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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte KIHACHIRO OKURA

Appeal 2020-002341
Application 14/953,856
Technology Center 1700

Before KAREN M. HASTINGS, N. WHITNEY WILSON, and
MICHAEL G. MCMANUS, *Administrative Patent Judges*.

HASTINGS, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Pursuant to 35 U.S.C. § 134(a), Appellant¹ appeals from the Examiner's decision to reject claims 3–5. *See* Non-Final Act. 1. We have jurisdiction under 35 U.S.C. § 6(b).

We reverse.

¹ We use the term “Appellant” to refer to “applicant” as defined in 37 C.F.R. § 1.42. Appellant identifies the real party in interest as “YAMAZEN CORPORATION”. Appeal Br. 1.

CLAIMED SUBJECT MATTER

The claims are directed to a method for liquid chromatography.
Claims 3 and 4, reproduced below, are illustrative of the claimed subject matter:

3. A method for liquid chromatography,
in the liquid chromatography, an eluent being generated by mixing two solvents at a mixture ratio that is linearly increased, and the generated eluent and a sample composed of a plurality of components passing through a column,

the method comprising the steps of:
determining “a” which indicates a rate of change in the mixture ratio;
calculating elution time “ t_r^c ” based on Equation (1), the elution time “ t_r^c ” being from a start of flow-in of the sample into the column to elution of a component “c” which is one of the components from the column;

$$\int_0^{t_r^c} R_f^c \left(\frac{t}{t_0} \right) d \left(\frac{t}{t_0} \right) = 1$$

(1)

selecting the column based on the calculated elution time “ t_r^c ”; and
conducting the liquid chromatography using the selected column;
wherein:
“t” indicates elapsed time from the start of flow-in of the sample into the column;

“ t_0 ” indicates time from a start of flow-in of the eluent into the column to a start of flow-out of the eluent from the column; and

“ $R_f^c(t/t_0)$ ” indicates a mobility of the component “c” in the elution time “ t_r^c ” and is represented by Equation (2),

$$R_f^c\left(\frac{t}{t_0}\right) = 1 - e^{-a\left(\frac{t}{t_0}\right) + b}$$

(2)

wherein “b” indicates a constant regarding an initial mobility R_{f0} , $b = \ln(1 - R_{f0})$.

4. A method for liquid chromatography, in the liquid chromatography, an eluent being generated by mixing two solvents at a mixture ratio that is linearly increased, the mixture ratio being adjusted by a valve, and the generated eluent and a sample composed of a plurality of components passing through a column,

the method comprising the steps of:

determining elution time “ t_r^c ”, the elution time “ t_r^c ” being from a start of flow-in of the sample into the column to elution of a component “c” which is one of the components from the column;

calculating a mobility $R_f^c(t/t_0)$ of the component “c” in the elution time “ t_r^c ”, by calculating “a” and “b” for the elution time “ t_r^c ” based on Equations (1) and (2):

$$\int_0^{t_r^c} R_f^c\left(\frac{t}{t_0}\right) d\left(\frac{t}{t_0}\right) = 1$$

(1)

$$R_f^c\left(\frac{t}{t_0}\right) = 1 - e^{-a\left(\frac{t}{t_0}\right) + b}$$

(2)

; and

conducting the liquid chromatography by controlling the valve based on the calculated mobility $R_f^c(t/t_0)$,

wherein:

“a” indicates a rate of change in the mixture ratio;

“b” indicates a constant regarding an initial mobility R_{f0} , $b = \ln(1 - R_{f0})$;

“t” indicates elapsed time from the start of flow-in of the sample into the column;

“ t_0 ” indicates time from a start of flow-in of the eluent into the column to a start of flowout of the eluent from the column; and

“ $R_f^c(t/t_0)$ ” is represented by Equation (2).

REJECTIONS

Claim 4 is rejected under 35 U.S.C. § 112(a) or 35 U.S.C. § 112 (pre-AIA), first paragraph, as failing to comply with the written description requirement. Non-Final Act. 2.

Claims 3–5 are rejected under 35 U.S.C. § 101 as being directed to judicially excepted subject matter because the claimed invention is directed to an abstract idea without significantly more. Non-Final Act. 3.

OPINION

The § 112 rejection for lack of written description

For an applicant to comply with the 35 U.S.C. § 112, first paragraph, written description requirement, the applicant's Specification must “convey with reasonable clarity to those skilled in the art that, as of the filing date sought, he or she was in possession of the invention.” *Carnegie Mellon Univ. v. Hoffmann-La Roche Inc.*, 541 F.3d 1115, 1122 (Fed. Cir. 2008) (quoting *Vas-Cath Inc. v. Mahurkar*, 935 F.2d 1555, 1563–64 (Fed. Cir. 1991)).

After review of the respective positions provided by Appellant and the Examiner, we find that a preponderance of the evidence supports Appellant's position that the original disclosure provides support for “controlling the valve” as recited in independent claim 4 (Appeal Br. 15–16; *see* Spec. Fig. 1, Spec. ¶¶ 30, 36, 56, 66). As Appellant explains, there is no dispute that the Specification explicitly describes a solenoid valve, which the Examiner agrees is a valve (Reply Br. 10; Ans. 14).

The Examiner's position is that the Specification never explicitly states anything other than controlling a *solenoid* valve, such that claiming controlling a valve is new matter (Ans. 14, 15).

As Appellant states, the Examiner has not even made any allegation of unpredictability (Reply Br. 10), and there is no dispute that a valve is a relatively straightforward mechanical component and encompasses a solenoid valve. The Examiner has not adequately explained, especially in light of the case law² discussed by Appellant (Appeal Br. 15, 16; Reply Br. 10), why one of ordinary skill in the art would not have appreciated that other valves may be used in the described method. In light of all these circumstances, one of ordinary skill would have appreciated that Appellant was in possession of controlling a valve based on the calculated mobility as recited in claim 4.

Accordingly, we reverse the Examiner's § 112 rejection on appeal.

The § 101 Rejection

Introduction

35 U.S.C. § 101 provides that “[w]hoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor.”

In that regard, illustrative claims 3 and 4 (above) covers a “method” and is thus statutory subject matter for which a patent may be obtained.³

² *Hologic Inc. v. Smith & Nephew Inc.*, 884 F.3d 1357 (Fed. Cir. 2018)

³ This corresponds to Step 1 of the 2019 Revised 101 Guidance which requires determining whether a “claim is to a statutory category.” *Id.* at 53. See also sentence bridging pages 53 and 54 (“consider[] whether the

However, the § 101 provision “contains an important implicit exception: Laws of nature, natural phenomena, and abstract ideas are not patentable.” *Alice Corp. v. CLS Bank Int’l*, 573 U.S. 208, 216 (2014); (quoting *Ass’n for Molecular Pathology v. Myriad Genetics, Inc.*, 569 U.S. 576, 589 (2013)).

In that regard, notwithstanding that independent claims 3 and 4 are statutory subject matter (as are the claims depending therefrom), the Examiner has raised a question of patent-eligibility on the ground that they are directed to an abstract idea.

Alice identifies a two-step framework for determining whether claimed subject matter is directed to an abstract idea. *Alice*, 573 U.S. at 217.

Alice step one – the “directed to” inquiry

According to *Alice* step one, “[w]e must first determine whether the claims at issue are *directed to* a patent-ineligible concept” (*Id.* at 218 (emphasis added)).

The Examiner determined, *inter alia*, that the claims are “directed to an abstract idea,” that is, “equations for calculating mobility” which are “not integrated into a practical application because the additional steps do not add a meaningful limitation to the method as they are insignificant extra-solution activity” and “do not add a meaningful limitation” to the method. Non-Final Act. 3. *See also id.* at 3–4:

There are no other limitations in the claim that show a patent-eligible application of the abstract idea itself. The steps of "an eluent being generated by mixing", "the generated eluent

claimed subject matter falls within the four statutory categories of patentable subject matter identified by 35 U.S.C. [§] 101 . . .”).

and a sample composed of a plurality of components can pass through a column", "the mixture ratio be adjusted by a valve", "determining "a" which represents a rate of change in the mixture ratio", "selecting the column", "conducting the liquid chromatography", and "conducting the liquid chromatography by controlling the valve based on the calculated mobility" do not significantly amount to anything more than the abstract idea since these pieces are routine and conventional in liquid chromatography systems. See MPEP §2106.

Appellant contends, *inter alia*, that the invention of each of claims 3 and 4 is directed to a statutory method that includes “new equations to control the physical components of the liquid chromatography process”. Appeal Br. 6. Specifically, Appellant contends that claim 3 recites the use of newly developed equations to select the particular column to use and then perform the liquid chromatography process using the selected column, whereas claim 4 likewise recites use of newly developed equations to operate the valve that controls the mixture ratio of the solvents to form the eluent and performing liquid chromatography process using that eluent. *Id.* Appellant contends that it is clear that the present claims as a whole are not directed to mathematical processes but each claim relates to an improved liquid chromatography process that takes into account “more accurate estimates to control the physical parameters” of the process “to yield more accurate results” (Appeal Br. 6; Spec. ¶ 6).

Accordingly, there is a dispute over what the claims are directed to. Are they directed to an abstract idea because of the mathematical equations for calculating mobility (e.g., Ans. 8) or are they directed to a liquid chromatography process that uses more accurate estimates to control liquid

chromatography processes to yield more accurate results over prior art methods (Appeal Br. 4–7, Spec. ¶¶ 4,)?

*Claim Construction*⁴

We consider each of claims 3 and 4 as a whole⁵ giving each the broadest reasonable construction⁶ as one of ordinary skill in the art would have interpreted it in light of the Specification⁷ at the time of filing.

⁴ “[T]he important inquiry for a § 101 analysis is to look to the claim.” *Accenture Global Servs., GmbH v. Guidewire Software, Inc.*, 728 F.3d 1336, 1345 (Fed. Cir. 2013). “In *Bancorp Servs., L.L.C. v. Sun Life Assurance Co. of Can.*, 687 F.3d 1266, 1273 (Fed. Cir. 2012), the court observed that ‘claim construction is not an inviolable prerequisite to a validity determination under § 101.’ However, the threshold of § 101 must be crossed; an event often dependent on the scope and meaning of the claims.” *Internet Patents Corp. v. Active Network, Inc.*, 790 F.3d 1343, 1347–48 (Fed. Cir. 2015).

⁵ “In determining the eligibility of respondents’ claimed process for patent protection under § 101, their claims must be considered as a whole.” *Diamond v. Diehr*, 450 U.S. 175, 188 (1981).

⁶ 2019 Revised 101 Guidance, page 52, footnote 14 (“If a claim, under its *broadest reasonable interpretation* . . .”) (Emphasis added.)

⁷ “First, it is always important to look at the actual language of the claims. . . . Second, in considering the roles played by individual limitations, it is important to read the claims ‘in light of the specification.’” *Smart Sys. Innovations, LLC v. Chicago Transit Authority*, 873 F.3d 1364, 1378 (Fed. Cir. 2017) (R. Linn, dissenting in part and concurring in part), citing *Enfish, LLC v. Microsoft Corp.*, 822 F.3d 1327, 1335 (Fed. Cir. 2016), among others.

Claims 3 and 4 each describe a “method for liquid chromatography” using specified equations to calculate an elution time and then selecting the chromatography column based on that elution time (claim 3) and conducting the liquid chromatography by controlling the valve to mix two solvents to generate the eluent based on more accurately estimating the mobility and elution time (*see* claim 4).

According to the Specification, a current method for calculating the estimated elution time is different than the measured elution time and it is therefore necessary to more precisely estimate the elution time (e.g., Spec. ¶¶ 5, 6).

Consistent with the intrinsic evidence, we reasonably, broadly construe claim 3 as a method for performing a liquid chromatography process using equations for more accurately estimating the elution time such that an appropriate column is selected and claim 4 as a method for performing a liquid chromatography process using equations for more accurately controlling the valve to mix two solvents to generate the eluent based on more accurately estimating the elution time. Thus, the claims are directed to more than what the Examiner describes. *Cf. McRO, Inc. v. Bandai Namco Games Am. Inc.*, 837 F.3d 1299, 1316 (Fed. Cir. 2016) (The claim uses limited rules in a process specifically designed to achieve an improved technological result in conventional industry practice.)

*The Abstract Idea*⁸

The claims do recite steps that involve mathematical operations, as found by the Examiner. Thus, in accordance with the Guidance, step (1), we determine that claims 3 and 4 each recite a mathematical concept, and therefore recites an abstract idea. *See* Guidance 52, 55–56.

*Improvement in the method for liquid chromatography*⁹

Although the claims recite an abstract idea as set forth above, we determine that the claims are not “directed to” an abstract idea because we find that the abstract idea is integrated into a practical application under Step 2A, Prong 2 of the Guidance.

The Examiner’s characterization of what the claim is directed to is inaccurate. The Examiner indicated that the claim is directed to “a

⁸ *See* Step 2A of the 2019 Revised 101 Guidance. Step 2A determines “whether a claim is ‘directed to’ a judicial exception,” such as an abstract idea. 84 Fed. Reg. at 53. Step 2A is a two prong inquiry.

⁹ *See* Prong Two (“**If the Claim Recites a Judicial Exception, Evaluate Whether the Judicial Exception Is Integrated Into a Practical Application**”) of Step 2A of the 2019 Revised 101 Guidance. “A claim that integrates a judicial exception into a practical application will apply, rely on, or use the judicial exception in a manner that imposes a meaningful limit on the judicial exception, such that the claim is more than a drafting effort designed to monopolize the judicial exception.” 2019 Revised 101 Guidance, 84 Fed. Reg. at 54. One consideration, implicated here, that is “indicative that an additional element (or combination of elements) may have integrated the exception into a practical application” (*id.* at 55) is if “[a]n additional element reflects an improvement in the functioning of a computer, or an improvement to other technology or technical field” (*id.*).

mathematical concept” (Ans. 7, 8) and that all the other claimed steps do “not significantly amount to anything more than the abstract idea”. Ans. 8. The claimed process, however, requires generating an eluent by mixing two solvents, selecting the chromatography column based on the calculated elution time, and conducting the liquid chromatography (claim 3); or conducting the liquid chromatography by controlling the valve based on the calculated mobility time (claim 4). The preponderance of the evidence supports Appellant’s position that the combination of the steps recited as claimed adds significantly more than the abstract idea the claims are alleged to be directed to so as to transform the abstract idea into an inventive concept. *Generally* Appeal Br., Reply Br., Spec. e.g., ¶¶ 4–11.

“The ‘abstract idea’ step of the inquiry calls upon us to look at the ‘focus of the claimed advance over the prior art’ to determine if the claim’s ‘character as a whole’ is directed to excluded subject matter.” *Affinity Labs of Tex., LLC v. DIRECTTV, LLC*, 838 F.3d 1253, 1257 (Fed. Cir. 2016) (quoting *Elec. Power Grp., LLC v. Alstom S.A.*, 830 F.3d 1350, 1353 (Fed. Cir. 2016)); *see also Enfish*, 822 F.3d at 1335. As the Federal Circuit stated in *Ancora Technologies, Inc. v. HTC America, Inc.*, 908 F.3d 1343, 1347 (Fed. Cir. 2018), we examine the patent’s “‘claimed advance’ to determine whether the claims are directed to an abstract idea.” *Finjan, Inc. v. Blue Coat System, Inc.*, 879 F.3d 1299, 1303 (Fed. Cir. 2018). “In cases involving software innovations, this inquiry often turns on whether the claims focus on ‘the specific asserted improvement in computer capabilities . . . or, instead, on a process that qualifies as an “abstract idea” for which computers are invoked merely as a tool.’” *Id.* (quoting *Enfish*, 822 F.3d at 1335–36); *see BSG Tech LLC v. Buyseasons, Inc.*, 899 F.3d 1281, 1285–86 (Fed. Cir.

2018). Computers are improved not only through changes in hardware; “[s]oftware can make non-abstract improvements to computer technology” *Enfish*, 822 F.3d at 1335; *see Finjan*, 879 F.3d at 1304. Claims can pass muster under *Alice* step one when sufficiently focused on such improvements.

The Specification’s description of the problem and solution shows the advance over the prior art by the claimed invention is in more accurately determining the required elution time so as to improve methods for liquid chromatography. *See Spec.*, e.g., ¶¶ 4–11. Accordingly, within the meaning of the 2019 Revised 101 Guidance, we find there is an integration into a practical application. Claim 3 recites “selecting the column based on the calculated elution time”. Appeal Br. 17 (Claims Appendix). This limitation causes claim 3 to integrate the abstract ideas it recites into a practical application. As a result, claim 3 is not “directed to” a judicial exception, but rather to a practical application of a judicial exception, and is patent eligible subject matter (Appeal Br. 9, 10; Reply Br. 4–7). Similarly, claim 4 recites “conducting the liquid chromatography by controlling the valve based on the calculated mobility” (Appeal Br. 18, Claims Appendix). As a result, claim 4 is also not “directed to” a judicial exception, but rather to a practical application of a judicial exception, and is patent eligible subject matter. A preponderance of the evidence supports Appellant’s position that this integrates the mathematical concept into a practical application (e.g., Appeal Br. 11–14; Reply Br. 8, 9). Therefore, we need not reach Step 2B of the Guidance.

In our view, each of claims 3 and 4 as a whole reflects a specific asserted improvement in technology, rooted in computer technology, over

that which was available in the prior art. Accordingly, we find the Appellant's arguments persuasive that the claimed subject matter is not directed to merely performing mathematical processes but to a technical improvement persuasive, given the present record.

Specific asserted improvements, when claimed, can render claimed subject matter nonabstract. *Cf. McRO, Inc. v. Bandai Namco Games Am. Inc.*, 837 F.3d 1299, 1316 (Fed. Cir. 2016) (“When looked at as a whole, claim 1 is directed to a patentable, technological improvement over the existing, manual 3–D animation techniques.”)

It should be noted that we have addressed purported specifically asserted improvements in technology under step one of the *Alice* framework. This is consistent with the case law. *See Ancora*, 908 F.3d at 1347 (“We have several times held claims to pass muster under *Alice* step one when sufficiently focused on such improvements.”). It can be discussed under step two of the *Alice* framework as well. *See buySAFE, Inc. v. Google, Inc.*, 765 F.3d 1350, 1354–55 (Fed. Cir. 2014). “[R]ecent Federal Circuit jurisprudence has indicated that eligible subject matter can often be identified either at the first or the second step of the *Alice/Mayo* [framework].” 2019 Revised 101 Guidance, 84 Fed. Reg. at 53; *see also id.* n.17.

In any case, there is sufficient evidence in the record before us that the claimed subject matter reflects a specific asserted improvement in technology over that which was practiced in the art and for that reason we determine that independent claims 3 and 4 (and claim 5 depending therefrom) are not directed to an abstract idea.

For the foregoing reasons, the Examiner's determination under *Alice* step one is not sustainable. Consequently, we do not need to reach *Alice* step two.

The rejection under 35 U.S.C. § 101 is not sustained.

CONCLUSION

The Examiner's decision to reject claims 3–5 is reversed.

DECISION SUMMARY

Claim(s) Rejected	35 U.S.C. §	Reference(s)/Basis	Affirmed	Reversed
4	112, first paragraph	Written Description		4
3–5	101	Eligibility		3–5
Overall Outcome				3–5

REVERSED