claim 48 as limiting, Akanuma discloses all the structure elements of the optical pickup actuator recited in the preamble of independent claim 48. Pet. 51 (citing Ex. 1006 ¶ 130). In particular, LG relies upon a claim chart to explain how Akanuma’s objective lens driving apparatus, which includes wire springs 16, at least one focusing coil 27 and at least one tracking coil 28 on each of opposite side surfaces 20 of objective lens supporting member 14, and magnets 26 arranged to face the corresponding sides of opposite sides surfaces 20 of objective lens supporting member 14, teaches all the structural elements recited in the preamble of independent claim 48. *Id.* at 51–52 (citing Ex. 1002, 6:51–7:52, Figs. 5A–6; Ex. 1006 ¶ 132).

In addition to LG’s explanations and supporting evidence as to how Akanuma teaches all the structural elements recited in the preamble of independent claim 48, LG contends that Akanuma’s objective lens driving apparatus teaches at least one of the method steps recited in this claim. Pet. 49–56. In the Decision on Institution, we determined that the asserted prior

art need only satisfy one of the two “inputting” steps in order to render obvious independent claim 48. Dec. on Inst. 19. To the extent that both of the “inputting” steps recited in independent claim 48 are required to satisfy this claim, LG turns to Wakabayashi to teach “inputting the input signal to each of sets, wherein the focus and tilt coils are divided into at least two sets of coils,” as claimed. Pet. 55–56. In particular, LG argues that 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, teaches this “inputting” step. *Id.* at 56 (citing Ex. 1005, 6:38–52, 6:61–67, 7:21–33).

LG further argues that one of ordinary skill in the art would have had a reasonable expectation that applying currents to Akanuma’s focusing coils 27 in the manner suggested by Wakabayashi would successfully drive Akanuma’s objective lens driving apparatus in the focus and tilt directions. Pet. 57 (citing Ex. 1006 ¶ 142). LG also argues that one of ordinary skill in the art would have recognized that applying Wakabayashi’s technique to the currents of Akanuma’s focusing coils 27 would have yielded the predictable result of driving Akanuma’s objective lens driving apparatus in the focus and tilt directions, thereby resulting in an improved system in which the focusing coils may be used for tilting. *Id.* 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 the focus and tilt directions. *Id.*

Toshiba relies upon essentially the same arguments it presented against LG's asserted ground based on obviousness over Akanuma to rebut LG's explanations and supporting evidence as to how the combination of Akanuma and Wakabayashi teaches all the limitations of independent claim 48. PO Resp. 23–24 (citing Ex. 2003 ¶ 57). For the same reasons discussed above with respect to independent claim 48, we do not agree with Toshiba's arguments. *See supra* Section II.D. We have reviewed LG's explanations and supporting evidence as to how this proffered combination teaches the remaining limitations in independent claim 48, 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 Wakabayashi, and we agree with and adopt LG's analysis. *See* Pet. 49–58.

3. Summary

Based on the record developed during trial, we conclude that LG has demonstrated by a preponderance of the evidence that independent claim 48 would have been obvious over the combination of Akanuma and Wakabayashi.

III. CONCLUSION

LG has demonstrated by a preponderance of the evidence that (1) claims 40–45 and 47 of the '110 patent are unpatentable under § 103(a) over the combination of Akanuma and APA; (2) claims 40–45 and 47 of the

'110 patent are unpatentable under § 103(a) over the combination of Akanuma and Ikegame; (3) claim 48 of the '110 patent is unpatentable under § 103(a) over Akanuma; and (4) claim 48 of the '110 patent is unpatentable under § 103(a) over Akanuma and Wakabayashi.

IV. ORDER

In consideration of the foregoing, it is

ORDERED that claims 40–45, 47, and 48 of the '110 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.

IPR2015-01642
Patent 6,721,110 B2

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