

Citation: Yanjun YC Che (Re), 2024 CACP 6
Commissioner's Decision #1665
Décision du commissaire n° 1665
Date: 2024-03-28

TOPIC: B00 Ambiguity or Indefiniteness (incomplete)
B20 Excessive width
C00 Adequacy or Deficiency of Description
F00 Novelty
G00 Utility
O00 Obviousness

SUJET : B00 Caractère ambigu ou indéfini (incomplet)
B20 Portée excessive
C00 Caractère adéquat ou inadéquat de la description
F00 Nouveauté
G00 Utilité
O00 Évidence

Application No. 2814276

Demande n° 2 814 276

IN THE CANADIAN PATENT OFFICE

DECISION OF THE COMMISSIONER OF PATENTS

Patent application number 2,814,276, having been rejected under subsection 199(1) of the *Patent Rules* (SOR/2019–251) ("*Patent Rules*"), has consequently been reviewed in accordance with paragraph 86(7)(c) of the *Patent Rules*. The recommendation of the Patent Appeal Board and the decision of the Commissioner are to refuse the application.

Applicant:

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INTRODUCTION

[1] This recommendation concerns the review of rejected Canadian patent application number 2,814,276, which is entitled “THE EXTRACTION OF GRAVITATIONAL FIELD ENERGY” and is owned by YANJUN Y.C. CHE. A review of the rejected application has been conducted by the Patent Appeal Board (“the Board”) pursuant to paragraph 86(7)(c) of the *Patent Rules*. As explained in more detail below, the Board’s recommendation is that the Commissioner of Patents refuse the application on the basis that the claims on file lack utility, that the specification is insufficient and that various claims on file are indefinite.

BACKGROUND

The application

[2] The application was filed on April 16, 2013. It was laid open to public inspection on October 16, 2014.

[3] The instant application relates to methods, systems and devices that may allegedly be used to convert gravitational field energy into mechanical energy. In particular, according to the instant application, the methods, systems and devices described therein enable the buoyancy forces that would normally act on an object immersed in a fluid to be eliminated by shielding its bottom surface by the upper surface of another object. In this way, the compound object created may fall in the fluid. When the positions are reversed, buoyant forces move the compound object upwards. If the invention were to function as described and claimed, the alternating downward and upward movement would enable mechanical work to be extracted and used as an energy source.

Prosecution history

- [4] On February 1, 2022, a Final Action (“FA”) was written pursuant to subsection 86(5) of the *Patent Rules*. The FA stated that the application is defective on the grounds that:
- claims 1–31 lack unity and do not comply with subsection 36(1) of the *Patent Act*;
 - claims 1–31 encompass subject-matter that lacks utility and do not comply with section 2 of the *Patent Act*;
 - claims 1–16, 17–21, 23, 25, and 27–31 lack novelty and do not comply with paragraph 28.2(1)(b) of the *Patent Act*;
 - claims 1–31 would have been obvious and do not comply with section 28.3 of the *Patent Act*;
 - claims 1, 8, 15, 17, 23, 29 and 30 are not fully supported by the description and do not comply with section 60 of the *Patent Rules*;
 - claims 1–5, 7–12, 14, 15, 17, 21–23, 25, 27, and 29–31 are indefinite and do not comply with subsection 27(4) of the *Patent Act*; and
 - claim 21 contains formality issues and does not comply with subsection 13(1) of the *Patent Rules*.
- [5] In a May 31, 2022 response to the FA (“R-FA”), the Applicant provided a proposed set of amended claims 1–31 (“proposed claim set-1”) wherein typographical and grammatical corrections were made to the claims on file. No substantial changes to the claim language were made. The Applicant also provided arguments in favor of patentability that would apply to both the claims on file and proposed claim set-1.

- [6] As the Examiner considered the application not to comply with the *Patent Act* and *Patent Rules*, pursuant to subsection 86(7)(c) of the *Patent Rules*, the application was forwarded to the Board for review on March 31, 2023 along with an explanation outlined in a Summary of Reasons (“SOR”). The SOR indicated that the formality issue in claim 21 would be overcome by proposed claim set-1, as well as some of the indefiniteness defects. The rest of the defects remained.
- [7] In a letter dated April 6, 2023, the Board forwarded to the Applicant a copy of the SOR and requested that the Applicant confirm their continued interest in having the application reviewed.
- [8] In a response to the SOR dated July 2, 2023 (“R-SOR”), the Applicant confirmed continued interest in having the application reviewed and requested the opportunity for an oral hearing. The Applicant also provided submissions in favor of the utility of the claimed invention.
- [9] The undersigned Panel was assigned to review the instant application and to make a recommendation to the Commissioner of Patents as to its disposition.
- [10] In a Preliminary Review letter (“PR letter”) sent November 1, 2023, the Panel set out its preliminary analysis of the outstanding issues. In particular, the Panel was of the preliminary view that:
- Claims 1–31 do not lack unity and are compliant with subsection 36(1) of the *Patent Act*;
 - Claims 1–31 lack utility and therefore do not comply with section 2 of the *Patent Act*;
 - Claims 1–31 are novel in view of the prior art and are therefore compliant with paragraph 28.2(1)(b) of the *Patent Act*;

- Claims 1–31 would not have been obvious to the skilled person in view of the prior art and are therefore compliant with section 28.3 of the *Patent Act*;
- The subject-matter of claims 1–31 on file does not lack support in the description, nor is it broader than the invention described;
- The application is insufficient and therefore is not compliant with subsection 27(3) of the *Patent Act*;
- claims 2–4, 7, 9–11, 14, 17, 22, 23, 25, 27, 29, 30 and 31 are indefinite and therefore do not comply with subsection 27(4) of the *Patent Act*; and
- claim 21 does not comply with paragraph 13(1)(c) of the *Patent Rules*.

[11] The Panel was also of the preliminary view that the proposed claims submitted with the R-FA would not overcome all of the outstanding defects.

[12] The PR letter provided the Applicant with an opportunity to make both written and oral submissions.

[13] In a response received via email dated December 28, 2023 (“R-PR”), the Applicant provided an amended set of proposed claims 1–28 (“proposed claim set-2”) and further argumentation in favor of patentability addressing the Panel’s analysis set out in the PR letter. This response was later submitted via formal communication channels on January 29, 2024.

[14] An oral hearing was originally scheduled to take place, but was cancelled with the agreement of the Applicant. As set out in an email dated January 18, 2024, with no further questions or concerns on the part of the Panel, other than confirming the Applicant’s mailing address, the Applicant agreed with the Panel’s proposal to proceed to prepare a final recommendation to the Commissioner of Patents.

[15] The Panel's final analysis of the outstanding issues is provided below.

ISSUES

[16] The issues to be addressed in this final review are whether:

- claims 1–31 lack unity and do not comply with subsection 36(1) of the *Patent Act*;
- claims 1–31 encompass subject-matter that lacks utility and do not comply with section 2 of the *Patent Act*;
- claims 1–31 lack novelty and do not comply with paragraph 28.2(1)(b) of the *Patent Act*;
- claims 1–31 would have been obvious and do not comply with section 28.3 of the *Patent Act*;
- claims 1–31 are not fully supported by the description and do not comply with section 60 of the *Patent Rules*;
- the application is insufficient and does not comply with subsection 27(3) of the *Patent Act*;
- any of claims 1–31 are indefinite and do not comply with subsection 27(4) of the *Patent Act*; and
- claim 21 contains formality issues and does not comply with subsection 13(1) of the *Patent Rules*.

[17] After considering the claims on file, we review proposed claim set-2 submitted with the R-PR to determine if they would be considered a necessary amendment under subsection 86(11) of the *Patent Rules*.

CLAIM CONSTRUCTION

Legal Principles and Office Practice

- [18] Purposive Construction is antecedent to any consideration of validity (*Free World Trust v Électro Santé Inc*, 2000 SCC 66 [*Free World Trust*] at para 19).
- [19] In accordance with *Free World Trust* and *Whirlpool Corp v Camco Inc*, 2000 SCC 67, purposive construction is performed from the point of view of the person skilled in the art in light of the relevant common general knowledge (“CGK”), considering the whole of the disclosure including the specification and drawings. In addition to interpreting the meaning of the terms of a claim, purposive construction distinguishes the essential elements of the claim from the non-essential elements. Whether an element is essential depends on the intent expressed in or inferred from the claim, and on whether it would have been obvious to the skilled person that a variant has a material effect upon the way the invention works.
- [20] “Patentable Subject-Matter under the *Patent Act*” (CIPO, November 2020) [PN2020–04] notes that all elements in a claim are presumed essential unless such presumption is contrary to the claim language, or it is established otherwise (see also *Free World Trust* at para 57, *Distrimedic Inc v Dispill Inc*, 2013 FC 1043 at para 201).

Analysis

The person skilled in the art

[21] In the PR letter at page 4, we set out our preliminary view of the person skilled in the art, taken from the FA and not disputed by the Applicant in the R-FA or R-SOR:

In the FA at page 11, the person skilled in the art was set out within the assessment of obviousness:

The person skilled in the art is a team comprising engineers and technicians skilled in the art of fluid mechanics, buoyance, and flotation.

[22] The Applicant did not offer any comments in the R-PR in respect of the above. We therefore proceed on this basis.

The relevant common general knowledge

[23] We set out at pages 4 and 5 of the PR letter our preliminary view as to the relevant points of CGK, which included that taken from the FA as well as further points identified by the Panel:

In the FA at page 11, again under the assessment of obviousness, the relevant CGK was set out as including:

the process of building and designing mechanical mechanisms to extract or convert energy from one form to another utilizing buoyancy, and the associated mechanical design options within those designs.

To the above points we would add the following taken from the Background of Technology section at pages 1 to 3 of the instant application and characterized as having been commonly known, as well as some basic principles that the person skilled in the art would have been aware of:

- Knowledge of various sources of energy, including that from mineral sources, solar and wind, as well as methods of extracting and utilizing such energy;
- Methods of using gravity to obtain energy, such as the use of hydroelectric dams;
- The knowledge that in a fluid, the force of gravity and buoyancy apply in opposite directions and that for a given object, the combined force of gravity and buoyancy cause movement in one direction only depending on the objects mass and volume;
- Knowledge of prior attempts to vary buoyant force on an object, such as by varying the volume so as to effect rising and falling of the object in a fluid; and
- Knowledge of basic principles governing buoyancy forces, namely Archimedes' principle that any body completely or partially submerged in a fluid is acted upon by a buoyant force equal to the weight of the fluid displaced by the body.

[24] The Applicant did not offer any comments in respect of the relevant CGK in the R-FA, R-SOR or the R-PR. We therefore proceed on the basis of the relevant CGK set out above.

The claims on file

- [25] The instant application contains five independent claims.
- [26] Claim 1 is directed to a method of enabling an object to lose its buoyancy in a fluid, claim 8 is directed to a method of enabling an object to move upward in a fluid, claim 15 is directed to a device embodying the method of claim 1, claim 17 is directed to a conveyor belt/container unit and carrier using the buoyancy eliminating principles of claim 1 to effect movement of the conveyor and generate mechanical energy and claim 23 is directed to a device comprising a rotating circular object in a container filled with fluid with a carrier to also use the buoyancy eliminating principles of claim 1 to effect rotation of the device.
- [27] In the PR letter at pages 5–6, we set out claims 1 and 8 (set out below as well) as representative of the basic premise of the invention, which is that covering a surface of an object affects the buoyant force exerted on it in a fluid:
1. A method for enabling an object to lose its buoyancy in a fluid, comprising:
 - fluid-tightly covering a bottom surface of the object in the fluid by a top surface of a second object; and
 - generating, along the surface of the second object, a downward movement.

 8. A method for enabling an object to move upward in a fluid, comprising:
 - fluid-tightly covering a top surface of the object in the fluid by a bottom surface of a second object; and

generating, along the surface of the second object, an upward movement.

[28] We noted that:

According to claim 1, the buoyancy force on the bottom surface of an object is eliminated by covering its surface with the top of another object, which then causes the object to fall in a fluid. This is the basis of the alternating movement in a fluid that allows work to be extracted from the devices and systems of the claims on file, as contended by the Applicant (e.g., see R-SOR at page 5).

[29] No comments in relation to the above were presented in the R-PR.

Claim Scope/Meaning of terms

[30] In the PR letter at pages 6–7, we set out our preliminary view as to the construction of certain terms used in the claims on file, namely “fluid-tightly covering” and the “generating ...” step of claims 1 and 8 and certain claims that refer to them:

Several issues concerning the clarity of terms used in the claims were identified in the FA, which will be dealt with later under our indefiniteness assessment. Most of these issues are easily corrected and do not affect our ability to assess the validity of the claims on file.

However, during our preliminary review, it became evident to us that the meaning of the term “fluid-tightly covering” used throughout the claims on file needed to be clearly defined in order to properly assess their compliance with the *Patent Act*. As such, we propose below our construction of this term.

The term “fluid-tightly covering” is not used in the description. However, the meaning of this term can be ascertained from an assessment of how the claimed invention is intended to function. In accordance with the description, the two surfaces of e.g., claim 1, one of which “fluid-tightly” covers the other, are to be in such proximity that there is no gap between them (instant application at para [0055]). The lower object is to shield the lower surface of the upper object, allegedly to shield the lower surface of the upper object from any effect of buoyant force exerted by the surrounding fluid. In such a case, the objects must be in such close proximity that no fluid is present between them and such that no buoyant force may act on the lower surface of the upper object. The objects must also remain in such a position so that no fluid may enter between them and start to exert a buoyant force. Otherwise the object would not continue to move downward in the fluid.

This construction of “fluid-tightly covering” is applied in our analyses below.

The other issue that requires clarification is the scope of claims 1 and 8 (and some claims that refer to them) in relation to the “generating...” step. Both of claims 1 and 8 set out such a generating step where the surface of one object is “fluid-tightly” covered by another so as to eliminate the effect of the surrounding fluid on the covered object’s surface. However, in claims 1 and 8 there is no clear link made between the fluid-tightly covering of one of the surfaces with the generation of a downward/upward movement. This issue seems to have led to the identification of a lack of support defect in the FA, which is addressed later in this letter.

Despite the apparent lack of a clear link between the fluid-tightly covering step and the generation step, in our preliminary view, the claim should be construed such that the generation of a downward/upward movement results from the fluid-tightly covering of a surface.

The principles of purposive construction require that the claims be read in an informed and purposive way (*Free World Trust* at para 44), taking into account the whole of the specification. In the present case, the preamble of claim 1 sets out a “method for enabling an object to lose its buoyancy in a fluid”, with the only step set out to accomplish such a result being fluid-tightly covering a bottom surface of an object by the top surface of another. In our preliminary view, reading the claim in context, the skilled person would then expect such a step to have caused the generation of a downward movement.

This understanding is supported by the rest of the specification. For example, in the instant application at paragraph [0032], the method of causing an object to lose the influence of buoyant forces is described. Multiple objects are combined with a compound object being formed. The lower object is shaped and structured such that it fully shields the lower surface of the upper object, with no gap between them. According to this method, with no water being able to affect the lower surface of the upper object, the buoyant forces on it are eliminated and the compound object falls downward in the fluid due to the fluid pressure on the top of the upper object and gravitational forces. The same principle is used in respect of the embodiments of Figure 3 (see para [0058]), Figure 4 (see para [0078]) and Figure 5 (see pages 20 and 20A). There is no suggestion in the rest of the specification that something other than the covering of a surface of an object has an effect on the buoyant forces acting on it.

We proceed on the basis that the skilled person would have understood the generating step of claim 1 to be a result of the fluid-tightly covering of a surface. The same would be true of the generating step of claim 8 and the movements set out in the other claims as well, which use the same buoyancy force shielding mechanism.

[31] The Applicant did not offer any comments in the R-PR in respect of the above quoted claim construction. We therefore proceed on the basis of the understanding set out therein.

The essential elements

[32] In the PR letter at page 7, we set out our preliminary view that all the elements of the claims are considered to be essential:

The FA did not present an analysis of the purposive construction of the claims on file. Given that the person skilled in the art would understand that there is no use of language in any of the claims indicating that the elements in each claim are optional, alternatives or a preferred embodiment, in our preliminary view, all the elements of the claims on file are considered to be essential and are taken into account in our analysis below.

[33] The Applicant offered no comments in response to the above in the R-PR. We therefore take all of the elements of the claims to be essential for the purpose of our later analyses.

UNITY

Legal Principles and Office Practice

[34] Subsection 36(1) of the *Patent Act* states:

Patent for one invention only

36(1) A patent shall be granted for one invention only but in an action or other proceeding a patent shall not be deemed to be invalid by reason only that it has been granted for more than one invention.

[35] Section 88 of the *Patent Rules* sets out when an application is directed to “one invention only”:

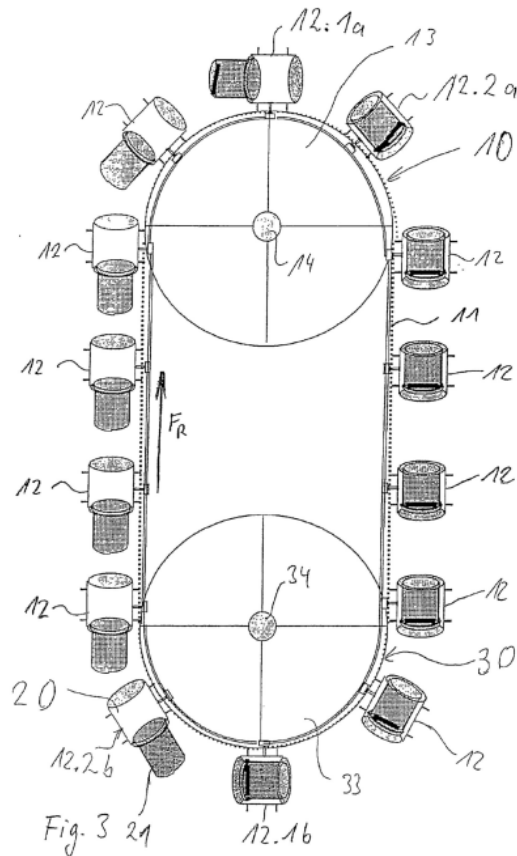
88 For the purposes of section 36 of the Act, ***one invention*** includes a group of inventions linked in such a manner that they form a single general inventive concept.

[36] As specified in the *Manual of Patent Office Practice* §21.06 (revised November 2013), a lack of unity defect may become apparent through either an *a priori* or an *a posteriori* evaluation of the claims:

The two aspects of the unity of invention requirement can be considered separately as: 1) the need for a common set of elements among the claims, and 2) the requirement that the common set of elements be new and unobvious (i.e. inventive) over the prior art.

The former can be assessed without regard to the state of the art, and is referred to as an *a priori* evaluation of unity of invention, whereas the latter requires the state of the art to be considered and is referred to as an *a posteriori* evaluation. A lack of unity of invention is a defect in an application regardless of whether it is identified *a priori* or *a posteriori*.

second side move downward. Figure 3 of D2 is reproduced below showing the arrangement and movement of the loop.



In claim 1 on file, the bottom surface of an object is covered by the top surface of a second object, which according to the claim causes the first object to lose its buoyancy, generating a downward movement. In D2, the piston and cylinder units on the right side as shown in Figure 3 above are moving down, but contrary to claim 1 of the instant application there is no top surface of a second object covering the bottom surface of a first object. The piston and cylinder are coextensive and share the same volume. On the left side, when the piston is extended out from the cylinder, one might characterize the arrangement as the top of one object fluid-tightly covering

the bottom of another. However, on the left side, the piston and cylinder units are moving up rather than down, again contrary to what is set out in claim 1.

Further, in D2 the increase in buoyancy force or decrease in buoyancy force is caused by a change in volume of the piston and cylinder unit, contrary to the claims on file where the elimination of buoyancy force (claim 1) is caused simply by covering a surface of the object.

While, as discussed above, D2 may be considered to show a situation where the top surface of an object is covered by the bottom surface of a second object (on the left side of the loop) and upward movement is effected (claim 8 of the instant application), again this is due to a change in volume rather than the simple covering of a surface.

In our preliminary view, the single general inventive concept that is shared by the claims on file, including independent claims 15, 17 and 23 (which operate under the same premise as claims 1 and 8) is controlling the buoyant force that is exerted on a first object by a fluid by shielding or not a surface of the first object with the surface of a second object, thereby effecting upward or downward movement of the objects. Such a concept is not disclosed by prior art document D2, nor by any of the other prior art documents cited in the FA (which will be discussed later in detail under the assessments of novelty and obviousness).

- [38] The Applicant did not provide any comments on the above preliminary view in the R-PR.
- [39] For the reasons set out in the PR letter, we conclude that claims 1–31 do not lack unity and are therefore compliant with subsection 36(1) of the *Patent Act*.

UTILITY

Legal Principles

[40] Utility is required by 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.

[41] In *AstraZeneca Canada Inc v Apotex Inc*, 2017 SCC 36 [*AstraZeneca*] at para 53, the Supreme Court of Canada stated that the “[u]tility will differ based on the subject-matter of the invention as identified by claims construction” and outlined the approach that should be undertaken to determine whether a patent discloses an invention with sufficient utility under section 2 of the *Patent Act*:

[54] To determine whether a patent discloses an invention with sufficient utility under s. 2, courts should undertake the following analysis. First, courts must identify the subject-matter of the invention as claimed in the patent. Second, courts must ask whether that subject-matter is useful—is it capable of a practical purpose (i.e. an actual result)?

[55] The Act does not prescribe the degree or quantum of usefulness required, or that every potential use be realized—a scintilla of utility will do. A single use related to the nature of the subject-matter is sufficient, and the utility must be established by either demonstration or sound prediction as of the filing date (AZT, at para 56).

[42] Therefore, utility must be established either by demonstration or sound prediction as of the Canadian filing date. Utility cannot be supported by evidence and knowledge that only became available after this date (see also *Apotex Inc v*

Wellcome Foundation Ltd, 2002 SCC 77 at para 56 [AZT], cited in the passage above at para 55 [*AstraZeneca*]).

- [43] Where the utility of an invention is to be established by demonstration, the demonstration must have occurred as of the filing date but need not have been included in the description (see *Eli Lilly Canada Inc v Apotex Inc*, 2015 FC 1016 at paras 138–142). Information establishing the demonstrated utility as of the filing date may be provided after the filing date by the Applicant.
- [44] The doctrine of sound prediction allows the establishment of asserted utility even where that utility had not been fully verified as of the filing date. However, a patent application must provide a “solid teaching” of the claimed invention as opposed to “mere speculation” (AZT at para 69).
- [45] The soundness of a prediction is a question of fact (AZT at para 71). Analysis of that soundness should consider three elements (AZT at para 70):
- there must be a factual basis for the prediction;
 - the inventor must have, at the date of the patent, an articulable and sound line of reasoning from which the desired result can be inferred from the factual basis; and
 - there must be proper disclosure of the factual basis and line of reasoning.
- [46] These elements are assessed from the perspective of the skilled person to whom the patent is directed, taking into account the skilled person’s CGK. Further, with the exception of the CGK, the factual basis and line of reasoning must be included in the patent application (See *Bell Helicopter Textron Canada Ltée v Eurocopter SAS*, 2013 FCA 219 at paras 152–153).
- [47] Although a prediction does not need to amount to a certainty to be sound, there must be a *prima facie* reasonable inference of utility (*Gilead Sciences Inc v*

Idenix Pharmaceuticals Inc, 2015 FC 1156 at para 251; *Mylan Pharmaceuticals ULC v Eli Lilly Canada Inc*, 2016 FCA 119 at para 55).

Analysis

What is the subject-matter of the invention as claimed?

[48] We summarized the subject-matter of the invention at page 12 of the PR letter:

As set out above under Purposive Construction, we have preliminarily taken all the elements of the claims as essential. Also, given that we have taken claims 1 and 8 as representative of the subject-matter of the claims on file and the remaining claims are based on the principles set out in these claims, our focus will be on claim[s] 1 and 8 for the purposes of the assessment of utility, in particular claim 1 since claim 8 merely reverses the surface covering and consequential movement of the object.

With respect to claim 1, the subject-matter of the invention is a method for enabling an object to lose its buoyancy in a fluid. This method is accomplished by fluid-tightly covering a bottom surface of a first object by the top surface of a second object. In accordance with our construction of claim 1 set out above, as a consequence of this covering, the first object loses the buoyancy force that would normally be exerted on it by the fluid and a downward movement of the objects is generated by the remaining forces acting on them.

[49] The Applicant did not contest this assessment. We proceed on the basis of the subject-matter identified above.

Was the subject-matter useful—is it capable of a practical purpose?

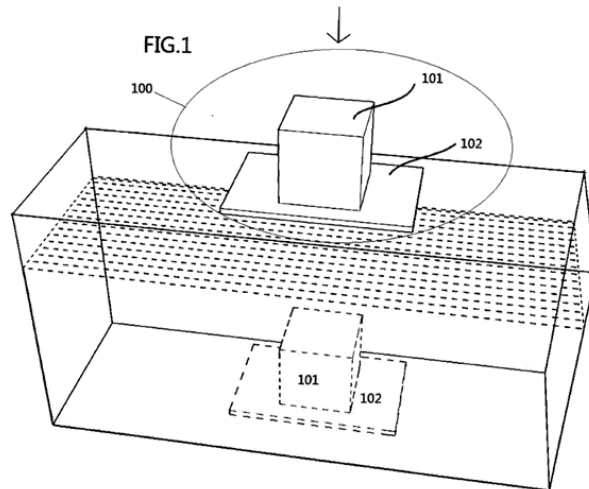
[50] As we noted in the PR letter at page 12, the answer to this question involves a determination as to whether the utility of the claimed subject-matter was established by demonstration or sound prediction as of the filing date.

WAS UTILITY ESTABLISHED BY DEMONSTRATION AS OF THE FILING DATE?

[51] At pages 12–13 of the PR letter, we set out our preliminary view that the utility of the claimed subject-matter was not established by demonstration as of the filing date:

The instant application describes the principles behind the basic method of causing an object to lose its buoyancy and fall within a fluid such as water. As described at paragraph [0032] of the application for example, the method involves creating a compound object such as that shown in Figure 1. The shape and structure of a lower object fully shield[] the lower surface of an upper object. By attaching or sealing the two objects, the fluid cannot act on the lower surface of the upper object and according to the application, this eliminates any buoyant force acting on the upper object. Since a downward pressure would still act on the upper surface of the upper object, this downward pressure causes the compound object to fall in the fluid. Figure 1 of the instant application, reproduced below, illustrates the above basic principle of operation of the claimed invention, with the lower object 102

shielding the upper object 101 from the buoyant forces that should be exerted on it by the fluid.



Various embodiments of the invention were described that use the above basic principle.

However, there is nothing in the specification or drawings that indicates that the [A]pplicant built and tested any of the disclosed embodiments before the Canadian filing date. The specification describes the invention in reference to Figures 1 to 10 that appear to be schematics of proposed devices that according to the Applicant, function in the manner described. No examples of test devices have been set out nor any experimental data that was derived from them.

We acknowledge the submission of several documents showing images of experiments that the Applicant claims to have conducted, including images and related discussion submitted with the responses dated May 11, 2018, May 23, 2018, June 12, 2018, June 21, 2018, July 24, 2018, February 12, 2020 and November 3, 2020. The most recent of these submissions make reference to videos of experiments conducted by the Applicant that are part

of a Microsoft PowerPoint presentation previously submitted to the examiner, but officially submitted to the Patent Office on November 11, 2020, which the present Panel has also reviewed.

With respect to the images of experiments and related videos that have been submitted, there is no evidence that any such experiments were conducted prior to the Canadian filing date as required by *AstraZeneca*. As a result, none of this information can be used to establish utility of the invention.

With there being no evidence on record of demonstration that the claimed subject-matter will function as claimed, in our preliminary view, utility of the claimed subject-matter was not established by demonstration at the filing date.

- [52] At page 17 of the R-PR, the Applicant contends that the utility of the claimed subject-matter was proven before the filing date, that extensive experiments and research was conducted prior to filing and that evidence of this was submitted to the examiner during the earlier stages of prosecution:

The phenomenon of an object losing its buoyancy and its experimental verification were completed prior to the application date, and thus, the practicality of this invention should be acknowledged by the Panel.

The phenomenon, wherein a buoyant object becomes incapable of upward movement after its buoyancy is shielded, though counterintuitive, has been discovered and proven by the applicant. This discovery resulted from extensive experiments and research conducted by the applicant before the application date. The absence of these experimental verifications in the application submission merely reflects the applicant's incomplete

understanding of the application process, and does not imply the non-existence of the discovery or its verification.

For instance, on May 2, 2014, the applicant sent an email to the previous examiner, Mr. Jean-Francois Harbour, inquiring about the submission of experimental proof. The communication via email with the previous examiner (refer to Attachment below).

The previous examiner stated in the email: "I can review the video to better understand your invention, but these videos cannot formally be incorporated into the patent application."

This indicates that the applicant had already completed the relevant experimental verification before the application date and attempted to communicate with the patent office to provide this evidence. [Emphasis in original]

- [53] The experimental proof referred to by the Applicant in the above quotation was addressed in the PR letter at pages 12–13, as set out above. All of the images of experiments and related video were submitted after the Canadian filing date. We noted in the PR letter that there was no evidence on record establishing that the images of experiments and related video submitted during the earlier prosecution show events that occurred prior to the Canadian filing date, as required by *AstraZeneca*. Unfortunately, despite the fact that the Applicant referred to this evidence as "experimental proof", these image and video submissions do not show that the events took place before the required date and therefore may not be used to establish utility of the claimed subject-matter per Canadian jurisprudence.
- [54] We note the referenced exchange above between the Applicant and the Examiner during earlier prosecution regarding the future submission of video evidence of utility. As we indicated in the PR letter, quoted above, we reviewed

these videos, but again, there is no evidence that any such experiments occurred prior to the Canadian filing date.

- [55] At pages 18–19 and 23 of the R-PR, the Applicant submitted further images of experiments conducted to demonstrate the practical utility of the invention. However, like the images and videos submitted earlier in prosecution before the examiner, there is no evidence that any of the illustrated experiments took place before the Canadian filing date of October 16, 2014.
- [56] In our view, the utility of the claimed subject-matter was not established by demonstration as of the Canadian filing date.
- [57] The Applicant asserts, at pages 17–18, that the invention’s theoretical basis can provide a solid ground for predicting its utility, that physical testing is not the only means of establishing utility, that *AstraZeneca* does not mandate physical testing of embodiments before the application date to establish utility and that a sound prediction case serve as the basis for establishing the utility of a claimed invention.
- [58] We agree. The Supreme Court in *AZT* set out the criteria for using a sound prediction to establish utility. Those criteria were applied in our previous PR letter and are reviewed below, taking into account the Applicant’s submissions in the PR letter.

WAS UTILITY ESTABLISHED BY SOUND PREDICTION AS OF THE FILING DATE?

As noted in the PR letter at page 14, an assessment of sound predication of utility requires assessing the three components set out in *AZT*. Our final assessment of those components is set out below.

The factual basis

[59] At page 14 of the PR letter, we set out our preliminary view that the only factual basis for a sound prediction in this case is the description of the proposed devices in the application and the relevant CGK of the skilled person:

The instant application describes various embodiments of the claimed invention that use the basic principle that fluid-tightly covering the bottom surface of an object with the surface of another body can allegedly eliminate buoyant forces acting on the object and cause both objects to fall in a fluid (or rise if the position of the second object is reversed). The particular physical configurations of the embodiments using such a principle are described and illustrated by Figures 1 to 10 of the instant application. As noted under the assessment of demonstration of utility, there is no indication that such devices were actually produced and tested.

The Applicant seems to accept that generally an object immersed in a fluid is subject to the effect of buoyant forces in accordance with Archimedes' law, which states that the upward buoyant force acting on an object immersed in a fluid is equal to the weight of the fluid displaced by the object. This relationship was set out in the FA at page 4:

As again explained in the previous examiner's report and in this final action, the buoyancy force on an object is given by:

$$(1) B = \rho V_1 g$$

where ρ represents the density of the fluid, V_1 represents the volume of the immersed object, g represents the acceleration due to gravity and B represents the resultant upward buoyant force.

However, according to the instant application, the above principle would not apply to the compound objects disclosed therein where fluid-tightly covering

the bottom of one object by the top surface of another eliminates the buoyant forces on the top object and the compound object will fall in the fluid (e.g., water). There is therefore a conflict with what would have been CGK to the skilled person, namely that based on the law of buoyancy, any object, including a compound one, would be subject to buoyant forces based on the total volume.

With no evident construction or testing of the disclosed devices prior to the filing date, the only factual basis from which to proceed is the description of their configuration and the CGK of the skilled person, which includes knowledge of the law of buoyancy and the general forces acting on an object immersed in a fluid.

[60] Having reviewed the submissions in the R-PR, we can find no commentary on the position taken in the PR letter and set out above.

Is there an articulable and sound line of reasoning from which the desired result can be inferred from the factual basis?

[61] In the PR letter at pages 15–18 we set out our preliminary analysis as to why there is no sound line of reasoning for the alleged operation of the methods, systems and devices of claims 1–31:

The FA at pages 4 to 5 contends that a compound object, such as that shown in Figure 1 of the instant application, would be subject to the combined buoyancy force that would be due to the combined volume of the objects immersed in a fluid:

If two objects are combined together in a manner that prevent[s] them from being separated, then the resulting buoyancy is still given by (1), using the new resulting volume:

$$(2) B = \rho(V_1 + V_2)g$$

This combined object would sink if the weight is greater than the buoyancy forces:

$$(3) (m_1 + m_2)g > \rho(V_1 + V_2)g$$

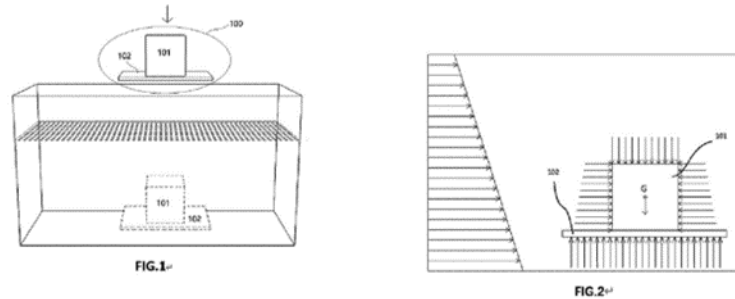
Therefore, contrary to the applicant's assertion in the correspondence of 08 July 2021, the buoyancy force of an object does not depend on the shape of the object, but only on its volume.

In other words, if an object that would normally float in a fluid is attached to a second object, whether the compound object would float or sink will depend on the value of the combined gravitational force of the compound object in comparison to the combined buoyancy force exerted on it by the fluid. As such, there would be no basis for the premise behind the claimed invention that somehow by covering the bottom surface of the upper object, no buoyancy force is exerted on it, directly, or indirectly by means of the buoyant forces that would be exerted on the bottom surface of the second object.

The Applicant's position as to why the claimed invention functions as intended is best summarized by the passages from the instant application set out at pages 6 to 7 of the R-FA, which also set out and refer to related Figures 1 and 2:

[0045] FIG.1 is the schematic diagram of the first embodiment of a method of object losing buoyancy in the present invention. The gravity force combined object 100 includes one of object (or box) 101 and one of object 102.

[0046] FIG.2 is the diagram according to the embodiment FIG.1 of this invention in which it shows the liquid pressure on object 101 and object 102.



[0057] FIG1 is the first embodiment of this concept using two objects to combine into a compound object to achieve object loses buoyancy, in FIG1, the cubic object 101 and the positions above and under the flat plate object 102 combines into a compound object 100. The gravity force of object 102 is greater than its buoyant force; object 101 and object 102 are in close attached without gap. The upper surface of object 102 is greater than and also shields the lower surface of object 101. In the upper area inside the container, perpendicular to the horizontal plane, places the combined object 100. Under the effect of the gravity force, object 102 first enters the liquid, and the 4 sides and lower surface of object 102 are pressured by the liquid. And since the 4 sides of the object are of equal area and respectively symmetrical, the liquid pressures on the 4 sides are equal and also in opposite directions, and therefore the liquid pressures cancel out each other. The gravity force of object 102 is greater than its buoyant force, and that enables for object 102 to continue to sink down; [Emphasis in original]

As object 101 follow[s] object 102 into the liquid, object 101 being square-shaped, its 4 sides are symmetrical and are of the same area, the liquid pressures on the 4 sides are equal and they cancel

out each other as they are in opposite directions. The lower surface is shielded by object 102 and is without liquid, it is no longer under the pressure effect of liquid; the liquid pressure is zero. As the depth into the liquid increases, the downward liquid pressure on the upper surface of object 101 increases gradually. The liquid pressure on the upper surface is greater than the liquid pressure on the lower surface, therefore the liquid can only produce a downward pressure difference for object 101. And because the pressure difference is directed downwards, object 101 then is non-buoyant; it is without the buoyant kinetic energy, and is in a non-buoyant state. Therefore, the gravity force loses the buoyant force. And being in the state of non-buoyant, with the downward pressure difference and the effect of gravitational potential energy, object 101 generates downward kinetic energy, and presses on top of object 102 to follow down until at the bottom of the container.

According to the theory described above, with the lower surface of object 101 being covered by the upper surface of object 102 (whose gravitational force exceeds the buoyant forces acting on it), no buoyant force acts on object 101 and the compound object falls in the fluid.

However, as pointed out in the FA, the person skilled in the art would, according to the well-accepted law of buoyancy of an object in a fluid, understand that the combined buoyant force acting on the compound object would be directly related to the combined volume of the object and the buoyant force acting on object 101 would not be eliminated by covering its lower surface with the upper surface of object 102. It is true that with the bottom of object 101 covered and no fluid being between the surfaces 101 and 102 (i.e., they are attached to each other), the fluid could not directly exert a buoyant force on the bottom surface of object 101. However, the surrounding fluid can exert a buoyant force on object 102, and through 102, a buoyant force on object 101 as well. The skilled person would understand

that the total buoyant force would depend on the total volume of the compound object and so long as the surrounding fluid can exert a force on the compound object, then that total buoyant force is applied (part of it cannot be eliminated by covering one of the surfaces).

In the R-FA, the Applicant discusses the experiments that were conducted to illustrate the principle that applies to the claimed invention. However, as noted under the assessment of factual basis, these experiment[s] appear to have been conducted after the Canadian filing date and therefore cannot be used to establish utility.

In the R-FA at pages 16 to 22, the Applicant has reproduced a paper published by Lima et al. entitled [“A downward buoyant force experiment”](#), [Rev. Bras. Ensino Fís. 36 \(2\) • June 2014](#). In this paper the authors attempt to illustrate an exception to Archimedes’ principle of buoyancy by examining a “bottom case” scenario where an object is resting on the bottom of a container. If an object is in such close contact with the bottom of the container that no water is present under the object, then the object will remain on the bottom, even though the object would normally float in the fluid.

The “bottom case” scenario can be explained by the well-known operation of a suction cup. If a state of vacuum can be created between an object and a non-porous flat surface, then the lack of pressure under the object will keep it in contact with the surface. In the Lima et al. experiment, a wooden block was pressed against a rubber pad on the bottom of the container, which was then filled with water. The wooden block was pressed down during filling of the container to avoid any disturbance of the block and water seepage between the wooden block and rubber pad (see page 21 of the R-FA). As the authors acknowledge, if water seeps under the block, between it

and the surface on which it rests, buoyant forces will apply and the block will not remain at rest on the bottom of the container (see page 19 of the R-FA).

The situation in the Lima et al. paper is not equivalent to the methods and devices of the claimed invention where the bottom of the compound object is not shielded from the buoyancy effects of the surrounding fluid. In fact, as set out in the claims, unlike Lima et al., the claims presume that a downward movement is to be caused by the alleged elimination of a buoyant force on the upper object. Therefore the compound object cannot be at rest on the bottom of a container such that the situation in Lima et al. would apply.

Claim 8 on file sets out the reverse situation to that of claim 1. The shielding object is placed on top with the intent of not shielding the bottom one from the effect of buoyant forces, but instead to shield the top of the bottom object from any downward pressure of the fluid. As is the case with claim 1 on file, the skilled person would recognize the even though the fluid cannot exert downward pressure directly on the lower object, it would exert it indirectly through downward pressure on the upper object, to which the lower object is fixed. As such, the skilled person would recognize that the downward pressure on the lower object cannot be eliminated and therefore cause any upward movement due to some consequent force imbalance.

Claim 15 sets out a device that is to function based on the method of claim 1 and therefore, like claims 1 and 8 lacks any sound line of reasoning for its operation.

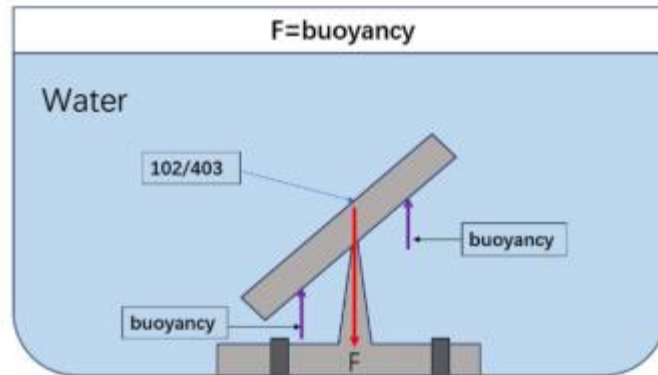
Claims 17 and 23, which use the principles set out in claims 1 and 8 to allegedly effect rotation of a system and device, likewise lack any sound line of reasoning for their operation. In light of the above analysis of claims 1 and 8, there is no basis for the assertion that downward movement of an object in a fluid can be effected by shielding its lower surface. With no downward movement, there can be no upward movement when the

shielding is reversed. With no sound line of reasoning for the generation of a rotational motion of the system and device of claims 17 and 23, there can be no work extracted from such motion and no energy generated as ultimately desired by the Applicant.

With respect to claims 17 and 23 in particular, we note that the instant application and the submissions of the Applicant in the R-FA assert that elements 302A and 302B of e.g., Figure 5 (corresponding to the device of claim 23) and element 403 of e.g., Figure 7 (corresponding to the system of claim 17) act as shielding members in the same way that element 102 of Figure 1 acts as a shielding member (see e.g., page 5 of the R-FA). The Applicant states that these shielding members are fixed to the containers in which they are situated and that as the elements of the devices of Figure[s] 5 and 7 move across them the elements are shielded from the buoyancy effects of the fluid (see e.g., page 15 of the R-FA). Referring back to the discussion in relation to the Lima et al. paper, if the system and device of claims 17 and 23 are rotating, then the seal that allows the wooden block in the Lima et al. paper to not feel the buoyancy effects of the surrounding fluid is not present in claims 17 and 23. The skilled person would not expect the system and device of claims 17 and 23 to therefore cause a downward movement on one side of the system or device and consequent upward movement on the other side due to any suppression of buoyant forces.

- [62] Throughout the R-PR, the Applicant asserts, as was the case in earlier submissions, that traditional buoyancy laws do not apply to the claimed subject-matter, since it creates a non-buoyant environment/condition. One example set out to illustrate this point is the figure and related explanation set out at page 6 of the R-PR, reproduced below. The figure shows a fixed inclined object within a container of water, the inclined object fixed to the base of the container through attachment to a base portion. The Applicant asserts that it would be improper to

assert lack of utility in such a situation based on traditional buoyancy principles given the fixed configuration.



- [63] Given that the object discussed above is fixed in the container of water and cannot move, it is not clear to the Panel how such a configuration would relate to the subject-matter of the claims, where the alleged removal of a buoyant force must generate motion in order for the system to function.
- [64] The Applicant also asserts (e.g., pages 14–16 of the R-PR) that the claimed invention operates according to Newton’s laws of motion rather than traditional laws of buoyancy. This is premised on the idea that the buoyant force on an object can be eliminated by shielding its bottom by another object, thereby causing it to fall in a fluid and generate motion, that can then be reversed by restoring the buoyant forces, the alternating actions used to generate energy through some associated equipment.
- [65] However, the Panel is unconvinced that the buoyant forces acting on an object in a fluid can be eliminated by simply shielding its lower surface by another object, itself subject to those buoyant forces. The Applicant continues to deny the effect of the buoyant forces acting on the lower object, which would then indirectly exert buoyant forces on the upper object, the two objects behaving as one larger compound object. In light of the above, it is the Panel’s view that since the

buoyant forces on an object cannot be eliminated in the manner proposed by the Applicant, the alleged motion cannot be generated and therefore the laws of motion cannot aid the Applicant in explaining the basis for the utility of the claimed invention.

- [66] At pages 20–22 of the R-PR, the Applicant points to two papers authored by Lima et al., one of which is the same paper referred to by the Applicant in the R-FA. Both of the papers discuss the “bottom case” scenario addressed in the PR letter, where an object is positioned on the bottom of a container filled with water. As long as the interface between the bottom of the object and the bottom of the container remains free of the influence of the surrounding water pressure, the object will stay on the bottom of the container.
- [67] In the PR letter we pointed to the fact that in the Lima et al. paper referred to in the R-FA, it was acknowledged that if water seeps under the block positioned on the bottom of the container, between it and the surface on which it rests, buoyant forces will apply and the block will not remain at rest on the bottom of the container. The same would be true in the case of Applicant’s upper and lower object scenario described in the instant application. While there may be no buoyant forces at the interface between the upper and lower objects, since the lower object is not on the bottom of a container (it being expected to move), it would be subject to buoyant forces that would depend on the combined volume displaced by the upper and lower objects.
- [68] We note that in the R-FA at pages 16 and 22, the Applicant pointed to the 2014 Lima et al. paper as support for the utility of the presently claimed invention. The Applicant indicated at page 22 of the R-FA that the block of wood in Lima et al. at the bottom of the container not subjected to buoyant forces was like the presently claimed arrangement where no buoyant forces act on the upper object at the upper/lower object interface.

- [69] However, after the Panel pointed, in the PR letter, to the differences between the two systems and the acknowledgement in the 2014 Lima et al. paper that as soon as water infiltrated the wood block/container bottom interface that buoyant forces would act on it, the Applicant now, in the R-PR at pages 21–22, appears to have moved away from the position that Lima et al. support the utility of the presently claimed subject-matter.
- [70] In the R-PR at page 22, the Applicant now points to differences between the experiments in Lima et al. and what is presently claimed. The Applicant asserts that the subject-matter of the claims on file does not require sealing between the upper and lower objects, as is the case in Lima et al. between the wood block and the bottom of the container. However, with no seal between the surfaces, as specified in Lima et al. and as would be understood by the skilled person, water would be able to exert pressure on the lower surface of the upper object and the lower object could not prevent the action of buoyant forces. The Applicant includes, at page 9 of the R-PR, a figure showing a fixed inclined surface in a fluid, upon which an object rests. The purpose is to illustrate how buoyant forces can be eliminated by eliminating the influence of the water pressure at the interface between the surface and the object. However, as is the case in the Lima et al. paper, absent a seal between the surfaces, buoyant forces could not be eliminated, contrary to the assertions made in the R-PR.
- [71] The Applicant also includes other figures such as the concrete bridge piers shown on page 11 of the R-PR that are to illustrate examples of an absence of buoyant forces. As acknowledged in the R-PR, the piers are firmly rooted in the riverbed or lakebed and cannot move. It is unclear to the Panel how such an arrangement relates to objects that must move up and down in a body of water.
- [72] At pages 23–28, the Applicant discusses the principle of “Symmetry Breaking” and its application to the claimed subject-matter. In essence, the Applicant explains that by eliminating the buoyant forces on a portion of an object, the

symmetrical application of pressure on the object is broken, with the object then experiencing a net force in a certain direction.

- [73] While we agree that breaking the symmetrical application of forces around an object would lead to a net force in a certain direction, we do not agree that this can be accomplished in the manner set out in the claims, namely by covering the bottom of an object with the top of a lower object, this somehow leading to the object losing application of buoyant forces and falling in the fluid, despite the application of buoyant force on the lower object.
- [74] None of the arguments presented by the Applicant in the R-PR aid in supporting a sound line of reasoning for any predicted utility of the claimed subject-matter.
- [75] We are therefore of the view that there is no sound line of reasoning for the alleged operation of the methods, systems and devices of claims 1–31 on file.

Disclosure of the factual basis and line of reasoning

- [76] In the PR letter at pages 18–19, we set out our preliminary view that what was disclosed in the application does not provide a sufficient basis for establishing utility:

As discussed above, the only factual basis set out in the instant application from which to proceed is the description of the disclosed methods, devices and systems and the principles under which they operate, which principles are not sound based on the assessment above.

Most of the reasoning set out in the R-FA and in previous submissions by the Applicant is not disclosed in the instant application, though it does include basic scientific principles that would have been part of the CGK. Nevertheless, even if it were, it would not provide a sound basis for the

subject-matter of the claims, as set out above in the assessment of sound line of reasoning.

- [77] The Applicant's arguments in the R-PR do not point to any further subject-matter disclosed in the application or that was part of the CGK that would provide a further basis for utility of the claimed subject-matter.

Conclusion in respect of sound prediction

- [78] In light of the above, we are of the view that the factual basis and sound line of reasoning is insufficient for the person skilled in the art to have concluded that there is a *prima facie* reasonable inference of utility for the claims on file.

- [79] Therefore, in our view, the subject-matter of claims 1–31 on file lack utility and therefore claims 1–31 on file do not comply with section 2 of the *Patent Act*.

NOVELTY

Legal Principles

- [80] Subsection 28.2(1) of the *Patent Act* requires claimed subject matter to be new:

The subject-matter defined by a claim in an application for a patent in Canada (the "pending application") must not have been disclosed

- (a) before the one-year period immediately preceding the filing date or, if the claim date is before that period, before the claim date by the applicant, or by a person who obtained knowledge, directly or indirectly, from the applicant, in such a manner that the subject-matter became available to the public in Canada or elsewhere;

- (b) before the claim date by a person not mentioned in paragraph (a) in such a manner that the subject-matter became available to the public in Canada or elsewhere;

[remainder of subsection omitted]

- [81] There are two separate requirements to show that prior art anticipates a claimed invention: there must be a prior disclosure of the claimed subject-matter and the prior disclosure must enable the claimed subject-matter to be practiced by a skilled person (*Apotex Inc v Sanofi–Synthelabo Canada Inc*, 2008 SCC 61 [*Sanofi*] at paras 24–29, 49).

Analysis

- [82] In the PR letter at pages 20–21, we set out our preliminary view that the claims on file were novel in view of the cited prior art:

Claims 1–16

The FA at page 5 contended that the subject-matter of claims 1–16 on file was disclosed by prior art document D2 before the claim date.

In relation to the *a posteriori* unity assessment set out earlier, we discussed how D2 does not disclose the principle behind the subject-matter of claims 1–31, which is embodied in the methods, systems and devices of those claims.

As such, in our preliminary view, D2 did not disclose the subject-matter of the claims on file, including that of claims 1–16.

Claims 17–21

The FA at page 7 contends that claims 17 to 21 on file lack novelty in view of prior art document D3, identified below:

D3: US 4,363,212

Everett

December 14, 1982

D3 discloses a buoyancy prime mover that uses the buoyancy of gas released in a liquid to move a plurality of rigid or collapsible buckets joined by one or more chains in a continuous loop. On one side of the loop a plurality linked buckets have their open ends facing downwards. Gas is released into the open ends of the buckets and the rising gas causes the buckets to rise, driving the loop. Gas is released from the buckets as they pass over the top of the loop beyond the surface of the liquid and continue back into the liquid on the other side.

In our preliminary view, D3 does not disclose the subject-matter of claims 17 to 21.

Claims 17 to 21, like the other claims on file, use the idea of shielding the lower surface of an object (the carrier in claim 17 fluid-tightly covering the bottom surface of an upper portion of the loop) so as to cause buoyancy forces to be eliminated and the object to fall in a fluid. One side of the conveyor belt therefore moves downward and the other side moves upward. D3, on the other hand, uses a continuous flow of gas released into inverted buckets to drive the buckets upward on the loop. There is no disclosure or suggestion of movement occurring as a result of shielding a surface from the buoyant effects of the surrounding fluid.

Claims 23, 25 and 27–31

The FA at pages 7 to 8 contends that claims 23, 25 and 27 to 31 lack novelty in view of prior document D4, identified below:

D4: WO 2009/072796 A2 Mun

June 11, 2009

D4 discloses a disk-type rotary device that has buoyancy means distributed about its periphery. The disc is mounted such that a portion of the disk is inside a water tank and another portion is not. The buoyancy means in the portion that is inside the water tank causes that part of the disk to move upward, causing rotation of the disk since the portion outside of the tank is not subject to the same buoyancy forces.

In our preliminary view, D4 does not disclose the subject-matter of claims 23, 25 and 27 to 31.

Unlike the device set out in claim 23 on file, the disk disclosed in D4 does not use any type of carrier to fluid-tightly cover a portion of the disk such that the buoyancy force on that portion is eliminated causing that portion of the disk to fall in the fluid. D4 instead uses the available buoyant force of the water in the tank to drive the disk on one side. Rotation occurs since the other side of the disk is outside the tank and not subject to the same buoyant forces. Claim 23 uses the shielding properties of the carrier to effect a difference in forces exerted on one side of the device compared to the other.

Summary of Novelty Assessment

In light of the preliminary analysis above, the claims identified in the FA do not lack novelty in view of the prior art cited against them. Further, having

reviewed documents D2 to D4, our preliminary view is that none of claims 1 to 31 lack novelty in view of any of prior art documents D2, D3 or D4.

[83] The Applicant provided no comments on our preliminary assessment of novelty.

[84] We conclude that claims 1–31 on file are novel in view of the cited prior art documents D2 to D4 and are compliant with paragraph 28.2(1)(b) of the *Patent Act*.

OBVIOUSNESS

Legal Principles

[85] Section 28.3 of the *Patent Act* sets out the legislative requirement that claimed subject-matter not be obvious:

The subject-matter defined by a claim in an application for a patent in Canada must be subject-matter that would not have been obvious on the claim date to a person skilled in the art or science to which it pertains, having regard to

- (a) information disclosed before the one-year period immediately preceding the filing date or, if the claim date is before that period, before the claim date by the applicant, or by a person who obtained knowledge, directly or indirectly, from the applicant in such a manner that the information became available to the public in Canada or elsewhere; and
- (b) information disclosed before the claim date by a person not mentioned in paragraph (a) in such a manner that the information became available to the public in Canada or elsewhere.

[86] In *Sanofi*, the Supreme Court of Canada stated that it is useful in an obviousness inquiry to follow the following four-step approach, which we use below in our analysis:

- (1)(a) Identify the notional “person skilled in the art”;
 - (b) Identify the relevant common general knowledge of that person;
- (2) Identify the inventive concept of the claim in question or if that cannot readily be done, construe it;
- (3) Identify what, if any, differences exist between the matter cited as forming part of the “state of the art” and the inventive concept of the claim or the claim as construed;
- (4) Viewed without any knowledge of the alleged invention as claimed, do those differences constitute steps which would have been obvious to the person skilled in the art or do they require any degree of invention?

Analysis

[87] In the PR letter at pages 22–25, we set out our preliminary view that claims 1–31 on file would not have been obvious in view of any of the prior art documents, considered individually or on combination with the relevant CGK:

(1)(a) Identify the notional “person skilled in the art”

The person skilled in the art has been identified above under Purposive Construction. We apply the same characterization here.

(1)(b) Identify the relevant common general knowledge of that person

The relevant CGK has also been identified under the Purposive Construction analysis. We apply the same points of CGK here.

(2) Identify the inventive concept of the claim in question or if that cannot readily be done, construe it

In the FA at page 11, two different inventive concepts were set out for claims 22, 24 and 26 in light of the groupings set out in the FA for the unity of invention defect. Claim 22 refers to independent claim 17 and claims 24 and 26 refer to independent claim 23, hence the two different inventive concepts based on the claim groupings:

Specifically, the claims of Group B are directed to a system for operating in a fluid to generate mechanical energy comprising a first spindle having a first runner, a second spindle having a second runner, a conveyor belt, a plurality of containers, and a carrier having a top surface fluid-tightly covering a bottom surface of the conveyor belt; and the claims of Group C are directed to a device comprising a hub mounted on a wall of a container, a circular object comprising a plurality of units, and a carrier fluid-tightly covering a portion of the circular object.

In the R-FA at page 33, the Applicant sets out the inventive concept of the claims as follows:

The inventive concept of the claims in present application are non-obvious. Specifically, a non-equilibrium system is constructed in water using two opposing directions of forces.

More broadly, the inventive concept of these claims relates to the use of physical phenomena that violate the law of buoyancy, i.e., the use of method in which object loses buoyancy to gain fluid gravity (downward buoyancy), such that one side of conveyor belt is driven

by fluid gravity (downward buoyancy) to move downward, the other side is driven by upward buoyancy to move upward, and thereby the conveyor belt is in reciprocal motion. The pressure energy is transformed into the form of work in two opposite directions.
[Emphasis in original]

We note that the passage above specifically refers to the embodiment of the claims set out in claims 17 to 22 with the conveyor system. However, the other general principles discussed would apply to the claims as a whole.

At the bottom of page 33 to page 34 of the R-FA, the Applicant then set out the subject-matter of the claims as grouped in the FA for the unity of invention issue and afterward identified the following general concept for the instant application:

The general concept of the present application for extracting the energy of the gravitational field is to use the object 102 (403) to shield the buoyancy of the object 101(401), so that the object 101 (401) is not affected by the buoyancy, so that its own weight does not decrease.

We agree that the above principle is one that is common throughout the subject-matter of the claims on file, as is evident from our preliminary view that there is unity of invention among them.

However, for the purposes of obviousness, the subject-matter of the claims must be assessed on a claim-by-claim basis and different claims will generally have different inventive concepts (*Zero Spill Systems (Int'l) Inc. v. 614248 Alberta Ltd. (c.o.b. Lea-Der Coatings)*, 2015 FCA 115).

In the present case, as stated under Purposive Construction, we have taken all the elements of the claims to be essential. For the purposes of this

assessment we take the combination of the essential elements of each claim to represent its inventive concept.

(3) Identify what, if any, differences exist between the matter cited as forming part of the "state of the art" and the inventive concept of the claim or the claim as construed

The FA at page 11 set out the difference at *Sanofi* step 3 as relating to the specific details of the system and devices of claims 22, 24 and 26 in comparison with prior art documents D3 and D4:

The differences between D3 and the subject matter of claim 22, and D4 and the subject matter of claims 24 and 26 are the number of spindles supporting the runners and conveyor belt, and the extent of the portion of the circular object. Specifically, claim 22 recites that the system further comprises a third spindle, and claims 24 and 26 recite that the portion is a quadrant of the circular object.

More broadly, the devices and systems of the claims differ in their structure. The system of Group B comprises spindles and runners in fluid supporting a conveyor belt carrying a plurality of containers with a carrier covering a portion of the bottom surface of the conveyor belt; and the device of Group C comprises a circular object rotatably mounted on a hub in a container of fluid, and a carrier mounted on the wall of the container covering a portion of the circular object's surface.

In response, the Applicant, at page 37 of the R-FA, contended that the difference between the claims and the prior art was more fundamental, that the prior art documents did not disclose the basic principle behind the subject-matter of the claims:

The inventive subject matter in this application is to use a scheme that violates the law of buoyancy to obtain the fluid gravity (downward buoyancy).

Specifically, a shielding carrier 403 fixed on the container is used to cover the upper part of the conveyor belt enabling the objects on the conveyor to gain fluid gravity (downward buoyancy) and move downward or cover a part of the circular object (Fig4,5 and 6). By applying this method, the system can obtain power in two opposite directions to do work.

However, D2, D3 and D4 utilize only one direction of power to do work, ie only using buoyancy to do work.

We preliminarily agree with the Applicant that the differences between the subject-matter of the claims on file and the prior art documents are more fundamental than what is set out in the FA. As evident from our review of the unity of invention and novelty issues, in our preliminary view, none of the prior art documents discloses the idea of shielding the lower surface of an object immersed in a fluid so as to cause buoyancy forces to be eliminated and the object to fall in the fluid, which principle is then used in some claims to cause rotary motion from which work may be extracted. This is despite our preliminary view that the methods, systems and devices that claim to operate according to this principle lack utility.

(4) Viewed without any knowledge of the alleged invention as claimed, do those differences constitute steps which would have been obvious to the person skilled in the art or do they require any degree of invention?

As set out above, the common difference between the claims on file and the prior art documents D2, D3 and D4 is that the methods, systems and

devices of the claims use the idea of shielding the lower surface of an object immersed in a fluid so as to cause buoyancy forces to be eliminated and the object to fall in the fluid, which principle is then used in some claims to cause rotary motion from which work may be extracted.

Under the assessment of novelty, we have preliminarily indicated that none of the prior art documents discloses any method, system or device that uses such a principle. Further, we can find no suggestion of any such principle in these documents or within the relevant CGK of the person skilled in the art. As the Applicant pointed out at page 37 of the R-FA, the principle used in the instant application is counter to the well-accepted law of buoyancy.

Summary of Obviousness Assessment

In light of the above, we are of the preliminary view that claims 1 to 31 on file would not have been obvious to the skilled person in view of the prior art documents cited and the relevant CGK and are therefore compliant with section 28.3 of the Patent Act.

[88] The Applicant made no comments in respect of our preliminary assessment of obviousness.

[89] We conclude that claims 1–31 on file would not have been obvious to the skilled person in view of the cited prior art documents and the relevant CGK and are therefore compliant with section 28.3 of the *Patent Act*.

LACK OF SUPPORT/BROADER THAN THE INVENTION/SUFFICIENCY

Legal Principles

[90] In the PR letter at pages 25–27, we reviewed the legal principles surrounding these issues, noting that the lack of support defect identified in the FA was more

appropriately dealt with under the principle of overbreadth and giving the Applicant notice of both the overbreadth defect as well as a sufficiency defect:

The FA referred to section 60 of the *Patent Rules*, which states that “The claims must be clear and concise and must be fully supported by the description independently of any document referred to in the description.”

Section 60 of the *Patent Rules* and subsection 27(3) of the *Patent Act* are related since both are concerned with the relationship between the disclosure and the scope of the claims.

Subsection 27(3) of the Act read as follows:

The specification of an invention must:

- (a) correctly and fully describe the invention and its operation or use as contemplated by the inventor;
- (b) set out clearly the various steps in a process, or the method of constructing, making, compounding or using a machine, manufacture or composition of matter, in such full, clear, concise and exact terms as to enable any person skilled in the art or science to which it pertains, or with which it is most closely connected, to make, construct, compound or use it;
- (c) in the case of a machine, explain the principle of the machine and the best mode in which the inventor has contemplated the application of that principle; and
- (d) in the case of a process, explain the necessary sequence, if any, of the various steps, so as to distinguish the invention from other inventions.

A determination of whether the specification complies with subsection 27(3) of the *Patent Act* requires that three questions be answered: What is the invention? How does it work? Having only the specification, can the person of skill in the art produce the invention using only the instructions contained in the disclosure? (*Teva Canada Ltd v Novartis AG*, 2013 FC 141 at para 344 citing *Teva Canada Ltd v Pfizer Canada Inc*, 2012 SCC 60 at para 50 and *Consolboard v MacMillan Bloedel (Sask) Ltd*, [1981] 1 SCR 504 at 519–522).

With respect to the third question, “it is necessary that no additional inventive ingenuity be required in order to make the patent work” (*Aventis Pharma Inc v Apotex Inc*, 2005 FC 1283 at para 172, citing *Merck & Co v Apotex Inc*, [1995] 2 FC 723 (Fed CA) [at para] 68, (1995), 60 CPR (3d) 356 (Fed CA) at 385). A patent will not be invalid for insufficient disclosure where routine experimentation is required of the skilled person, but the Supreme Court of Canada has held that a disclosure is insufficient if the specification “necessitates the working out of a problem” (*Idenix Pharmaceuticals, Inc v Gilead Pharmasset LLC*, 2017 FCA 161 at para 19, citing *Pioneer Hi-Bred v Canada* [1989] 1 SCR 1623 at 1641).

Having reviewed the lack of support defect identified in the FA, it is our preliminary view that the concerns expressed relate more to whether the claims on file are broader than the invention described (the legal principle of overbreadth), given that the FA focused on whether the claims encompassed the generation of downward movement of an object by a mechanism other than shielding its surface from the effect of buoyant force by another object.

The concept of overbreadth stems from subsections 27(3) and 27(4) of the *Patent Act*, and is a consequence of the bargain theory (*Western Oilfield Equipment Rentals Ltd v M-I LLC*, 2021 FCA 24, at paras 129 and 130).

Overbreadth may overlap with other grounds of invalidity but overbreadth is a distinct ground of invalidity (*Seedlings Life Science Ventures, LLC v Pfizer Canada ULC*, 2021 FCA 154 at para 51). For example, it has been said that overbreadth and insufficiency are the two sides of the same coin. Where a claim is broader than the description, it may fail for overbreadth, but it may also fail because the description does not adequately describe how to put it into practice.

Overbreadth can be found because a claim is broader than the invention disclosed in the specification or it is broader than the invention made. To determine whether a claim is overbroad, it must be assessed whether the claim reads fairly on what the patent application discloses in the description and the drawings or whether the claim is too wide and claims more than what was invented. In this regard, this determination does not require that the patent application describe all possible embodiments of the claims as the claims may be broader than the embodiments disclosed in the description, which are considered examples of what is protected by the patent's monopoly (*Angelcare Canada Inc v Munchkin Inc*, 2022 FC 507 at para 452). However, there is a limit to how much broader the claims can be relative to the described embodiments (*Les Laboratoires Servier v Apotex Inc*, 2019 FC 616 [at] para 209).

Despite our preliminary view that the lack of support defect from the FA relates more to an overbreadth issue, we also assess below compliance with the sufficiency requirement.

Defects relating to sufficiency or overbreadth were not set out in the FA and as noted earlier in this letter, we give notice under subsection 86(9) of the *Patent Rules* of these additional issues.

[91] We apply the same principles in our analysis below.

Analysis

Lack of support/overbreadth

[92] At page 27 of the PR letter, we set out our preliminary reasons as to why it was our view that the subject-matter of the claims is not broader than the invention described, nor does it lack support in the description:

The FA at page 12 contends that steps such as the “generating” step of claim 1 are directed to a broad desired result, rather than any technical features to achieve the result. In particular, the issue appears to be that because of the breadth of the “generating” step and it not being linked with the step of fluid-tightly covering a lower surface of an object with the upper surface of another object (in the case of claim 1), the generating step could encompass an embodiment where someone simply pushes down on the object to cause downward movement, rather than such movement being the result of shielding an object from buoyant forces.

If the generating step of claim 1 or similar steps in the other claims on file were taken to be so broad that they encompassed movement of the claimed objects by something other than the shielding of buoyancy forces, then they would in our preliminary review be broader than the invention described and be contrary to the premise behind the disclosed invention.

However, we have, under Purposive Construction, preliminarily construed the generation of a downward movement in claim 1, as well as the other movements set out in the remaining claims, to be the result of the buoyancy force shielding mechanism that is common to the claimed subject-matter and not something such as a person simply exerting a force on an object immersed in a fluid. As such, the subject-matter of the claims on file is not

broader than the invention described, nor does it lack support in the description.

[93] The Applicant made no comments in respect of the above in the R-PR.

[94] We conclude that the subject-matter of the claims on file is not broader than the invention described, nor does it lack support in the description.

Sufficiency

[95] At page 28 of the PR letter, we set out our preliminary view that in light of the fact that the claimed subject-matter lacks utility because it cannot function as claimed, it cannot be described so as to allow a skilled person to reproduce it:

For the purposes of our assessment, the critical question in relation to sufficiency is: "Having only the specification, can the person of skill in the art produce the invention using only the instructions contained in the disclosure?"

Given our preliminary view that the claimed subject-matter lacks utility and cannot function based on well-accepted principles of physics, clearly it is not described so as to allow a person skilled in the art to reproduce the invention. As such, the instant application is insufficient and therefore does not comply with subsection 27(3) of the *Patent Act*.

[96] The Applicant submits at page 29 of the R-PR that the application is sufficient since it does not contradict well-established physical principles and that traditional laws of buoyancy do not apply where buoyancy is zero.

[97] We have already addressed such points in our analysis above in respect of the lack of utility of the claimed subject-matter.

- [98] The Applicant further points to a figure set out on page 30 of the R-PR, which is the same figure set out on page 6, discussed earlier in this recommendation in relation to the assessment of sound prediction. The figure shows an inclined object fixed to a base, which is itself fixed to the bottom of a container filled with water. The Applicant asserts that it is not subject to buoyant forces since it is fixed to the bottom of the container.
- [99] We previously discussed this figure in relation to the assessment of utility and commented on its relevance to a situation where buoyant forces are intended to be eliminated such that an object would fall within a fluid. In our view it does not assist the Applicant in explaining how covering the bottom of an upper object by the top of a lower object would cause both objects to fall within a body of water. Being fixed, the object at page 30 of the R-PR cannot move at all and while being subject to the buoyant forces of the water around it, they are not sufficient to overcome the forces exerted by the devices that fix it to the container bottom. How such a situation validates the elimination of buoyant forces and subsequent downward movement claimed by the Applicant is unclear.
- [100] At page 31 of the R-PR, the Applicant made reference to a now granted United States Patent no. 11,047,359, owned by the Applicant and relating to a system similar to that of the instant application. While informative, the grant of similar patents in other jurisdictions does not impose any obligations on the Canadian Patent Office.
- [101] In light of the above, it is our view that the instant application is insufficient and therefore does not comply with subsection 27(3) of the *Patent Act*.

INDEFINITENESS/LACK OF CLARITY

Legal Principles

[102] Subsection 27(4) of the *Patent Act* requires claims to distinctly and explicitly define subject-matter:

The specification must end with a claim or claims defining distinctly and in explicit terms the subject-matter of the invention for which an exclusive privilege or property is claimed.

[103] In *Minerals Separation North American Corp v Noranda Mines Ltd*, [1947] Ex CR 306, 12 CPR 99 at 146, the Court emphasized both the obligation of an Applicant to make clear in the claims the ambit of the monopoly sought and the requirement that the terms used in the claims be clear and precise:

By his claims the inventor puts fences around the fields of his monopoly and warns the public against trespassing on his property. His fences must be clearly placed in order to give the necessary warning and he must not fence in any property that is not his own. The terms of a claim must be free from avoidable ambiguity or obscurity and must not be flexible; they must be clear and precise so that the public will be able to know not only where it must not trespass but also where it may safely go.

Analysis

[104] At pages 28–32 of the PR letter, we set out our preliminary analysis in respect of the numerous indefiniteness issues identified in the FA, as well as those raised by the Panel:

The FA at pages 13 to 14 indicated that claims 1 and 8 are indefinite due to the indirect introduction of a second object in the claim. Namely, claim 1,

e.g., introduces “an object” and then refers to “the object”. Later “a second object” is introduced and then referred to as “the second object”.

In our preliminary view, while the first object was not explicitly referred to as “a first object” in comparison with the “second object”, we do not believe that the person skilled in the art would be unsure of the scope of the claim based on the language used. In our preliminary view, the person skilled in the art would recognize that the first introduction of an object would require the use of a label such as “a second object” or “another object” if a further object is to be introduced.

The FA at page 14 indicated that claims 1, 5, 8, 12, 15, 17, 23 and 25 are indefinite as the expression “fluid-tightly covering” is ambiguous and unclear.

In light of our construction above of the term “fluid-tightly covering”, we are of the preliminary view that the term is not ambiguous or unclear.

The FA at page 14 indicated that claims 2, 3, 9 and 10 are indefinite because they do not set out any additional features than the claims to which they refer and appear to be describing known scientific principles. Having reviewed the features of claims 2, 3, 9 and 10, we preliminarily agree that what limitations are added by the additional features of these claims is unclear. If the subject-matter of claims 1 and 8 is to function as claimed, then the features of claims 2, 3, 9 and 10 would seem inherent to such functioning, given the well-known effects of fluid on an immersed object. This is not to say that the subject-matter of claims 1 and 8 would in fact function as claimed, as discussed under our earlier assessment of utility.

The FA at page 14 indicated that claims 4 and 11 are indefinite because they fail to state any additional features and appear to describe an invention that functions contrary to known scientific principles. We preliminarily agree

that these claims do not add features beyond those of the claims to which they refer. If the surface of the object of claims 1 or 8 is covered by another surface, then inherently there is no influence from the surrounding fluid at that interface. Further, we preliminarily agree that the claim sets out an invention that functions contrary to [known] scientific principles. However, this issue has already been addressed under our assessment of utility.

The FA at page 14 indicated that claim 15 is indefinite because the phrase “covering bottom surface” contains a typographical error and should read “covering the bottom surface.” While such error should be remedied during prosecution, our preliminary view is that the person skilled in the art would not be uncertain as to the scope of the claim. Only one bottom surface was previously referred to and would be present so that the person skilled in the art would know to which one the phrase referred.

The FA at page 14 indicated that claim 17 is indefinite because the expressions “drive the conveyor belt slide downwardly” and “drive the conveyor belt slide upwardly” contain grammatical errors and should read as “drive the conveyor belt to slide downwardly” and “drive the conveyor belt to slide upwardly”, respectively [emphasis in original]. We preliminarily agree that this claim is indefinite for these reasons, since without the missing preposition, the claim could be taken to refer to some unknown element “conveyor belt slide.”

The FA at page 14 indicated that claim 22 is indefinite because it is unclear where the third spindle is located within the system. We preliminarily agree that the configuration would be unclear, given the introduction of another spindle without any information about how it is to be integrated in the system of claim 17. Further, no mention is made in the rest of the specification of a third spindle, which might clarify its arrangement.

The FA at page 14 indicated that claims 23 and 25 are indefinite because the expression “carrier secured mount” contains a grammatical error and should read as “carrier securely mounted.” We preliminarily agree that the expression causes uncertainty since it could be taken by the person skilled in the art to refer to a “mount” which is “carrier secured” rather than the carrier being qualified by the other two terms.

The FA at page 14 indicated that claim 23 is indefinite because the expression “wherein the portion is located at a side from a diameter of the circular object” [emphasis in original] is functionally unclear. In our preliminary view, considering the surrounding context of this expression, it is not unclear. The whole passage reads “wherein the portion is located at a side from a diameter of the circular object perpendicular to a ground level.” In this context, the portion of the circular object covered by the carrier is located in one of the upper two quadrants of the circular objects, the quadrants separated by a diametrical vertical line running through the circular object. We also note that in view of this understanding, claim 24, which specifies that the portion is a quadrant of the circular object, would be redundant.

The FA at page 14 indicated that claim 27 is indefinite because the expression “has plurality of units” contains a typographical error and should read as “has a plurality of units.” In our preliminary view, although it would be clearer to have the missing article, we do not believe the person skilled in the art would be unsure of the scope of the claim based on this error. However, since no such “units” are introduced in claim 23, to which claim 27 refers, in our preliminary view, this issue does make the scope of claim 27 unclear.

The FA at page 15 indicated that claims 29 and 30 are indefinite because the term “buoyance” contains a typographical error and should read as

“buoyancy.” According to Merriam-Webster online at www.merriam-webster.com, “buoyance” is a synonym for “buoyancy.” It is therefore our preliminary view that claims 29 and 30 are not indefinite for this reason.

The FA at page 14 identified various lack of proper antecedent issues in a number of the claims, which are addressed below.

The FA indicated that “the surface” in claims 1 and 8 at lines 4 and 4, respectively, lacks an antecedent. However, this term is part of the broader expression “the surface of the second object.” Given that only one surface of the second object was previously identified, in our preliminary view, the reference would not be unclear to the person skilled in the art.

The FA indicated that “the first and second objects” [emphasis in original] in claims 7 and 14 at lines 1 and 1, respectively, lacks a proper antecedent. In considering the introduction of the objects in claims 1 and 8, we indicated above that the person skilled in the art would take the introduction of “an object” in those claims as equivalent to introducing a first object from which a second object may follow. In this case, however, the explicit reference to “the first” object may be confusing since “a first object” was not set out in claims 1 and 8. The reference in claims 7 and 14 may imply the presence of an object in claims 1 and 8 that was not previously identified. For this reason, in our preliminary view, claims 7 and 14 are avoidably ambiguous and indefinite.

The FA indicated that the term “the external surface” in “the external surface of the conveyor belt” in claim 17 at line 10 lacks a proper antecedent. Given that claim 17 sets out the conveyor belt as forming the continuous loop and that the continuous loop has an upper and lower portion that moves about the first and second runners, in our preliminary view, the person skilled in the art would recognize that an internal and external surface of the conveyor belt would be present. Namely, the surface of the conveyor belt that faces

the first and second runners would be considered as an “internal surface” and the surface of the conveyor belt that faces away from them would be considered an “external surface. For these reasons, it is our preliminary view that claim 17 is not indefinite due to a lack of a proper antecedent.

However, in our preliminary view, how “the external surface of the conveyor belt” relates to the rest of claim 17 is unclear. We are unable to discern why this element has been included at this point in the claim. Therefore in our preliminary view claim 17 is indefinite for that reason.

The FA indicated that claim 17 is also indefinite because “the container units” at line 12 lacks a proper antecedent. We preliminarily agree that this makes claim 17 indefinite as no prior reference to container units was made.

The FA indicated that claim 29 is indefinite because “the first carrier” at line 1 lacks a proper antecedent. Claim 23, to which claim 29 refers, introduces “a carrier” and refers to it as “the carrier” in claim 23. In our preliminary view, reference in claim 29 to “the first carrier” could cause confusion as the person skilled in the art may question whether an element was missing from claim 23. Therefore, in our preliminary view, claim 29 is indefinite for this reason.

The FA indicated that claim 30 is indefinite because “the second portion” at line 1 lacks a proper antecedent. We preliminarily agree since no second portion has been introduced in claim 23, to which claim 30 refers. Further there is no antecedent for “the second carrier” as well. For these reasons claim 30 is indefinite.

The FA indicated that claim 31 is indefinite because “each unit” at line 1 lacks a proper antecedent. We preliminarily agree since no “unit” was introduced in claim 23, to which claim 31 refers. We further note that this claim specifies that “each unit has a density lower or greater than, or equal

to the density of the fluid.” The claimed features, assuming that the “unit” refers to an element of claim 23, encompasses all possible relationships between the unit’s density and the fluid’s density. The additional features do not therefore appear to add any limitations to the subject-matter of claim 23 and seem to be redundant. Their effect is therefore unclear.

In addition to the indefiniteness issues addressed above, we note the following issues that arose during our preliminary review.

Claims 7 and 14 specify that “the total volume of the first and second objects is unchanged.” In our preliminary view, given the configuration set out in claims 1 and 8, where the bottom surface of one object is fluid-tightly covered by the top of another, the skilled person would not understand how the total volume could have changed such that the limitations of claims 7 and 14 are necessary. The fact that claims 7 and 14 specify that the total volume is unchanged means that the scope of claims 1 and 8 is broad enough to encompass embodiments where the volume could change, which does not seem to be supported by the description in any case. Claims 7 and 14 therefore introduce ambiguity into the claims and seem unnecessary.

[105] The Applicant made submissions in respect of several groups of claims in response to the indefiniteness assessment set out in the PR letter.

Claims 2, 3, 9 and 10

[106] With respect to claims 2 and 9 on file, the Applicant contends at page 33 of the R-PR that these claims “offer a more comprehensive understanding of the source of motion for the objects described in the invention”, that they are “crucial for comprehending the inventive concept in its entirety.”

[107] In our view, considering that in order for the motion set out in claims 1 and 8 to occur, the factors in claims 2 and 9 must apply, setting them out explicitly in

claims 2 and 9 would only serve to confuse the skilled person. The skilled person would wonder whether by including claims 2 and 9, something else could cause the movement in claims 1 and 8, which would not be the case.

[108] In respect of claims 3 and 10 the Applicant contends that they provide “an in-depth description of the pressure variations experienced by the objects when moving within a fluid.”

[109] As is the case for claims 2 and 9, the addition of claims 3 and 10 would only serve to confuse the skilled person and lead them to wonder if something other than the natural variation of pressure within the fluid is occurring, which again is not the case.

[110] In light of the above, we are of the view that claims 2, 3, 9 and 10 are indefinite.

Claims 7 and 14

[111] At page 34 of the R-PR, the Applicant responds to the concern in the PR letter that by these claims specifying that “the total volume of the first and second objects is unchanged”, they question the understanding from claims 1 and 8 that there is no change in volume. This explicit limitation implies that claims 1 and 8 encompass embodiments where the volume does change, which itself does not seem to be supported by the description.

[112] The Applicant contends that the inclusion of the limitation of claims 7 and 14 is to “explicitly highlight a key feature of the invention”, that it “prevents potential misunderstandings about volume changes” and “helps to avoid overly broad interpretations of the invention’s scope to include embodiments where volume changes could occur.”

[113] If a key feature of the invention is only highlighted or set out in a dependent claim, then the broad claim to which it refers would likely be defective due to

overbreadth (*Seedlings Life Science Ventures v Pfizer Canada*, 2021 FCA 154 at para 54), which would be a further reason why claim 7 and 14 are defective. Setting out an explicit limitation in a dependent claim creates a presumption that the claim to which it refers is not so limited (*Bauer Hockey Ltd v Sport Masko Inc (CCM Hockey)*, 2020 FC 624 at para 68). As such, contrary to the Applicant's submissions, the presence of claims 7 and 14 do not prevent misunderstandings about volume changes or avoid overly broad interpretations about the scope of the broad claims. These claims only serve to create ambiguity and questions about the breadth of the broader claims.

[114] In light of the above, we are of the view that claims 7 and 14 are indefinite.

Further submissions in respect of claims 2–4, 7, 9–11, 14, 17, 22, 23, 25, 27, 29, 30 and 31

[115] At pages 35–36 of the R-PR, the Applicant makes general comments about the clarity of the claims identified as being indefinite in the PR letter. The Applicant asserts that the language is clear, that the claims provide sufficient detail to inform a skilled person about the scope of the invention, that they are precise, and that they clearly outline the boundaries of the invention.

[116] However, none of the above points directly address the particular concerns set out in the PR letter and quoted above.

[117] At page 36 of the R-PR, the Applicant makes some specific comments on claims 1–7, 8–14, 15–16 and 17–31. However, the comments are limited to describing the features of these claims, not to addressing the particular indefiniteness issues set out in the PR letter.

Conclusion in respect of indefiniteness

[118] In light of the above discussion, we conclude that claims 2–4, 7, 9–11, 14, 17, 22, 23, 25, 27, 29, 30 and 31 are indefinite and therefore do not comply with subsection 27(4) of the *Patent Act*.

CLAIM FORMALITIES

Legal Principles

[119] Paragraph 13(1)(c) of the *Patent Rules* states:

13(1) Subject to subsection (2), documents submitted in paper form in connection with a patent and an application for a patent must

...

(c) be free of interlineations, cancellations or corrections.

Analysis

[120] At page 32 of the PR letter, we set out our preliminary view that claim 21 was not compliant with the above provision:

As noted in the FA at page 15, claim 21 contains an indication of a correction to the claim in the phrase “The system of claim 17,…” Therefore, in our preliminary view, claim 21 is not compliant with paragraph 13(1)(c) of the *Patent Rules*.

[121] The Applicant made no comments in respect of the above in the R-PR.

[122] We conclude that claim 21 is not compliant with paragraph 13(1)(c) of the *Patent Rules* for the reasons set out in the PR letter.

PROPOSED CLAIMS

[123] With the R-PR, the Applicant submitted proposed claim set-2. As set out in the PR letter at page 33, it is only these latest proposed claims that are to be considered as possible amendments in making a final recommendation to the Commissioner of Patents.

[124] The proposed claims address the following indefiniteness issues:

- The indefiniteness issue set out in the FA where a second object was set out in claims 1 and 8 without the introduction of a first object. However, as noted in the PR letter we were of the preliminary view that claims 1 and 8 were not indefinite for this reason;
- The indefiniteness issues set out in the FA regarding the typographical error in claim 15. However, as noted in the PR letter, we were of the preliminary view that claim 15 was not indefinite for this reason;
- While most of the indefiniteness issues identified in relation to claim 17 have been addressed by the proposed claims, the introduction of “the objects” to replace “the container units” in order to address the lack of antecedent issue, has resulted in a lack of antecedent issue for “the objects”. As such, proposed claim 17 remains indefinite;
- Claim 22 is to be deleted, which would resolve any indefiniteness issues;
- The indefiniteness issues with claim 23 would be resolved by the proposed amendments;
- The indefiniteness issues with claim 29 would be resolved by the proposed claims;

- The indefiniteness issues with claim 30 would be resolved by the proposed claims; and
- Claim 31 is to be deleted, which would resolve any indefiniteness issues.

[125] Since other indefiniteness defects identified in the PR letter were not addressed in the proposed claims and the arguments in the R-PR in relation to those defects do not convince us that they are not present, the proposed claims are defective as being indefinite.

[126] Further, the proposed claims do not address the lack of utility and sufficiency defects.

[127] In light of the above, since the proposed claims would not overcome all of the outstanding defects, they are not considered a “necessary” amendment for compliance with the *Patent Act* and Patent Rules, as required by subsection 86(11) of the *Patent Act*.

CONCLUSIONS

[128] We conclude that:

- Claims 1–31 on file do not lack unity and are therefore compliant with subsection 36(1) of the *Patent Act*;
- Claims 1–31 on file lack utility and are therefore not compliant with section 2 of the *Patent Act*;
- Claims 1–31 on file are novel in view of the cited prior art and are therefore compliant with paragraph 28.2(1)(b) of the *Patent Act*;
- Claims 1–31 on file would not have been obvious to the person skilled in the art and are therefore compliant with section 28.3 of the *Patent Act*;

- Claims 1–31 on file do not lack support in the description and are not broader than the invention described;
- The instant application is insufficient and therefore does not comply with subsection 27(3) of the *Patent Act*;
- Claims 2–4, 7, 9–11, 14, 17, 22, 23, 25, 27, 29, 30 and 31 are indefinite and therefore do not comply with subsection 27(4) of the *Patent Act*; and
- Claim 21 does not comply with paragraph 13(1)(c) of the *Patent Rules*.

[129] We also conclude that the proposed claims would not overcome all of the outstanding defects present in the claims on file and therefore are not considered a “necessary” amendment for compliance with the *Patent Act* and *Patent Rules*, as required by subsection 86(11) of the *Patent Rules*.

RECOMMENDATION OF THE BOARD

[130] In view of the above, the undersigned recommend that the application be refused on the grounds that:

- Claims 1–31 on file lack utility and are therefore not compliant with section 2 of the *Patent Act*;
- The instant application is insufficient and therefore does not comply with subsection 27(3) of the *Patent Act*;
- Claims 2–4, 7, 9–11, 14, 17, 22, 23, 25, 27, 29, 30 and 31 are indefinite and therefore do not comply with subsection 27(4) of the *Patent Act*; and
- Claim 21 does not comply with paragraph 13(1)(c) of the *Patent Rules*.

Stephen MacNeil

Liang Ji

Beatrice Sze

Member

Member

Member

DECISION OF THE COMMISSIONER

[131] I concur with the conclusions and recommendation of the Board that the application be refused on the grounds that:

- Claims 1–31 on file lack utility and are therefore not compliant with section 2 of the *Patent Act*;
- The instant application is insufficient and therefore does not comply with subsection 27(3) of the *Patent Act*;
- Claims 2–4, 7, 9–11, 14, 17, 22, 23, 25, 27, 29, 30 and 31 are indefinite and therefore do not comply with subsection 27(4) of the *Patent Act*; and
- Claim 21 does not comply with paragraph 13(1)(c) of the *Patent Rules*.

[132] 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.

Konstantinos Georgaras

Commissioner of Patents

Dated at Gatineau, Quebec
this 28th day of March, 2024.