INTELLECTUAL PROPERTY OFFICE OF SINGAPORE

# Written Opinion

**Application No.**
**10202402555S**

| Application filing date | (Earliest) Priority Date |
|---|---|
| 21/08/2024 | |

1. This first Written Opinion is issued under Section 29(5) of the *Patents Act*.

2. This opinion contains indications relating to the following items:

| | | |
|---|---|---|
| I | ☒ | Basis of the opinion |
| II | ☐ | Priority |
| III | ☐ | Non-establishment of opinion with regard to novelty, inventive step and industrial applicability |
| IV | ☒ | Unity of invention |
| V | ☒ | Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement |
| VI | ☐ | Clarity, Clear and Complete Disclosure, and Support |
| VII | ☐ | Double patenting |

3. If no reply is filed, the Examination Report will be established on the basis of this opinion.

Intellectual Property Office of Singapore
1 Paya Lebar Link #11-03
PLQ 1, Paya Lebar Quarter
Singapore 408533
Email: operations@iposinternational.com

Date of Written Opinion:
10/09/2024

**Authorized Officer**
Sim Cheow Hin (Dr)

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# Written Opinion

**Application No.**
**10202402555S**

## I. Basis of the opinion

1. This opinion has been drawn on the basis of:

   ☒ the application **as originally filed**.

2. ☐ This opinion has been established based on the exclusion of additional matter beyond the earlier application, as indicated in the supplemental box.

3. ☐ This opinion has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the supplemental box.

4. Additional observations, if necessary:

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## IV. Unity of invention

1. There are multiple inventions in this application, as follows:

   Group 1: Claims 1-12 relate to a battery sorting apparatus comprising an imaging device configured to capture an image of a battery to determine an actual orientation of the battery and a platform moveable relate to a base to align the battery along a predetermined orientation of a measurement device.

   Group 2: Claims 13-17 relate to a battery sorting method comprising obtaining a discharging rate of the battery and determining a grade of the battery based on the discharging rate.

   The common features among the inventions defined in the above 2 groups of claims which could potentially provide a contribution over the prior art relate to a battery sorting apparatus configured to measure an electrical characteristic of the battery to determine a grade of the battery. However, the common features are disclosed in D1 (para. [0067]-[0079]). Thus, the inventions defined in the 2 groups of claims are not so linked as to form a single inventive concept involving one or more of the same or corresponding special technical features. Therefore, there is a lack of unity *a posteriori*.

2. Consequently, this opinion has been established in respect of the following parts of the application:

   ☐ all parts

   ☒ the parts relating to claim(s) no. 1-12

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**V. Reasoned statement with regard to novelty, inventive step or industrial applicability; Citation and explanation supporting such statement**

**Statement with regard to novelty, inventive step or industrial applicability**

| | | | |
| --- | --- | --- | --- |
| Novelty (N) | Claim(s) | 1-12 | YES |
| | Claim(s) | NONE | NO |
| Inventive Step (IS) | Claim(s) | 7-8 AND 10-12 | YES |
| | Claim(s) | 1-6 AND 9 | NO |
| Industrial applicability (IA) | Claim(s) | 1-12 | YES |
| | Claim(s) | NONE | NO |

**1. Citations**

The following citations are referred to in this opinion. Full bibliographic details are provided in the Search Report:

D1 – US 2013/0317639 A1
D2 – CN 212808551 U
(machine translation was used for the purpose of establishing the opinion)
D3 – CN 220509099 U
(machine translation was used for the purpose of establishing the opinion)
D4 – CN 110539111 B
(machine translation was used for the purpose of establishing the opinion)
D5 – KR 10-2022-0133417 A
(machine translation was used for the purpose of establishing the opinion)

**2. Novelty (Section 14 of the *Patents Act*)**

The subject matter of claims 1-12 is novel since none of the cited prior art documents individually discloses all the features of said claims.

**3. Inventive Step (Section 15 of the *Patents Act*)**

D1 discloses the following features of claim 1 (strikethrough wordings refer to features which are not disclosed):

A battery sorting apparatus (fig. 1) comprising:

- a base (para. [0049], fig. 1: robot 10);
- an imaging device (para. [0052]: non-contact visual means using an imaging device) mounted to the base (para. [0077]: all N tools are assembled into a single tool permanently attached to the robot);
- a measurement device mounted to the base (para. [0049], fig. 1: end effector 11a or tool 12);
- a platform (para. [0051], fig. 1: feeding of battery objects 14 to the testing site, platform is implicit for carry the battery objects 14) ~~movably coupled to the base~~, and
- a controller coupled to the imaging device, the measurement device and the platform (para. [0102], fig. 7: robot controller 104);

wherein

- the imaging device is configured to capture an image of a battery carried by the platform to determine an actual orientation of the battery (para. [0051]-[0052]: non-contact visual means using an imaging device, determine the position and orientation of the battery objects 14);

**V. Reasoned statement with regard to novelty, inventive step or industrial applicability; Citation and explanation supporting such statement**

- ~~the platform is moveable relative to the base to align the battery along a predetermined orientation of the measurement device and to position the battery under the measurement device;~~
- the measurement device is configured to measure electrical characteristics of the battery to determine a grade of the battery (para. [0076]-[0079]: grading and classification of the tested battery object 14), and
- the controller is configured to assign the grade to the battery (para. [0081]-[0087]).

D1 further discloses a robot configured for repositioning and reorientation of the object prior to its testing (para. [0051]). The difference between claim 1 and D1 thus lies in that the mechanism for aligning the battery along a predetermined orientation of the measurement device. D2 teaches a rotatable convey platform comprising a mounting plate coupled with a rotatable placement seat (para. [n0014], fig. 1: mounting plate 12, placement seat 13), the mounting plate is movable relative to a base (para. [n0014], fig. 1, 3: mounting plate 12 is configured to slide along conveying platform 1). The battery on the placement seat is configured to be oriented and transported to a position under an IV detection head for performing electrical measurement (para. [n0017], fig. 3: IV detection head 12). A skilled person would consider configuring the battery platform in D1 with a rotating mechanism as taught in D2 as a matter of an alternative design implementation to reduce the workload of the integrated robot. The subject matter of claim 1 thus lacks an inventive step over D1 and D2.

The additional features in claims 2-4 relating to detailed implementation of the translation and rotation mechanism of the apparatus are either disclosed by D2 (para. [n0014], fig. 1: linear slide 11, driving device 14, mounting portion 121, extension portion 122, bottom plate 132) or concern simple implementation alternatives to the disclosure of D2. Claims 2-4 are not inventive.

Claims 5 and 6 further relate to detailed implementation of a fixture for clamping the battery to the second stage. Whilst D2 teaches an absorption plate provided with vacuum suction for holding the battery to the second stage (para. [n0014], fig. 2), the use of a clamping fixture is a straightforward alternative design option that is conventional in the art, see for example, D3, para. [n0035], fig. 1: clamping plate 6; D4, fig. 1: clamping device 2. These claims are not inventive.

The additional feature in claim 9 is disclosed by D1 (fig. 1 illustrating test tool 12 comprising 2 probes). Claim 9 is not inventive.

The additional feature in claim 7 concerns the provision of an actuator for fine adjustment of the bracket and clamp positions relative to the second stage. The additional features in claims 10-12 concern the provision of two positive probes spaced apart at different pitch from the negative probe. Said implementations are neither suggested by the prior art documents nor appear to be common in the art. Therefore, the skilled person would not find it obvious to implement the features as defined in claims 7, 8 and 10-12. The subject matter of claims 7, 8 and 10-12 is thus acknowledged to involve an inventive step.

**4. Industrial Applicability (Section 16 of the *Patents Act*)**
The subject matter of claims 1-12 is industrially applicable.

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For clarification of the Patent Examiner's comments in this report, direct communication may be arranged with the Patent Examiner via email. For the procedure to initiate such communication, please refer to the Patents Formalities Manual (please click here), under the heading **"Direct Communication with the Patent Examiner"**.

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