

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 IPR2015-01659
Patent 7,367,037 B2

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

JEFFERSON, *Administrative Patent Judge*.

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

I. INTRODUCTION

LG Electronics, Inc. and LG Electronics U.S.A., Inc. (collectively “Petitioner” or “LG”) filed a Petition (Paper 1, “Pet.”) requesting an *inter partes* review of claims 1, 5, 8–11, 15–18, and 22 of U.S. Patent No. 7,367,037 B2 (Ex. 1001, “the ’037 patent”). On February 5, 2016, we instituted *inter partes* review of claims 1, 5, 8–11, 15–18, and 22 of the ’037 patent on the basis that these claim would have been unpatentable as obvious under 35 U.S.C. § 103(a). Paper 8 (“Dec. on Inst.”).

Toshiba Samsung Storage Technology Korea Corporation (“Patent Owner” or “Toshiba”), filed a Patent Owner’s Response (Paper 22, “PO Resp.”) and Petitioner filed a Reply (Paper 26, “Pet. Reply”). A consolidated oral hearing was held on October 6, 2016, and the hearing transcript has been entered in the record. Paper 40 (“Tr.”).

We have jurisdiction under 35 U.S.C. § 6. This Final Written Decision is issued pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. Pursuant to our jurisdiction under 35 U.S.C. § 6, we conclude, for the reasons discussed below, Petitioner has shown by a preponderance of the evidence that claims 1, 5, 8–11, 15–18, and 22 of the ’037 patent are unpatentable as obvious under 35 U.S.C. § 103(a).

A. *Related Proceedings*

The parties report the following pending litigation matter related to the ’037 patent: (1) *LG Electronics, Inc., v. Toshiba Samsung Storage Technology Korea Corp.*, Case No. 1:12-cv-01063 (D. Del.); (2) *Toshiba Samsung Storage Technology Korea Corp., v. LG Electronics, Inc.*, Case No. 1:15-cv-691 (D. Del.). Pet. 3; Paper 6, 1.

B. The '037 Patent

The '037 patent discloses a conventional disk player, turntable, clamper, and spindle motor that incorporates a self-compensating dynamic balancer for restricting internal vibrations from the eccentric center of gravity of a disk. Ex. 1001, 1:24–33. The '037 patent describes a typical disc player as prior art, which contains a turntable, clamper, spindle motor, rotational shaft, deck plate, and buffering members. *Id.* at 1:41–59, Fig. 1.

A disk player embodying the invention of the '037 patent is illustrated in Figure 2, reproduced below.

FIG. 2

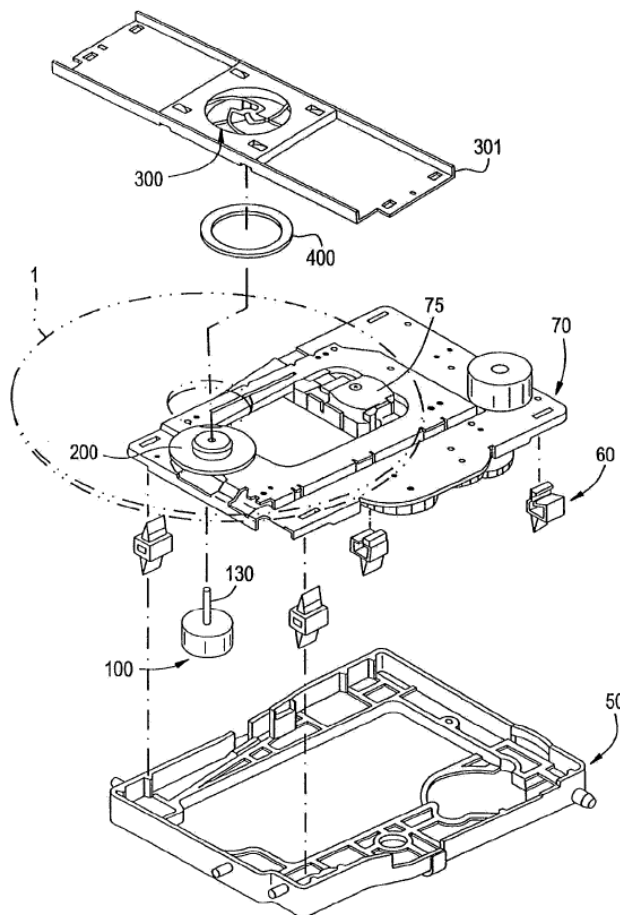


Figure 2 shows deck base 50, deck plate 70, buffering members 60, spindle motor 100, turntable 200, and clamper 300 similar to those noted in a typical disk player. *Id.* at 5:4–12, 1:41–59, Fig. 1. Figure 2 also depicts self-compensating dynamic balancer 400, which prevents eccentric rotation of rotational shaft 130 of spindle motor 100 caused by the eccentric center of gravity of disc 1. *Id.* 5:12–15.

The '037 patent specification states that:

a method of dampening internal vibrations generated by the rotation of the spindle motor [] due to an eccentric center of gravity of the disk is not taken into consideration [by buffering members which protect from external impacts]. In such a case, the eccentric center of gravity of the disk is caused by a discrepancy between the rotational center of the disk and the center of gravity of the disk due to errors in the manufacturing process of the disk. Thus, the rotational shaft of the spindle motor [] exhibits an orbital revolution due to wobbling of the rotational shaft.

Such orbital revolution of the rotational shaft of the spindle motor does not effect a low-speed disk player such as a 1x or 2x type. However, in the case of a high-speed model . . . , the effects of the orbital revolution of the rotational shaft of the spindle motor become serious making the recording/reproducing of information difficult.

Id. at 1:62–2:11.

The '037 patent solves this problem of the orbital revolution wobbling (caused by the discrepancy between the rotational center of the disk and the center of gravity of the disk) by “incorporating a self-compensating dynamic balancer [400], which is employed in a disk player so that the internal

vibrations due to an eccentric center of gravity of a disk can be limited” at either the turntable, clamper, or spindle motor. *Id.* at 2:26–45.

C. Illustrative Claim

Independent claim 1 is illustrative of the challenged claims and reproduced below:

1. A self-compensating dynamic balancer apparatus for a disk player which records and reproduces information from a disk installed on said disk player, said apparatus comprising:

a self-compensating dynamic balancer comprising:

a non-magnetic hollow tube; and

a mobile unit which comprises at least one rigid body and is disposed within said non-magnetic hollow tube,

wherein said self-compensation dynamic balancer is locatable coaxial with a rotation axis about which said disk is rotated by rotational components of said disk player,

wherein said self-compensation dynamic balancer rotates in use with at least one of rotational components,

wherein said mobile unit is arranged to be freely movable within said non-magnetic hollow tube by centrifugal force generated by rotation of said disk such that the center of gravity of said self-compensating dynamic balancer moves to be located opposite to the center of gravity of said disk with respect to said rotation axis when an angular frequency of the disk is greater than a natural frequency of a deck plate of the disk player,

wherein the natural frequency of the deck plate is determined by an elastic modulus of buffering members of the disk player and mass of the deck plate and other elements to be installed on the deck plate, and represents a rate of vibration in a horizontal direction, and

wherein the self-compensating dynamic balancer is mounted to at least one among members which are rotated by the rotational force provided by a spindle motor, and the center of gravity of said self-compensating dynamic balancer is located opposite to that of said disk with respect to a rotational shaft of said spindle motor by a centrifugal force generated during rotation of said disk, thereby to compensate for vibrations due to an eccentric center of gravity of said disk.

Ex. 1001, 16:64–17:32.

D. Instituted Grounds

We instituted trial on the following grounds of unpatentability for the challenged claims of the '037 patent as follows (Dec. on Inst. 18–19):

References	Basis	Claim[s] Challenged
Nishida ¹ and Hellerich ²	35 U.S.C. § 103(a)	1, 8–11, and 15–18
Nishida, Hellerich, and Kilgore ³	35 U.S.C. § 103(a)	5
Nishida, Hellerich, and Decker ⁴	35 U.S.C. § 103(a)	22

¹ U.S. Patent No. 5,469,311 to Nishida, issued Nov. 21, 1995 (Ex. 1003, “Nishida”).

² U.S. Patent No. 3,854,347 to Hellerich, issued Dec. 17, 1974 (Ex. 1002, “Hellerich”).

³ U.S. Patent No. 4,674,356 to Kilgore, issued June 23, 1987 (Ex. 1004, “Kilgore”).

⁴ U.S. Patent No. 3,731,556 to Decker, issued May 8, 1973 (Ex. 1005, “Decker”).

References	Basis	Claim[s] Challenged
Admitted Prior Art (APA) ⁵ and McGale ⁶	35 U.S.C. § 103(a)	1, 8, 11, and 16–18
APA, McGale, and Cobb ⁷	35 U.S.C. § 103(a)	9 and 10
APA, McGale, and Kilgore	35 U.S.C. § 103(a)	5
APA, McGale, and Taylor ⁸	35 U.S.C. § 103(a)	15
APA, McGale, and Decker	35 U.S.C. § 103(a)	22

II. ANALYSIS

A. Claim Interpretation

We interpret claims of an unexpired patent using the broadest reasonable interpretation in light of the specification of the patent in which they appear. *See* 37 C.F.R. § 42.100(b); *see also* *Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 2131, 2144–46 (2016) (upholding the use of the broadest reasonable interpretation standard as the claim construction standard to be applied in an *inter partes* review proceeding). Under the broadest

⁵ Ex. 1001, Fig. 1, 1:35–59. 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 '037 patent. For clarity, we refer to APA and its disclosure generally in the analysis that follows.

⁶ U.S. Patent No. 5,142,936 to McGale, issued Sept. 1, 1992 (Ex. 1006, “McGale”).

⁷ U.S. Patent No. 3,913,980 to Cobb, issued Oct. 21, 1975 (Ex. 1007, “Cobb”).

⁸ U.S. Patent No. 5,460,017 to Taylor, issued Oct. 24, 1995 (Ex. 1008, “Taylor”).

reasonable interpretation standard, 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). Thus, contrary to Patent Owner’s argument that we should construe claim terms using the *Phillips* standard in *inter partes* proceedings (PO Resp. 1–2 (citing *Phillips v. AWH Corp.*, 415 F.3d 1303, 1313 (Fed. Cir. 2005) (en banc))), we interpret claim terms using the broadest reasonable interpretation, in light of the specification. *See Cuozzo Speed Techs., LLC*, 136 S. Ct. at 2144–46.

1. “disk player”

Claim 1 recites a “disk player.” Ex. 1001, 16:65. Petitioner contends that the broadest reasonable interpretation of “disk player” is “a device that is capable of recording and/or reading information onto and/or from a disk.” Pet. 6 (citing Ex. 1001, 1:35–37; Ex. 1009 ¶¶ 81–83). We determined for purposes of the Decision on Institution that the broadest reasonable interpretation of disk player is “a device that is capable of recording and/or reading information onto and/or from a disk.” Dec. on Inst. 7–8.

Patent Owner argues that applying the *Phillips* standard “‘disc player’ should be interpreted to mean ‘a device that records and/or reads information onto and/or from a *removable optical recording medium*.’” PO Resp. 3, 6 (emphasis added). Patent Owner contends that “optical” is supported by the use of the word “required” in the specification, which states that “the disc player is required to protect the disc and optical pickup from external impacts and internal vibrations.” PO Resp. 3 (quoting Ex. 1001 at 1:37–40); *see also* Ex. 1001 at 16:53–56. Because the specification refers only to

“typical disc players” that Patent Owner argues are removable optical disc players, Patent Owner asserts that a person of ordinary skill in the art “would understand that characterizing vibrational problems occurring in connection with 6x, 8x, 12x, 20x, or 24x type disc player models (as opposed to low-speed 1x or 2x models) refers explicitly to disc players that play removable optical media.” PO Resp. 3 (citing Ex. 1001, 2:5-11). Thus, Patent Owner argues that the recited disc player does not encompass magnetic hard disc drives or other discs that are not optically read. *Id.* at 3. Patent Owner argues that to omit “optical recording medium” from the construction of disc player results in an unreasonably broad construction that does not reasonably reflect the ’037 specification. *Id.* (citing *In re Suitco Surface, Inc.*, 603 F.3d 1255, 1260 (Fed. Cir. 2010)); *see* Ex. 2002 ¶¶ 39–46. Patent Owner further asserts that under the *Phillips* standard, “disc player” in claim 1 should be interpreted to mean “a device that records and/or reads information onto and/or from a removable optical recording medium,” or at least “under the broadest reasonable construction standard to mean ‘a device that records and/or reads information onto and/or from an optical recording medium.’” PO Resp. 5–6 (citing Ex. 2002 ¶¶ 39–41).

Petitioner responds that Patent Owner’s construction is not the broadest reasonable interpretation as the scope of the claims is not limited to disk players with optical pickups, and the ’037 patent specification does not limit the term disk players to such removable optical media players. Pet. Reply 3. Petitioner argues that the speeds associated with the disk player in the ’037 patent are not limited or unique to optical disk players. *Id.* at 4. In addition, the Petitioner notes that the ’037 patent prosecution history

demonstrates that disk players are not limited to players with optical pickups. Pet. Reply 4; Pet. 6 (citing Ex. 1010, 22–31, 40, 51–60, 69–70, 102–111, 118, 148–150, 215–219).

Upon review of the full record developed during trial, we are not persuaded by Patent Owner’s contentions that “disk player,” as recited in the claims, is limited by the “Background of the Invention” as described in the specification of the ’037 patent. The ’037 patent specification suggests that the recording medium could be “a recording medium such as a compact disk (CD), a CD-ROM and a digital versatile disk (DVD),” but the term “such as” indicates that the invention is not limited to optical disk players because a CD, a CD-ROM, and a DVD are merely exemplary. Ex. 1001, 1:36–37. Although Patent Owner contends that “such as” limits the type of disc player to optical types and excludes other devices (PO Resp. 5), we do not find that the specification and claims indicate to a person of ordinary skill in the art that the patentee limited “disc player” to removable, optical recording medium. The Federal Circuit “counsels the [Patent and Trademark Office or] PTO to avoid the temptation to limit broad claim terms solely on the basis of specification passages.” *In re Bigio*, 381 F.3d 1320, 1325 (Fed. Cir. 2004). Thus, “[a]bsent claim language carrying a narrow meaning, the PTO should only limit the claim based on the specification or prosecution history when those sources expressly disclaim the broader definition.” *Id.* We find that the reference to disk player, like the description in the generally described Field of Invention (Ex. 1001, 1:24–33), addresses a “disk player having a self-compensating dynamic balancer” in broad terms that are not “‘words or expressions of manifest exclusion’ or ‘explicit’ disclaimers in the

specification [that] are necessary to disavow claim scope.” *Gillette Co. v. Energizer Holdings, Inc.*, 405 F.3d 1367, 1374 (Fed. Cir. 2005). We also note that claim 1 describes “a disk installed on said disk player” in a manner that is not limited to “a removable recording medium” as Patent Owner contends. Accordingly, we maintain that the broadest reasonable interpretation of “disk player” is “a device that is capable of recording and/or reading information onto and/or from a disk.”

2. “*horizontal direction*”

Petitioner contends that the proper interpretation of “‘horizontal direction’ is ‘a direction parallel to the plane of the disk.’” Pet. 6–7 (citing Ex. 1001, 5:41–46; Ex. 1009 ¶¶ 84–85). Patent Owner does not provide an express construction for this claim term and does not dispute Petitioner’s construction. Based on the full record developed during trial, we adopt Petitioner’s construction of the term “horizontal direction” as “a direction parallel to the plane of the disk.” Dec. on Inst. 8.

3. “*a non-magnetic metal such as SUS300, SUS304 and SUS316*” and “*a non-oxidizing substance which does not corrode*”

Petitioner proposes constructions of these claim phrases as follows: (1) “a non-magnetic metal such as SUS300, SUS304 and SUS316” “would include any non-magnetic metal and is not limited to the exemplary nonmagnetic metals”; and (2) “‘a non-oxidizing substance which does not corrode’ includes substances that substantially resist corrosion such as stainless steel and plastics.” Pet. 7. Patent Owner does not dispute Petitioner’s construction or provide an express construction for these claim

phrases. Based on the full record developed during trial, we adopt Petitioner's proposed constructions. Dec. on Inst. 8.

4. *"turntable"*

Petitioner argues that the plain meaning of the term "turntable" is "'a revolvable platform.'" Pet. 7. Petitioner supports this construction by reference to at least one dictionary definition (Ex. 1032, 1262), and to the interpretation offered during prosecution of the '037 patent and a related application (Ex. 1010, 41, 70, 119; Ex. 1057, 189, 256). Pet. 7–8. Patent Owner does not dispute Petitioner's construction or provide an express construction for the term.

Based on the full record develop during trial, and for the reasons discussed in the Decision on Institution (Dec. on Inst. 9), we determine that, a "turntable" is "a revolvable platform."

5. *"compensate for"*

Patent Owner contends that the term "compensate for" as recited in the claim should be interpreted as "substantially eliminate or substantially remove." PO Resp. 6 (citing Ex. 2001, 70:12–17). Patent Owner argues that Petitioner's declarant, I-Yeu Shen, Ph.D., confirmed this construction and the cited prior art only partially cancels out imbalances. *Id.*

We are not persuaded that the broadest reasonable interpretation of "compensate for," in light of the '037 patent specification and claims, requires a degree or quantitative amount of compensation. We find no support for Patent Owner's construction in the claims themselves or the specification. The extrinsic evidence, from which Petitioner's declarant understood the phrase to mean "take away a good part of the vibration" (Ex.

2001, 79:12–17), is not sufficient to support Patent Owner’s construction of “substantially eliminate” or “substantially remove.” Based on the full record developed during trial, we determine that “compensate for” does not require an express construction.

B. Level of Skill in the Art

Petitioner’s declarant, Dr. Shen, describes the field relevant to the claims as vibration engineering in the context of high-speed rotating machinery, which includes computer disk drives. Ex. 1009 ¶ 20.

Petitioner’s declarant further states that:

a person of ordinary skill in the relevant art for the ‘037 patent would have at least an undergraduate degree in the field of mechanical engineering or an equivalent engineering degree. Additionally, a person of ordinary skill in the art would have at least two years of experience in the design of rotating disk drives or other high-speed rotating machinery, either in industry or academia, or a comparable amount of combined education and equivalent work experience with respect to the design of rotating disk drives or other high-speed rotating machinery.

Id. ¶ 21.

Patent Owner’s declarant, Dr. David B. Bogy, agrees with Dr. Shen’s assessment of the level of skill in the art, stating that a person of ordinary skill in the art “would likely be a person with a bachelor’s degree in mechanical engineering with two to five years of teaching or work experience in the relevant field.” Ex. 2002 ¶ 17. However, the relevant field for Patent Owner is described as and limited to “optical disk player art.” *Id.* at ¶ 18. Indeed, Patent Owner argues that the pertinent and only relevant art is that of disk players and not vibration engineering. PO Resp. 56–57 (citing

Ex. 1009 ¶ 20). With the field so narrowed, Patent Owner contends that the dynamic balancing of rotating objects in general is not applicable to the '037 patent and has nothing to do with disk players. *Id.*; see Ex. 2002 ¶ 18.

We agree with level of skill in the art cited by the parties, but disagree with Patent Owner that the pertinent field is limited to the field of optical disk players. Instead, we agree with Petitioner that the field is vibration engineering in the context of high-speed rotating bodies or machinery. See, e.g., Ex. 1001, 1:24–33 (characterizing that field of endeavor as generally relating to a disk player, turntable, clamper and spindle motor and, in particular, to “a disk player having a self-compensating dynamic balancer for restricting internal vibrations generated due to an eccentric center of gravity of a disk,” as well as a turntable, clamper, and spindle motor incorporating the same).

We also note that Petitioner argues that “[b]etween July 1996 and October 1997, at least nine independent patent applications were filed disclosing a dynamic balancer in combination with a disk player as claimed in the '037 patent. Pet. 11 (citing Ex. 1040 (priority filing date Jul. 19, 1996); Ex. 1041 (priority filing date Sep. 17, 1996); Ex. 1001 (priority filing date Oct. 9, 1996); Ex. 1042 (filed Dec. 21, 1996); Ex. 1044 (priority filing date Dec. 26, 1996); Ex. 1045 (filed Apr. 9, 1997); Ex. 1047 (priority filing date Apr. 16, 1997); Ex. 1048 (priority filing date June 25, 1997); Ex. 1049 (priority filing date Jul. 3, 1997); Ex. 1009 ¶¶ 58–64). Petitioner argues that these filings within a year of the critical date of the '037 patent are strong evidence of independently reached simultaneous invention that support obviousness of the claimed invention. Pet. 12 (citing *Geo. M. Martin Co. v.*

Alliance Mach. Sys. Int'l LLC, 618 F.3d 1294, 1305 (Fed. Cir. 2010) (“Independently made, simultaneous inventions, made ‘within a comparatively short space of time,’ are persuasive evidence that the claimed apparatus ‘was the product only of ordinary mechanical or engineering skill.’”) (quoting *Concrete Appliances Co. v. Gomery*, 269 U.S. 177, 184 (1925)). Although these related references are not prior art and do not serve as the basis of the grounds instituted for this trial, they nonetheless provide additional support for our determination that the field of invention includes vibration engineering for high speed rotating bodies or machinery.

C. Obviousness based on Nishida and Hellerich

1. Nishida (Ex. 1003)

Nishida discloses “[a] magnetic disk apparatus [that] includes a base coupled to a supporting frame by means of a damping member so that the vibration caused by the operation of the internal actuator subsides.” Ex. 1003, [57]. Figure 3, reproduced below, depicts a view of the magnetic disk apparatus.

FIG. 3

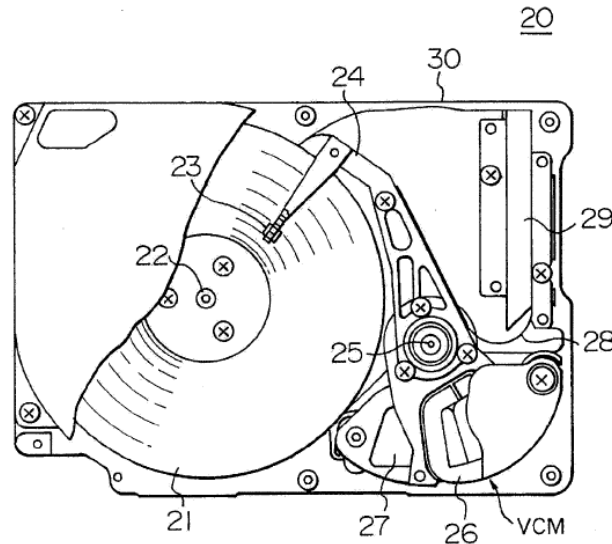


Figure 3 shows magnetic disk apparatus 20 with magnetic recording disk 21, spindle 22 for rotating disk 21 at a constant revolutionary speed, magnetic head 23 for reading and writing data on disk 21, carriage 24 which supports magnetic head 23, voice coil motor (VCM) including a coil 26 and a magnetic circuit 27 for swinging the carriage 24 around a pivot 25 so as to position the magnetic head 23 to an intended position on the disk 21.
Ex. 1003, 3:35–43.

2. Hellerich (Ex. 1002)

Hellerich discloses “[a] plurality of small, round, heavy balls [] enclosed within a continuous, hollow, annular tube [where] the tube is attached to [various areas of] a rotary disc pack memory . . . to dynamically balance it.” Ex. 1002, [57]. Figures 2 and 5, reproduced below, depict a dynamic balancer (Fig. 5) provided within a rotating disk assembly (Fig. 2).

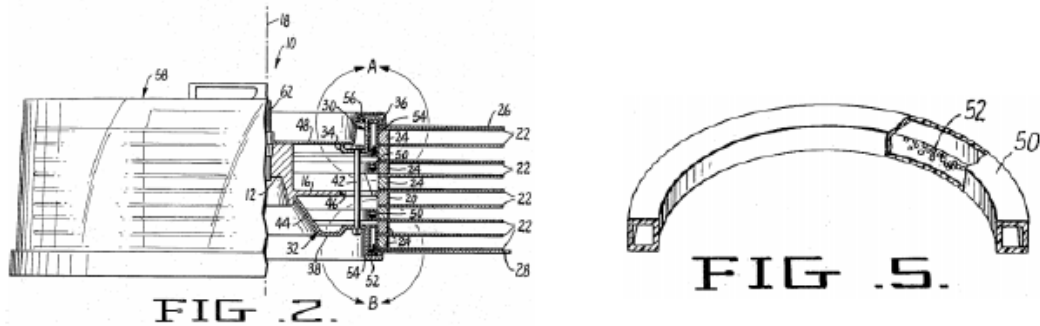


Figure 2 shows disk pack assembly 10 and hub 12 that is turned by disk drive shaft 14 (not shown). Ex. 1002, 2:48–51. Figure 5 shows tube 50 and mass members 52. *Id.* at 3:50–64. “[M]ass members 52 are free to move within the hollow of [] tube 50 and thus are free to locate at any point which will compensate for rotational eccentricity caused by imbalance of the complete disc pack.” *Id.* at 4:2–6. The location of tube 50 in the disc pack is a matter of design and depends upon the configuration of the disc pack assembly. *Id.* at 4:7–9.

3. Analysis

Petitioner contends that Nishida teaches the claimed features of the disk player recited in claims 1, 8–11, and 15–18, except for the dynamic balancer functional limitations as recited in these claims. Pet. 18–32. Petitioner turns to Hellerich as teaching these claim features. *Id.* Petitioner contends that it would have been obvious to combine the disk player of Nishida with the balancer of Hellerich. *Id.* at 18. Petitioner provides an analysis, including citations to the references, and citations to the Declaration of Dr. Shen (Ex. 1009), in support of its contentions. Pet. 18–32. Petitioner provides evidence and argument that the combination of Nishida and Hellerich discloses the disk player and dynamic balancer, the

position of the dynamic balancer, and the functional limitations regarding vibration of the rotating disk as disclosed in claim 1. Pet. 14–15, 18–29 (citing Ex. 1009 ¶¶ 81–83, 95, 107–08, 112–15, 125, 126, 130–33, 135–37, 140–42, 146, 157–59, 223–25, 234–36). In addition, Petitioner provides persuasive reasoning in support of the combination of Hellerich and Nishida. Pet. 21. Specifically, Petitioner cites evidence and testimony that the application of dynamic balancers to rotational bodies was widely known and applied (*id.* at 8–12), and provides a sufficient rationale to combine the disk assembly of Nishida with the dynamic balancer of Hellerich (*id.* at 21). Petitioner contends that “the combination of the Nishida disk player with the dynamic balancer taught by Hellerich would amount to nothing more than combining prior art elements according to known methods to yield predictable results.” *Id.* at 21 (citing Ex. 1009, ¶¶ 127, 129). With respect to dependent claims 8–11 and 15–18, which provide additional limitations on the structure of the dynamic balancer, Petitioner has provided persuasive evidence and argument to support its contention that Nishida and Hellerich teach the limitations of claims 8–11 and 15–18. Pet. 29–32.

Patent Owner contends that Nishida and Hellerich do not teach the claim 1 requirement that the “center of gravity of said self-compensating dynamic balancer moves to be located opposite to the center of gravity of said disc with respect to said rotation axis” because these features do not occur in Hellerich or Nishida alone or in combination. PO Resp. 7 (citing Ex. 2002 ¶¶ 49–64). Patent Owner argues that the Hellerich load balancer is based on the center of gravity of the entire disc pack and not the disk itself

as recited in the claims, thus Hellerich in combination with Nishida does not meet the limitation of claim 1. PO Resp. 7–19.

We are not persuaded by Patent Owner’s argument that “the [Hellerich and Nishida] combination’s focus on compensating for imbalance of an entire disc pack assembly [in Hellerich] is very different from the claim 1 focus on just one disc.” PO Resp. 8; *see id.* at 11 (citing Ex. 2002 ¶¶ 58–61). We credit the testimony of Petitioner’s declarant, Dr. Shen, who testifies that claim recitation for the dynamic balancer are the functional recitations of the well-known dynamic balancer. *See* Pet. 23–24 (citing Ex. 1009 ¶¶ 41–44, 112–15, 132–33, 157–59, 223–25, and 234–36).

Patent Owner’s argument that the physics principles behind dynamic balancers are not evident in the Hellerich disclosure, which use such balancers, ignores the functional principles applicable to dynamic balancers as understood by a person of ordinary skill in the art. PO Resp. 11–16. During cross-examination, Patent Owner’s declarant, Dr. Bogy, acknowledged that the principles of physics behind the behavior of compensating balance balls do not depend on the size of the rotating body, and that the natural frequency of the deck plate, which includes everything mounted on the deck plate, depends on universal principles as well. Ex. 1061, 94:13–96:12, 97:22–102:10. Petitioner has also provided persuasive evidence that the functional performance of the balancer as recited in the limitations of claim 1 do not change whether the balancer of Hellerich balances a disc pack or single disc as applied in Nishida. Pet. Reply 7 (citing Ex. 1009 ¶¶ 30, 34, 41, 44, 113). Thus, we are not persuaded by Patent Owner’s arguments that the center of gravity of a disc pack (as

taught in Hellerich) differ significantly from the center of gravity for a disc (as taught Nishida) such that the physics principles of a dynamic balancer would operate differently and not align “opposite to” the center of gravity, as recited in claim 1. Petitioner’s testimony and argument indicate that it is within the knowledge of a person of ordinary skill in the art to apply the known principles of a dynamic balancer used with rotating bodies, as taught in Hellerich, to the disc of Nishida that would yield the same functional results from the operation of the dynamic balancer. Pet. Reply 7–8, 12–13.

Patent Owner contends that, because Nishida solves the dampening of vibrations problem “one skilled in the art at the time of invention would not have introduced Hellerich’s dynamic balancer into Nishida, because there is no logical reason to solve a problem that is already solved in Nishida itself.” PO Resp. 22. We disagree with Patent Owner. We credit the un rebutted evidence from Petitioner’s declarant, Dr. Shen, that the Nishida damping solution did not eliminate all vibrations known to persons of ordinary skill in the art. Pet. 20; Ex. 1009 ¶ 125; see Ex. 1003, 4:30–54. Patent Owner’s declarant, Dr. Bogy, also supports Petitioner’s contention that Nishida did not address disk vibrations caused by imbalances or the sources of vibrations not expressly discussed in Nishida. Pet. Reply 14–15 (citing Ex. 1061, 111:12–14, 128:19–130:17). We also are persuaded by Petitioner’s evidence and testimony that applying the teachings of Hellerich to reduce vibrations applied to the disk player in Nishida would yield predictable results. Pet. 20–21 (citing Ex. 1009 ¶¶ 126, 127, 129, 135–37; Ex. 1002, 1:12–20, 2:3–10). Thus, we do not find that Nishida’s approach to vibrations forestalls or otherwise prohibits the use of Hellerich’s dynamic balancer.

Finally, we do not find availing Patent Owner's argument that Nishida and Hellerich do not disclose disc players in accordance with the '037 patent claims because they are not removable optical recording media. PO Resp. 26–28. Because we find in our claim construction section above that the broadest reasonable construction of “disc player” is not limited to optical recording media or an optical pick up, Patent Owner's arguments are based on an erroneous claim construction and unpersuasive. *See supra* Section II.A.1.

We find that Petitioner has provided persuasive argument and evidence that Hellerich and Nishida teach the scientific and functional limitations of claim 1, showing that the scientific principles governing dynamic balancers as applied to the disk assemblies in Hellerich and Nishida are well-known and conventional. Pet. 17, 23–29; Pet. Reply 7–13.

Based on the full record developed during trial, we adopt Petitioner's argument and evidence that Nishida and Hellerich teach the limitations of claims 1, 8–11, and 15–18. Pet. 18–32; *see* Pet. Reply 6–16. Accordingly, Petitioner has shown by a preponderance of the evidence that there claims 1, 8–11, and 15–18 are unpatentable as obvious under 35 U.S.C § 103(a) over Nishida and Hellerich.

D. Obviousness based on Nishida, Hellerich, and Kilgore

Petitioner contends that the combination of Nishida, Hellerich, and Kilgore teach the limitation of dependent claim 5, which recites that the tube of claim 1 “is formed of a body having a race in which said mobile unit is disposed and a cover member which covers said race by coupling to said body. Pet. 32–34; Ex. 1001, 17:45–48. Kilgore discloses a dynamic

balancer featuring balls disposed in a race formed about the outer surface of a disk, and a cover to retain the balls in the race. Ex. 1004, Figs. 2–3, 3:42–45. Kilgore discloses that “[t]he race or groove 3 is formed in an outer cylindrical surface 6. A number of the weights 4 are positioned within the groove 3, and the groove is enclosed by a band 7 which encircles the disk 2.” *Id.*

Based on the information in the Petition, we find that Petitioner has provided persuasive evidence and analysis to support its contention that Nishida, Hellerich, and Kilgore teach the limitation of dependent claim 5, which recites “said tube is formed of a body having a race in which said mobile unit is disposed and a cover member which covers said race by coupling to said body.” Pet. 32–33 (citing Ex. 1002, 4:65–5:2; Ex. 1004, 3:42–45, Figs. 2, 3; Ex. 1009 ¶¶ 166, 168–73, 258–59).

Patent Owner contends that there would be no reasonable expectation of success in using Kilgore’s technique in the disc drive/dynamic balancer combination of Nishida or Hellerich because Taylor (Ex. 1008) teaches that it cannot be scaled down to size. PO Resp. 28–29 (citing Ex. 2002 ¶¶ 79–83). We do not agree with Patent Owner that Taylor expressly states that Kilgore cannot be scaled down. A proper reading of Taylor states that Kilgore may not remove additional imbalances after the balls move to their optimum position. Taylor does not attribute the size or length problem to the Kilgore reference. Ex. 1008, 1:33–2:1. Patent Owner’s arguments and evidence misread the teachings of Taylor, which does not teach away or disparage combining the teachings of Kilgore with those of Nishida and Hellerich based on size or scale.

We are also not persuaded by Patent Owner's argument that Kilgore, which generally discusses dynamic rotations structures like those of an internal combustion engine, is not analogous art to the '037 patent and, therefore, ineligible for combination with Nishida and Hellerich. PO Resp. 30–31. Two separate tests define the scope of analogous prior art: “(1) whether the art is from the same field of endeavor, regardless of the problem addressed and, (2) if the reference is not within the field of the inventor's endeavor, whether the reference still is reasonably pertinent to the particular problem with which the inventor is involved.” *In re Bigio*, 381 F.3d at 1325. We credit Petitioner's declarant, Dr. Shen, who testifies that a person of skill in the art would have understood the applicable knowledge from heavy machinery dynamic balancers to smaller disk applications. Ex. 1062 ¶¶ 3–9. Moreover, Patent Owner's declarant, Dr. Boyd, acknowledged the applicability of teachings from large machines like cotton gins and bicycles are relevant to work on computer disk rotation mechanics. Pet. Reply 20–21 (quoting Ex. 1061, 63:8–64:1). Finally, Petitioner has provided persuasive evidence that the principles underlying the operation of dynamic balancers is applicable to rotating bodies, regardless of their size. Pet. Reply 8–13 (citing Ex. 1061, 97:22–102:10, 220:12–221:1); *see also* Pet. 8–12 (discussing history of dynamic balancers). We also find that the art of dynamic balancers is pertinent to the problem of vibrations in high-speed rotating disk. *See supra* II.B. Accordingly, we determine that Kilgore, which generally discusses dynamic rotations structures like those of an internal combustion engine, is analogous art to the '037 patent because it

falls within the same field of endeavor and is pertinent to the art of vibrations in high speed rotating disks.

Based on the complete record, we find that Petitioner has shown by a preponderance of the evidence that claim 5 is unpatentable as obvious under 35 U.S.C § 103(a) over Nishida, Hellerich, and Kilgore.

E. Obviousness based on Nishida, Hellerich, and Decker

Petitioner contends that the combination of Nishida, Hellerich, and Decker teach the limitation of dependent claim 22. Pet. 34–36. Claim 22, which depends from claim 1, recites that “said self-compensating dynamic balancer is formed integrally with a turntable.” Ex. 1001, 18:58–60.

Petitioner contends it would have been obvious to provide a turntable for a rotating disk in the disc drive/dynamic balancer combination of Nishida and Hellerich because Decker teaches an example of a disk and turntable where the dynamic balancer is formed with the identified turntable. Pet. 35 (citing Ex. 1005, 1:35–50; 2:6–10, 2:40–58, Fig. 2).

Decker discloses a rotary grinder with grinding wheel 10 rotationally supported on flange 11. Ex. 1005, Fig. 2, 2:6–10. Petitioner asserts that in Decker, wheel 10 and flange 11 are examples of a disk and turntable, respectively. Ex. 1009 ¶¶ 185–186, 277–278. Decker discloses a balancer comprised of balls 35 disposed within raceway 36, wherein dynamic balancer 35, 36 is formed integrally with turntable 11. Ex. 1005, 1:35–50, 2:40–58. Petitioner also asserts the combination of the disk player in Nishida, the dynamic balancer of Hellerich, and the turntable that supports the disk in Decker would involve the use of known techniques to improve similar devices. Pet. 35.

Patent Owner presents the following arguments: (1) Decker is not analogous art; (2) Petitioner does not provide a motivation to combine Decker with Nishida and Hellerich; and (3) flange 11 of Decker is not a turntable because it is not a rotatable platform for a removable optical disc. PO Resp. 33–37.

As discussed above, Patent Owner’s declarant supports the argument that dynamic balancers applied to large machinery is applicable to the balancers of smaller disk devices. Pet. Reply 20–21 (quoting Ex. 1061, 63:8–64:1). Thus, we are not persuaded that Decker is not analogous art for purposes of the dynamic balancers. Decker discloses “[a] dynamic balancing apparatus for a rotary member, . . . supported for rotation on a spindle journaled in a spindle housing” that falls within the field of endeavor for the ’037 patent. *See supra* Section II.B. We also find that Petitioner has provided persuasive articulated reasoning in support of the combination as it conveys advantages in location of the balancer adjacent to the plane of the disk unbalance. Pet. 35–36 (citing Ex. 1009 ¶¶ 185–188; Ex. 1026, 120–121 (discussing location of dynamic balancer)).

We also disagree with Patent Owner’s contention that flange 11 on a grinding wheel in Decker is not a revolvable platform. Petitioner has provided persuasive argument and evidence that the structure in Decker teaches a revolving surface that supports a rotating body. Pet. 36 (citing Ex. 1009 ¶¶ 185–88). In particular, Petitioner relies on the combined teachings of Decker with those of Nishida and Hellerich, and not simply on the structure in Decker to support combining the support structure in Decker with the disk structure in Nishida. Ex. 1009 ¶¶ 185–88.

Based on the complete record, we find that Petitioner has shown by a preponderance of the evidence that dependent claim 22 is unpatentable as obvious under 35 U.S.C § 103(a) over Nishida, Hellerich, and Decker.

F. Obviousness based on APA and McGale

1. APA (Ex. 1001)

The '037 patent describes a conventional disk player shown below in Figure 1. Ex. 1001, 1:35–59.

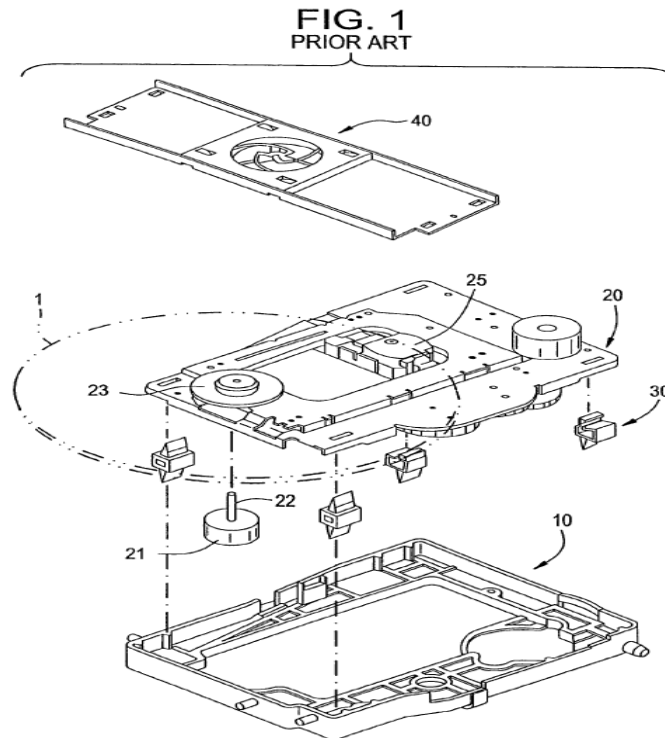


Figure 1 shows a typical disk player of the prior art as follows:

A typical disk player, as shown in FIG. 1, includes a deck base 10 hinge-coupled to a housing (not shown) to be capable of rotating vertically, a deck plate 20 coupled to the deck base 10, a spindle motor 21 installed at the deck plate 20 for providing a rotational force to a disk 1, a turntable 23 coupled to a rotational shaft 22 of the spindle motor 21 for accommodating the disk 1, a clamber 40 installed on the inner surface of the upper portion of

the housing to face the turntable 23 for securing the disk 1 placed on the turntable 23, and an optical pickup 25 coupled to the deck plate 30 to be capable of moving across the disk 1 for performing recording and reproduction operations. The disk player includes buffering members 30 disposed between the deck base 10 and the deck plate 20 to prevent the external vibrations transferred through the deck base 10 from being transferred directly to the deck plate 20, the spindle motor 21 and the optical pickup 25. The buffering members 30 are formed of a material such as soft rubber or polyurethane which can absorb external impacts.

Ex. 1001, 1:35–59 (bolding omitted).

2. McGale (Ex. 1006)

McGale discloses a “self-compensating dynamic balancer” as illustrated in Figures 1 and 3, reproduced below.

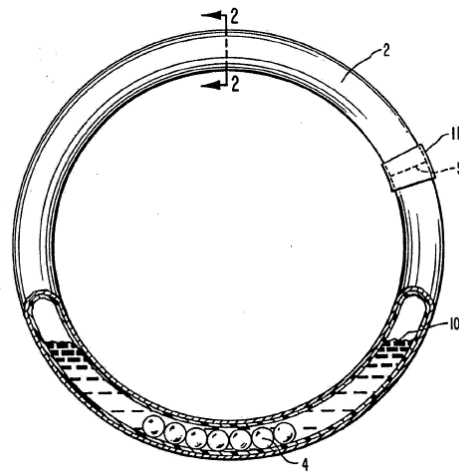


FIG. 1

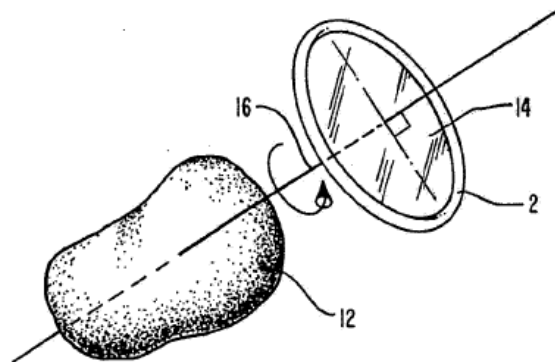


FIG. 3

Figure 1 depicts an annular balancing hoop, and Figure 3 depicts the orientation of an annular balancing hoop with a generic rotating object concentric with the axis of rotation 16. Ex. 1006, 4:11, 4:14–15.

In Figure 1, McGale discloses a dynamic balancer comprising spherical weights 4 arranged to move freely within annular or tubular hoop 2. Ex. 1006, 1:13–20, 2:63–3:5, 4:25–45, 6:50–51. Figure 3 of McGale teaches that the dynamic balancer may be mounted to rotate with an unbalanced rotating object 12 in order to “partially cancel the imbalance of the rotating object,” which “results in less undesired vibration.” *Id.* at Fig.3,

1:16–20, 2:63–68, 4:49–60, 5:5–16, 8:33–45. McGale further teaches that the dynamic balancer may be applied to reduce vibration of a rotating object, stating that:

Four requirements for successful application of the method for self compensating balancing are described. First, there must be inertial forces on the rotating shaft that cause the mass center to misalign with the rotation center of the support bearings. Second, the rotating part must operate above its critical speed (i.e., the speed at which the shaft resonants [sic] and deflections are maximum). Third, the bearings must have resiliency. Fourth, the rotor must be sufficiently balanced to avoid damage to itself as it passes through the critical speed during startup.

Id. at 2:43–54.

3. Analysis

Petitioner contends that APA teaches the limitations of a disk player and McGale teaches a dynamic balancer such that it would have been obvious to combine the known disk player with McGale’s dynamic balancer to render claims 1, 8, 11, and 16–18 obvious. Pet. 36–53. Petitioner provides detailed analysis of the claims and teachings of the cited art and declaration testimony in support of its contentions. *Id.*

McGale discloses “an apparatus for dynamically and constantly balancing rotating objects while they are in motion. Such an apparatus can be applied to balancing wheels of automobiles or trucks or can be applied to balancing the shafts of rotating machinery.” Ex. 1006, [57]. Petitioner contends that a person of ordinary skill in the art seeking to reduce vibrations in the known disk player disclosed in Figure 1 of the APA would

use the self-compensating dynamic balancer that McGale teaches. Pet. 40–41.

Patent Owner argues that because the APA discloses a conventional solution to the vibrations of a high speed optical disc by increasing the mass of the deck plate or the rigidity of the buffering members, there would have been no reason for one of ordinary skill in the art to look to apply McGale at the time of invention of the '037 patent. PO Resp. 36–38 (citing *Ex Parte Rinkevich, et al*, Appeal No. 2007-1317 (BPAI May 29, 2007) (non-precedential)). We agree with Petitioner that a person of ordinary skill in the art would have recognized that there are multiple sources of vibrations, and that further improvements could be made to the conventional disc player of the APA. Pet. Reply 24; Ex. 2002 ¶ 26. In addition, Petitioner has provided persuasive evidence and argument that the need for increased speeds in disc players also increased vibration problems. Pet. 38–39 (citing Ex. 1022, 2:19–25; Ex. 1023, 1:27–41; Ex. 1024, 1:14–41; Ex. 1024, 1:28–55); *see also* Pet. 11–12 (citing numerous patents around the time of invention applying dynamic balancers structures and principles to disk players) On the full record developed during trial, Petitioner has provided persuasive evidence that a problem associated with vibrations of high speed disk was not solved by the solutions of the APA to eliminate the use of dynamic balancers for other known vibrations.

We are also not persuaded by Patent Owner's arguments that a person of ordinary skill in the art would not have looked to McGale, which relates to rotating machinery, to apply to the disk player of the APA, because McGale is not analogous art in that it is not reasonably pertinent to the

problems of the '037 patent's prior art disk player. PO Resp. 37–38, 42–43. For the reasons discussed above, we are not persuaded that the general teachings related to dynamic balancers in McGale are inapplicable to disk players based on size or complexity. Petitioner presents persuasive evidence supported by Patent Owner's declarant that it was within the knowledge of a person of ordinary skill in the art to apply the teachings of the dynamic balancer in McGale to the APA disk player. Pet. 36–44; Pet. Reply 8–14, 21 (discussing applicability of knowledge from cotton gins and bicycles to other rotating disks). In addition, McGale supports applying the dynamic balancer “hoop to a rotating object 12, not claimed,” indicating that the balancer could be applied generically to rotating objects. Pet. 40; Ex. 1006, 4:49–57. Furthermore, Patent Owner's declarant and Petitioner's reply declaration reinforce that dynamic knowledge of balancing of rotating objects is applicable from heavy machinery to smaller disk-based devices. See Ex. 1061, 63:8–64:11; Pet. Reply 21–22; Ex. 1062 ¶¶ 3–6.

We are also not persuaded by Patent Owner's argument or evidence that Taylor (Ex. 1008, 1:33–2:2) teaches there is a problem scaling McGale's balancer to work on a disk player. PO Resp. 38–39. Taylor says nothing about the generic balancer disclosed in McGale, and does not teach away from the combination of McGale and the APA. Ex. 1008, 1:33–2:2. We are not persuaded by Patent Owner's evidence and argument that the dynamic balance techniques of McGale, which Patent Owner's declarant admits are based on known principles, are inapplicable based on size or complexity to the disk player of the APA.

Finally, we disagree with Patent Owner that McGale and the APA would not disclose the features of claim 1. Petitioner has persuasively shown that the functional recitations of the claims are directed to principles of the operation of dynamic balancers in general that are widely applicable to rotating bodies. Ex. 1009 ¶¶ 41–44, 112–15, 132–33, 157–59, 223–25, and 34–236; Pet. 36–53. Indeed, Petitioner has provided evidence and argument that dynamic balancers, such as that disclosed in McGale, as applied to rotating bodies, such as disks, offers a combination of familiar elements according to known methods which yield nothing more than predictable results. *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 401 (2007); see Pet. 1–2, 21, 43, 47.

Patent Owner also contends that, because McGale teaches that the balancer only partially cancels the imbalance of the rotating object, it cannot teach the “compensating for” limitation of claim 1. PO Resp. 39–40 (Ex. 1006, Abstract, 1:16–20). Patent Owner’s argument is based on an erroneous claim construction that the balancer of claim 1 must “substantially” compensate to teach the limitations of the claim. Patent Owner’s arguments are not commensurate in scope with claim 1, which only requires compensation. See *In re Self*, 671 F.2d 1344, 1348 (CCPA 1982) (explaining that limitations not appearing in the claims cannot be relied upon for patentability). Based on the full record, Petitioner has provided persuasive evidence that McGale in combination with the APA teaches the “compensate for” limitation of claim 1.

Based on the full record developed during trial, we agree with and adopt Petitioner’s evidence and argument. Pet. 36–53. We find that

Petitioner has shown by a preponderance of the evidence that claims 1, 8, 11, and 16–18 are unpatentable as obvious under 35 U.S.C. § 103(a) over APA and McGale.

G. Obviousness Grounds Based on APA and McGale

Petitioner asserts that (1) APA, McGale, and Kilgore teach the limitations of dependent claim 5 (Pet. 54–56); (2) APA, McGale, and Cobb teach the limitations of dependent claims 9 and 10 (*id.* at 56–57); (3) APA, McGale, and Taylor teach the limitations of dependent claim 15 (*id.* at 57–58); and (4) APA, McGale and Decker teach the limitations of dependent claim 22 (*id.* at 58–60). Petitioner provides persuasive citations to the record and argument in support of its contentions, which we adopt. *Id.* at 54–60.

Patent Owner’s presents arguments that APA, McGale, and Kilgore do not teach the limitations of dependent claim 5 because McGale does not teach “a body having a race in which said mobile unit is disposed and a cover member which covers said race by coupling to said body” as recited in claim 5. PO Resp. 51–52. Petitioner argues that the inner hoop layer in McGale is coupled to the outer hoop layer and, thus, teaches the body and cover member limitations. Pet. 54–55 (citing Ex. 1006, 4:25–48; Ex. 1009 ¶¶ 251–256). Upon review of the evidence and argument, we agree with Petitioner that the inner and outer layers joined in McGale teach the race and cover member limitations of claim 5.

We are also not persuaded that Kilgore cannot be scaled down for use with APA and McGale based on Patent Owner’s misreading of Taylor. PO Resp. 53 (citing Ex. 1008, 1:33–2:2; Ex. 2002 ¶ 102). For the reasons

discussed above with respect to Kilgore, Hellerich and Nishida, we do not find that Taylor distinguishes or teaches away from combining the teachings of Kilgore with the dynamic balancer in McGale and the disk player of the APA. *See supra* Section II.C.3. For the reasons discussed above, we also find that Kilgore falls within the same field of endeavor of the '037 patent—namely, the art of vibration of high speed rotating machinery. Accordingly, we find that Kilgore is analogous art to the '037 patent.

Finally, with respect to claim 22, Patent Owner argues that Decker is not analogous art eligible for combination with the APA (or combinable with the APA and McGale), and that Decker does not disclose a turntable, as recited in claim 22. PO Resp. 55–56. These arguments repeat the same analysis presented above for Decker in combination with Hellerich and Nishida. For the same reasons discussed above, we are not persuaded that Decker is not analogous and not combinable with the APA and McGale. We are also not persuaded that Decker fails to teach a turntable as recited in claim 22.

Patent Owner does not challenge or rebut Petitioner's contentions with respect to claims 9 and 10 (APA, McGale, and Cobb), and 15 (APA, McGale, and Taylor).

Based on the complete record, we adopt Petitioner's evidence and argument. Consequently, we determine that Petitioner has shown by a preponderance of the evidence that claims 5, 9, 10, 15, and 22 are unpatentable as obvious under 35 U.S.C. § 103(a) over APA, McGale, and Kilgore (claim 5); APA, McGale, and Cobb (claims 9 and 10); APA, McGale, and Taylor (claim 15); and APA, McGale, and Decker (claim 22).

III. CONCLUSION

For the foregoing reasons, we are persuaded that Petitioner has demonstrated by a preponderance of the evidence that:

(1) claims 1, 8–11, and 15–18 of the '037 patent are unpatentable as obvious under 35 U.S.C. § 103(a) over Nishida and Hellerich;

(2) claim 5 of the '037 patent is unpatentable as obvious under 35 U.S.C. § 103(a) over Nishida, Hellerich, and Kilgore;

(3) claim 22 of the '037 patent is unpatentable as obvious under 35 U.S.C. § 103(a) over Nishida, Hellerich, and Decker;

(4) claims 1, 8, 11, and 16–18 of the '037 patent are unpatentable as obvious under 35 U.S.C. § 103(a) over APA and McGale;

(5) claim 5 of the '037 patent is unpatentable as obvious under 35 U.S.C. § 103(a) over APA, McGale, and Kilgore;

(6) claims 9 and 10 of the '037 patent are unpatentable as obvious under 35 U.S.C. § 103(a) over APA, McGale, and Cobb;

(7) claim 15 of the '037 patent is unpatentable as obvious under 35 U.S.C. § 103(a) over APA, McGale, and Taylor; and

(8) claim 22 of the '037 patent is unpatentable as obvious under 35 U.S.C. § 103(a) over APA, McGale, and Decker.

IV. ORDER

Accordingly, it is

ORDERED that, based on the grounds under review, claims 1, 5, 8–11, 15–18, and 22 of U.S. Patent No. 7,367,037 B2 are held unpatentable; and

FURTHER ORDERED that, because this is a Final Written Decision under 35 U.S.C. § 318(a), the parties to the proceeding seeking judicial review of this decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

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