

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SHENZHEN ROOT TECHNOLOGY CO., LTD.,
Petitioner,

v.

WILLOW BLOSSOM HOLDCO LIMITED,¹
Patent Owner.

IPR2025-00560
Patent 11,813,381 B2

Before MEREDITH C. PETRAVICK, GRACE KARAFFA OBERMANN,
and BARRY L. GROSSMAN, *Administrative Patent Judges*.

GROSSMAN, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining All Challenged Claims Unpatentable
35 U.S.C. § 318(a)

¹ Willow Blossom Holdco Limited (“Willow”) acquired the challenged patent from original patent owner Chiaro Technology Ltd. after the filing of the petition. *See* Paper 5, 1 (filed April 22, 2025) (citing the numbered page; the cover page is not numbered). The caption is updated to reflect this change of ownership.

I. INTRODUCTION

A. Background and Summary

Shenzhen Root Technology Co., Ltd. (“Petitioner” or “Shenzhen”) filed a Petition (Paper 2, “Pet.”) requesting an *inter partes* review of claims 1–29 (the “challenged claims”) of U.S. Patent No. 11,813,381 B2 (Ex. 1001, “the ’381 patent”).

Willow Blossom Holdco Limited (“Patent Owner” or “Willow”) filed a Request for Discretionary Denial. Paper 13 (including Exhibits 2001–2005 in support of its Request). Petitioner opposed this Request. Paper 14. The Director denied Patent Owner’s Request and “referred [the Petition] to the Board to handle the case[] in the normal course, including by issuing a decision on institution addressing the merits and other nondiscretionary considerations, as appropriate.” Paper 15, 2.

The Board issued a decision instituting an *inter partes* review on all challenged claims and all asserted grounds of unpatentability. Paper 16.

Patent Owner did *not* file a Preliminary Response or a Response. Neither a Preliminary Response nor a Response is required. Because there was no Response, there also was no Reply or Sur-reply filed by the parties.

Neither party requested an oral argument. *See* Ex. 3002, 3003 (emails from counsel confirming that neither party requested an oral argument). Based on counsels’ affirmative representations, it is clear there was no “abandonment of the contest” by either party pursuant to 37 C.F.R. § 42.73(b)(4).

Additionally, we note that Patent Owner *did not* cross-examine Mr. Ryan Bauer, who provided a detailed, 169-page expert report providing, on behalf of Petitioner, his opinions about the issues in this proceeding. *See* Exhibit 1003. Mr. Bauer’s testimonial evidence in this proceeding remains un rebutted.

Thus, the record before us is the same record we had when we issued the Decision to Institute.

We do not draw any adverse inference from Patent Owner’s decision to rest its case on the merits of its patent. Petitioner has the burden of proving unpatentability of a claim by a preponderance of the evidence. 35 U.S.C. § 316(e); *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016) (“In an IPR, the petitioner has the burden from the onset to show with particularity why the patent it challenges is unpatentable.”). The burden of persuasion never shifts to the patent owner. *Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015) (“In an *inter partes* review, the burden of persuasion is on the petitioner to prove ‘unpatentability by a preponderance of the evidence,’ and that burden never shifts to the patentee.”).

On the record before us, we determine Petitioner has met its burden of proof on all challenged claims and on all asserted grounds.

B. Real Parties-in-Interest

Petitioner identifies itself as well as Hong Kong Lute Technology Co., Ltd., Shenzhen Conglin E-Commerce Co., Ltd., Shenzhen Jinruihang Technology Co, Ltd., Shenzhen Xitao Network Technology Co., Ltd., and ROOT Technology Ltd. as the real parties-in-interest. Pet. 100. Petitioner also notes that Shenzhen Root Technology Co., Ltd., was also known as

Shenzhen Lutejiacheng Network Technology Co., Ltd., which changed its name to Shenzhen Lute Innovation Technology Co., Ltd., in September 2023. *Id.*

Patent Owner identifies Willow Blossom Holdco Limited and Willow Innovations, Inc. as the real parties-in-interest. Paper 10, 1.

C. Related Matters

The parties indicate that the '381 patent is the subject of the following district court proceeding: *Shenzhen Root Technology Co., Ltd. v. Chiaro Technology, Ltd.*, case no. 2-23-cv-00631 (WAWD). Pet. 100; Paper 3, 1. This case has been stayed by Order of the U. S. Bankruptcy Court for the District of Delaware. *See* Ex. 3001 (Docket entry 159 from the Washington District Court, including its attached Order (Ex. A), automatically staying the Western District of Washington District Court litigation); *see also* Ex. 1060 (Docket entry 157 from the Washington District Court titled "Suggestion of Bankruptcy.").

We have not been informed by the parties that the Washington District Court stay has been lifted.

We also note that patents challenged in IPR2025-00554 and IPR2024-01296 involve similar subject matter and the same Petitioner. The patent challenged in the '01296 IPR also has a common priority claim with the patent challenged in the '00560 IPR, now before us. The following chart summarizes the related IPR proceedings.

PROCEEDING	PATENT	PETITIONER	STATUS
IPR2024-00560	11,813,381	Shenzhen Root Technology	Proceeding before us
IPR2024-01296	11,413,380; common parent application with 11,813,381	Shenzhen Root Technology	All claims, 1–46, unpatentable in a FWD
IPR2024-00953	11,413,380	Shenzhen Root Technology	Pet. denied; parallel, 2 nd ranked petition to IPR2024-01296
IPR2025-00554	11,806,454	Shenzhen Root Technology	Pending; DI issued 10/14/2025

D. The '381 patent

The '381 patent is titled “Breast Pump System.” Ex. 1001, code (54). The disclosed technology relates to “a wearable, electrically powered breast pump system for extracting milk from a mother.” *Id.* at 1:21–23.² Breast pumps often augment or replace nursing a baby for many reasons. Ex. 1003 ¶ 19. “They can be used to address milk supply (either under or over-supply), separation of the mother-baby dyad, milk elimination, building stored milk reserves, donation (i.e., milk banking), breast mastitis, etc.” *Id.*

Breast pump systems, in general, are well-known, as disclosed in the '381 patent. *Id.* at 1:43–2:59. These known systems include fully integrated wearable breast pump systems. *Id.* at 2:7–8.

² Citations to the '381 patent are in the format of column: line(s).

As stated in the '381 patent, in the known, fully integrated wearable systems:

the suction source, power supply and milk container are contained in a single, wearable device; there is no need for bulky external components or connections. Such devices can be provided with a substantially breast shaped convex profile so as to fit within a user's bra for discrete pumping, as well as pumping on-the-go without any tethers to electrical sockets or collection stations. The internal breast shield is naturally convex to fit over a breast.

Id. at 2–9–17; *see also, id.* at 3:43–51 (further describing known, integrated, wearable breast pump systems).

As summarized in the written description of the '381 patent, the disclosed invention is a wearable breast pump system that includes: “a housing shaped at least in part to fit inside a bra; a piezo air-pump fitted in the housing and forming part of a closed loop system that drives a separate, deformable diaphragm to generate negative air pressure, that [sic] the diaphragm being removably mounted on a breast shield.”

Id. at 3:66–4:4.

Figures 5 and 6 from the '381 patent, annotated by Petitioner (Pet. 11), are reproduced below.

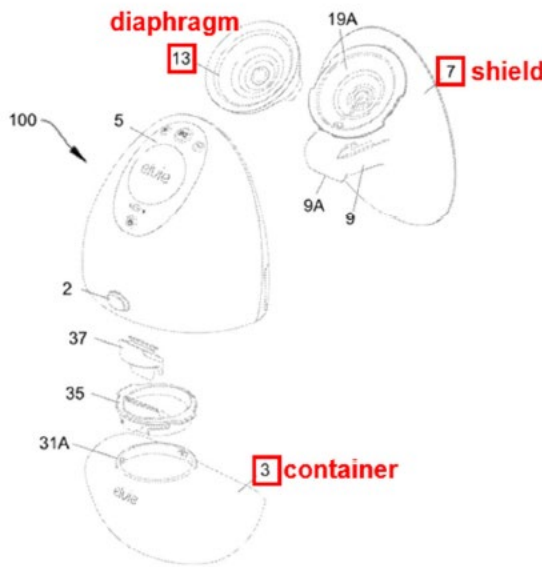


FIGURE 5

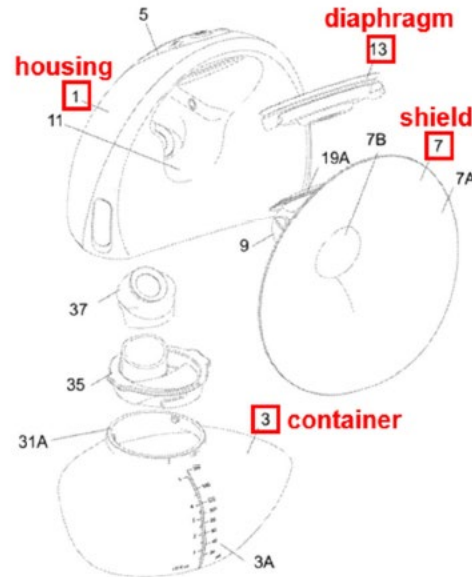


FIGURE 6

FIG. 5, annotated by Petitioner (Pet. 11), is a front view of a partially disassembled breast pump system. FIG. 6, annotated by Petitioner (*id.*), is a rear view of the partially disassembled breast pump system of FIG. 5. Ex. 1001, 4:12–15.

As shown in Figures 5 and 6, modular breast pump system 100 includes housing 1 shaped to substantially fit inside a bra. Ex. 1001, 5:66–6:1. Breast shield 7 and milk container 3 are removably attachable to housing 1. *Id.* at 6:4–7. Housing 1, milk collection container 3, and breast shield 7 “form the three major subcomponents of breast pump system 100. In use, these sub-components clip together to provide the functioning breast pump system 100.” *Id.* at 8:67–9:2.

In addition to housing 1, breast shield 7, and milk container 3, the disclosed system also includes flexible diaphragm 13. These parts attach

together to provide a closed-loop pneumatic system powered by piezoelectric pumps located in the housing 1. Figure 8 shows the location of battery 81 and pumps 83A, 83B mounted in series inside housing 1. In preferred embodiments, pumps 83A, 83B are “piezoelectric air pumps (or piezo pumps), which operate nearly silently and with minimal vibrations.” Ex. 1001, 13:46–53. A milk-flow pathway, such as nipple tunnel 9, defines a path from an opening in the breast shield to the milk collection container. *Id.* at 9:48–51.

In operation, breast pump 100 is activated and a pumping cycle begins, in which pumps 83A, 83B generate “a negative air pressure that is transmitted via an air channel to a first side of the diaphragm 13 mounted on the diaphragm housing 19A.” *Id.* at 13:61–66. “[D]iaphragm 13 transmits this negative air pressure to its opposite side (denoted the milk-flow side).” *Id.* at 14:1–2. The “negative pressure is transferred through a small opening in the diaphragm housing 19A to the breast shield nipple tunnel 9 and the curved opening 7B of the breast shield 7 that contacts the breast,” which applies “the pressure cycle to the breast of the user, in order to express milk.” *Id.* at 14:2–6. The milk is then drawn through nipple tunnel 9, to one way valve 37 that remains closed when negative pressure is applied. *Id.* at 14:7–9. “When the negative air pressure is released, the valve 37 opens and milk flows under gravity past the valve 37 and into milk container 3.” *Id.* at 14:10–12.

E. Illustrative Claim

Petitioner challenges claims 1–29, which are all the claims in the patent. Claim 1, the sole independent claim, is illustrative, and is

reproduced below with bracketed labels employed by Petitioner to facilitate analysis and discussion. *See* Pet. 1.

- 1[pre] A breast pump device comprising:
 - 1[a] a self-contained, in-bra wearable device comprising:
 - 1[a][1] a diaphragm configured to prevent milk from reaching an air pump by forming a seal around its outer edge;
 - 1[a][2] a housing that includes:
 - 1[a][2][i] a battery, and
 - 1[a][2][ii] the air pump powered by the battery and configured to generate negative air pressure by driving the diaphragm;
 - 1[a][3] a breast shield comprising a breast flange and a nipple tunnel extending from the breast flange,
 - 1[a][3][i] the nipple tunnel comprising a closed end and a milk port intermediate to the breast flange and the closed end, and
 - 1[a][3][ii] the breast shield being separate from the diaphragm; and
 - 1[a][4] a milk container that is configured to attach to the housing and receive expressed milk via the milk port.

Ex. 1001, 71:45–60.

F. Prior Art and Asserted Grounds

Petitioner asserts that one or more of the challenged claims would have been obvious on the following sixteen grounds:

Claim(s) Challenged	35 U.S.C. §³	Reference(s)/Basis
1–13, 16, 17, 22, 23, 27, 29	103	Chang, ⁴ Fang ⁵
19	103	Chang, Fang, Yuen ⁶
24	103	Chang, Fang, Makower ⁷
25	103	Chang, Fang, Makower, Guthrie ⁸
1–13, 16, 17, 22, 23, 26–29	103	Chang, Fang, Kurihara ⁹
19	103	Chang, Fang, Kurihara, Yuen
24	103	Chang, Fang, Kurihara, Makower
25	103	Chang, Fang, Kurihara, Makower, Guthrie
1–18, 20–23, 27, 29	103	Chang, Fang, Khalil ¹⁰
19	103	Chang, Fang, Khalil, Yuen
24	103	Chang, Fang, Khalil, Makower
25	103	Chang, Fang, Khalil, Makower,

³ The Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112-29, 125 Stat. 284, 296–07 (2011), took effect on September 16, 2011. The changes to 35 U.S.C. §§ 102 and 103 in the AIA do not apply to any patent application filed before March 16, 2013. Because the application for the patent at issue in this proceeding was filed after March 16, 2013, we refer to the AIA version of the statute.

⁴ U.S. Patent Publication No. 2018/0333523 A1, Nov. 22, 2018, Ex. 1007 (“Chang”).

⁵ Chinese Publication No. CN 205913571 U, Feb. 1, 2017, Ex. 1008 (“Fang”). We refer to the certified English translation filed by Petitioner, Ex. 1009.

⁶ U.S. Patent No. 7,641,629 B2, Jan. 5, 2010, Ex. 1011 (“Yuen”).

⁷ U.S. Patent Publication No. 2016/0206794 A1, July 21, 2016, Ex. 1014 (“Makower”).

⁸ U.S. Patent No. 10,483,002 B2, Nov. 19, 2019, Ex. 1015 (“Guthrie”).

⁹ U.S. Patent Publication No. 2016/0271305 A1, Sept. 22, 2016, Ex. 1016 (“Kurihara”).

¹⁰ U.S. Patent Publication No. 2013/0023821 A1, Jan. 24, 2013, Ex. 1010 (“Khalil”).

Claim(s) Challenged	35 U.S.C. § ³	Reference(s)/Basis
		Guthrie
1–18, 20–23, 26–29	103	Chang, Fang, Khalil, Kurihara
19	103	Chang, Fang, Khalil, Kurihara, Yuen
24	103	Chang, Fang, Khalil, Kurihara, Makower
25	103	Chang, Fang, Khalil, Kurihara, Makower, Guthrie

Petitioner also relies on the Declaration testimony of Mr. Ryan Bauer. *See* Ex. 1003.¹¹

We note that the Chang, Fang, Yuen, and Khalil references relied on in the proceeding before us were the primary references also relied on in related IPR2014-01296, where all claims were found unpatentable in a Final Written Decision. The claim chart below compares claim 1 from the case before us to claim 1 of the related 0126 IPR, with highlights added to show similarities (blue) and major differences (green).

IPR2025-00560 – Pat 11,813,381	IPR2024-01296 – Pat 11,413,380
1[pre] A breast pump device comprising:	1[pre] A breast pump device comprising:
1[a] a self-contained, in-bra	1[a] a self-contained, in-

¹¹ Mr. Bauer earned a Bachelor’s degree in Mechanical Engineering and a Master’s degree in Product Development. Ex. 1003 ¶ 4. He currently is a Director of Medical Device & Pharmaceutical Solutions at Siemens AG. Ex. 1006, 1 (Mr. Bauer’s CV). His experience in research is summarized in his CV. *See id.* at 1–4. Mr. Bauer has experience in engineering analysis and project management of breast pumps and accessories (*id.* at 3), managed a product development department within the breastfeeding business to support new product initiatives (*id.* at 2) and was responsible for development of new strategic breast pump architecture and global product launch (*id.*).

wearable device comprising:	bra wearable device comprising:
1[a][1] a diaphragm configured to prevent milk from reaching an air pump by forming a seal around its outer edge;	1[e] ¹² a diaphragm that is configured to prevent milk from reaching the pump, the diaphragm being seated against a diaphragm housing that is fixed to a recessed surface of the pump housing, and the diaphragm being a membrane that deforms in response to changes in air pressure caused by the pump to create negative air pressure in the nipple tunnel.
1[a][2] a housing that includes:	1[b] a pump housing that includes:
1[a][2][i] a battery, and	1[b][i] a rechargeable battery, 1[b][ii] a power charging circuit for controlling charging of the rechargeable battery, 1[b][iii] control electronics powered by the rechargeable battery,
1[a][2][ii] the air pump powered by the battery and configured to generate negative air pressure by driving the diaphragm;	1[b][iv] a pump powered by the rechargeable battery and configured to generate negative air pressure, 1[b][v] a Universal Serial

¹² To provide a better comparison of the claims, clause 1[e] from claim 1 in the 01296 IPR has been moved to be adjacent to clause 1[a][1] in claim 1 in the 00560 IPR.

	Bus (USB) charging socket for transferring power to the power charging circuit and the rechargeable battery, and 1[b][vi] a recess or cavity that defines a pumping chamber;
1[a][3] a breast shield comprising a breast flange and a nipple tunnel extending from the breast flange,	1[c] a breast shield made up of a breast flange and a nipple tunnel;
1[a][3][i] the nipple tunnel comprising a closed end and a milk port intermediate to the breast flange and the closed end, and	
1[a][4] a milk container that is configured to attach to the housing and receive expressed milk via the milk port.	1[d] a milk container that is configured to be attached to and removed from the pump housing
	1[e] (see above, and fn 12)

II. ANALYSIS

A. Legal Standards

Section 103 forbids issuance of a patent when “the differences between the subject matter sought to be patented 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 ordinary skill in the art; and (4) when available, evidence such as commercial success, long felt but unsolved needs, and failure of others.¹³ *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966); *see KSR*, 550 U.S. at 407 (“While the sequence of these questions might be reordered in any particular case, the [*Graham*] factors continue to define the inquiry that controls.”). The Court in *Graham* explained that these factual inquiries promote “uniformity and definiteness,” for “[w]hat is obvious is not a question upon which there is likely to be uniformity of thought in every given factual context.” 383 U.S. at 18.

The Supreme Court made clear that we apply “an expansive and flexible approach” to the question of obviousness. *KSR*, 550 U.S. at 415. Whether a patent claiming the combination of prior art elements would have been obvious is determined by whether the improvement is more than the predictable use of prior art elements according to their established functions. *Id.* at 417. To support this conclusion, however, it is not enough to show merely that the prior art includes separate references covering each separate limitation in a challenged claim. *Unigene Labs., Inc. v. Apotex, Inc.*, 655 F.3d 1352, 1360 (Fed. Cir. 2011). Rather, obviousness additionally requires that a person of ordinary skill at the time of the invention “would have selected and combined those prior art elements in the normal course of research and development to yield the claimed invention.” *Id.*

¹³ There is no objective evidence of non-obviousness on the evidentiary record before us.

In determining whether there would have been a motivation to combine prior art references to arrive at the claimed invention, it is insufficient to simply conclude the combination would have been obvious without identifying any reason *why* a person of skill in the art would have made the combination. *Metalcraft of Mayville, Inc. v. Toro Co.*, 848 F.3d 1358, 1366 (Fed. Cir. 2017).

Moreover, in determining the differences between the prior art and the claims, the question under 35 U.S.C. § 103 is not whether the differences themselves would have been obvious, but whether the claimed invention as a whole would have been obvious. *Litton Indus. Prods., Inc. v. Solid State Sys. Corp.*, 755 F.2d 158, 164 (Fed. Cir. 1985) (“It is elementary that the claimed invention must be considered as a whole in deciding the question of obviousness.”); *see Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 1537 (Fed. Cir. 1983) (“[T]he question under 35 U.S.C. § 103 is not whether the differences *themselves* would have been obvious. Consideration of differences, like each of the findings set forth in *Graham*, is but an aid in reaching the ultimate determination of whether the claimed invention *as a whole* would have been obvious.”).

As a factfinder, we also must be aware “of the distortion caused by hindsight bias and must be cautious of arguments reliant upon *ex post* reasoning.” *KSR*, 550 U.S. at 421.

Applying these general principles, we consider the evidence and arguments before us, recognizing Petitioner’s burden.

B. Level of Ordinary Skill in the Art

The level of skill in the art is “a prism or lens” through which we view the prior art and the claimed invention. *Okajima v. Bourdeau*, 261 F.3d

1350, 1355 (Fed. Cir. 2001). “This reference point prevents . . . factfinders from using their own insight or, worse yet, hindsight, to gauge obviousness.” *Id.*

“The *Graham* analysis includes a factual determination of the level of ordinary skill in the art. Without that information, a . . . court cannot properly assess obviousness because the critical question is whether a claimed invention would have been obvious at the time it was made to one with ordinary skill in the art.” *Custom Accessories, Inc. v. Jeffrey-Allan Indus., Inc.*, 807 F.2d 955, 962 (Fed. Cir. 1986); *see Ruiz v. A.B. Chance*, 234 F.3d 654, 666 (Fed. Cir. 2000) (“The determination of the level of skill in the art is an integral part of the *Graham* analysis.”).

Factors pertinent to a determination of the level of ordinary skill in the art include: (1) educational level of the inventor; (2) type of problems encountered in the art; (3) prior art solutions to those problems; (4) rapidity with which innovations are made; (5) sophistication of the technology; and (6) educational level of workers active in the field. *Env’t Designs, Ltd. v. Union Oil Co.*, 713 F.2d 693, 696–697 (Fed. Cir. 1983) (citing *Orthopedic Equip. Co. v. All Orthopedic Appliances, Inc.*, 707 F.2d 1376, 1381–82 (Fed. Cir. 1983)). Not all such factors may be present in every case, and one or more of these or other factors may predominate in a particular case. *Id.* Moreover, these factors are not exhaustive but are merely a guide to determining the level of ordinary skill in the art. *Daiichi Sankyo Co. v. Apotex, Inc.*, 501 F.3d 1254, 1256 (Fed. Cir. 2007). In determining a level of ordinary skill, we also may look to the prior art, which may reflect an appropriate skill level. *Okajima*, 261 F.3d at 1355.

Petitioner asserts that a person of ordinary skill in the art would have had “bachelor’s degree in mechanical engineering or a similar field and at least two years of experience designing human breast pump equipment. More education could substitute for experience and vice versa.” Pet. 8 (citing Ex. 1003 ¶¶ 15–18).

Mr. Bauer’s Declaration testimony states he considered some of the factors listed above. Ex. 1003 ¶ 17. Mr. Bauer testifies that based on his background and experience, in his opinion, the level of ordinary skill is as stated by Petitioner. *Id.* at 18.

Based on the prior art, the sophistication of the disclosed technology in the ’381 patent, and Mr. Bauer’s undisputed testimony, we adopt Petitioner’s definition of the level of ordinary skill.

C. Claim Construction

We construe each claim “using the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. [§] 282(b).” 37 C.F.R. § 42.100(b) (2021). Under this standard, claim terms are generally given their ordinary and customary meaning as would have been understood by a person of ordinary skill in the art at the time of the invention and in the context of the entire patent disclosure. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–14 (Fed. Cir. 2005) (en banc) (“We have frequently stated that the words of a claim ‘are generally given their ordinary and customary meaning.’” (citations omitted)).

Petitioner asserts that the Examiner construed the term “self-contained, in-bra wearable device” to mean “complete, or having all that is needed, in itself” and is capable of being worn in a bra.” Pet. 8 (citing

Ex. 1005, 2290).¹⁴ According to Petitioner, “[Patent Owner] did not dispute this construction, and Petitioner applies it herein.” *Id.* Petitioner contends that all other terms “should receive their plain and ordinary meaning.” *Id.*

We do not perceive the need to construe any claim limitation. Claims must be construed “only to the extent necessary to resolve the controversy.” *AstraZeneca AB v. Mylan Pharms. Inc.*, 19 F.4th 1325, 1345 (Fed. Cir. 2021) (quoting *Vivid Techs., Inc. v. American Science & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999); *see also Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (“Because we need only construe terms ‘that are in controversy, and only to the extent necessary to resolve the controversy,’ we need not construe the claim preambles here where the construction is not ‘material to the [obviousness] dispute.’” (citations omitted))).

*D. Ground 1A¹⁵ – Claims 1–13, 16, 17, 22, 23, 27, and 29
in View of Chang and Fang*

Petitioner asserts claims 1–13, 16, 17, 22, 23, 27, and 29 would have been obvious over Chang and Fang. Pet. 14–55. First, we summarize the disclosures of Chang and Fang.

1. Chang (Ex. 1007)

We make the following findings of fact concerning Chang.

¹⁴ The citation to Ex. 1005, 2290 appears to be an error. We do not find the cited claim construction at this location.

¹⁵ For consistency, we use Petitioner’s alpha-numeric identification of the asserted grounds. As shown in our chart in Section I.F of this Decision, there are sixteen distinct asserted grounds.

Chang is titled “Breast Pump Assembly and Methods.” Ex. 1007, code (54). Chang relates to “portable breast pump systems and methods for collecting milk from a breast of a nursing mother.” *Id.* ¶ 1.

Chang discloses “[s]ystems and methods for pumping milk from a breast, wherein the milk is expressed from the breast under suction and milk is expelled from the pumping mechanism to a collection container under positive pressure.” Ex. 1007, code (57). By way of background, Chang explains that “[a]lthough a variety of breast pumps are available, a number are awkward and cumbersome, requiring many parts and assemblies and being difficult to transport.” *Id.* at ¶ 3. Chang explains that “[s]ome systems are battery driven, but draw down the battery power fairly rapidly as the motorized pump continuously operates to maintain suction during the milk extraction process.” *Id.* Chang also discloses that “[t]o ensure that the nursing baby is receiving adequate nutrition, it is useful to monitor the baby’s intake.” *Id.* ¶ 5. Thus, Chang provides that it would be desirable to have a breast pump system that “easily and accurately monitors the volume of milk pumped by the system,” “make[s] it convenient for the nursing mother to know how much milk has been extracted by breast pumping,” and “track[s] milk volume pumped per session, so that the volume of milk contained in any particular milk collection container can be readily known.” *Id.*

To address these issues and desires, Chang discloses a breast pump system that “includes breast contacting structure and a collection or storage container or assembly, and structure that delivers milk from a breast to the collection assembly.” *Id.* ¶ 7. Chang also discloses a method that “involves

pumping milk from a breast and delivering the pumped milk into the collection assembly or storage container.” *Id.*

Chang’s breast pump system housing “can be shaped and configured to be contoured to the breast of a user and to thus provide a more natural appearance when under the clothing of the user” and a flange “which is sized and shaped to engage a breast of a user.” Ex. 1007 ¶ 71. The housing comprises a chassis, a circuit board, a rechargeable battery, pump components comprising motors, motor mountings, pumps, a conduit or flex tube, recesses, and compression and expansion members. *Id.* at ¶¶ 68, 71–73, 80.

Figure 1A from Chang, annotated by Petitioner, is reproduced below.

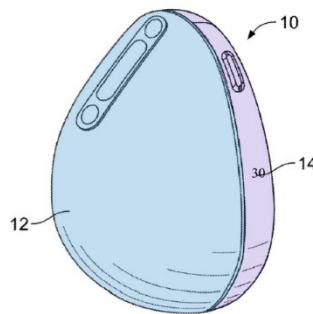


FIG. 1A

Figure 1A from Chang is an annotated perspective view of the disclosed breast pump system. Pet. 15 (citing Ex. 1003, ¶ 76); *see also* Ex. 1007 ¶ 30. As shown in annotated Figure 1A, Chang’s breast pump 10 includes housing or outer shell 12 (blue) and flange 14 (purple).

Figure 6A of Chang is reproduced below.

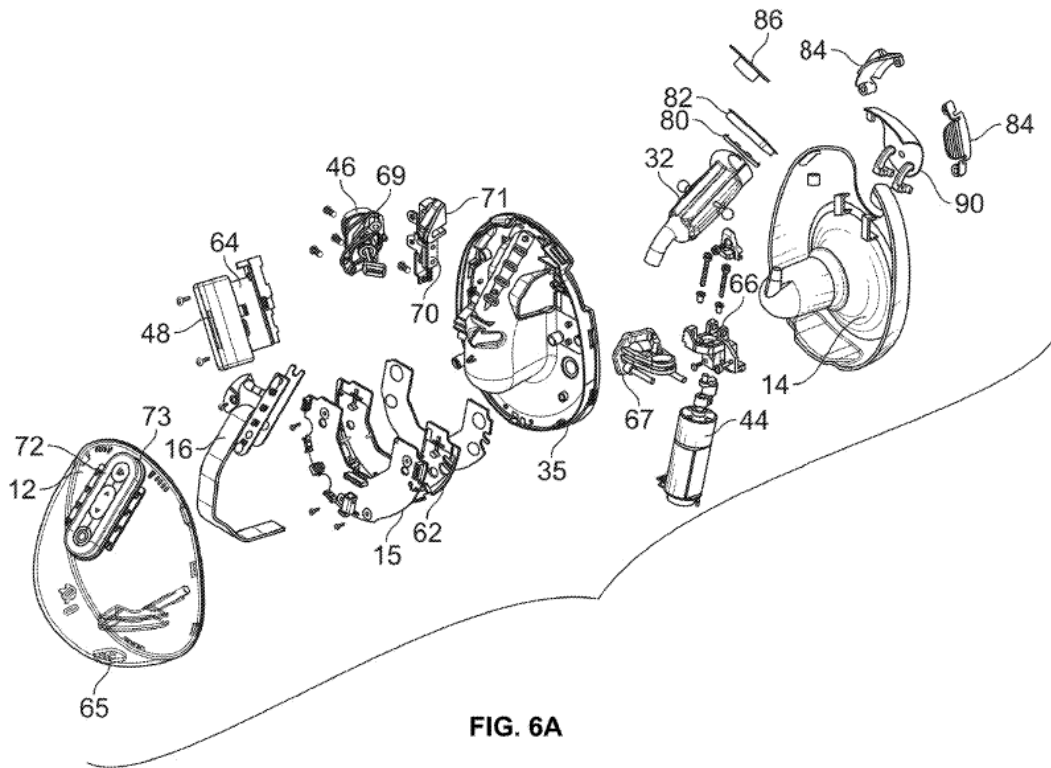


FIG. 6A

Figure 6A is an exploded view of a breast pump system depicting mechanical components of the system. Ex. 1007 ¶ 36. Chang's breast pump system includes housing or outer shell 12 and flange 14, as shown above, which are "sized and shaped to engage a breast of a user...to provide structure for sealingly engaging with breast tissue." *Id.* ¶ 71. Between shell 12 and flange 14 is pump chassis 35, which supports the pump components. *Id.* ¶ 80. The pump components include "rechargeable battery 48 assembly that powers the system 10" and "the system motor which is powered by the battery and which functions to move actuators operating on the conduit or flex-tube 32." *Id.* In particular, motors 44 and 46 are "controlled electronically by the system to effect manipulation of actuators [] operating on [] conduit or flex-tube 32." *Id.* ¶ 72. Chang's "system is configured to pump into a sealed collection or container assembly 60," which may be

“inside or outside of the pump housing.” *Id.* ¶¶ 99, 101; *see also, e.g., id.* Figs. 8–10.

2. *Fang (Ex. 1009)*

We make the following findings of fact concerning Fang.

Fang is titled “Electric Breast Pump Convenient for Both Separate and Combined Configurations.” Ex. 1009, code (54). Fang “relates to a breast pump used for breastfeeding assistance.” *Id.* ¶ 1. Fang’s pump includes an elastic diaphragm that separates an inner cavity and an outer cavity. *Id.* ¶ 4. “The elastic diaphragm is used to prevent milk from flowing into the air pump main unit.” *Id.* Fang’s Figure 5 is reproduced below.

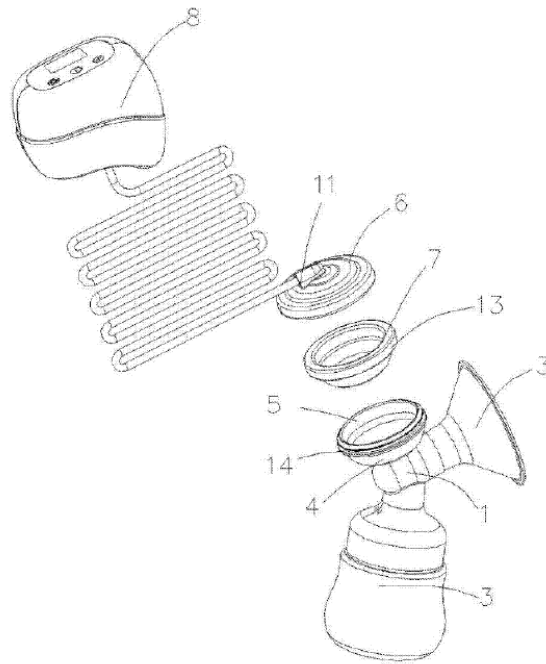


FIG. 5

Figure 5 is an exploded schematic diagram of an embodiment of Fang’s disclosed breast pump system. Ex. 1009 ¶ 15.

As shown in Figure 5 of Fang, the electric breast pump comprises three-way connector 1 with a first end connected to suction head 2¹⁶, and a second end connected to container 3. *Id.* ¶ 19. Fang discloses that “[a] third end of the three-way connector 1 is provided with an expansion opening 4” that is connected to annular edge 5 on which connection cover 6 is “detachably provided.” *Id.* Fang also teaches that elastic diaphragm 7 “separates the third end of the three-way connector 1 into an inner cavity and an outer cavity is provided within the annular edge 5.” Ex. 1009 ¶ 19. Fang’s electric breast pump also includes air pump main unit 8 configured to be detachably mounted on annular edge 5 with an upper airflow opening 10 of air pump main unit 8 located inside protruding edge 9. *Id.* “The elastic diaphragm 7 is used to prevent milk from flowing into the air pump main unit 8.” *Id.*

Fang’s elastic diaphragm 7 has annular edge 5, and its air pump main unit 8 has airflow opening 10 detachably mounted on annular edge 5 using connecting protruding edge 9, so that elastic diaphragm 7 prevents milk from flowing into air pump main unit 8. *Id.* ¶ 19.

3. *Yuen – Exhibit 1011*

We make the following findings of fact concerning Yuen.

¹⁶ Figure 5 has a clear error in using reference numeral “3” twice to refer to two distinct elements. Reference numeral “3” at the bottom of Figure 5 correctly identifies container 3 (*see* Fig. 1). Reference numeral “3” in the middle of Figure 5 should be numeral “2,” identifying suction head 2 (*see id.*).

In the context of monitoring an infant's milk consumption and nutrition (Ex. 1011, 3),¹⁷ Yuen discloses “[a]n apparatus for receiving a container, comprising: a weighing unit arranged to measure the mass of the container provided thereon during a predetermined interval.” *Id.*, code (57). The apparatus also comprises “a processor arranged to [process] the measured mass during the predetermined interval to provide information relating to the consumption of the content stored in the container.” *Id.* Yeun's apparatus is powered by a rechargeable battery charged by a power supply through a charging port such as a micro-USB port. *Id.* at 16:14–16.

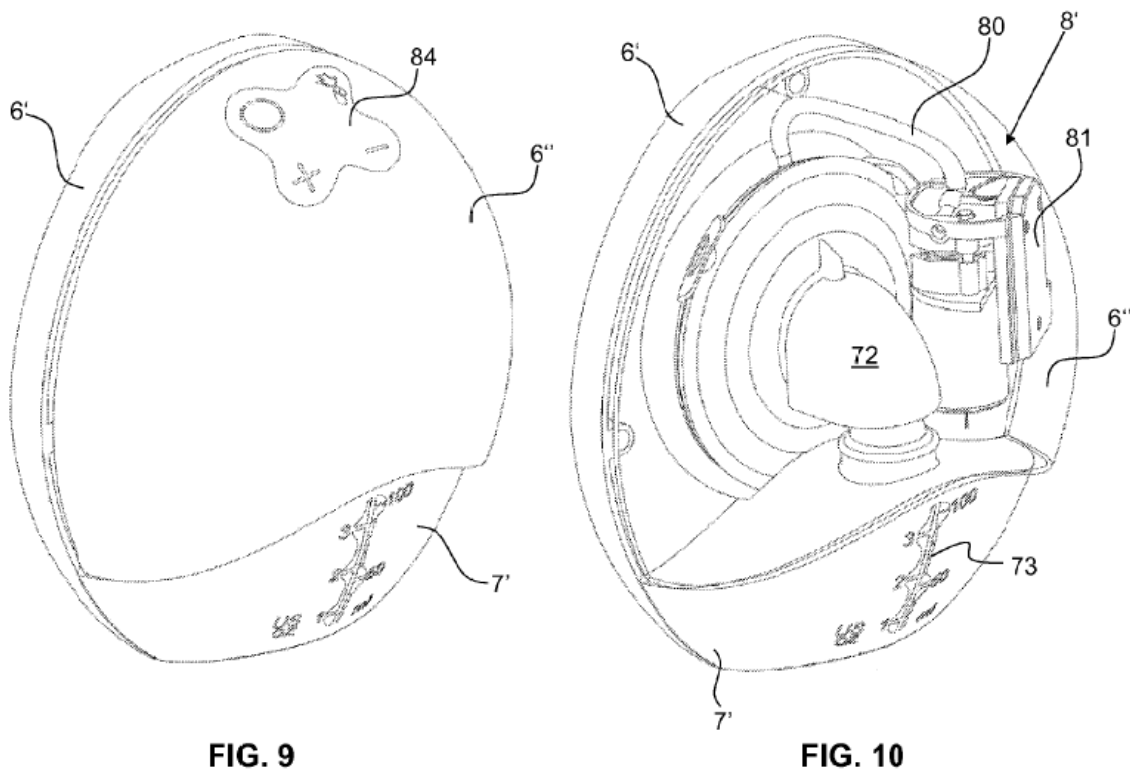
4. *Khalil – Exhibit 1010*

We make the following findings of fact concerning Khalil.

Khalil relates to “[a] breastshield unit for expressing human breastmilk.” Ex. 1010, code (57). The breastshield unit has “a receiving part for receiving a human nipple, an underpressure chamber for applying an under-pressure [sic] to the nipple, wherein the receiving part opens into this underpressure chamber, and a membrane for generating an underpressure in the underpressure chamber.” *Id.*

Figures 9 and 10 of Khalil, which are reproduced below, show a perspective view of a breast pump with breast shield unit with (Fig. 9) and without (Fig. 10) a cover, respectively. Ex. 1010 ¶¶ 44–45.

¹⁷ Starting with Exhibit page 3, the Yeun reference includes two different numbers on the bottom of each page. We refer to the Exhibit page number, which is beneath the original application page number.



Figures 9 and 10 depict an embodiment wherein “the breastshield unit is designed as a complete breastpump with an integrated suction pump unit [8’].” Ex. 1010 ¶ 66. As shown in Figures 9 and 10, “shell ring 6’ has an opening with a circumferential securing flange 62 for securing the breast interface 1.” *Id.* ¶ 67. “A rear face, i.e., the face directed away from the breast, is partially closed by a cover [6’],” and “[a] pump seat 82, in which a vacuum pump 81 is held, is formed integrally in this cover [6’].” *Id.*

Khalil’s Figure 11, reproduced below, shows an exploded view of the breast pump in Figure 9, with a breast shield interference 1, integrated milk collection container 7’, and integrated vacuum pump 8’ (Fig. 10).

Ex. 1010 ¶ 46.

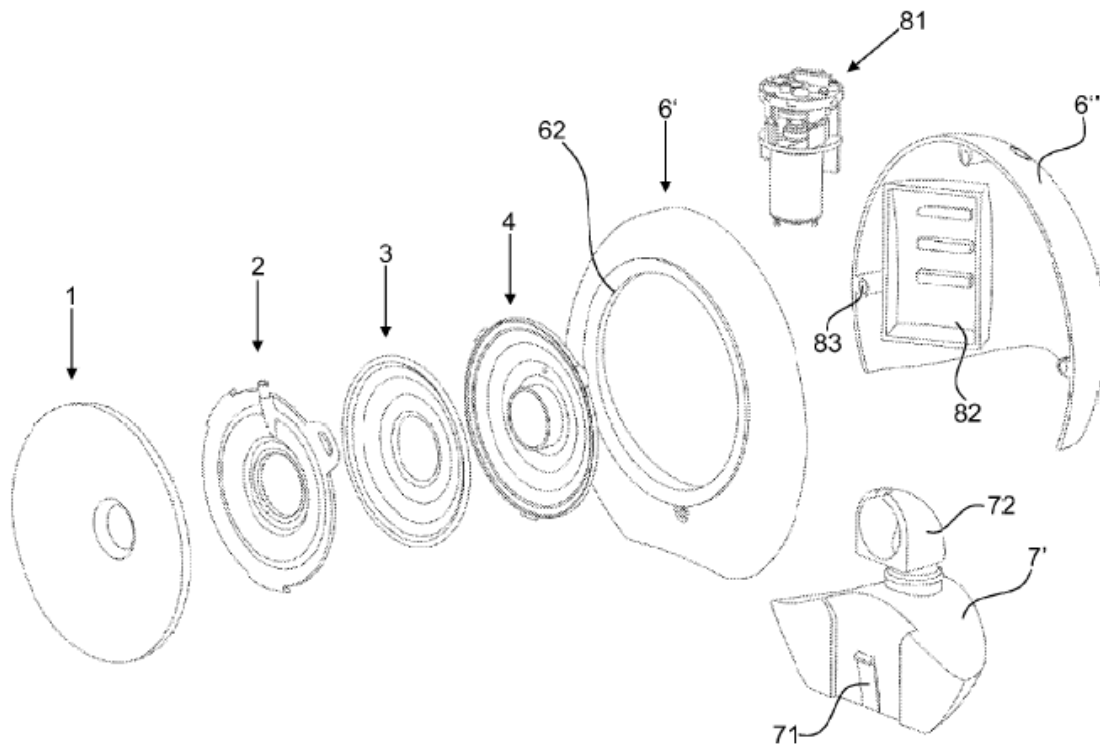


FIG. 11

Figure 11 of Khalil shows an embodiment “in which the breastshield unit is designed as a complete breastpump with an integrated suction pump unit 8'.” Ex. 1010 ¶ 66. Depicted in Figure 11 are breast interface 1, membrane housing parts 2 and 4, membrane 3, shell ring 6' with circumferential securing flange 62, a rear face partially closed by cover 6', pump seat 82 in which diaphragm vacuum pump 81 is held and formed integrally with cover 6.” *Id.* at ¶¶ 66–67. Milk collection container 7' is in the lower area adjoining cover 6.” *Id.* ¶ 69. “A locking lug 71 is integrally formed on this milk collection container 7' and can engage in a corresponding recess (not shown in the Figures) of the shell ring 6',” such that container 7' is releasably connected to shell ring 6'. *Id.* Container 7' has coupling part 72 to plug into the milk port of membrane housing part 4 facing away from the breast “such that the expressed milk can flow from the

underpressure chamber 40 into the interior of milk collection container 7’.”
Id.

Below is a detailed analysis of the challenge based on Chang and Fang against the sole independent claim, claim 1.

5. *Analysis of Independent Claim 1*

Petitioner provides a clause-by-clause analysis of claim 1 mapping each element or limitation of claim 1 to what Petitioner asserts is the corresponding disclosure in Chang and Fang. Pet. 25–34. Petitioner also provides reasons why a person of ordinary skill would use the diaphragm of Fang in the device of Chang, with a reasonable expectation of success in doing so. *Id.* at 19–24.

Throughout its analysis of claim 1, Petitioner cites the written description and drawings of Chang and Fang and the Declaration testimony of Mr. Bauer for evidentiary support. *See, e.g., id.* at 25, 26.

a) *Claim 1*

(1) *1[pre] A breast pump device comprising:*

Petitioner asserts that “[i]f the preamble is limiting, the Chang-Fang device describes it.” Pet. 25 (citing Ex. 1003, ¶¶108, 119–20). Petitioner also asserts that “Chang describes ‘portable breast pump systems and methods for collecting milk from a breast of a nursing mother.’” *Id.* (citing Ex. 1007, ¶ 1; “Abstract”, Figs. 1–21). Based on the record before us, we agree.

There can be no reasonable dispute that Chang and Fang each disclose a breast pump device, as asserted by Petitioner. Pet. 25.

(2) *1[a] a self-contained, in-bra wearable device comprising:*

Petitioner asserts that Chang describes a small, portable, self-powered, energy efficient, wearable breast pump system that is contemplated to fit comfortably and conveniently into a bra of a user, with the components of the device all contained within a cup of a brassiere. Pet. 25 (citing Ex. 1007 ¶¶ 4, 11, 19; Ex. 1003 ¶ 121. Based on the record before us, we agree.

Petitioner demonstrates by a preponderance of the evidence that Chang discloses a self-contained, in-bra wearable device. *Id.*

(3) *1[a][1] a diaphragm configured to prevent milk from reaching an air pump by forming a seal around its outer edge;*

Petitioner relies on Fang for the disclosure of a diaphragm, as stated in this clause. Pet. 25–26. Petitioner asserts the proposed combination of elements suggest a breast pump device that would have used a diaphragm pump including first and second diaphragm housing components and an elastic diaphragm, “in accordance with Fang’s suggestions.” *Id.* at 25. As also asserted by Petitioner, Fang discloses that flexible diaphragm 7 (i.e., a membrane) is configured to prevent milk from reaching the pump. *Id.* at 26 (citing Ex. 1009 ¶ 19 (“The elastic diaphragm 7 is used to prevent milk from flowing into the air pump main unit 8.”)).

Mr. Bauer testifies:

The flexible diaphragm [diaphragm 7 in Fang] forms a watertight and airtight seal around its outer edge. In doing so, the diaphragm prevents the passage of milk from reaching the air pump and facilitates generation of negative pressure during operation. Fang also explains that the elastic diaphragm 7 deforms away from the nipple tunnel when a vacuum is created on a pumping chamber, which then creates negative air pressure in the nipple tunnel when a vacuum is created on a pumping chamber.

Ex. 1003, ¶ 123 (citing Ex. 1009 ¶¶ 19–25).

Additionally, Petitioner asserts “[t]he overall form factor of the predictable combination generally would remain as taught by Chang, yet with an improved pump chamber defined between a recessed wall of the pump housing and the elastic diaphragm, in accordance with Fang’s suggestions.” Pet. 20 (citing Ex. 1003 ¶ 111).

According to Petitioner, the use of a diaphragm pump in breast pump devices was widely known, including in “in-bra” devices. *Id.* at 21 (citing Ex. 1003 ¶ 112); *see also* Ex. 1003 ¶¶ 113–118 (additional testimony from Mr. Bauer further explaining why, in his opinion, it would have been obvious to use Fang’s diaphragm in the Chang breast pump system, with a reasonable expectation of success).

Petitioner also asserts that “[m]ultiple reasons would have prompted a POSITA to implement a diaphragm pump in Chang’s breast pump device in accordance with Fang’s suggestions.” *Id.* at 21–24.

Based on the record before us, we agree that Fang discloses a diaphragm, as recited in clause 1[a][1]. We also agree, based on the record before us, that a person of ordinary skill would have had multiple reasons to use Fang’s diaphragm pump in Chang’s device with a reasonable expectation of success.

(4) 1[a][2], [2][i] a housing that includes a battery

Petitioner asserts that the outer shell and pump chassis in Chang “together form a pump housing that accommodates pump components,” including the battery. Pet. 26–28.

Based on the record before us, we agree.

(5) *1[a][2][ii] the air pump powered by the battery and configured to generate negative air pressure by driving the diaphragm;*

Petitioner asserts the proposed diaphragm pump in the proposed Chang-Fang combination “is in pneumatic connection with the elastic diaphragm and configured to generate negative air pressure by driving the diaphragm, as taught by Fang.” Pet. 28 (citing Ex. 1009 ¶¶ 19, 24. Based on Chang’s disclosure, all the components of the system are located within the housing. *Id.* (citing Ex. 1007 ¶¶ 72, 80).

Based on the record before us, where there is no contrary argument or evidence, we agree with Petitioner’s assertions.

(6) *1[a][3] a breast shield comprising a breast flange and a nipple tunnel extending from the breast flange,*

Petitioner asserts that Chang discloses a breast shield that has two portions—a “nipple receiving portion...contoured to more closely match the natural shape of the nipple” (Pet. 29 (citing Ex. 1007 ¶ 90)), and “surfaces that extend outwardly from a nipple receiving portion of the flange to engage breast tissue, thus providing extra surface area for comfortably contacting tissue” (*id.* (citing ¶¶ 71, 90)). Petitioner also provides the following annotated Figure 4 from Chang, which illustrates a flange comprising the nipple receiving portion (green) and breast-contact portion (blue).

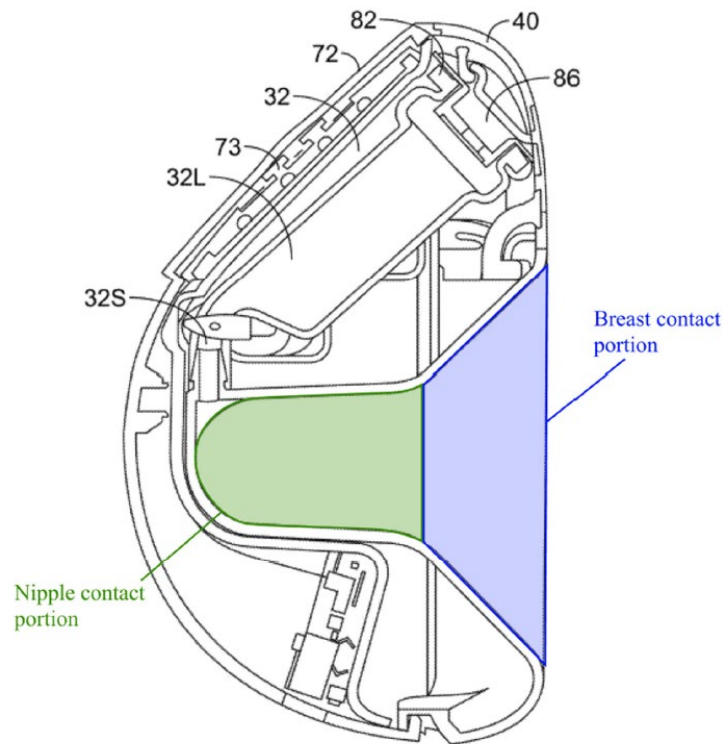


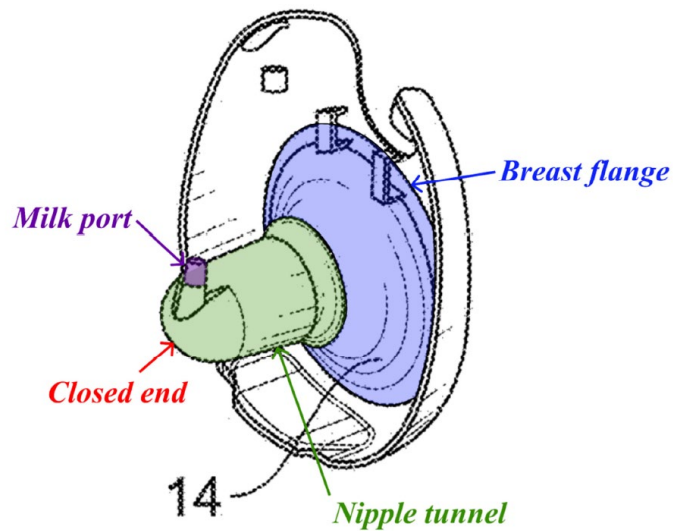
FIG. 4

Figure 4 from Chang, annotated by Petitioner (Pet. 30 (citing Ex. 1003 ¶ 128), is a cross-sectional side view of Chang's disclosed breast shield and other components of Chang's system.

Based on the record before us, we agree with Petitioner's assertions.

(7) *1[a][3][i] the nipple tunnel comprising a closed end and a milk port intermediate to the breast flange and the closed end, and*

Petitioner provides the following annotated excerpt of Figure 6A from Chang (Pet. 31).



Petitioner’s annotated excerpt of Figure 6A from Chang illustrating the breast flange (blue), nipple tunnel (green), closed end (red arrow) and milk port (purple) elements. Pet. 30–32 (citing Ex. 1003 ¶ 129 (annotating and excerpting Ex. 1007, Fig. 6A)).

Mr. Bauer testifies

As shown in the figure above, the *milk port* is positioned to be *intermediate to the breast flange and the closed end* because the boundaries defining the *milk port* are between the outer end of the *closed end* (the left-most end of breast shield A1) and the outer end of the breast flange (the right-most end of breast shield A1). See Ex. 1001, 18:56-19:16.

Ex. 1003 ¶ 129 (emphasis in original text).

Based on the record before us, we agree with this analysis.

(8) 1[a][3][ii] the breast shield being separate from the diaphragm; and

Petitioner asserts that “[i]n the Chang-Fang device, the breast shield is separate from the flexible diaphragm.” Pet. 32–33. According to Petitioner, a person of ordinary skill “would have understood and found obvious that removability of the breast shield in the Chang-Fang device indicates that the

breast shield is separate from the elastic diaphragm. *Id.* at 33 (citing Ex. 1007 ¶¶ 21, 23, 81, 86, 92, 99, 100). Petitioner also notes that such a configuration “enables access to the breast shield during normal disassembly for cleaning.” *Id.* (citing Ex. 1003 ¶ 134). Patent Owner does not dispute these assertions. On this record, Petitioner’s assertions and evidence are sufficient to establish that the modified device meets this limitation.

(9) *1[a][4] a milk container that is configured to attach to the housing and receive expressed milk via the milk port.*

Petitioner asserts, and Patent Owner does not dispute at this juncture, that Chang discloses that the milk container is configured to be attached to and removed from the pump housing such that the container is within the device in a fixed position relative to other components as part of the wearable, in-bra. Pet. 33 (citing Ex. 1007 ¶ 19). On this record, we agree.

b) Conclusion for Claim 1

Based on the arguments and evidence in the record before us, we determine Petitioner has established by a preponderance of the evidence that independent claim 1 is unpatentable over Chang and Fang.

6. Dependent Claims 2–13, 16, 17, 22, 23, 27, and 29

Dependent claims 2–13, 16, 17, 22, 23, 27, and 29 depend from claim 1. Petitioner provides a clause-by-clause analysis of where each element in dependent claims 2–13, 16, 17, 22, 23, 27, and 29 is disclosed in Chang and Fang. Pet. 34–55.

We have reviewed Petitioner’s evidence and arguments, and, based on the evidence and arguments before us, we determine for the reasons stated in the Petition (*id.*), supported by the testimony of Mr. Bauer, that Petitioner establishes by a preponderance of the evidence, that dependent claims 2–13,

16, 17, 22, 23, 27, and 29 are not patentable. Accordingly, we adopt Petitioner's unrebutted arguments and unrebutted cited evidence for these dependent claims, supported by Mr. Bauer's unrebutted testimony, as our findings and conclusions for dependent claims 2–13, 16, 17, 22, 23, 27, and 29.

E. Additional Grounds

As noted above, Petitioner has submitted 16 distinct grounds. For these additional grounds, Petitioner relies on Chang and Fang, and one or more additional references for these additional grounds. We have considered Petitioner's arguments and evidence. We also have considered the detailed, comprehensive declaration testimony of Mr. Bauer and find it credible and helpful. Accordingly, for all additional grounds, we adopt Petitioner's arguments and cited evidence, supported by Mr. Bauer's unrebutted testimony, as our findings and conclusions. Accordingly, we determine that each asserted additional ground establishes by a preponderance of the evidence that the challenged claim or claims is/are unpatentable.

III. CONCLUSION¹⁸

We have determined that all challenged claims are unpatentable under each asserted ground.

¹⁸ Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this decision, we draw Patent Owner's attention to the April 2019 *Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding*. See 84 Fed. Reg. 16,654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent

IV. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that, Petitioner has shown by a preponderance of the evidence that claims 1–29 are not patentable;

FURTHER ORDERED that

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

V. SUMMARY

Claims	35 U.S.C. §	Reference(s)/ Basis	Claims Shown Unpatentable	Claims Not shown Unpatentable
1–13, 16, 17, 22, 23, 27, 29	103(a)	Chang, Fang	1–13, 16, 17, 22, 23, 27, 29	
19	103(a)	Chang, Fang, Yuen	19	
24	103(a)	Chang, Fang, Makower	24	
25	103(a)	Chang, Fang, Makower, Guthrie	25	
1–13, 16, 17, 22, 23, 26–29		Chang, Fang, Kurihara	1–13, 16, 17, 22, 23, 26–29	
19		Chang, Fang, Kurihara, Yuen	19	
24		Chang, Fang, Kurihara, Makower	24	
25		Chang, Fang, Kurihara,	25	

Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. *See* 37 C.F.R. § 42.8(a)(3), (b)(2).

Claims	35 U.S.C. §	Reference(s)/ Basis	Claims Shown Unpatentable	Claims Not shown Unpatentable
		Makower, Guthrie		
1–18, 20–23, 27, 29		Chang, Fang, Khalil	1–18, 20–23, 27, 29	
19		Chang, Fang, Khalil, Yuen	19	
24		Chang, Fang, Khalil, Makower	24	
25		Chang, Fang, Khalil, Makower, Guthrie	25	
1–18, 20–23, 26–29		Chang, Fang, Khalil, Kurihara	1–18, 20–23, 26–29	
19		Chang, Fang, Khalil, Kurihara, Yuen	19	
24		Chang, Fang, Khalil, Kurihara, Makower	24	
25		Chang, Fang, Khalil, Kurihara, Makower, Guthrie	25	
Overall Outcome			1–29	

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