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Commissioner's Decision #1565
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Date: 2021-03-25

TOPIC: J00 Meaning of Art

J10 Computer
Programs

SUJET: J00 Signification de
la technique

J10 Programmes
d'ordinateur

Application No. : 2,801,386

Demande n° 2 801 386

IN THE CANADIAN PATENT OFFICE

DECISION OF THE COMMISSIONER OF PATENTS

Patent application number 2,801,386, having been rejected under subsection 30(3) of the *Patent Rules* (SOR/96-423) as they read immediately before October 30, 2019 (“*former Rules*”) has consequently been reviewed in accordance with paragraph 199(3)(c) of the *Patent Rules* (SOR/2019-251) (“*Patent Rules*”). The recommendation of the Board and the decision of the Commissioner are to withdraw the rejection and allow the application.

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INTRODUCTION

- [1] This recommendation concerns the review of rejected Canadian patent application number 2,801,386 (“the instant application”), which is entitled “METHOD AND SYSTEM FOR STABILIZING FORMULATION METHODS” and is owned by EXXONMOBIL UPSTREAM RESEARCH COMPANY (“the Applicant”). A review of the rejected application has been conducted by the Patent Appeal Board (“the Board”) pursuant to paragraph 199(3)(c) of the *Patent Rules*. As explained in more detail below, my recommendation is that the Commissioner of Patents withdraw the rejection and that the application be allowed.

BACKGROUND

The Application

- [2] The instant application was filed under the *Patent Cooperation Treaty* and has an effective filing date in Canada of March 3, 2011. It was laid open to public inspection on December 22, 2011.
- [3] The instant application relates to methods and systems for improving the stability and efficiency of computer simulations of multiphase flow, in particular the computer simulations of hydrocarbon reservoirs. These simulations, which are mathematical models of the flow patterns of the underlying geology of the reservoir, are used to optimize the eventual hydrocarbon production from the reservoir.

Prosecution History

- [4] On May 9, 2019, a Final Action (“FA”) was written pursuant to subsection 30(4) of the *former Rules*. The FA stated that the instant application is defective on the ground that all of the claims 1-37 on file at the time of the FA (“claims on file”) are directed to non-patentable subject-matter that lies outside the definition of “invention” and do not comply with section 2 of the *Patent Act*.
- [5] In a September 10, 2019 response to the FA (“R-FA”), the Applicant did not propose any amendments to the instant application. Further, the Applicant relied on the arguments presented in previous correspondence in respect of the reasons why the claims on file are compliant with section 2 of the *Patent Act*.

- [6] As the Examiner considered the application not to comply with the *Patent Act*, pursuant to paragraph 199(3)(c) of the *Patent Rules*, the application was forwarded to the Board for review on February 25, 2020 along with an explanation outlined in a Summary of Reasons (“SOR”). The SOR set out the position that the claims on file were still considered to be defective as being directed to non-patentable subject-matter and are therefore non-compliant with section 2 of the *Patent Act*.
- [7] In a letter dated March 2, 2020, the Board forwarded to the Applicant a copy of the SOR and requested that the Applicant confirm its continued interest in having the application reviewed.
- [8] There has been no reply to the Board’s letter of March 2, 2020.
- [9] As a result of the Federal Court Decision in *Chouiefaty v Canada* (AG) 2020 FC 837 [*Chouiefaty*] and the subsequent publication of the Patent Office Patent Notice in respect of patentable subject-matter, “Patentable subject-matter under the *Patent Act*” (CIPO, November 2020) [PN2020–04], the Examiner re-evaluated the instant application for compliance with section 2 of the *Patent Act* and provided a Supplemental Summary of Reasons (“SSOR”) dated January 22, 2021 to the Board. The SSOR indicated that in light of *Chouiefaty* and PN2020-04, the Examiner now considered the claims on file to be compliant with section 2 of the *Patent Act*.
- [10] I have reviewed the instant application in accordance with paragraph 199(3)(c) of the *Patent Rules* and provide my analysis below.

ISSUE

- [11] The issue to be addressed by the present review is whether claims 1-37 on file are directed to patentable subject-matter.

LEGAL PRINCIPLES AND OFFICE PRACTICE

Claim Construction

- [12] In accordance with *Free World Trust v Électro Santé Inc.*, 2000 SCC 66, purposive construction of a claim is done by considering the whole of the disclosure, including the specification and drawings (see also *Whirlpool Corp. v Camco Inc.*, 2000 SCC 67 at paragraphs 49(f) and (g) and 52). This consideration is performed from the point of view of

the person skilled in the art in light of the relevant common general knowledge.

- [13] With respect to the determination of the essential/non-essential elements of a claim, *PN2020-04* clarified the Patent Office's approach to this determination:

During purposive construction of a claim, the elements of the claimed invention "are identified as either essential elements (where substitution of another element or omission takes the device outside the monopoly) or non-essential elements (where substitution or omission is not necessarily fatal to an allegation of infringement)." In carrying out this identification of essential and non-essential elements, all elements set out in a claim are presumed essential, unless it is established otherwise or is contrary to the language used in the claim.

Patentable Subject-Matter

- [14] The definition of invention is set out in section 2 of the *Patent Act*:

"invention" means any new and useful art, process, machine, manufacture or composition of matter, or any new and useful improvement in any art, process, machine, manufacture or composition of matter.

- [15] Subsection 27(8) of the *Patent Act* prescribes that:

No patent shall be granted for any mere scientific principle or abstract theorem.

- [16] Following *Choueifaty*, *PN2020-04* clarified Patent Office practice with respect to the determination of patentable subject-matter under section 2 and subsection 27(8) of the *Patent Act*. In general:

To be both patentable subject-matter and not be prohibited under subsection 27(8) of the *Patent Act*, the subject-matter defined by a claim must be limited to or narrower than an actual invention that either has physical existence or manifests a discernible physical effect or change and that relates to the manual or productive arts, meaning those arts involving or concerned with applied and industrial sciences as distinguished in particular from the fine arts or works of art that are inventive only in an artistic or aesthetic sense.

- [17] With particular reference to the determination of patentable subject-matter in respect of computer-implemented inventions, *PN2020-04* states that:

The mere fact that a computer is identified to be an essential element of a claimed invention for the purpose of determining the fences of the monopoly under purposive construction does not necessarily mean that the subject-matter defined by the claim is patentable subject-matter and outside of the prohibition under subsection 27(8) of the *Patent Act*. In such a case, it is

necessary to consider whether the computer cooperates together with other elements of the claimed invention and thus is part of a single actual invention and, if so, whether that actual invention has physical existence or manifests a discernible physical effect or change and relates to the manual or productive arts.

ANALYSIS

Claim Construction

The person skilled in the art

[18] In the FA at page 2, the person skilled in the art was characterized as:

a team composed of experts in oilfield operations for exploration and/or for exploitation, and computer experts implementing and running related computer systems.

[19] The Applicant did not dispute the above characterization. While it may be appropriate to characterize the skilled person in a particular context as an “expert”, it is important to note that such a person must not be taken as being inventive (*Whirlpool Corp. v. Camco Inc.*, 2000 SCC 67 at paragraph 74). I adopt the above characterization for the purpose of this review.

The relevant common general knowledge

[20] In the FA at page 2, the relevant CGK was set out as including:

- A knowledge of formulation methods such as IMPES, SI, IMPSAT and CI, with the understanding that the stability in such formulation methods improves as the implicitness of the formulation method increases (see paragraph [0023]);
- An understanding that an increase in implicitness, results in a dramatic increase in the cost of deriving solutions (see paragraph [0023]);
- An adaptive implicit method (AIM) which combines formulation methods is used to overcome the implicitness versus costs (see paragraph [0024]); and
- Formulating robust stability criteria and creating an adaptable, highly efficient computational infrastructure are challenging tasks for AIM (see paragraph [0024]).

[21] The above points of CGK were not disputed by the Applicant and I adopt them for the purpose of this review.

The essential elements of the claims

[22] The instant application includes independent claims 1, 15 and 27 of which claim 1 on file is taken as representative:

1. A method for producing hydrocarbons from a reservoir by modeling properties of the reservoir performed by a computing system comprising at least one processor and a machine readable medium comprising code configured to direct the at least one processor to perform the method comprising:

performing a simulation based on an IMPSAT formulation method for the reservoir that performs an auxiliary time-stepping procedure to improve the stability of the simulation, wherein the plurality of time steps comprise an old time step and a new time step, wherein performing the simulation comprises:

calculating a plurality of phase flow rates at the old time and a plurality of flow rate derivatives with respect to a plurality of saturations at the old time;

performing an auxiliary time-stepping procedure between the old time and the new time, wherein the auxiliary time-stepping procedure comprises:

calculating a plurality of masses of the reservoir explicitly;

updating a plurality of phase component densities of the reservoir linearly from the plurality of masses;

calculating a plurality of saturation changes of the reservoir based on the plurality of masses:

updating a plurality of phase flow rates of the reservoir based on the plurality of saturation changes, the plurality of phase flow rates at the old time, and the plurality of phase flow rate derivatives with respect to the plurality of saturations at the old time; and

calculating a plurality of component flow rates of the reservoir based on the updated plurality of phase component densities, the plurality of phase flow rates of the reservoir;

performing pressure and saturation linear solve after the performance of the auxiliary time-stepping procedure and between the old time and the new time;

outputting a solution from the computer system; and

causing a well to be drilled at a location based on the solution for producing hydrocarbons.

[23] The FA presented an analysis of the purposive construction of the claims on file in accordance with the guidance set out in the *Manual of Patent Office Practice*, revised June 2015 (CIPO) at §12.02. As this approach has now been superseded by *PN2020-04*, I undertake anew the identification of the essential elements of the claims on file.

[24] I note that there have been no issues raised during the prosecution of the instant application

in regard to the meaning or scope of any of the terms used in the claims on file. I proceed below on the basis that the meaning and scope of the claims would have been clear to the skilled person.

[25] As set out above, *PN2020-04* states in respect of the identification of essential/non-essential elements that:

In carrying out this identification of essential and non-essential elements, all elements set out in a claim are presumed essential, unless it is established otherwise or is contrary to the language used in the claim.

[26] With respect to the claims on file, the person skilled in the art would understand that there is no use of language in any of the claims indicating that any of the elements in each claim are optional, a preferred embodiment or one of a list of alternatives.

[27] Therefore, in my view, all the elements of the claims on file are considered to be essential, including the computer implementation and computer-related components.

Patentable Subject-Matter

[28] I set out below my assessment of patentable subject-matter in light of the essential elements identified above and the guidance as to the assessment of patentable subject-matter set out in *PN2020-04*.

[29] Claim 1 on file specifies that the method is for “producing hydrocarbons from a reservoir by modeling properties of the reservoir.” At paragraph [0005] of the instant application is stated that “[t]he goal of a simulation model is generally to simulate the flow patterns of the underlying geology in order to optimize the production of hydrocarbons from a set of wells and surface facilities.”

[30] Claim 1 primarily relates to the steps of a computer-implemented algorithm for improved simulation of oil and gas production from a prospective oil and gas reservoir. Most of the steps involve a series of calculations that are designed to produce a more accurate representation of the hydrocarbon reservoir, the purpose of which is to optimize the oil and gas production.

[31] However, claim 1 on file also includes the step of “causing a well to be drilled at a location based on the solution for producing hydrocarbons.” As such, the results of the calculations set out in claim 1, which are used to improve the accuracy of the well model, are applied to

the eventual physical drilling of the well. The results of the improved modelling are used by the oil and gas production personnel to determine the parameters of well drilling and improve the overall oil and gas production from the well.

- [32] In the R-FA, the Applicant stated that it would rely on its previous submissions in support of the position that the claims on file are compliant with section 2 of the *Patent Act*. In the Applicant's response dated September 12, 2018 at page 5, the Applicant discussed the link between the hydrocarbon simulation modelling and the eventual well drilling steps:

In complex geology, accurate hydrocarbon reservoir modelling helps well-site teams optimize drilling before it actually starts. Some estimates conclude that 85% of well problems can be tracked back to poor subsurface modeling and associated well planning. A precise subsurface model can ensure major savings during every phase of operation. Accordingly, there is very clearly a link between the claimed invention and the conditions of hydrocarbon exploration and production. Very basically, the claimed invention is useful in identifying where to explore for and produce hydrocarbons.

- [33] In my view, it is evident from the claim language and the rest of the specification that the simulation algorithm and the results it produces cooperate with the well-drilling step to form a single actual invention that produces an overall improved oil and gas production result. As the step of drilling a well based on the simulation results clearly is a physical process that produces discernable physical effects, the actual invention of claim 1 on file "manifests a discernable effect or change" (*Canada (Attorney General) v Amazon.com Inc*, 2011 FCA 328 at paragraph 66). In comprising the use of computer components and the physical step of well drilling, the actual invention of claim 1 on file also relates to the manual or productive arts and is not prohibited subject-matter under subsection 27(8) of the *Patent Act*.

- [34] The other independent claims on file, namely claims 15 and 27, also include respective steps of:

output simulation results from the simulation based on the SI formulation method for the reservoir that performs an auxiliary time-stepping procedure, for use to cause a well to be drilled at a location based on the simulation results for producing hydrocarbons

and:

producing hydrocarbons from the oil and/or gas field at a location based at least in part on results of the simulation performed based on the IMPES formulation method for the oil and/or gas field that performs an auxiliary time-stepping procedure.

[35] While claim 15 does not recite an active step of “causing a well to be drilled...based on the solution” or “producing hydrocarbons...based at least in part on results of the simulation”, as in claims 1 and 27, it does specify that the simulation results of the claimed system are “for use to cause a well to be drilled... based on the simulation.” In my view, this constitutes the same type of cooperation between the simulation algorithm steps and the physical well-drilling as that of the other independent claims.

[36] Therefore, claims 15 and 27 on file also comprise a single actual invention that “manifests a discernable effect or change”, relates to the manual or productive arts and is not prohibited subject-matter under subsection 27(8) of the *Patent Act*.

[37] Dependent claims 2-14, 16-26 and 28-37, being directly or indirectly dependent on independent claims 1, 15 or 27, also comprise actual inventions that manifest a discernable effect or change, are related to the manual or productive arts and are not prohibited subject-matter under subsection 27(8) of the *Patent Act*.

[38] In light of the above, I conclude that claims 1-37 on file are directed to patentable subject-matter and therefore comply with section 2 of the *Patent Act*.

CONCLUSIONS

[39] I have determined that claims 1-37 on file are directed to patentable subject-matter and are therefore compliant with section 2 of the *Patent Act*.

RECOMMENDATION OF THE BOARD

[40] In view of the above, I am of the view that the rejection is not justified on the basis of the defect indicated in the Final Action notice and I have reasonable grounds to believe that the instant application complies with the *Patent Act* and the *Patent Rules*. I recommend that the Applicant be notified in accordance with subsection 86(10) of the *Patent Rules* that the rejection of the instant application is withdrawn and that the instant application has been found allowable.

Stephen MacNeil

Member

DECISION OF THE COMMISSIONER

[41] I concur with the conclusion and recommendation of the Board. In accordance with subsection 86(10) of the *Patent Rules*, I hereby notify the Applicant that the rejection of the instant application is withdrawn, the instant application has been found allowable and I will direct my officials to issue a Notice of Allowance in due course.

Virginie Ethier
Assistant Commissioner of Patents

Dated at Gatineau, Quebec

this 25th day of March, 2021