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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte MATTHEW ALDER, STEVEN PAUL FARRUGIA, CHINMAYEE SOMAIYA, and KRISTIAN THOMSEN[1]

Appeal 2017–004809
Application 13/710,925
Technology Center 3700

Before JENNIFER D. BAHR, WILLIAM A. CAPP, and JILL D. HILL, *Administrative Patent Judges*.

Opinion for the Board filed by Hill, *Administrative Patent Judge*

Opinion Concurring filed by CAPP, *Administrative Patent Judge*

HILL, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Matthew Alder et al. ("Appellants") appeal under 35 U.S.C. § 134(a) from the Examiner's final decision rejecting claims 1–5, 7–18, 20, and 21.[2] We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM.

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[1] Appellants identify the real party in interest as Applicant ResMed Limited. Appeal Br. 1.

[2] Claim 6 and 19 have been canceled. Appeal Br. 24–25 (Claims App.).

BACKGROUND

Sole independent claim 1, reproduced below, illustrates the claimed invention.

> 1. A snoring detection device comprising:
>
> a sensor configured to detect sounds during a breathing cycle; and a processor configured to:
>
> detect a noise level during an inspiration phase of the breathing cycle with said sensor;
>
> detect a noise level during an expiration phase of the breathing cycle with said sensor;
>
> determine an occurrence of a snore based on a difference in the noise levels detected during inspiration and expiration, the difference comprising a subtraction of the noise level during expiration from the noise level during inspiration.

Appeal Br. 23 (Claims Appendix).

REJECTION

I. Claims 1–5, 7–12, 14–18, 20 and 21 stand rejected under 35 U.S.C. § 101 as directed to non-statutory subject matter. Final Act. 7.

II. Claims 7, 18, 20, and 21 stand rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the enablement requirement. Final Act. 9.

III. Claims 7, 8, and 18 stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite. Final Act. 11.

IV. Claims 1–5 and 8–17 stand rejected on the ground of non-statutory double patenting as being unpatentable over claims 1–8 of U.S.

Patent No. 8,365,729 B2 in view of Sullivan (US 5,245,995, iss. Sept. 21, 1993). Final Act. 13.

V. Claims 1–5 and 9–17 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Sullivan and Takeuchi (JP 2-13453 U, pub. Jan. 26, 1990)[3]. Final Act. 15.

VI. Claims 1–5 and 9–17 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Sullivan, Zilberg (WO 2004/066804 A2, pub. Aug. 12, 2004) and Gavish (US 7,850,619 B2, iss. Dec. 14, 2010). Final Act. 18.

VII. Claims 7, 8, 18, 20, and 21 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Sullivan, Takeuchi, and Ariav (WO 2005/120167 A2, pub. Dec. 22, 2005), or in the alternative over Sullivan, Zilberg, Gavish, and Ariav. Final Act. 22.

ANALYSIS

Rejection I: Non-Statutory Subject Matter

Appellants argue all of the claims together in contesting the rejection under 35 U.S.C. § 101. Appeal Br. 4–12. Accordingly, we decide the appeal of this rejection on the basis of claim 1, with claims 2–5, 7–12, 14–18, 20, and 21 standing or falling with claim 1. *See* 37 C.F.R. § 41.37(c)(1)(iv) (permitting the Board to select a single claim to decide the appeal as to a single ground of rejection of a group of claims argued together).

Under 35 U.S.C. § 101, an invention is patent-eligible if it claims a "new and useful process, machine, manufacture, or composition of matter."

[3] We derive our understanding of Takeuchi from the translation contained in the image file wrapper of this application. All references to Takeuchi are to portions of the translation.

35 U.S.C. § 101. The Supreme Court, however, has long interpreted § 101 to include an implicit exception: "[l]aws of nature, natural phenomena, and abstract ideas" are not patentable. *Alice Corp. v. CLS Bank Int'l*, 573 U.S. 208, 216 (2014).

The Supreme Court, in *Alice*, reiterated the two-step framework previously set forth in *Mayo Collaborative Services v. Prometheus Laboratories, Inc.*, 566 U.S. 66 (2012), "for distinguishing patents that claim laws of nature, natural phenomena, and abstract ideas from those that claim patent-eligible applications of those concepts." *Alice Corp.*, 573 U.S. at 217. The first step in that analysis is to "determine whether the claims at issue are directed to one of those patent-ineligible concepts." *Id.* If the claims are not directed to a patent-ineligible concept, e.g., an abstract idea, the inquiry ends. Otherwise, the inquiry proceeds to the second step where the elements of the claims are considered "individually and 'as an ordered combination"' to determine whether there are additional elements that "'transform the nature of the claim' into a patent-eligible application." *Id.* (quoting *Mayo*, 566 U.S. at 79, 78).

The Examiner determined that the claims, considering all elements both individually and in combination, do not amount to significantly more than the abstract idea of "detecting noise/snoring." Final Act. 7–8. The Examiner further determines that any additional elements, or combination(s) thereof, amount to no more than a "recitation of generic computer structure" (e.g., a sensor, a processor) performing "generic computer functions that are well-understood, routine, and conventional activities previously known to the pertinent industry," and thus fail to "provide meaningful limitation(s) to

transform the abstract idea into a patent eligible application of the abstract idea." *Id.* at 8.

The Examiner notes, however, "that claim 13 is not rejected under 35 U.S.C. 101 because it connects the generic processor performing the abstract idea of noise/snore detection to a CPAP blower such that the blower motor can be adjusted as a result of the noise/snore detection to result in a change in therapy." *Id.*

Appellants argue that the Examiner fails to "include any valid rationale to demonstrate that what is claimed is even partially abstract." Appeal Br. 4 (citing *Enfish LLC v. Microsoft Corp.*, 822 F. 3d 132 (Fed. Cir. 2016)). Appellants contend that their claimed "technological improvement concerns 'a simplified method for identifying a snore in a CPAP device," which is "achieved by detecting the noise level from an appropriate sensor in the device and taking advantage of the fact that the noise from snoring occurs only during" inspiration. *Id.* at 5 (citing Spec. ¶ 10). Appellants explain that by "partitioning noise levels in relation to a user's breathing cycle with the claimed sensor, claim 1 recites a specific and practical device that may be used to effectively identify the user's snoring," such that "claim 1 goes far beyond being merely a device for 'general noise detection'" by applying technology components "to detect certain real world practical and particular events (the occurrence of a snore)." *Id.* at 7–8. Thus, Appellants' argue, the claimed noise detection is not an abstract idea, but rather "something that is quite technologically real." *Id.* at 6 (because the claimed detector "is capable of detecting a real world occurrence - i.e., a sound event or the noise level from it," noise detection cannot be an abstract idea).

Appellants further argue that their claims "are of a specific configuration that improve[s] the ability of processors in respiratory detection and treatment devices to detect the occurrence of snoring" by "partitioning and comparing [] noise levels" so that the processor can "detect snoring in a less technically complex way," thus improving the functioning of the processors and rendering them "non-generic by nature of their particular respiratory related detection abilities and functions." *Id.* at 10 (emphasis omitted).

The Examiner responds that claim 1's detection steps are conventional data gathering steps, with data being generated by a conventional sound detecting sensor, and the claimed detecting and determining are performed by a conventional processor performing functions "that are well-understood, routine, and conventional activities previously known to the pertinent industry." Ans. 5–6.

The PTO recently published revised guidance on the application of § 101. USPTO's January 7, 2019 Memorandum, *2019 Revised Patent Subject Matter Eligibility Guidance* ("2019 Guidance Memorandum"). Under that guidance, in conducting step one of the *Alice* framework, we first look to whether the claim recites:

> (1) any judicial exceptions, including certain groupings of abstract ideas (i.e., mathematical concepts, certain methods of organizing human interactions such as a fundamental economic practice, or mental processes); and
>
> (2) additional elements that integrate the judicial exception into a practical application (*see* MPEP § 2106.05(a)–(c), (e)–(h)).

Step 1, Prong 1

The 2019 Guidance Memorandum identifies three key concepts identified as abstract ideas: (a) mathematical concepts including "mathematical relationships, mathematical formulas or equations, mathematical calculations"; (b) certain methods of organizing human activity, such as "fundamental economic principles or practices," "commercial or legal interactions," and "managing personal behavior or relationships or interactions between"; and (c) mental processes including "observation, evaluation, judgment, [and] opinion."

Here, Appellants' claims are directed to a system including a sensor for sensing sounds during a breathing cycle, and using an alleged non-conventional approach (isolating a sensed noise level during an inspiration phase of a breathing cycle from a sensed noise level during an expiration phase of the breathing cycle) to detect snoring — the approach being non-conventional because the sensed parameters (noise level during inspiration phase and noise level during expiration phase) are the only sensed data necessary to detect snoring, rather than a modeling of all sources of noise. Spec. ¶ 8–10. According to Appellants, this snore detection approach requires less complex calibration/calculation, reducing device cost. *See id.*

Thales Visionix Inc. v. United States, 850 F.3d 1343 (Fed. Cir. 2017) also analyzed whether a system employing sensed data was directed to statutory subject matter. In *Thales*, the Federal Circuit determined that a system for tracking motion of an object via a first inertial sensor on a moving object, a second inertial sensor on a moving reference frame, and an element adapted to receive signals from the inertial sensors and determine an orientation of the object relative to the moving reference frame, was not

directed to an abstract idea. *See Thales*, 850 F.3d at 1348–49. The court in *Thales* based its determination on the fact that the claimed system used its inertial sensors in a *non-conventional manner* to determine the relative position and orientation of a moving object on a moving reference frame. *Id.* Consideration of *Thales* informs us that the "non-conventional manner" referred to by the court speaks to the "unconventional choice of reference frame" and "unconventional configuration of sensors" (one sensor located on the moving object and one sensor located on the reference frame) rather than to processing of data from the sensors. *Id.* at 1349.

Unlike *Thales*, Appellants' claims employ a sensor in a generic and ordinary way, and for an ordinary purpose, such that Appellants' improvement is purely in the abstract idea of sensing a snore. Such sound sensing falls into the abstract idea category of mental processes including observation, evaluation, judgment, and opinion.

Step 1, Prong 2

We next consider whether the claimed snore detection system includes additional elements that integrate the judicial exception into a practical application. The Examiner finds that the claimed sensor and processor perform "generic computer functions that are well-understood, routine, and conventional activities previously known to the pertinent industry," failing "to transform the abstract idea into a patent eligible application of the abstract idea." Final Act. 8.

The sensor and processor are both recited in a generic manner. We find no indication in Appellants' Specification, nor do Appellants direct us to any indication, that the claimed invention is implemented using other than a generic sound sensor and generic processor to perform generic sound

detection and generic computer functions, respectively. The operations (detecting noise levels during inspiration and expiration with the sensor, and determining an occurrence of a snore based on the result of subtracting the noise level during expiration from the noise level during inspiration) performed by the processor are merely generic computer functions of receiving data and performing a simple mathematical operation (subtraction) on the received data. Thus, the claimed invention does not improve the functioning of the computer (processor) or the sensor and does not use a particular, or special, machine. In other words, the claims "are not tied to any particular novel machine or apparatus" capable of rescuing them from the realm of abstraction. *See Ultramercial, Inc. v. Hulu*, LLC, 772 F.3d 709, 716 (Fed. Cir. 2014).

Claim 1 does not recite taking any action in response to determining the occurrence of a snore. *Compare* Appeal Br. 23 (Claims Appendix, Claim 1), *with id.* at 24 (Claim 13 (reciting a CPAP device with the snoring detection device connected to the speed control means of the motor for adjustment of the motor speed in response to a signal indicative of a snore value from the determination of the occurrence of a snore). In other words, claim 1 does not recite a transformation of a particular article to a different state or thing.

In summary, we do not find anything of record, short of attorney argument, which attributes any improvement in computer technology and/or functionality to the claimed invention, or otherwise indicates that the claimed invention integrates the abstract idea into a "practical application," as that phrase is used in the USPTO's "2019 Revised Patent Subject Matter Eligibility Guidance," 84 Fed. Reg. 50, 55 (January 7, 2019).

Step 2

Turning to step two of the *Mayo/Alice* framework, we are not persuaded that the Examiner erred in determining that the elements of claim 1, considering all elements both individually and in combination, do not amount to significantly more than the abstract idea of "detecting noise/snoring." *See* Final Act. 7–8.

Appellants attempt to analogize claim 1 to the claims in *Enfish, LLC v. Microsoft Corp.*, 822 F.3d 1327 (Fed. Cir. 2016). Appeal Br. 4–6. In *Enfish*, the court found that "the self-referential table recited in the claims on appeal is a specific type of data structure designed to improve the way a computer stores and retrieves data in memory." *Id.* at 1339. The court found they were "not faced with a situation where general-purpose computer components are added post-hoc to a fundamental economic practice or mathematical equation," but "[r]ather, the claims are directed to a specific implementation of a solution to a problem in the software arts." *Id.* The question becomes whether the claims as a whole "focus on a specific means or method that improves the relevant technology" or are "directed to a result or effect that itself is the abstract idea and merely invoke[s] generic processes and machinery." *McRO, Inc. v. Bandai Namco Games Am. Inc.*, 837 F.3d 1299, 1314 (Fed. Cir. 2016). For the reasons discussed above, Appellants' claim 1 falls into the latter category—claim 1 merely invokes generic processes and machinery (generic sensor and processor) to achieve the result (detecting snoring) that is itself the abstract idea.

Appellants' attempt to analogize claim 1 here to the claims in *SiRF Technology Inc. v. ITC*, 601 F.3d 1319, 1333 (Fed. Cir. 2010) is similarly inapposite. *See* Appeal Br. 8–9. The court in *SiRF* stated:

> [i]n order for the addition of a machine to impose a meaningful limit on the scope of a claim, it must play a significant part in permitting the claimed method to be performed, rather than function solely as an obvious mechanism for permitting a solution to be achieved more quickly, i.e., through the utilization of a computer for performing calculations.

SiRF, 601 F.3d at 1333.

Here, as the Examiner explains, the claimed "sensor" is used simply for extra-solution data gathering, and is recited and described as a generic noise detector, such as a microphone, and the claimed "'processor' could just as easily be fed any electrical signal(s) corresponding to 'noise level/sounds during a breathing cycle' and arrive at the same result." Ans. 6–7. The Examiner contrasts the invention of claim 1 from the claim in *SiRF*, which was directed to calculating the absolute position of GPS receiver, emphasizing that "the position of the GPS receiver is essential to the method because it affects the outcome thereof (for instance, signals corresponding [to] the position of a receiver A could not be used by the method to calculate the position of a receiver B)." *Id.* at 7; *see SiRF*, 601 F.3d at 1332.

Claim 1 merely recites a generic means of gathering data (i.e., sounds) and a generic processor for analyzing the received data (by subtracting some of the data from other data) and then outputting a result (determination of occurrence of a snore). We agree with the Examiner that the recited sensor and processor behave as expected according to their ordinary use (Final Act. 8), and therefore cannot confer patent eligibility on an otherwise ineligible claim.

As very succinctly pointed out on pages 2–3 of the concurring opinion:

> [S]noring is an auditory phenomenon that is readily detectable by the human sensory modality of hearing. In that regard, the invention of claim 1 is little more than an attempt to automate what a human listener can accomplish when in close proximity to a sleeper. The Examiner is correct that claim 1 is nothing more than a generic listening device that subtracts softer sound amplitudes from louder sound amplitudes and then uses a generic processor to perform routine calculations and logic operations. The deduction that a "snore" has occurred is merely a logical deduction derived from a simple subtraction calculation in connection with a host of unclaimed assumptions regarding the environment in which the sound measurements are taken.

For the above reasons, the recited elements of claim 1, considered individually and as an ordered combination, do not constitute an "inventive concept" that transforms independent claim 1 into patent-eligible subject matter. *See Alice*, 134 S. Ct. at 2355. On this record, we affirm the Examiner's § 101 rejection of claim 1, as well as claims 2–5, 7–12, 14–18, 20, and 21, which fall with claim 1.

Rejection II: Enablement

The Examiner determined that Appellants' Specification "fails to describe what value/parameter the claimed 'time constant' represents, particularly in relation to the inspiration/expiration noise levels, or how a time constant for filtering in the determination of the inspiratory snore value and . . . the expiratory snore value are to be determined or calculated." Final Act. 9. According to the Examiner, because Appellants' Specification "also does not disclose how inspiration and expiration periods are detected/defined," a skilled artisan would not be able to "guess what these time constants represent, or how the time constants might be defined/calculated." *Id.*

Insofar as the enablement requirement is concerned, the dispositive issue is whether an applicant's disclosure, considering the level of ordinary skill in the art as of the date of the appellant's application, would have enabled a person of such skill to make and use the appellant's invention without undue experimentation. *See In re Strahilevitz*, 668 F.2d 1229, 1232 (CCPA 1982). In calling into question the enablement of an applicant's disclosure, the examiner has the initial burden of advancing acceptable reasoning inconsistent with enablement so as to shift the burden to the appellant to show that one of ordinary skill in the art could have practiced the claimed invention without undue experimentation. *Id. See also In re Wright*, 999 F.2d 1557, 1561-62 (Fed. Cir. 1993) (when rejecting a claim for lack of enablement, the PTO bears the initial burden of setting forth a reasonable explanation as to why the scope of the claim is not adequately enabled by the description provided in the specification).

There are multiple factors to be considered when determining whether there is sufficient evidence to support a determination that a disclosure does not satisfy the enablement requirement — the factors include, but are not limited to: (A) breadth of the claims; (B) nature of the invention; (C) state of the prior art; (D) level of one of ordinary skill; (E) level of predictability in the art; (F) amount of direction provided by the inventor; (G) existence of working examples; and (H) quantity of experimentation needed to make or use the invention based on the content of the disclosure. *See In re Wands*, 858 F.2d 731, 737 (Fed. Cir. 1988).

The Examiner finds that Appellants' Specification "provides no instruction on how to select two <u>different</u> 'time constraints', or how they are to be/can be 'adjusted such that the treatment pressure does not cause false

snore detection.'" Ans. 8. Appellants contend that such filtering time constants were well understood by those of ordinary skill in the art, citing references as evidence thereof, and submit that their Specification sufficiently describes the distinction between the filtering time constants for inspiratory and expiratory noise that one of ordinary skill in the art would understand how to adjust them so as to avoid false snore detection. Appeal Br. 13–14. The Examiner has not met the initial burden of setting forth a reasonable explanation as to why a person having ordinary skill in the art would not have understood the function of time constants in filtering the detected inspiratory and expiratory signals and how to use and adjust them to eliminate false snore detection.

Thus, we are not persuaded that the "time constant" limitations lack enablement, and we therefore do not sustain Rejection II.

Rejection III: Definiteness

Regarding claims 7 and 18, the Examiner determined that "it is unclear what value/parameter 'time constant' describes in relation to the inspiration/expiration noise levels." Final Act. 11. Regarding claim 8, the Examiner determined that it is unclear which parameters from claims 1 and 5 correspond with the claim term "filter[ed] noise levels." *Id.* at 11–12.

Appellants argue that the test for enablement is whether one skilled in the art could make or use the invention from the patent disclosure, without undue experimentation. Appeal Br. 12 (citing *United States v. Telectronics*, Inc., 857 F.2d 778, 785 (Fed. Cir. 1988)). Under this standard, Appellants argue, the disclosure may "omit details to the extent that these could be gleaned from background knowledge or through experimentation." *Id.* According to Appellants, one skilled in the art would be able to "use

common background knowledge regarding the engineering concepts of filtering in order to implement claims 7 and 18 without undue experimentation." *Id.* Appellants further contend that "the claims make the determination of the time constant *quite simple* in that it must at least be a time constant for filtering in the determination of the inspiratory snore value during inspiration greater than a time constant for filtering in the determination of an expiratory snore value during expiration." *Id.* at 13.

Appellants further argue that they have presented evidence that the meaning of the term "time constant" is commonly understood in the context of filtering. *Id.* (citing https://en.wikipedia.org/wiki/Low-pass_filter).

A decision regarding whether a claim is indefinite requires a determination of whether one skilled in the art would understand what is claimed when the claim is read in light of the specification. *See Power-One, Inc. v. Artesyn Techs., Inc.*, 599 F.3d 1343, 1350 (Fed. Cir. 2010); *Orthokinetics, Inc. v. Safety Travel Chairs, Inc.*, 806 F.2d 1565 (Fed. Cir. 1986). The Examiner's rejection of claims 7 and 18 does not appear to take into account the understanding of the skilled artisan, as required for a determination of indefiniteness, and we therefore do not sustain the rejection of claims 7 and 18 as indefinite.

With respect to claim 8, Appellants explain:

> Claim 1 recites "a difference in the noise levels detected during inspiration and expiration" and claim 5 recites "the noise level during the inspiration phase is used to determine an inspiratory snore value during inspiration by filtering, and the noise level during the expiration phase is used to determine an expiratory snore value during expiration by filtering."

Appeal Br. 14. Thus, claims 1 and 5 provide clear antecedent basis for "filtered noise levels" and for "a difference between filtered noise levels"

in claim 8. Accordingly, we do not sustain the rejection of claim 8 as indefinite.

Rejection IV: Double Patenting

Appellants do not address the pending double patenting rejection, which we therefore summarily sustain.

Rejection V: Obviousness – Sullivan and Takeuchi

Claim 1 recites, *inter alia*, "a processor configured to . . . determine an occurrence of a snore based on a difference in the noise levels detected during inspiration and expiration, the difference comprising a subtraction of the noise level during expiration from the noise level during inspiration." We understand the claim term "noise level" to refer to an amplitude of the noise, rather than a frequency of the noise. The Examiner and Appellant appear to use the term in a manner consistent with our understanding throughout the record before us.

The Examiner finds that Sullivan discloses, *inter alia*, a CPAP device with a snore detector comprising "a pressure sensor that is a microphone" to detect breathing sounds, and a processor for detecting noise levels during an inspiration phase and an expiration phase of a breathing cycle "with said sensor." Final Act. 15 (citing Sullivan 4:46, 9:42–43, 8:65–10:46). The Examiner finds that Sullivan also discloses "determining and signaling the occurrence of a snore by subtracting a generic frequency for wind noise (i.e. intrinsic device noise value/expiratory snore value) from a sound signal comprising snoring, breathing and intrinsic device noise . . . using a lowpass filter." *Id.* at 15–16 (citing Sullivan 5:28–29 (referring to a pressure

transducer "to detect and produce a signal or signals responsive to snoring"), 13:25–27 ("the high frequency wind noise is eliminated and signals indicative of snoring and breathing are obtained.")); *see* Fig 9 (illustrating high frequency wind noise relative to snore).

The Examiner finds that Sullivan does not disclose the inspiratory snore value being "determined by filtering the noise level detected specifically during the inspiration phase" and the intrinsic device noise value/expiratory snore value being "determined by filtering the noise level detected specifically during the expiration phase," and therefore Sullivan's "intrinsic device noise value/expiratory snore value includes not only wind noise, but also other persistent device and/or environmental noises as well as (expiratory) sounds of breathing, such that the subtraction of the intrinsic device noise value/expiratory snore value removes these additional noise sources." *Id.* at 16–17.

The Examiner then finds that Takeuchi discloses that it was "known in the art of snore detection . . . that snoring sounds typically produce a high noise level, even after band pass filtering, specifically during inspiration." *Id.* at 17 (citing Takeuchi p. 2, ll. 11–18; p. 6, ll. 1–7 ("The analogue signal becomes a rectangular signal by extracting [an] analog signal of a predetermined level or more. . . . For standard snoring sounds . . ., this rectangular signal has a HIGH level during inhalation and a LOW level during exhalation" for given time periods.); p. 3, ll. 5–12 (distinguishing snore based on frequency); p. 7 (detecting three snores in 12 seconds causes blower motor to be driven)).

The Examiner concludes that it would have been obvious to modify Sullivan's "snore-detecting CPAP device that subtracts wind noise from

overall noise to isolate snoring noise using a low-pass/band-pass filter" to include, alternatively or additionally, a band-pass filter that determines "intrinsic device noise value/expiratory snore value . . . from specifically the expiratory phase to isolate any constant environmental noise, such as breathing," and to determine "an inspiratory snore value . . . by low-pass filtering noise from specifically the inspiratory phase to isolate any constant environmental noise, such as breathing," so that the combination of Sullivan and Takeuchi teaches determining a snore occurrence "by subtracting the intrinsic device noise value/expiratory snore value (which includes persistent environmental noise, such as breathing) from the inspiratory snore value (which includes persistent environmental noise, such as breathing), . . . to provide a CPAP device" that "precisely detects the snoring sound in various noise environments with fewer malfunctions" by "eliminating not only wind noise, but any persistent environmental noise, such as breathing, from the inspiratory noise level." *Id.* at 17–18 (citing Takeuchi p. 2, ll. 19–22).

Appellants argue, *inter alia*, that neither Sullivan nor Takeuchi discloses the claimed processor configured to "determine an occurrence of a snore based on a difference in the noise levels detected during inspiration and expiration." Appeal Br. 15–16. Appellants argue that Sullivan does not teach the claimed *difference*, instead applying "frequency techniques in a manner that isolates snoring by applying a series of filters to a pressure sensor signal to separate pressure waves at the frequencies of interest." Appeal Br. 16 (citing Sullivan 13:24–27.) Appellants contend that Takeuchi "actually teaches the same methodology that Sullivan teaches . . . a filter to separate the frequency [of snoring] from other sounds . . . ." *Id.* at 19 (italics omitted).

In response, the Examiner clarifies that, although removing a specific frequency by filtering is subtraction, the rejection does not find "that removing a specific frequency from a signal is the same as 'determining a difference of two noise levels . . .'". Ans. 10. The Examiner further clarifies that the basis of the pending rejection is that "Sullivan teaches the basic concept of subtracting intrinsic device noise to determine whether a snore has occurred (which is the same reason for Appellant's claimed difference/subtraction step . . .), and Takeuchi teaches an alternative method for accounting for intrinsic de[v]ice noise that accounts for additional environmental noises." *Id.* at 11. The Examiner also clarifies that the rejection is "based on Takeuchi's teaching that, after a band pass filter, excess (i.e. unsubtracted/remaining) noise still present during inspiration as compared to any excess noise still present during expiration is a means by which snoring can be assessed." *Id.* (citing Final Act. 17 (finding that Takeuchi discloses that it was known in the art of snore detection "that snoring sounds typically produce a high noise level, even after band pass filtering, specifically during inspiration (. . . the analogue signal [after being filtered a band-pass filter and amplified] becomes a rectangular signal by extraction ... for standard snoring sounds ... this rectangular signal has a HIGH level during inhalation, page 6, first para), compared to a low noise level, after band-pass filtering, during expiration (Takeuchi, this rectangular signal. .. has a LOW level during exhalation, page 6, first para).)).

We disagree with the Examiner's assumption that Sullivan's subtracted "high frequency wind noise" includes an expiratory snore value. Nowhere in Sullivan is the "high frequency wind noise" so defined. Indeed, Sullivan identifies the "high frequency wind noise" as being generated by

the air blower rather than the patient, and states that "the air flow rate during inhalation/exhalation and the beginning/end points of the breathing cycle are derived from the very low frequency pressure wave." Sullivan 13:11–12, 5:65–68. Thus, the Examiner erred in determining that Sullivan's subtraction (i.e., elimination) of the high frequency wind noise includes any subtraction of an expiratory snore value. *See* Final Act. 16.

Sullivan discloses a CPAP device that analyzes noise/sound patterns, shown in Fig. 2A, to detect or predict sleep apnea using snore detection via a microphone. *See* Sullivan, Abstract; 9:16–27. To detect snore, certain frequencies of sound sensed by the microphone 11 are filtered out – for example the "HIGH FREQUENCY WIND NOISE" illustrated in Figure 9 – before the patterns are analyzed. *Id.* at 13:10–32; Fig. 9. Sullivan also contemplates amplitude filtering "to effectively ignore all sounds below a particular minimum amplitude" (*id.* at 9:7–13, 13:25–27), although Sullivan does not disclose that exhalation noise is included in the "sounds below a particular minimum amplitude." Rather, Sullivan mentions using an amplitude filter to diminish, specifically, the "effect of blower motor noise." *Id.* at 9:7–10, 13:34–38.

Sullivan determines the onset of sleep apnea by recognizing a particular pattern of snore, for example as shown in sections D and E of Figure 2A. *Id.* at 9:16–32. Sullivan's Figure 2A shows "sound levels obtained using the monitor of the present invention for a patient suffering from sleep apnea" (*id.* at 8:4–6), and Figure 2A is stated to show "sound amplitudes recorded from the snoring detection device 10" (*id.* at 9:3–4). Sullivan appears to take sound amplitude into account in determining both hypopnea and apnea, discussing "breathing sound intensity" in reference to

the hypopnea pattern shown in section D of Figure 2A (*id.* at 9:19–27.13:46–50), and "loud breathing sounds" when describing sleep apnea in section E of Figure 2A (*id.* at 9:28–32, 13:55–59). Subtraction of any kind of exhalation amplitude, however, is not likewise discussed.

Takeuchi discloses a snoring detection device that filters a sound signal (filter 37) to remove certain frequencies, amplifies (amplifier 38) the signal, and detects a filtered, amplified signal of "a predetermined level or more." *See* Takeuchi p. 1, ll. 9–13; p. 5, ll. 19–25. Regarding the filtered, amplified sound signal, Takeuchi "focuse[s] on the cycle of snoring sounds," using "two factors of the cycle of snoring sounds and the number of cycles." *Id.* at p. 2, ll. 19–22; p. 3, ll. 5–12, p. 5, ll. 25–29. The filtered and amplified signal "becomes a rectangular signal by *extraction of the analogue signal* that is of a predetermined level or more." *Id.* at p. 6, ll. 1–2 (emphasis added). This rectangular signal "has a HIGH level during inhalation and a LOW level during exhalation." *Id.* at p. 6, ll. 2–4. Takeuchi, however, does not disclose that the extracted analogue signal includes or represents exhalation noise.

For the reasons explained above, the Examiner has not established that Sullivan or Takeuchi discloses "a processor configured to . . . determine an occurrence of a snore based on a difference in the noise levels detected during inspiration and expiration, the difference comprising *a subtraction of the noise level during expiration* from the noise level during inspiration." We therefore do not sustain the rejection of independent claim 1, or the rejection of claims 2–5 and 9–17, which depend directly or indirectly from claim 1.

Rejection VI: Obviousness – Sullivan, Zilberg, and Gavish

The Examiner makes the same findings regarding Sullivan's disclosure set forth above in Rejection V, again finding that Sullivan discloses the inspiratory snore value being "determined by filtering the noise level detected specifically during the inspiration phase" and the intrinsic device noise value/expiratory snore value being "determined by filtering the noise level detected specifically during the expiration phase," and therefore Sullivan's "intrinsic device noise value/expiratory snore value includes not only wind noise, but also other persistent device and/or environmental noises as well as (expiratory) sounds of breathing, such that the subtraction of the intrinsic device noise value/expiratory snore value removes these additional noise sources." Final Act. 19–20.

The Examiner then finds that Zilberg discloses that "snores are detected specifically in the inspiration portion of a breath (page 43, second full paragraph . . .)" and Gavish discloses (1) filtering sounds during inspiration and determining an inspiratory value therefrom, (2) filtering sounds during expiration and determining an expiratory value therefrom, and (3) using these values to "separate intrinsic device/background noise: from inspiration and expiration." Final Act. 20–21 (citing Gavish 4:24–27, 16:1–25, Figs. 8, 9A, 9B ("in filtering step 310 ... control unit 26 subtracts inspiration spectrum 350 from expiration spectrum 352 to obtain a net spectrum, column 22, lines 13-15"). The Examiner proposes modifying Sullivan's CPAP device such that the "inspiratory snore value is determined by band-pass filtering noise from specifically the inspiratory phase to isolate any constant environmental noise, such as breathing, as well as any snoring as taught by Zilberg and Gavish (since Zilberg teaches that the snoring of Sullivan will be in the inspiratory phase)." *Id.* at 21. The Examiner

contends that this modification would "provide a CPAP device responsive to snoring that takes into account local, potentially variable, background noise when determining whether snoring is occurring (Gavish col. 4, lines 2-10), by . . . eliminating . . . wind noise [and] persistent environmental noise, such as breathing, from the inspiratory noise level." *Id.*

Appellants argue, in addition to the arguments set forth above that Sullivan fails to disclose the claimed processor configured to "determine an occurrence of a snore based on a difference in the noise levels detected during inspiration and expiration" (Appeal Br. 15–16), that Gavish similarly fails to disclose determining a difference in the noise levels detected during inspiration and expiration (*id.* at 20). According to Appellants, Gavish filters a frequency spectrum by subtracting an inspiration frequency spectrum from an expiration frequency spectrum. *Id.*

As explained above in Rejection V, we determine that Sullivan does not teach or suggest determining snore based on a difference in the noise levels detected during inspiration and expiration. The same is true of Gavish. Gavish is directed to breathing pattern determination, and certain embodiments contemplate use of such patterns for detecting sleep apnea. Gavish, Title, 5:51–55. To detect sleep apnea, Gavish monitors breath-by-breath airflow during exhalation. *Id.* at 5:51–56. Gavish's breathing pattern is identified, in relevant part, by the *timing* of expiration and inspiration, with inspiration time contemplated being estimated. *Id.* at 3:64–4:3, 8:1–3, 18:50–54, 19:4–8. Gavish filters background noise from respiration airflow sound signal, and the filtering frequencies f_1 and f_2 are determined as shown in Gavish's Figs. 8, 9A, and 9B. *Id.* at 13:21–31, 16:49–56. Gavish's Figure 8 is a flow chart illustrating how filtering frequencies f_1 and f_2 are

determined, and Figures 9A and 9B show exemplary spectra used in determining the frequencies f_1 and f_2. *Id.* at 15:1–6, 21:32–34, 22:8–16. Although Gavish discloses subtraction, it subtracts an inhalation frequency spectrum from an exhalation frequency spectrum, rather than an exhalation amplitude from an inhalation amplitude. *Id.* at 22:8–30, Figs. 9A, 9B.

Thus, the references – alone or in the proffered combination – do not disclose a processor configured to "determine an occurrence of a snore based on a difference in the noise levels detected during inspiration and expiration" as recited in claim 1. We, therefore, do not sustain the rejection of independent claim 1, or the rejection of claims 2–5, 6–18, 20, and 21, which depend directly or indirectly from claim 1.

Rejection VII: Obviousness – Adding Ariav

Claims 7, 8, 18, 20, and 21 depend directly or indirectly from claim 1. The Examiner does not find that Ariav cures the deficiency of (1) the combination of Sullivan and Takeuchi, or (2) the combination of Sullivan, Zilberg, and Gavish. For this reason, we do not sustain the Rejection VII for the reasons set forth above regarding Rejections V and VI.

DECISION

We AFFIRM the rejection of claims 1–5, 7–12, 14–18, 20 and 21 under 35 U.S.C. § 101 as directed to non-statutory subject matter.

We REVERSE the rejection of claims 7, 18, 20, and 21 under 35 U.S.C. § 112, first paragraph.

We REVERSE the rejection of claims 7, 8, and 18 under 35 U.S.C. § 112, second paragraph.

We AFFIRM the rejection of claims 1–5 and 8–17 on the ground of non-statutory double patenting.

We REVERSE the rejection of claims 1–5 and 9–17 under 35 U.S.C. § 103(a) as unpatentable over Sullivan and Takeuchi.

We REVERSE the rejection of claims 1–5 and 9–17 under 35 U.S.C. § 103(a) as unpatentable over Sullivan, Zilberg, and Gavish.

We REVERSE the rejection of claims 7, 8, 18, 20, and 21 under 35 U.S.C. § 103(a) as unpatentable over Sullivan, Zilberg, Gavish, and Ariav.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv). *See* 37 C.F.R. § 41.50(f).

AFFIRMED

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte MATTHEW ALDER, STEVEN PAUL FARRUGIA, CHINMAYEE SOMAIYA, and KRISTIAN THOMSEN

Appeal 2017–004809
Application 13/710,925
Technology Center 3700

CONCURRING OPINION

CAPP, *Administrative Patent Judge*

In concur in the result and reasoning set forth by the majority. I write separately to add my individual observations with respect to the Examiner's Section 101 rejection of claim 1.

In the *Alice* case, the Supreme Court took pains to caution against interpreting Section 101 "in ways that make patent eligibility 'depend simply on the draftsman's art." *Alice*, 573 U.S. at 226. In my opinion, claim 1 is merely an exercise in linguistic finesse that is designed to create the superficial impression that Appellants have invented something more than information gathering in the form of recording sound with a microphone.

Claim 1 attempts to create the impression that a first noise level is detected "during an inspiration phase" and a second noise level is detected "during an expiration phase" of a breathing cycle. Claims App. However, in truth, the entire invention is devoted to simplifying the process of snore

detection so as to eliminate the need to actually detect either inspiration or expiration. See Spec. ¶ 11 (explaining that the invention uses a microphone to detect snore and that pressure or flow sensors, that can actually differentiate between inhalation and exhalation, are optional). In reality, the invention uses a microphone to detect noise level and a processor to measure and subtract higher amplitude sounds from lower amplitude sounds and then arrives at a logical deduction that, if the higher amplitude sound exceeds the lower amplitude sound by a predetermined threshold, a "snore" may have occurred.

Furthermore, claim 1 presumes the existence of a considerable amount of essential but unclaimed subject matter, not the least of which is the presence of a human being who is asleep. Claim 1 also presumes an ambient background noise level that would allow detection of sleep/breathing sound amplitudes. Claim 1 also presumes the absence of other sources of intermittent and/or repetitious higher and lower amplitude noises that could be confused with sleep/breathing sounds. Claim 1 also presumes a physical location of the microphone proximate to a sleeper's mouth and nose that would facilitate differentiation between sleep/breathing sounds and other sources of noise.

It also bears mention that snoring is an auditory phenomenon that is readily detectable by the human sensory modality of hearing. In that regard, the invention of claim 1 is little more than an attempt to automate what a human listener can accomplish when in close proximity to a sleeper. The Examiner is correct that claim 1 is nothing more than a generic listening device that subtracts softer sound amplitudes from louder sound amplitudes and then uses a generic processor to perform routine calculations and logic

operations. The deduction that a "snore" has occurred is merely a logical deduction derived from a simple subtraction calculation in connection with a host of unclaimed assumptions regarding the environment in which the sound measurements are taken.

The courts treat collecting information, including when limited to particular content that does not change its character as information, as within the realm of abstract ideas. *Electric Power Group, LLC v. Alstom S.A.*, 830 F.3d 1350, 1353 (2016). Similarly, the courts treat analyzing information by steps that people go through in their minds, or by mathematical algorithms, without more, as essentially mental processes within the abstract idea category. *Id.* at 1354. In the instant case, Appellants merely claim a device that collects and analyzes data. The microphone (sensor) merely converts sound to a signal that can be processed by a computer. Once the data is collected and analyzed, claim 1 requires nothing further. The outcome of the data analysis is not even displayed, much less used in connection with some practical application, such as providing therapy.

Creating a generic listening device for sound detection, without more, does not rise above the level of an abstract idea. Here, Appellants merely superimpose, over the description of an otherwise generic listening device, certain phraseology that is associated with sleep disorders. This amounts to no more than application of "the draftsman's art" and is insufficient to create patentable subject matter. *Alice*, 573 U.S. at 226.