Filed on behalf of: Meta Platforms, Inc.

Filed: August 8, 2024

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

META PLATFORMS, INC.
Petitioner,

v.

JAWBONE INNOVATIONS, LLC,
Patent Owner.

Case No. IPR2023-01128
U.S. Patent No. 8,326,611

PETITIONER'S REPLY TO PATENT OWNER'S RESPONSE

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EXHIBIT LIST

Ex. 1001	U.S. Patent No. 8,326,611 to Petit *et al*. ("the '611 patent")
Ex. 1002	Excerpts from the Prosecution History of the '611 patent ("the Prosecution History")
Ex. 1003	Declaration of Dr. Thomas Kenny
Ex. 1004	*Curriculum Vitae* of Dr. Thomas Kenny
Ex. 1005	U.S. Patent No. 8,194,880 B2 ("Avendano")
Ex. 1006	U.S. Patent No. 7,464,029 B2 ("Visser")
Ex. 1007	RESERVED
Ex. 1008	U.S. Patent No. 7,155,019 B2 ("Hou")
Ex. 1009	Byrne, D, *et al*, "An international comparison of long-term average speech spectra," 1994 Oct; *J. Acoust. Soc. Am.*; 96(4): 2108-2120 ("Byrne").
Ex. 1010	U.S. Publication No. US 2011/0103626 A1 ("Bisgaard")
Ex. 1011	U.S. Provisional App. No. 60/816,244 ("the Bisgaard Provisional")
Ex. 1012	U.S. Publication No. US 2002/0198705 A1 ("Burnett")
Ex. 1013	Berglund, B, *et al*, "Sources and effects of low-frequency noise," 1996 May; *J. Acoust. Soc. Am*; 99(5): 2985-3002 ("Berglund").
Ex. 1014	Declaration of June Ann Munford
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Ex. 1017	October 26, 2023 E-mail from Board authorizing Petitioner Reply and Patent Owner Sur-Reply to Patent Owner's Preliminary Response
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Ex. 1020	Transcript of the Deposition of Akbar M. Sayeed, Ph.D., taken July 17, 2024 ("Sayeed Tr.")

I. INTRODUCTION

The Petition established that the challenged claims are unpatentable. In a transparent attempt to avoid the prior art, PO manufactures a claim construction dispute and mischaracterizes the Petition's combination of Avendano with Visser for the independent claims. For certain dependent claims, PO misinterprets the Petition's position and does not address the explicit claim requirements and claimed embodiments.

For PO's claim construction dispute, PO attempts to narrow the claimed "filter" to the patent's β filter, despite the specification describing at least two other filters—the α filter and the delay filter—as within the scope of the term. But even under PO's improper narrowing, the Board need only find that the patent's β filter can include a mere delay (as PO's expert confirms), and the challenged claims would be unpatentable. This is because Avendano's delay node would undisputedly satisfy the claimed "filter" under PO's narrowing, and the Board need not reach PO's remaining claim construction arguments.

To the extent the Board reaches PO's other claim construction arguments, the Board should find there is no disavowal of the patent's delay filter from the scope of the claimed "filter." Further, PO's narrow language is unsupported in the record as it excludes preferred embodiments of the specification, including the delay filter. The only requirement of the claimed "filter" is that it has to describe a relationship

for speech, which encompasses any of the three filter embodiments. Specifically, the claimed relationship for speech includes a temporal relationship, as the patent explicitly acknowledges by describing the delay "filter."

PO's remaining arguments can be similarly rejected. For the independent claims, PO misleadingly mischaracterizes the Avendano and Visser combination and rebuts a combination that was not proposed in the Petition. Specifically, PO incorporates Visser's cross filters without any VAD, but the Petition relies on Visser's VAD, and alternately on Avendano's VAD. PO's arguments can be rejected as non-responsive.

For dependent claims 7 and 9, PO fails to recognize that the proposed prior art combinations are consistent with the explicit requirements in the claims and teachings in the specification, and therefore, meets the explicit requirements in the claims. Thus, to the extent that these dependent claims are supported by the patent, the proposed prior art combinations must also render them obvious.

Accordingly, the Board should find all the Challenged Claims unpatentable.

II. CLAIM CONSTRUCTION

A. "filter that describes a relationship for speech between the first physical microphone and the second physical microphone"(claim 1)

The primary dispute between the parties is whether a delay meets the claimed "filter." If so, then there is no dispute that Avendano's delay node would satisfy the

claimed "filter," and the challenged claims are unpatentable.[1] There are two independent ways for the Board to reach a conclusion that the claimed "filter" includes a delay.

First, even if the claimed "filter" must be limited to the patent's β filter (as PO contends), if the Board determines that the patent's β filter can encompass a simple delay, then PO's remaining claim construction arguments are moot. Critically, equations in the patent as well as statements from PO's own expert Dr. Sayeed confirm that the β filter simplifies to a simple delay. *See* Section II.A.1, *infra*. If the Board determines that the β filter can encompass a simple delay, then the Board need not consider PO's arguments regarding disavowal (*see* Section II.A.2, *infra*), nor does the Board need to consider whether PO's interpretation is supported (*see* Section II.A.3, *infra*).

Second, if the Board determines that there is no disavowal in the patent, then the claimed "filter" encompasses the patent's delay "filter." The portion of the patent that PO relies on as express disavowal of the patent's delay filter is, at best, ambiguous. The language in the patent does not meet the "clear and unmistakable" standard for disavowal. PO's implied disavowal arguments should also be rejected

[1] Petitioner responds to PO's arguments regarding certain dependent claims separately in Sections III.C and IV.

because for every embodiment that includes the β filter, the delay filter is also included. *See* Section II.A.2, *infra*.

The Board should reject PO's narrow proposed language for a third, independent reason—it is unsupported in the record. In order to avoid Avendano's delay node, PO rewrites the claimed filter to additionally "alter[] a signal based on the non-temporal components of relative responses to speech of the first and second microphones." POR, 14. But PO's interpretation reads out a preferred embodiment for the filter—the delay filter, and is redundant with other language recited in the claims. *See* Section II.A.3.

1. The Experts Agree The Claimed Filter Can Be A Simple Delay

Even accepting PO's argument that the claimed "filter" should be limited to the patent's β filter, the patent's equations (reproduced in Dr. Sayeed's declaration) confirm that the claimed filter can be a delay. As Dr. Sayeed summarizes in his second declaration at ¶¶35-36 (reproduced below with boxed annotations for the equations) (*see also* Dr. Sayeed's statements at ¶¶32-33 of his first declaration), the claimed invention involves three filters: a calibration filter α(z), a filter β(z), and a delay filter $z^{-\gamma}$.

> 35. Ideally the microphones O_1 and O_2 are assumed to be calibrated so that "their response to a source located the same distance away was identical for both amplitude and phase." Ex 1001, 28:55-57. However, this is not always feasible in practice and the calibration filter

> α(z) can be determined using adaptive algorithms, for example, so that in the presence of speech only signals (with no or low levels of noise) the microphone signals O_1 and O_2 satisfy the relationship:
>
> $$\boxed{O_1(z) = \alpha(z)O_2(z)}$$
>
> Ex. 1001 28:61-29:27.
>
> 36. After the calibration filter α(z) is determined, the filter β(z) can be determined, either from the geometry of microphones relative to the target speech source, or, in the claimed embodiments, by using an adaptive filter algorithm to satisfy the relationship:
>
> $$\boxed{\tilde{\beta}(\mathrm{z}) = \frac{\alpha(z)O_2(z)}{z^{-\gamma}O_1(z)}}$$
>
> Ex. 1001 6:1-11.

Ex. 2005 ¶¶35-36.

As Dr. Sayeed explained, the calibration filter α is specifically determined to satisfy the first equation $\boxed{O_1(z) = \alpha(z)O_2(z)}$, where $O_1(z)$ and $O_2(z)$ correspond to the microphone signals. Ex. 2005 ¶35; Ex. 2002 ¶32. Then, taking the second equation $\boxed{\tilde{\beta}(\mathrm{z}) = \frac{\alpha(z)O_2(z)}{z^{-\gamma}O_1(z)}}$ (*see* Ex. 2005 ¶36; Ex. 2002 ¶33), and substituting the left hand side of the first equation into the numerator, it follows that:

$\boxed{\tilde{\beta}(\mathrm{z}) = \frac{\alpha(z)O_2(z)}{z^{-\gamma}O_1(z)}}$	• Begin with the second equation for the β filter;
$= \frac{O_1(z)}{z^{-\gamma}O_1(z)}$	• Based on the first equation, substitute $O_1(z)$ for the numerator;

$$= \frac{\cancel{O_1(z)}}{z^{-\gamma}\cancel{O_1(z)}}$$

- $O_1(z)$ appears in both the numerator and denominator, and therefore cancels out; and

$$= \frac{1}{z^{-\gamma}} = z^{\gamma}$$

- The β filter simplifies to a mere delay.

Therefore, a simple substitution of the first equation into the numerator of the second equation results in the filter β being reduced to a simple delay (z^{γ}).

Thus, the patent and Dr. Sayeed's statements confirm that even if the claimed filter were limited to the β filter (as PO proposes), this filter can be represented by a simple delay or time shift. This is consistent with Dr. Kenny's declaration at ¶¶134-138 (explaining how a POSITA would understand Avendano's delay node 402 to meet the claimed "filter").

2. No disavowal in the specification

The Board was correct to find no lexicography or disavowal in the specification, express or implied. ID, 17. Nothing in the POR changes that.

a. No express disavowal

PO points to a portion of the '611 patent that it alleges "clearly disavows the concept of a delay filter, alone."

> The NAVSAD and PSAD systems include an array algorithm for speech detection **that uses the difference in frequency content between two microphones to calculate a *relationship between the signals of the two microphones*.** This is in contrast to conventional arrays that attempt to use the time/phase difference of each microphone to remove the noise outside of an "area of sensitivity". ***The methods***

> ***described herein provide a significant advantage, as they do not require a specific orientation of the array with respect to the signal.***

POR, 15 (citing '611 Patent, 11:18-27) (emphases in original). But this cited portion of the patent is, at best, ambiguous. *Roku Inc. v. Universal Elecs., Inc.*, No 2023-1019, 2024 U.S. App. LEXIS 14723, at *13 (Fed. Cir. June 18, 2024) (finding no disavowal when the alleged disavowal language was "too ambiguous to narrow the clear, broader meaning of the disputed limitation"); *CUPP Computing AS v. Trend Micro Inc.*, 53 F.4th 1376, 1382 (Fed. Cir. 2022) (finding no disclaimer "where the alleged disavowal is ambiguous, or even amenable to multiple reasonable interpretations") (internal quote omitted). The quoted language above does not clearly and unmistakably renounce the patent's "delay filter" from the scope of the claimed "filter." *See Cont'l Circuits LLC v. Intel Corp.*, 915 F.3d 788, 797 (Fed. Cir. 2019).

As an initial matter, the quoted language cannot be disavowal at least because it does not even use the language from the claimed "filter," nor does it use language describing the allegedly disclaimed delay filter. First, the cited language refers to "calculat[ing] a relationship between the signals of the two microphones," but does not even use the claim term "filter," let alone a filter that describes a relationship for speech. *See* Ex. 1001, 11:18-27; *see also Roku,* 2024 U.S. App. LEXIS 14723, at *12 (finding no disavowal when the cited statements "do not even include the

disputed claim language," citing *Golight, Inc. v. Wal-Mart Stores, Inc.*, 355 F.3d 1327, 1333 (Fed. Cir. 2004)). Second, in describing "conventional arrays," the cited language only states they "use the time/phase difference of each microphone," but this does not reference the delay filter that "depends on the size of the array." *See* Ex. 1001, 11:22-24, 5:29-33.

Here, just as in *Cont'l Circuits*, "none of the statements [in the specification]… rises to the level of a 'clear and unmistakable disclaimer'". *See Cont'l Circuits*, 915 F.3d at 797 (*citing Thorner v. Sony Comput. Entm't Am. LLC*, 669, F.3d 1362, 1367 (Fed. Cir. 2012)). Instead, the statements in the specification simply describe NAVSAD and PSAD embodiments as calculating a relationship between microphones (but not describing any "filter" let alone the claimed "filter"), and distinguishing these embodiments from conventional arrays that use the time/phase difference for each microphone (but not referencing any "delay filter").

These are not "clear and unmistakable" statements narrowing the claimed "filter" to require "alter[ing] a signal based on the non-temporal components of relative responses to speech." Absent such "clear and unmistakeable" language, the specification's statements do not meet the "exacting" standard required to limit the scope of the claims to the narrowed language. *Id.* at 798 (citing *Thorner*, 669 F.3d at 1366-67); *see also Intellectual Ventures I LLC v. T-Mobile USA, Inc.* 902 F.3d 1373, 1378-79 (Fed. Cir. 2018) ("Disavowal is an exacting standard under which it

must be established that the patentee demonstrated an intent to deviate from the ordinary and accustomed meaning of a claim term through expressions of manifest exclusion or restriction.") (internal quotes and citations omitted).

b. No implied disavowal

There is also no implied disavowal, as PO argues. *See* POR, 18. According to PO, there is implied disavowal to narrow the claimed "filter" to the β filter because of the mere fact that every embodiment uses the β filter. *Id.*, 18-21. What PO does not address, however, is that every embodiment also uses other filters (the delay and α filters) that also meet the claimed "filter." Indeed, every teaching in the patent uses the β filter not in isolation, but together with the delay and α filters. The patent's description of three filter embodiments is not a reason to narrow the claimed "filter" to only the β filter. *See GE Lighting Sols., LLC v. AgiLight, Inc.*, 750 F.3d 1304, 1309 (Fed. Cir. 2014) ("disavowal requires that the specification or prosecution history make clear that the invention does not include a particular feature.") (internal quotes and citations omitted).[2]

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[2] PO relies on *August Tech.*, but that case is inapplicable here. *See* POR, 21. In *August Tech.*, it was improper to construe the claim term "plurality of wafers" to include a single wafer when the specification disclosed both single and multiple wafer embodiments. *August Tech. Corp. v. Camtek, Ltd.*, 655 F.3d 1278 (Fed. Cir.

Even if the β filter were the only filter described in the patent, "[a] patent that discloses only one embodiment is not necessarily limited to that embodiment," and it is "improper to read limitations from a preferred embodiment described in the specification—even if it is the only embodiment—into the claims absent a clear indication in the intrinsic record that the patentee intended the claims to be so limited." *Id.* (citations omitted).

PO relies on the *Techtronic* decision as supporting its position that there is implied disavowal. POR, 18-19 (citing *Techtronic Indus. Co. v. Int'l Trade Comm'n*, 944 F.3d 901 (Fed. Cir. 2019)). But the facts here are distinguishable. First, in *Techtronic*, the specification "in each of its sections, discloses as the invention a garage door opener improved by moving the passive infrared detector from the head unit to the wall console." *Techtronic*, 944 F.3d at 907. The same is not true here, where the patent, rather than emphasizing improvements stemming from the β filter specifically, discloses all three filters (α, β, and delay filters) as part of each and every embodiment. *See, e.g.*, Ex. 1001, Figs. 2-4, 5:20-6:59. Second, in *Techtronic*, the background section explained "the prior art taught the use of passive infrared

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2011). Here, every teaching in the patent involves all three filters. PO's proposed construction improperly narrows the claimed filter to the β filter, despite the patent also disclosing the α and delay filters as meeting the term.

detectors in the head unit of the garage door opener to control the garage's lighting, but that locating the detector in the head unit was expensive, complicated, and unreliable." *Techtronic*, 944 F.3d at 907-08. Here, there is no similar disparaging of the delay filter (or any filter), and PO points to none.

As PO acknowledges, the β filter is never presented in isolation (*see* POR, 19), as it always operates together with the α and delay filters. *See, e.g.*, Ex. 1001, Figs. 2-4, 5:20-6:59. The fact that β is always presented together with the delay filter exactly undermines PO's argument that the claimed "filter" must be limited to β (and exclude the delay filter).

PO's reliance on *Ventana* is inapposite because that decision actually supports Petitioner's position. *See* POR, 19-20 (quoting *Ventana Med. Sys., Inc. v. Biogenex Labs., Inc.*, 473 F.3d 1173, 1181 (Fed. Cir. 2008). In *Ventana*, as PO points out, it was "improper to limit the claim to other, unclaimed features" even when the preferred embodiments in the specification were so limited. *Id.* This is because "the inventors were not required to claim this feature… and, indeed, did not do so." *Id.* (emphasis omitted). Similarly here, it would be improper to limit the claims to the β filter when both the delay and α filters each individually meet the claim language. The inventors were not required to, and indeed did not, limit the claims to the β

filter.[3]

Thus, "absent a clear disavowal or alternative lexicography by a patentee, he or she is free to choose a broad term and expect to obtain the full scope of its plain and ordinary meaning." *Wasica Fin. GmbH v. Cont'l Auto. Sys., Inc.*, 853 F.3d 1272, 1282 (Fed. Cir. 2017) (internal quotations and citation omitted).

3. PO's new proposal is unsupported in the record

PO now rewrites its proposed construction to get around Petitioner's pre-institution arguments that the patent's delay filter met PO's previous proposal.[4] The

[3] PO's position that the patent clearly disavows "a delay-based method" (POR, 15) is contrary to the teachings of the patent—the delay filter and the simplification of the β filter to a delay. It is also contrary to PO's own statement that its construction "allows for the unclaimed delay or calibration filters" (POR, 19).

[4] PO narrows its previous construction by newly requiring "non-temporal components of relative responses." But as confirmed with testimony from PO's expert, PO also broadens its previous construction by removing the requirement that the filter must "alter[] the magnitude" of the signal, instead now only requiring "alter[ing]" any aspect of the signal, including magnitude or phase. Ex. 1020, 51:2-11.

fact that PO still struggles to define this term only confirms that its current proposal has no basis in the record.

PO's Previous Construction	**PO's Current Construction**
"A filter that alters **the magnitude of a signal based on the** relative responses to speech of the first and second physical microphones" (POPR, 10) (emphasis added)	"A filter that alters **a signal based on the non-temporal components of** relative responses to speech of the first and second physical microphones" (POR, 13) (emphasis added)

PO points to no support in the specification for its current proposal, as there is none. Nowhere do the terms "temporal" (let alone "non-temporal components") or "relative responses" appear anywhere in the specification. PO tries to rewrite the claimed filter to exclude the patent's delay filter and inject the β filter. But even if it was proper to insert the β filter into the claims, the patent does not describe the β filter using the proposed language, nor does PO cite any language in the specification supporting its proposal. *See Source Vagabond Sys. V. Hydrapak, Inc.*, 753 F.3d 1291, 1299-300 (Fed. Cir. 2014) (rejecting proposal to add words to the claim language, without support from the patent, that would have altered otherwise unambiguous claim language).

Moreover, the language in PO's proposed construction should be rejected because it is redundant with other claim limitations. Dr. Sayeed acknowledged this

multiple times during his deposition: (1) stating the "responses to speech of the first and second microphones" refers to the first and second signals received from the physical microphones, which are separately recited in the claim (Ex. 1020, 26:4-19), and (2) stating that altering a signal means that the filter is applied, which is separately recited in the claim (*id.*, 50:16-19). Accepting PO's construction would therefore "render some portion of the claim language superfluous [which is] disfavored." *Akzo Nobel Coatings, Inc. v. Dow Chem. Co.*, 811 F.3d 1334, 1340 (Fed. Cir. 2016) (internal quotes and citation omitted).

Finally, PO points to dependent claims 7 and 32 (applying a delay) and dependent claims 6 and 31 (applying a calibration) as support for its position that there is disavowal for the claimed "filter." POR, 20-22. But these dependent claims merely confirm that the processing described in the independent claim is broad enough to include delay and calibration filters, not that the claimed "filter" in the independent claims must exclude the delay filter. *See Littelfuse, Inc. v. Mersen USA EP Corp.*, 29 F.4th 1376, 1380 (Fed. Cir. 2022) ("By definition, an independent claim is broader than a claim that depends from it, so if a dependent claim reads on a particular embodiment of the claimed invention, the corresponding independent claim must cover that embodiment as well.").

III. GROUND 1: AVENDANO AND AVENDANO/VISSER COMBINATION MEET THE CLAIMS

A. Avendano's Delay Node Is The Claimed Filter (Independent Claim 1)

PO's sole argument challenging the Petition's mapping to Avendano's delay node is based on its claim construction arguments. POR, 24-26. As explained in the Petition, and as PO and its expert confirms, Avendano's delay node teachings align with the patent's description of the β filter (when it reduces to a simple delay) as well as the delay filter. *Compare* Pet., 25-27 (Ex. 1003 ¶¶133-138) *with* POR, 25 (confirming that Avendano's temporal relationship is "exactly the relationship" described by the patent's delay).[5] Thus, there is no dispute that Avendano's delay node would meet the claimed filter if the Board were to determine that the claimed filter includes the β filter (including when it reduces to a simple delay, *see* Section

[5] PO alleges that Avendano's gain cannot be the claimed relationship filter because "it is simply a gain that matches signal strengths." POR, n.3. However, Avendano's gain is the same as the fixed β teaching in the patent, which applies a fixed gain based on the distances from the microphones and, as PO acknowledges, "adjusts the signal to account for the relative strengths of the signal." *See* POR, 17 (depicting a fixed β(z) as a simple gain based on the distances between each microphone and the user's mouth: $\frac{d_1}{d_2}$).

II.A.1, *supra*) or the delay filter. As PO raises no other arguments for this mapping, the claims would then be unpatentable.

B. Combination of Avendano with Visser Renders Obvious The Claimed Filter (Independent Claim 1)

The proposed combination of Avendano with Visser would not "result in numerous errors," as PO alleges. *See* POR, 26. In order to find these alleged errors, PO mischaracterizes the Petition's combination as omitting Visser's VAD, which "cause[s] the filters to adapt continuously, regardless of whether speech is occurring." POR, 29. This is not the proposed combination, and PO's arguments are irrelevant and should be rejected.

Contrary to PO's contention, the Petition explicitly referred to Visser's VAD multiple times. In the description of the combination of Avendano with Visser, the Petition referenced Visser's VAD by stating Visser "identif[ies] voice activity" (Pet., 16; Ex. 1003 ¶¶102-104) and describing the operation of Visser's VAD (Pet., 18; Ex. 1003 ¶109). In the mapping for the claimed "filter" in [1b], the Petition referenced the section describing the combination (Pet., 27) and also explicitly "incorporate[d] Visser's 'ICA or BSS processing function' into Avendano's system." Pet., 27; Ex. 1003 ¶¶139-144. Moreover, in summarizing Visser, the Petition repeatedly referenced Visser's VAD 106 as generating a control signal for activating the signal separation process (Pet., 13-14 (reproducing Visser's Fig. 1

depicting the VAD); Ex. 1003 ¶¶68-72) and determining the presence of speech (Pet., 15; Ex. 1003 ¶¶73-77).

As Dr. Kenny[6] further clarified during his deposition, "the components of Visser that I rely upon for my opinions are associated with Figure 10," which includes "the description of… components around [the cross filters]." Ex. 2004, 59:13-61:4. As Visser makes clear, the components around the cross filters include the VAD. *See, e.g.*, Ex. 1006, Fig. 1, 8:27-47 (describing the VAD as "enhanc[ing] stability, increas[ing] separation effectiveness, and reduc[ing] power consumption"). Dr. Kenny further testified that "[j]ust to be clear though, [a POSITA] would read the entirety of Visser and think about what's taught in Visser when thinking about ways that one might combine the features." Ex. 2004, 61:21-62:12.

[6] PO misleadingly cites Dr. Kenny's testimony to support its contention that the proposed combination excludes Visser's VAD. POR, 28 (citing Ex. 2004, 59:5-61:4, 61:14-63:6). But a review of the transcript confirms that Dr. Kenny did not testify that the proposed combination excludes Visser's VAD. Instead, Dr. Kenny testified that the combination includes "components around" the cross filters (Ex. 2004, 59:13-61:4), which include the VAD.

Even if PO is correct that the combination excludes Visser's VAD, the combination at minimum would still include Avendano's VAD. Pet., 17 (discussing the combination as including Avendano's "determin[ing] the presence of speech" using the ratio (ILD) between energy levels); Ex. 2004, 25:20-26:20 (Dr. Kenny describing Avendano's VAD as the energy and ILD modules). As the Petition established, Visser's VAD "us[es] principles similar to those taught by Avendano" because both VADs "determine[] the presence of speech based on two processed signals." Pet., 18. Therefore, even in the absence of Visser's VAD, the adaptation of Visser's cross filters would have been controlled based on Avendano's VAD, which operates similarly to Visser's VAD. PO's allegation of "numerous errors" is premised on a missing VAD from the combination. POR, 26-30. Thus, with Avendano's VAD (even without Visser's VAD), there is no continuous adaptation, and PO's alleged errors would not arise. Therefore, PO's arguments should be rejected.

PO's final argument that Petitioner and Dr. Kenny performed a hindsight-based search (POR, 29-30) is unfounded. There is no hindsight bias where, as here, the analysis "takes into [] account only knowledge which was within the level of ordinary skill at the time the claimed invention was made." *In re McLaughlin*, 58 C.C.P.A. 1310, 1313 (C.C.P.A. 1971). The Petition as well as Dr. Kenny's statements and testimony are all based on the knowledge of a POSITA "at the time

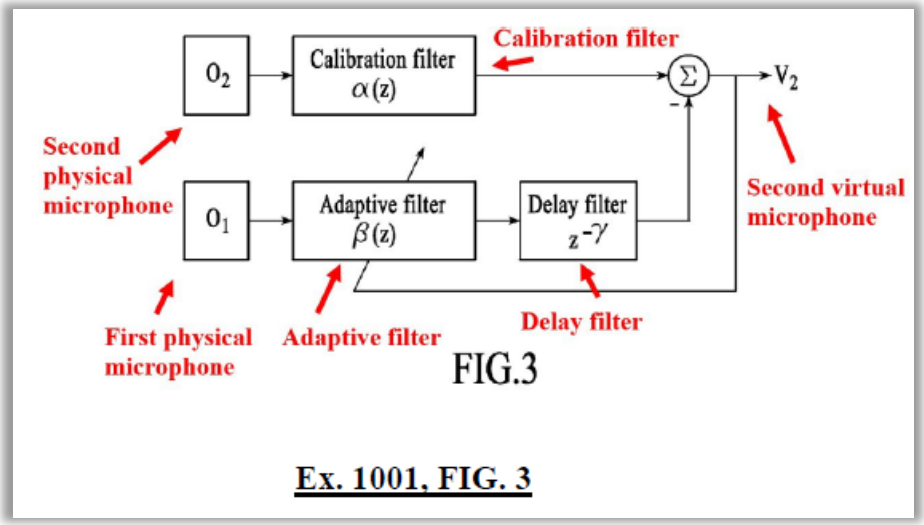
[] the invention was made (not today)" (*see* Ex. 1003 ¶24), and therefore cannot be the result of hindsight bias.

C. Avendano's Delay Node or Visser's Cross Filter Applies A Delay (Dependent Claim 7)

PO's only remaining argument for Ground 1 relates to dependent claim 7, which requires "applying a delay to the first intermediate signal." POR, 30-31. According to PO, the Petition's first mapping of the claimed "first intermediate signal" to Avendano's delay node output is a "contradiction" because the same block in Avendano applies the claimed filter and delay. POR, 31. PO's interpretation is overly narrow, ignores the explicit claim requirements, and is unsupported by the specification.

What PO fails to recognize is that independent claim 1 (and patent's teachings) require the claimed "first intermediate signal" to have the same alleged "contradiction" as the Petition's mapping. Specifically, claim 1 requires that the "first intermediate signal" is summed with the second signal. The only possible support for this in the patent is in Figs. 2-3 (and their associated text), which depict

the signal that is summed is the output of the delay filter (not the input), and therefore exists only after the delay has been applied.[7]



Pet., 6; Ex. 1003 ¶¶42-49. Thus, just as in Avendano, the same delay filter block in the patent applies both the claimed filter and delay. Avendano's teaching (and the Petition's mapping) is therefore consistent with the teachings in the patent.

PO next argues that the Petition's alternative mapping of the claimed "first intermediate signal" to the output of Visser's cross filters "has the same flaw." POR, 31-32. But PO fails to acknowledge the Petition's reference to Visser's description of its cross filters as "gain factors with only one filter coefficient per filter, for example, a delay gain factor." Pet. 38 (emphasis omitted). In other words, similar

[7] In the patent, the output of β cannot be the "first intermediate signal" because that output is not summed with another signal, as required by independent claim 1.

to Avendano's delay node, Visser's cross-filter applies both the claimed "filter" and the claimed "delay," which is again consistent with the teachings of the patent for the same reasons.[8]

Therefore, the prior art combination meets this limitation.

IV. GROUND 2: VISSER'S CROSS FILTER MEETS CLAIM 9

PO presents no additional substantive arguments for Ground 2, except for dependent claim 9[9], which requires "applying the filter to the second signal." POR,

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[8] To the extent that this claim encompasses applying the delay before the filter, the combination with Visser also meets this limitation. As Dr. Sayeed confirmed, Avendano's delay node and Visser's cross filters are both linear systems, and involve simple multiplication in the frequency domain. Ex. 1020, 52:10-18, 55:22-58:7. Thus, the order of Avendano's delay node and Visser's cross filters in the combination could have been swapped without affecting the characteristics of the overall system.

[9] For claim 7, PO alleges the Petition "does not use Bisgaard to add a delay to the intermediate signal, but only to set the amount of delay… before the intermediate signal." POR, 33 (emphasis omitted). In Ground 2, Petitioner relies on a combination with Bisgaard to challenge claims 8-16, 23-24, all of which depend from claim 7. As set forth in the Petition, Bisgaard's delays are similar to

32-36. According to PO, because independent claim 1 requires "applying the filter to the first signal," this claim requires "that the ***same filter*** be applied to ***both*** the first and second signals." POR, 35 (emphasis in original). PO alleges that Visser's cross filters cannot meet this limitation because neither cross filter is applied to both microphone signals (*id.*), but PO's interpretation is overly narrow and unsupported by the specification.

PO's narrow interpretation of the claimed "filter" reads out each and every embodiment in the patent, in which different component filters are applied to the two microphone signals. *See, e.g.*, Ex. 1001, Figs. 2-4 (depicting the β or delay filter applied to the first microphone signal O_1, and the α filter applied to the second microphone signal O_2).[10] Thus, to the extent this claim is supported in the patent,

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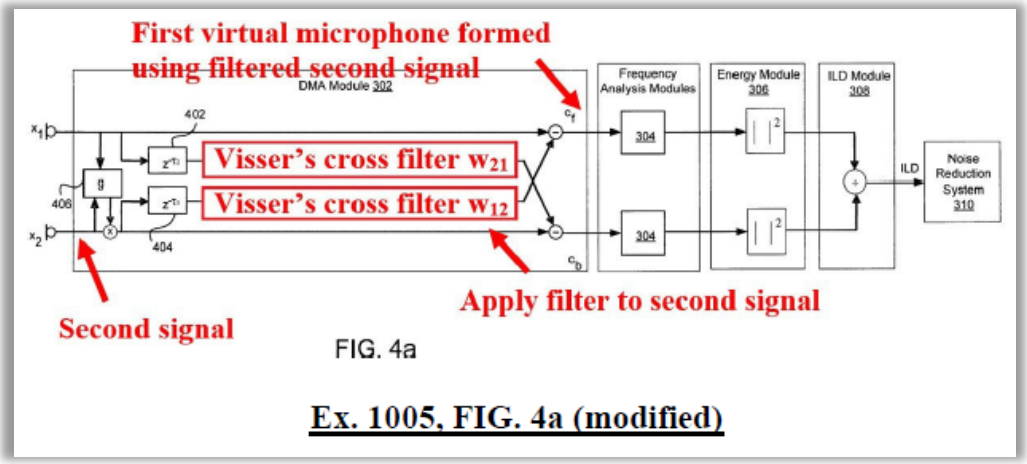
Avendano's delay nodes, are implemented similarly in the combination, and would have overcome PO's alleged deficiencies for claim 7 for the same reasons as discussed for Ground 1. *See* Pet. 41-45.

[10] Fig. 4 depicts the β filter applied to a branch stemming from the second microphone signal O_2, but only after the α filter is first applied. Dr. Sayeed testified that the α filter changes the signal O_2 to give rise to a different signal. Ex. 1020,

the claimed "filter" that is applied to both first and second signals (in claims 1, 9) can only refer to an overall system applying different component filters to the individual signals. Under that interpretation, Visser's cross filters would have met the claimed "filter," as set forth in the Petition for claims 1 and 9.

Even accepting PO's interpretation, Visser's cross filter w_{12} satisfies claim 9.



Ex. 1005, FIG. 4a (modified)

Pet. 48; Ex. 1003 ¶¶231-233. As the combined Avendano and Visser figure makes clear (reproduced above), Visser's cross filter w_{12} operates on a combination of both microphone signals x_1 and x_2. Specifically, both signals x_1 and x_2 are fed into the gain block 406, after which the gain is applied to x_2 and the resulting signal is delayed and input to w_{12}. Therefore, Visser's cross filter w_{12} is a filter that is applied to both the first and second signals, as claimed.

69:12-70:25. Thus, under PO's own interpretation, in Fig. 4, the β filter is not applied to the second microphone signal O_2.

Therefore, the prior art combination meets this limitation.

V. GROUNDS 3-4: THE COMBINATIONS RENDER OBVIOUS THE CHALLENGED CLAIMS

PO's challenges to Grounds 3-4 rely entirely on its challenges to Grounds 1-2. As discussed in Sections II-IV, these challenges fail.

Dated: August 8, 2024

By: /Lisa K. Nguyen/

Lisa K. Nguyen (Reg. No. 58,018)
PAUL HASTINGS LLP
1117 S. California Avenue
Palo Alto, CA 94304
Telephone: 650-320-1800
lisanguyen@paulhastings.com

Counsel for Petitioner Meta Platforms, Inc.

CERTIFICATE OF COMPLIANCE WITH 37 C.F.R. § 42.24

I hereby certify that this Reply complies with the word count limitation of 37 C.F.R. § 42.24(c)(1) because the Reply contains a total of 4,972 words, which is the sum calculated by Microsoft Word's word-count feature. This total excludes the cover page, signature block, and the parts of the Reply exempted by 37 C.F.R. § 42.24(c).

Dated: August 8, 2024

By: /Lisa K. Nguyen/

Lisa K. Nguyen (Reg. No. 58,018)
PAUL HASTINGS LLP
1117 S. California Avenue
Palo Alto, CA 94304
Telephone: 650-320-1800
lisanguyen@paulhastings.com

Counsel for Petitioner
Meta Platforms, Inc.

CERTIFICATE OF SERVICE

The undersigned certifies that a true and correct copy of **PETITIONER'S REPLY TO PATENT OWNER'S RESPONSE** was served via electronic email on Patent Owner's counsel of record listed below, pursuant to its Mandatory Notices, on August 8, 2024:

Alfred R. Fabricant
Peter Lambrianakos
Vincent J. Rubino, III
Enrique W. Iturralde
Richard Cowell
Jacob Ostling
FABRICANT LLP
411 Theodore Fremd Avenue,
Suite 206 South
Rye, New York 10580
Telephone: (212) 257-5797
Facsimile: (212) 257-5796
Email: ptab@fabricant.com

By: / Lisa K. Nguyen/
Lisa K. Nguyen (Reg. No. 58,018)
PAUL HASTINGS LLP
1117 S. California Avenue
Palo Alto, CA 94304
Telephone: 650-320-1800
lisanguyen@paulhastings.com

Counsel for Petitioner
Meta Platforms, Inc.