

Citation: ExxonMobil Upstream Research Company (Re), 2020 CACP 25
Commissioner's Decision #1545
Décision du Commissaire #1545
Date: 2020-06-10

TOPIC: J00 Meaning of Art

J10 Computer
Programs

J40 Mental Steps

SUJET: J00 Signification de la
technique

J10 Programmes
d'ordinateur

J40 Processus
psychologique

Application No. : 2,701,815
Demande n° 2 701 815

IN THE CANADIAN PATENT OFFICE

DECISION OF THE COMMISSIONER OF PATENTS

Patent application number 2,701,815, 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 refuse the application.

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INTRODUCTION

- [1] This recommendation concerns the review of rejected Canadian patent application number 2,701,815 (“the instant application”), which is entitled “VOLUME OF INVESTIGATION BASED IMAGE PROCESSING” 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, our recommendation is that the Commissioner of Patents refuse the application.

BACKGROUND

The Application

- [2] The instant application was filed under the *Patent Cooperation Treaty* and has an effective filing date in Canada of October 10, 2008. It was laid open to public inspection on June 11, 2009.
- [3] The instant application relates to the processing of information gathered by well logging tools used in hydrocarbon exploration. The processed information is used to provide information regarding the geological structures around a drill operating within a well. The instant application proposes an improved method of processing the data obtained from well logging so as to produce a more accurate representation of the surrounding formation.

Prosecution History

- [4] On July 11, 2017, 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 1-19 on file at the time of the FA (“claims on file”) encompass non-statutory subject-matter and therefore do not comply with section 2 of the *Patent Act*.
- [5] In a January 10, 2018 response to the FA (“R-FA”), the Applicant submitted proposed claims 1-21 (“proposed claims”), which included modifications to independent claims 1 and 10 on file. New proposed dependent claims 19 and 20 were submitted as well. The arguments in the R-FA focussed on the patentability of the proposed claims.
- [6] As the Examiner considered the application not to comply with the *Patent Act*, pursuant to paragraph 30(6)(c) of the *former Rules*, the application was forwarded to the Board for review on May 24, 2018 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 due to non-statutory subject-matter. The SOR also indicated that the proposed claims did not overcome the non-statutory subject-matter defect.

- [7] In a letter dated June 1, 2018, 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] In a response dated August 20, 2018, the Applicant indicated its continued interest in having the application reviewed.
- [9] The present panel (“the Panel”) was formed to review the instant application under paragraph 199(3)(c) of the *Patent Rules*.
- [10] In a preliminary review letter (“PR letter”) dated April 17, 2020, the Panel set out its preliminary analysis of the statutory subject-matter issue with respect to the claims on file and the proposed claims. The Panel also provided the Applicant with an opportunity to make oral and/or written submissions.
- [11] In a letter dated May 5, 2020, the Applicant indicated that an oral hearing was not required and that no further written submissions would be provided. The Applicant requested that the Panel complete its review.

ISSUE

- [12] The issue to be addressed by the present review is whether claims 1-19 on file are directed to non-statutory subject-matter.
- [13] If the claims on file are considered to be defective, we may turn to the proposed claims and consider whether they constitute amendments necessary for compliance with the *Patent Act* and *Patent Rules*, pursuant to subsection 86(11) of the *Patent Rules*.

LEGAL PRINCIPLES AND OFFICE PRACTICE

Claim Construction

[14] In accordance with *Free World Trust v Électro Santé Inc*, 2000 SCC 66 [*FreeWorldTrust*], essential elements are identified through a purposive construction of the claims done by considering the whole of the disclosure, including the specification and drawings (see also *Whirlpool Corp v Camco Inc*, 2000 SCC 67 at paras 49(f) and (g) and 52 [*Whirlpool*]). In accordance with the *Manual of Patent Office Practice*, §12.02 (revised June 2015), the first step of purposive claim construction is to identify the person skilled in the art and their relevant common general knowledge (“CGK”). The next step is to identify the problem addressed by the inventors and the solution put forth in the application. Essential elements can then be identified as those required to achieve the disclosed solution as claimed.

Statutory Subject-Matter

[15] 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.

[16] The Office examination memo PN 2013-03 entitled “*Examination Practice Respecting Computer-Implemented Inventions*” (“PN 2013-03”) clarifies examination practice with respect to the Office’s approach to computer-implemented inventions.

[17] As stated in PN 2013-03, Office practice considers that where a computer is found to be an essential element of a construed claim, the claimed subject-matter will generally be statutory. Where, on the other hand, it is determined that the essential elements of a construed claim are limited to matter excluded from the definition of invention (for example, fine arts, methods of medical treatment, features lacking in physicality, or claims where the subject-matter is a mere idea, scheme, rule or set of rules), the claim will not be compliant with section 2 of the *Patent Act*.

ANALYSIS

Claim Construction

The Person Skilled in the Art

[18] In the PR letter at page 3, we reviewed the characterization of the person skilled in the art in the FA and modified it in view of the subject-matter of the application:

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

a team composed of a geologist and software programmer with background in various data analysis and estimation techniques or methods for determining various geological strata parameters.

The Applicant did not dispute the above characterization.

In our preliminary view, considering that the subject-matter of the instant application relates to hydrocarbon exploration (instant application at para [0003]), the team set out in the FA would also include a petroleum engineer. In addition to the skills set out in the FA, the team would be skilled in hydrocarbon exploration.

[19] There having been no submissions in response to the PR letter, we apply the above in our analysis below.

The Relevant Common General Knowledge

[20] In the PR letter at page 4, we reviewed the relevant CGK as identified in the FA, which was not disputed by the Applicant. We further identified points of CGK referred to by the Applicant in the R-FA, taken from the instant application, as well as identifying an additional point of CGK also taken from the instant application:

In the FA at page 2, the relevant CGK of the person skilled in the art was set out as including:

- taking measurements of geological data (well log data) and providing formation attributes for a plurality of azimuth angles,
- using dual detector compensated density tools (paragraph [0004]),
- performing logging while drilling operations (paragraph [0004]),
- taking measurements to produce a density log,
- using $\Delta\rho$ density compensation technique (paragraph [0006]), and

- using α -processing technique (paragraph [0006]).

The Applicant did not dispute the above in the R-FA, but did make reference at pages 2-3 to additional points of CGK as taken from the instant application. We summarize the additional points below:

- using dual detector compensated density tools to collect geological data without requiring removal of the drill stem and using that data in logging while drilling (“LWD”) operations;
- using the information obtained from the above noted tools to control parameters of the drilling operations;
- the typical operation and configuration of a LWD system as set out at paras [0022]-[0026] of the instant application;
- that conventional density images acquired using LWD dual detector compensated density tools can reveal sedimentary structure of formation penetrated by the borehole, but do not address the effect of formation and borehole geometry on density measurement (para [0006] of instant application);
- conventional post-processing methods assume a one-dimensional variation of the formation density, which typically provide acceptable results for vertical borehole geometries penetrating horizontal formation geometries, but the assumption results in significant error as the relative dip between the borehole and formation increase (para [0007] of instant application);
- high angle and horizontal wells and wells penetrating sediment beds having an appreciable bed dip experience errors in bulk density estimation and bed boundary detection and the eccentricity and azimuthal rotation while drilling of the LWD dual detector make the tool response difficult to interpret with regard to borehole and formation for such wells (para [0007] of instant application).

We further note that at para [0028] of the instant application, reference is made to the typical reliability of a $\Delta\rho$ density compensation technique in compensating for borehole offset where a formation is substantially homogeneous. However, it is also noted that recently, density logs provided by the typical density tools have “found more applications beyond real time geosteering and completion interval selections, wherein density estimation errors associated with the non-homogeneity of the formation becomes significant.” As such, we take the use of the typical density logs for real time geosteering to have been part of the relevant CGK.

[21] As there were no submissions in response to the PR letter, we proceed based on the above-identified CGK.

The Problem to be Solved

[22] In the PR letter at page 5, after reviewing the Applicant’s submissions in the R-FA, we preliminarily agreed with the problem as set out in the FA:

In the FA at page 2, the problem to be solved was identified based on paras [0006] and [0007] as:

current post-processing methods for density log data result in significant error as the relative dip between the borehole and formation increases. This error is due to the use of the assumption that the formation density varies one-dimensionally in the radial or vertical direction.

In the R-FA at page 3, the Applicant suggests that the problem relates to enabling:

improved control of LWD operations, and thus the control of hydrocarbon production, by estimating formation boundary depth from well log data collected during the operation.

This is reiterated under the discussion of patent-eligible subject-matter where it is stated that:

a problem faced by the inventors was how better to improve control of a drilling system during drilling while logging operations.

In our preliminary view, the problem to be solved in the instant application is more accurately reflected by that of the FA. Contrary to the Applicant's assertions, as discussed at paras [0006] and [0007] of instant application, the problem lies in the post-processing procedures used to analyze the data gathered using the dual detector compensated density tools and the assumptions therein (i.e., a one dimensional variation in formation density). The problem is one of analysis of data that is gathered using conventional equipment and techniques in order to produce a better representation of borehole geometry and formation. There is no disclosure of any problems associated with gathering the data that is to be analyzed, or with control of the LWD operations based on any post-processed data.

In view of the above, we proceed on the basis of the problem as identified in the FA.

[23] Again, as there were no submissions in response to the PR letter, we apply the above problem in our analysis.

The Solution

[24] In the PR letter at pages 5-6, after reviewing the FA and the Applicant's submissions in the R-FA, we set out our preliminary view of the solution:

In the FA at page 2, the solution was characterized as:

using a calculated effective shift in height of a formation boundary dip surface to estimate formation boundary depth or dip angle (paragraph [0008]).

In the discussion of patent-eligible subject-matter, the Applicant suggested that the solution provided by the invention is:

improved formation boundary depth estimation during the drilling while logging operation, and use of this estimate for control of the drilling system for continuation of the drilling while logging operation.

In our preliminary view, the solution to the data analysis problem set out above is to use an effective volume of investigation (“EVOI”) analysis to determine an effective depth of investigation (ΔD) and an effective shift in height (Δh) of a formation boundary surface, and to use at least one of the ΔD and Δh to refine the formation boundary depth estimate or the formation boundary dip angle estimate. We derive this solution generally from the material disclosed at paras [0008] to [0010] of the instant application.

With respect to the Applicant’s assertions that the solution relates to control of the drilling system, since there were no problems to be solved related to the use of the processed data to control the drilling system, in our preliminary view, the solution does not involve such control.

[25] There having been no response to the PR letter, we proceed on the basis of the above solution.

The Essential Elements of the Claims

[26] The instant application includes two independent claims 1 and 10:

1. A method comprising:
 - obtaining well log data from a well log tool;
 - estimating a formation boundary depth from the well log data, said well log data providing formation attribute data for a plurality of azimuth angles, wherein said formation boundary depth is estimated for each of said azimuth angles;
 - estimating effective volume of investigation (EVOI), using a programmed computer, and using the relationship

$$EVOI = \Delta D^2 \cdot \Delta h \cdot \Delta \phi$$

- to determine an effective shift in height (Δh) of a formation boundary surface associated with said formation boundary depth, where ΔD is an effective depth of investigation and $\Delta \phi$ is an azimuthal aperture; and
- refining said formation boundary depth estimate using said effective shift in height (Δh).

10. A method comprising:
 - obtaining well log data using a well log tool;
 - estimating a formation boundary dip angle from the well log data, said well log data providing formation attribute data for a plurality of azimuth angles;
 - estimating effective volume of investigation (EVOI), using a programmed computer, and using the relationship

$$EVOI = \Delta D^2 \cdot \Delta h \cdot \Delta \phi$$

- to determine an effective shift in height (Δh) of a formation boundary surface associated with said formation boundary depth, where ΔD is an effective depth of investigation and $\Delta \phi$ is an azimuthal aperture; and

refining said formation boundary dip angle estimate using said effective shift in height (Δh).

[27] In the PR letter at pages 6-8, we reviewed the list of essential elements set out in the FA and the Applicant's response thereto in the R-FA. We set out a revised list of essential elements for claim 1 and addressed those of the remaining claims on file:

In the FA at page 2, the essential elements of independent claims 1 and 10 were set out:

As purposively construed, the essential elements in claim 1 that are required to solve the problem are:

- estimating a formation boundary depth from well log data;
- estimating effective volume of investigation (EVOI),
- using the relationship $EVOI = \Delta D^2 \cdot \Delta h \cdot \Delta \phi$ to determine an effective shift in height (Δh) of a formation boundary surface associated with said formation boundary depth, where ΔD is an effective depth of investigation and $\Delta \phi$ is an azimuthal aperture; and
- refining said formation boundary depth estimate using said effective shift in height (Δh).

Independent claim 10 is similar, except that, in claim 10, the formation boundary dip angle is estimated and refined in place of the formation boundary depth. [Emphasis in original]

The Applicant's submissions in the R-FA focussed on the essentiality of features related to the proposed claims submitted with the R-FA.

The FA also indicated that the use of a programmed computer is not an essential element of the claims. According to the FA:

A computer is part of the operational context of the invention as it is only for estimation and iteration of calculations to refine the estimations. These are tasks for which computers are normally used. Further, the well log data and the well log tool that provides formation attribute data at a plurality of azimuth angles is also contextual in nature. The data is not said to be different from commonly collected data, and is simply the standard well log data which is provided to the computer for processing.

We preliminarily agree with the above. The instant application discloses no details of the computer elements that are used to perform the analysis set out in the claims. Any computer elements that would be used would therefore be well-known generic computer components. As set out above, there is no computer problem to be solved, the problem instead relating to the processing of the data obtained from the well log tool. Likewise, the well logging tool

and detectors used to gather data are conventional and are also part of the operational context of the claimed invention.

However, while we agree that the data is obtained in a conventional manner using conventional equipment, in our preliminary view, the provision of the obtained data to the relationships set out in the claims is essential in order for the data analysis to take place.

As such, in our preliminary view, the essential elements of claim 1 on file are:

- providing well log data;
- estimating a formation boundary depth from the well log data, said well log data providing formation attribute data for a plurality of azimuth angles, wherein said formation boundary depth is estimated for each of said azimuth angles;
- estimating effective volume of investigation (EVOI), using the relationship
$$\text{EVOI} = \Delta D^2 \cdot \Delta h \cdot \Delta \phi$$
- to determine an effective shift in height (Δh) of a formation boundary surface associated with said formation boundary depth, where ΔD is an effective depth of investigation and $\Delta \phi$ is an azimuthal aperture; and
- refining said formation boundary depth estimate using said effective shift in height (Δh).

As stated in the FA, claim 10 on file differs from claim 1 in that the estimate relates to the formation boundary dip angle and it is this that is refined based on the effective shift in height (Δh).

With respect to dependent claims 2-9 and 11-18, in our preliminary view, the additional elements of these claims represent refinements of the data analysis and calculations that make up independent claims 1 and 10 on file.

Claim 19 relates to a non-transitory computer readable medium storing instructions for executing the method of any of claims 1-18. In our preliminary view, its essential elements are those of the claims to which it refers.

[28] There having been no response to the PR letter, we adopt the list of essential elements set out above from the PR letter.

Statutory Subject-Matter

[29] In the PR letter at pages 8-9 we reviewed the arguments set out in the FA and those in response in the R-FA:

In the FA at page 3, it was stated that:

Claims 1-19 encompass subject-matter that lies outside the definition of "invention" and do not comply with section 2 of the *Patent Act*. The defined

method is a mere scheme, plan, rule(s) or mental process(es) and is consequently not a statutory "art" or "process".

In considering the essential features of the claims, it is clear that they recite a set of steps that are exclusively a series of mental steps (e.g. performing calculations; manipulating data or information to produce data or information having a different purely intellectual meaning or aesthetic significance), and are disembodied (abstract) and therefore not a practical form of an invention.

In the R-FA, the Applicant's arguments focussed on the patentability of the proposed claims submitted with the R-FA, which we address below.

As stated in the FA, the Applicant previously presented arguments as to why the well log tool and computer were essential to the claimed invention. These points have already been addressed above under our consideration of the problem, solution and essential elements.

[30] We thereafter provided our preliminary view on the compliance of the essential elements of the claims on file with section 2 of the *Patent Act*:

In light of our identification of the essential elements of the claims, we preliminarily agree with the position taken in the FA. The essential elements of the claims, such as estimating steps and refining those estimates, are directed to a series of calculations and mathematical formulae, which are akin to scientific principles or abstract theorems. As such, the subject-matter of the claims on file is not directed to "something with physical existence, or something that manifests a discernable effect or change" (*Canada (Attorney General) v Amazon.com Inc*, 2011 FCA 328 at paragraph [66] [*Amazon*]).

We further note that the invention in *Schlumberger Canada Ltd v Commissioner of Patents* (1981), 56 CPR (2d) 204 (FCA), referred to in *Amazon*, and the essential elements of the claims on file in the instant application, are very similar. In both cases, a computer may be used to perform the calculations that make up the methods, but it is not essential that the methods be implemented in this manner. Both cases relate to the analysis of inputs through various calculations. The use of a computer, though convenient, is not essential to perform the analysis.

In light of the above, it is our preliminary view that claims 1-19 on file are directed to non-statutory subject-matter and are therefore non-compliant with section 2 of the *Patent Act*.

[31] There having been no response to the PR letter, we conclude that claims 1-19 on file are directed to non-statutory subject-matter and therefore do not comply with section 2 of the *Patent Act*, for the reasons set out in the PR letter and reproduced above.

PROPOSED CLAIMS

[32] In the PR letter at pages 9-10, we set out our preliminary view that proposed claims 1-21

submitted with the R-FA would not alter the outcome of the assessment of statutory subject-matter:

The Applicant submitted proposed claims 1-21 with the R-FA. Claims 1 and 10 were amended to specify “obtaining well log data from a well log tool used in a drilling while logging operation” and that after the formation boundary depth or dip angle estimates have been refined, “continuing, with a drilling system, the drilling while logging operation based on the formation boundary depth estimated from the well log data.”

New dependent claims 19 and 20 add drilling system components such as a processor based control system and a drill string.

The Applicant contends, at page 4 of the R-FA, that the inclusion of the above limitations leads to the subject-matter of the claims falling within the meaning of “art” in section 2 of the *Patent Act*. The Applicant contends that the proposed claims satisfy the test for a patentable “art” as set out in *Progressive Games Inc v Canada (Commissioner of Patents)* (1999), 3 CPR (4th) 517 (FCTD); aff’d (2000), 9 CPR (4th) 479 (FCA) [*Progressive Games*] and restated in *Amazon* at para 51. The Court in *Amazon* characterized the criteria in *Progressive Games* as reflecting the statutory requirements of novelty, utility and the prohibition on granting a patent for a mere scientific principle or abstract theorem.

The requirements of novelty (or obviousness) and utility are not at issue in the present case.

The Applicant contends that the proposed claims “require employment of physical agents and entities which act to cause manifestation or effect or change of character in such physical entities.” They would therefore have a method of practical application, as required by the first of the three criteria of *Progressive Games*.

However, in our preliminary view, the additional elements proposed for claims 1, 10, 19 and 20 do not change the non-statutory nature of the claims on file.

As set out in our construction of the claims on file in accordance with the approach set out in *MOPOP §12.02*, there were no problems to be addressed in relation to obtaining the required well log data and no problems to be addressed in control of the LWD operations based on any post-processed data. Likewise, the provision of a well log tool as part of a drill string was conventional and therefore the invention would not have solved any problems in this respect. As such, these features would not form part of any solution or be included in the list of essential features of the claims, such that the claims would not be disembodied calculations and mathematical formulae.

In light of the above, the essential features of the claims on file would not be altered by the amended language of proposed claims 1-21 and would likewise be directed to non-statutory subject-matter and therefore non-compliant with section 2 of the *Patent Act*. Therefore, it is our preliminary view that the proposed claims are not considered “necessary” for compliance with the *Patent Act* and *Patent Rules* as required by subsection 86(11) of the *Patent Rules*.

[33] With no submissions having been made in response to the PR letter, and in light of the

above, we conclude that proposed claims 1-21 are directed to non-statutory subject-matter and are therefore non-compliant with section 2 of the *Patent Act*. As such, the proposed claim set does not overcome the defect under statutory subject-matter for the claims on file and is therefore not “necessary” for compliance with the *Patent Act* and *Patent Rules* as required by subsection 86(11) of the *Patent Rules*.

CONCLUSIONS

[34] We have determined that claims 1-19 on file are directed to non-statutory subject-matter and are therefore non-compliant with section 2 of the *Patent Act*.

[35] We have further determined that proposed claims 1-21 do not overcome the defect under statutory subject-matter and are therefore not “necessary” for compliance with the *Patent Act* and *Patent Rules* as required by subsection 86(11) of the *Patent Rules*

RECOMMENDATION OF THE BOARD

[36] In view of the above, the Panel recommends that the application be refused on the ground that the claims on file are directed to non-statutory subject-matter and are therefore non-compliant with section 2 of the *Patent Act*.

Stephen MacNeil

Iain Baxter

Howard Sandler

Member

Member

Member

DECISION OF THE COMMISSIONER

[37] I concur with the conclusion and recommendation of the Board that the application be refused on the ground that the claims on file are directed to non-statutory subject-matter and are therefore non-compliant with section 2 of the *Patent Act*.

[38] Therefore, in accordance with section 40 of the *Patent Act*, I refuse to grant a patent on this application. Under section 41 of the *Patent Act*, the Applicant has six months within which to appeal my decision to the Federal Court of Canada.

Johanne Bélisle
Commissioner of Patents

Dated at Gatineau, Quebec

this 10th day of June, 2020