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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte PAUL J. HAYS

Appeal 2017-011712
Application 14/241,949
Technology Center 2800

Before N. WHITNEY WILSON, JEFFREY R. SNAY, and
MICHAEL G. MCMANUS, *Administrative Patent Judges*.

WILSON, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellant¹ appeals under 35 U.S.C. § 134(a) from the Examiner's November 2, 2016 decision finally rejecting claims 1–20 (“Final Act.”). We have jurisdiction over the appeal under 35 U.S.C. § 6(b).

We reverse.

¹ We use the word “Appellant” to refer to “applicant” as defined in 37 C.F.R. § 1.42. Appellant identifies Micron Motion, Inc. as the real party in interest (Appeal Br. 5).

CLAIMED SUBJECT MATTER

Appellant's disclosure relates to a method of a vibratory flowmeter for determining an average flow rate of a pulsating flow (Abstract). The claimed vibratory flowmeter includes a flowmeter assembly including two pickoff sensors and configured to generate at least two vibrational signals, and meter electronics configured to receive the at least two vibrational signals, generate a flow rate measurement signal, and then generate a period average flow rate (*id.*). The meter electronics generate the period average flow rate by dividing the flow rate measurement signal into a series of time periods, with each time period including a single flow peak that is substantially centered in the time period, totalize flow rate measurements of each time period to generate a period sum, and divide the period sum by a time period length to generate a period average flow rate (*id.*). The meter electronics output a sequence of period average flow rates as an average flow rate signal (*id.*). In addition to the claims to the vibratory flow meter, there are also claims to a method for determining an average flow rate of a pulsating flow. Details of the claimed invention are set forth in independent claims 1 and 11, which are reproduced below from the Claims Appendix to the Appeal Brief (*emphasis added*):

1. A vibratory flowmeter (5) for determining an average flow rate of a pulsating flow, the vibratory flowmeter (5) comprising:

- a flowmeter assembly (10) including at least two pickoff sensors (170L, 170R) and configured to generate at least two vibrational signals; and

- meter electronics (20) configured to receive the at least two vibrational signals and generate a flow rate measurement signal, divide the flow rate measurement signal into a series of

time periods, with each time period including a single flow peak that is substantially centered in the time period, totalize flow rate measurements of each time period to generate a period sum, and divide the period sum by a time period length to generate a period average flow rate, wherein the meter electronics (20) outputs a sequence of period average flow rates as an average flow rate signal.

11. A method for determining an average flow rate of a pulsating flow, the method comprising:

receiving two or more vibrational response signals from two or more pickoff sensors of a vibratory flowmeter and generating a flow rate measurement signal;

dividing the flow rate measurement signal into a series of time periods, with each time period including a single flow peak that is substantially centered in the time period;

totalizing flow rate measurements of each time period to generate a period sum; and

dividing the period sum by a time period length to generate a period average flow rate, wherein a sequence of period average flow rates is outputted as an average flow rate signal.

REJECTION

I. Claims 1–20 are rejected under 35 U.S.C. § 101 on the grounds that the claimed invention is directed to a judicial exception, without significantly more.

II. Claims 1, 2, 4–12, and 14–20 are rejected under 35 U.S.C. §103(a) as unpatentable over Bose² in view of Schaefer.³

III. Claims 3 and 13 are rejected under 35 U.S.C. § 103(a) as unpatentable over Bose in view of Schaefer, and further in view of Smith.⁴

DISCUSSION

Rejection I - Rejection under §101

Legal background. An invention is patent-eligible if it claims a “new and useful process, machine, manufacture, or composition of matter.” 35 U.S.C. § 101. However, the Supreme Court has interpreted § 101 to include implicit exceptions: “[l]aws of nature, natural phenomena, and abstract ideas” are not patentable. *E.g.*, *Alice Corp. v. CLS Bank Int’l*, 573 U.S. 208, 216 (2014).

In determining whether a claim falls within an excluded category, the Supreme Court’s two-step framework described in *Mayo* and *Alice* guides our analysis. *Id.* at 217–18 (citing *Mayo Collaborative Servs. v. Prometheus Labs., Inc.*, 566 U.S. 66, 75–77 (2012)). In accordance with that framework, we first determine what concept the claim is “directed to.” *See Alice*, 573 U.S. at 219 (“On their face, the claims before us are drawn to the concept of intermediated settlement, *i.e.*, the use of a third party to mitigate settlement risk.”); *see also Bilski v. Kappos*, 130 S. Ct. 3218 (2010) (“Claims 1 and 4 in

² Bose et al., US 5,734,112, issued March 31, 1998.

³ Schaefer, DE 19653184 A1, published July 2, 1998. Because Schaefer is in German, both Appellant and the Examiner rely on the English language translation of record.

⁴ Smith, US 4,187,721, issued February 12, 1980.

petitioners' application explain the basic concept of hedging, or protecting against risk.”).

Concepts determined to be abstract ideas, and thus patent ineligible, include certain methods of organizing human activity, such as fundamental economic practices (*Alice*, 573 U.S. at 219–20; *Bilski*, 130 S. Ct. 3218 (2010)); mathematical formulas (*Parker v. Flook*, 437 U.S. 584, 594–95 (1978)); and mental processes (*Gottschalk v. Benson*, 409 U.S. 63, 69 (1972)). Concepts determined to be patent eligible include physical and chemical processes, such as “molding rubber products” (*Diamond v. Diehr*, 450 U.S. 175, 191 (1981)); “tanning, dyeing, making water-proof cloth, vulcanizing India rubber, smelting ores” (*id.* at 182 n.7 (quoting *Corning v. Burden*, 56 U.S. 252, 267–68 (1854))); and manufacturing flour (*Benson*, 409 U.S. at 69 (citing *Cochrane v. Deener*, 94 U.S. 780, 785 (1876))).

In *Diehr*, the claim at issue recited a mathematical formula, but the Supreme Court held that “[a] claim drawn to subject matter otherwise statutory does not become nonstatutory simply because it uses a mathematical formula.” *Diehr*, 450 U.S. at 187; *see also id.* at 191 (“We view respondents’ claims as nothing more than a process for molding rubber products and not as an attempt to patent a mathematical formula.”). Having said that, the Supreme Court also indicated that a claim “seeking patent protection for that formula in the abstract . . . is not accorded the protection of our patent laws, . . . and this principle cannot be circumvented by attempting to limit the use of the formula to a particular technological environment.” *Id.* (citing *Benson* and *Flook*); *see, e.g., id.* at 187 (“It is now commonplace that an *application* of a law of nature or mathematical formula

to a known structure or process may well be deserving of patent protection.”).

If the claim is “directed to” an abstract idea, the analysis moves to the second step of the *Alice* and *Mayo* framework, where “we must examine the elements of the claim to determine whether it contains an ‘inventive concept’ sufficient to ‘transform’ the claimed abstract idea into a patent-eligible application.” *Alice*, 573 U.S. at 221 (quotation marks omitted). “A claim that recites an abstract idea must include ‘additional features’ to ensure ‘that the [claim] is more than a drafting effort designed to monopolize the [abstract idea].’” *Id.* (quoting *Mayo*, 566 U.S. at 77). “[M]erely requir[ing] generic computer implementation[] fail[s] to transform that abstract idea into a patent-eligible invention.” *Id.*

The PTO has published revised guidance on the application of § 101. *2019 Revised Patent Subject Matter Eligibility Guidance*, 84 Fed. Reg. 50 (Jan. 7, 2019) (“Guidance”). Under the Guidance, 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 activity 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)).
- Only if a claim (1) recites a judicial exception and (2) does not integrate that exception into a practical application, do we then look to whether the claim:
- (3) adds a specific limitation beyond the judicial exception that is not “well-understood, routine, conventional” in the field (*see* MPEP § 2106.05(d)); or

(4) simply appends well-understood, routine, conventional activities previously known to the industry, specified at a high level of generality, to the judicial exception.

See Guidance.

We address claims 1–10 (which recite a vibratory flowmeter) and claims 11–20 (which recite a method for determining an average flow rate of a pulsating flow) separately. We will address individual claims as necessary.

Claims 1–10

Guidance Step 1

There is no dispute that claims 1–10 fall within a statutory category, as these claims each recite a machine.

Guidance Step 2A, Prong 1

Under Step 2A of the Guidance, we first consider whether the claims recite a judicial exception. Claim 1 recites a number of steps involving mathematical manipulation of data, for example (1) “divide the flow rate measurement signal into a series of time periods, with each time period including a single flow peak that is substantially centered in the time period,” (2) “totalize flow rate measurements of each time period to generate a period sum,” and (3) “divide the period sum by a time period length to generate a period average flow rate.” Each of the foregoing steps recites a mathematical relationship, which is sufficient to conclude that claim 1 recites mathematical concepts, which are identified in the Guidance as an abstract idea.

Guidance Step 2A, Prong 2

Having determined that the claims recite a judicial exception, our analysis under the Guidance turns to determining whether there are

additional elements that integrate the exception into a practical application. See MPEP § 2106.05(a)–(c), (e)–(h). The additional elements in claim 1 are: (1) a flowmeter assembly, which includes (2) at least two pickoff sensors configured to generate at least two vibrational signals, (3) meter electronics configured to receive the two vibrational signals and generate a flow rate measurement signal, and (4) the meter electronics outputs a sequence of period average flow rates as an average flow rate signal.

Claim 1 represents a specific technical improvement to a technical field (i.e. the measurement of a pulsating flow through a flow meter assembly). These advantages, according to the Specification, include: (1) an improved ability to handle pulsating flows, (2) more accurate and reliable flow rates, (3) ability to generate average flow rates which update rapidly, and (4) ability to generate an average flow rate that minimally lags to instantaneous flow rate (Spec. 17–18). The additional elements (in addition to the abstract ideas) recited in claim 1 set forth a structure which, in combination with the abstract ideas, provides the aforementioned technical improvements to the vibratory flow meter.

The analysis in this situation is similar to the analysis in *Diehr*, 450 U.S. 175. In that case, the claim at issue related to a process for “molding raw, uncured synthetic rubber into cured precision products” based on the mold’s temperature. *Diehr*, 450 U.S. at 177. The claim recited a number of different, manipulative steps to which the rubber was subjected, and the process “lessen[ed] the possibility of ‘overcuring’ or ‘undercuring’” common in the art. *Id.* at 187. Likewise, in this case, the flowing liquid is measured and the data which is collected is used to generate additional information about the sample in a manner which has technical advantages

Thus, the claim includes additional elements that integrate the abstract limitations into a practical application.

Accordingly, we conclude that claim 1, and the claims which depend from it, describe patent eligible subject matter.

Claims 11–20

Guidance Step 1

There is no dispute that claims 11–20 fall within a statutory category, as these claims each recite a process.

Guidance Step 2A, Prong 1

Under Step 2A of the Guidance, we first consider whether the claims recite a judicial exception. Claim 11 recites a number of steps involving mathematical manipulation of data, for example (1) “dividing the flow rate measurement signal into a series of time periods, with each time period including a single flow peak that is substantially centered in the time period,” (2) “totalizing flow rate measurements of each time period to generate a period sum,” and (3) “dividing the period sum by a time period length to generate a period average flow rate.” Each of the foregoing steps recites a mathematical relationship, which is sufficient to conclude that claim 1 recites mathematical concepts, which are identified in the Guidance as an abstract idea.

Guidance Step 2A, Prong 2

Having determined that the claims recite a judicial exception, our analysis under the Guidance turns to determining whether there are additional elements that integrate the exception into a practical application. See MPEP § 2106.05(a)–(c), (e)–(h). The additional elements in claim 11 are: (1) receiving two or more vibrational response signals from two or more

pickoff sensors of a vibratory flowmeter, (2) generating a flow rate measurement signal, and (3) outputting a sequence of period average flow rates as an average flow rate signal.

Claim 11 represents a specific technical improvement to a technical field (i.e. the measurement of a pulsating flow). These improvements, according to the Specification, include: (1) an improved ability to handle pulsating flows, (2) more accurate and reliable flow rates, (3) ability to generate average flow rates which update rapidly, and (4) ability to generate an average flow rate that minimally lags to instantaneous flow rate (Spec. 17–18). The additional elements (in addition to the abstract ideas) recited in claim 11 set forth a process which provides the aforementioned technical improvements to the vibratory flow meter. Accordingly, we conclude that claim 11 recites patent eligible subject matter.

Rejection II and III – Obviousness Rejections

Appellant argues claims 1 and 11 together (see, e.g. Appeal Br. 27). Accordingly, we focus on the rejection of claim 1 over Bose in view of Schaefer. The Examiner finds that Bose teaches a vibratory flowmeter for determining an average flow rate of a pulsating flow, the vibratory flowmeter comprising a flowmeter assembly including at least two pickoff sensors and configured to generate at least two vibrational signals, and meter electronics configured to receive the at least two vibrational signals and generate a flow rate measurement signal (Final Act. 6, citing Bose, Figure 1, 5:45–49, 5:64–6:5, and 6:45–51). The Examiner further finds that Bose does not teach that the meter electronics are configured as recited in the last paragraph of claim 1 (Final Act. 6–7). The Examiner finds that Schaefer

teaches these elements (Final Act. 7), and determines that it would have been obvious to have combined Bose's vibratory flowmeter with Schaefer's calculation method because doing so "allows the smoothing of flow pulses to...a very high response speed to show the tendencies of change of the flow rate (Final Act. 7, citing Schaefer, p. 1, ¶ 9).

Appellant argues that:

[T]he proposed combination of Bose and Schaefer does not teach or suggest, or render obvious, the claimed "divide the flow rate measurement signal into a series of time periods, with each time period including a single flow peak that is substantially centered in the time period." More particularly, Schaefer specifically teaches that the flow peaks are not centered in purported time periods and, moreover, specifically require that the flow peaks not be centered in the purported time periods.

(Appeal Br. 27). Appellant's argument is persuasive.

The Examiner relies on the following passage from Schaefer as teaching dividing the flow rate measurement signal into a series of time periods with each time period including a single flow peak substantially centered in the time period:

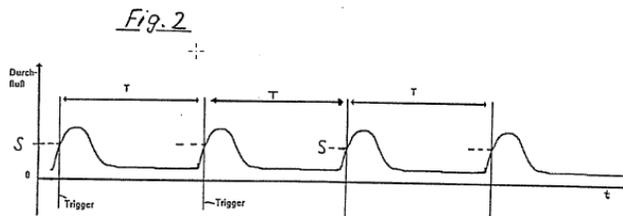
This object is achieved according to the invention is achieved in that the signal processing circuit in an operating mode for measurement in the substantially periodically pulsating flow is operable, in which the filter - and evaluation device of a time-related averaging of the measurement signal by means of center position, the time intervals by means of the practice of the period duration of the corresponding to the pulsating flow periodic measurement signal is adapted to, wherein to determine a respective averaging interval a pulse detection - and the trigger circuit is provided which, by monitoring of the occurrence of successive measurement signal pulses, the measuring signal periods of the measurement signal are

detected, and the trigger signals for the filter - and evaluation device is generated around the center position, the time interval of a respective signal center position, the operation with the measuring signal period to synchronize.

(Schäfer, p. 1, ¶8, emphasized portion specifically relied on by the Examiner). Appellants contend, however, that Schäfer conducts its measurements with the peak flow not “substantially centered” in the time period (Appeal Br. 28–29). In this regard, Appellant relies on the following passage from Schäfer, which describes how the time periods are set:

“In the flow rate/time - diagram according to Fig. 2, the typical time profile of such a modulated in a pulsating manner shown by flow. A corresponding time profile also has the analog measured-signal voltage at the input of the sampling - and hold circuit **11** - derived therefrom as well as the digital value train at the output of the analog/digital - converter circuit **13** on. The microprocessor circuit **15** reads the digital values in real time as a result of a and monitors the digital values on exceeding a in Fig. 2 in the case of s indicated threshold level. As soon as this threshold levels of the digital values is exceeded, the microprocessor circuit **15** with the numerical integration of the digitized recoplate [sic]. The respective integration operation is ended as soon as the threshold values is exceeded again, whereupon, in a corresponding way, a following integration operation is started. The result of the respective integration, for calculation of the time average of the measurement signal via the...integration time interval t used corresponding averaging time interval.”

(Schäfer, p. 3). This is illustrated in Schäfer’s Fig. 2:



Schäfer’s Fig. 2 shows in a flow rate/time - diagram the typical line profile of the flow in the case of conveyance of the respective measurement liquid.

As can be seen from the Fig. 2, and as is evident from the manner in which the time periods are set based on the flow rates, each peak flow rates is not “substantially centered in the time period,” because the time period is set so that it starts just as the peak is being reached. The Examiner argues that “It is considered that when the period between the peaks is short, the peak is substantially centered” in the time period. However, as is shown in Fig. 2, the method by which the time period is set results in the peak not being substantially centered, regardless of how long the period between peaks is.

The Examiner has the initial burden of establishing a *prima facie* case of obviousness based on an inherent or explicit disclosure of the claimed subject matter under 35 U.S.C. § 103. *In re Oetiker*, 977 F.2d 1443, 1445 (Fed. Cir. 1992) (“[T]he examiner bears the initial burden, on review of the prior art or on any other ground, of presenting a *prima facie* case of unpatentability.”). To establish a *prima facie* case of obviousness, the Examiner must show that each and every limitation of the claim is described or suggested by the prior art or would have been obvious based on the knowledge of those of ordinary skill in the art. *In re Fine*, 837 F.2d 1071, 1074 (Fed. Cir. 1988). In this instance, the evidence of record does not adequately establish that the cited art would have made obvious the limitation “with each time period including a single flow peak that is substantially centered in the time period.” Accordingly, we reverse the obviousness rejections.

CONCLUSION

In summary:

Claims Rejected	Basis	Affirmed	Reversed
1-20	§ 101		1-20
1, 2, 4-12, and 14-20	§ 103(a) Bose and Schaefer		1, 2, 4-12, and 14-20
3 and 13	§ 103(a) Bose, Schaefer, and Smith		3 and 13
Overall Outcome			1-20

REVERSED