

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ASCEND ELEMENTS, INC.

Petitioner,

v.

DUESENFELD GMBH,

Patent Owner.

Post-Grant Review No. PGR2025-00037

U.S. Patent No: 12,119,463

**DECLARATION OF VANI DANTAM
IN SUPPORT OF
PATENT OWNER’S DISCRETIONARY DENIAL BRIEF**

I, Vani Dantam, of Fishers, Indiana, declare that:

I. ASSIGNMENT

1. I have been retained by Robins Kaplan LLP on behalf of Duesenfeld GmbH (“Duesenfeld”) as an expert with regard to this matter. I understand that Petitioner Ascend Elements, Inc. (“Ascend” or “Petitioner”) is requesting that the Patent Trial and Appeal Board (“Board”) institute post-grant review (PGR) of U.S. Patent No. 12,119,463 (“the ’463 patent”) (Ex. 1001).

2. In my capacity as an expert, I have been asked to provide my independent analysis and opinions regarding the '463 patent, the prosecution history of the '463 patent and related applications as applicable, and the alleged prior art relied upon by Petitioner. My opinions and conclusions are fully discussed in later sections of this declaration.

3. I am an independent consultant through the firm of Fractal Energy Storage Consultants, and I am not, and have never been, an employee of Duesenfeld or Ascend. I received no compensation for this declaration beyond my normal hourly compensation through Fractal of \$500/hr based on my time actually spent analyzing the '463 patent, the prosecution history of the '463 patent and related applications, the prior art publications relied upon by Petitioner, the accompanying Declaration of Marc Juzkow, and other related materials. I will not receive any added compensation based on the outcome of this PGR or other proceedings involving the '463 patent (or the related '097 patent).

II. BACKGROUND AND QUALIFICATIONS

4. My Curriculum Vitae ("CV") is attached as **Appendix A**. I highlight here a few experiences in my career that are particularly germane to my opinions discussed herein, which give a basis of my opinions of a person of ordinary skill in the art at the time of invention (*i.e.*, approximately 2015).

5. In 1979, I obtained a Bachelor of Technology degree with a focus in Metallurgical Engineering from the Indian Institute of Technology – Banaras Hindu University (Varanasi, Uttar Pradesh, India), graduating with high honors at the top of my class.

6. In 1982, I obtained a Master's of Science (MS) degree in Mechanical Engineering from Vanderbilt University, under a U.S. Navy Scholarship.

7. In 1987, I obtained a Master's in Business Administration (MBA), specializing in Finance and International Business from Kelley School of Business, Indiana University, under a GM Fellowship.

8. I have certifications and continuing education, including QES Quality Engineering Certification, GM Quality Institute, Kettering University (Flint, MI).

9. From 2008 - 2010, I worked as the Director of Global Sales at Remy Electric, managing sales of Hybrid/EV motors/generators. These motors/generators operated using energy supplied by lithium ion batteries. Through my work at Remy Electric, I became familiar with the performance characteristics of different lithium ion batteries. Lithium ion batteries had just begun to proliferate in the industry.

10. From 2010 - 2012, I worked with the Indiana-based company EnerDel as their VP of Sales. EnerDel is a company that pioneered lithium ion battery technologies. Through my capacity as VP of sales, I developed a thorough understanding of lithium ion battery technology and the materials that went into

these batteries. I managed the design of battery modules and packs for different applications, based on customer inputs. Because of my technical background, I was able to talk to a customer, and translate those needs into a proposed module and pack design. I also worked as a team member scaling up the production of cells/modules/packs from the pilot plant in Fishers, IN to a GWh scale production plant in Greenfield, IN.

11. From 2012 - 2015, I worked for Axion Power as its Senior Vice President of Sales, Business Development, and Marketing. Axion Power is a company that specialized in manufacturing lead-carbon batteries, which is a technology that competed with lithium ion batteries. At Axion Power, I supervised Application Engineering and Module and Pack Development to reflect the customer needs. As I competed for business, my work at Axion Power helped me understand the tremendous advantages lithium ion batteries have, how advanced the material and process technology was set to become, and the areas where additional work was needed—from a customer perspective. Customers would show us their lithium ion battery packs, and asked us to design a lead-carbon battery that could outperform the lithium-ion battery, and I would supervise the application engineering personnel. Through this experience I became increasingly well-versed in both kinds of battery technologies.

12. In 2015, I joined Landis+Gyr (a division of Toshiba, Japan) as their V.P. of North American Sales. I managed the sales of LTO batteries (LTO batteries use Lithium Titanate anodes and LFP or NMC cathodes). During my five-year employment with Landis+ Gyr, I often visited Toshiba headquarters in Tokyo and their plant in Kashiwazaki (north of Tokyo) and received coaching and training from my colleagues in Japan on different battery chemistries and material preparation as well as production line design. One area of my focus was understanding the electrode preparation and how the plant prepared the rejects for recycling by recruiting special material recyclers for plant waste and returned battery packs.

13. Starting in 2019, I worked for Lucas TVS (Chennai, India) and 24m Technologies (Cambridge, MA) as their Chief Project Consultant, focusing on feasibility, finance, Engineering, Procurement, and Construction (“EPC”), operations, and customer development. In this role, I managed plant feasibility studies regarding production of semi-solid state lithium ion battery technology conducive to Indian ambient conditions. Through this capacity I helped design a plant directed to produce new cell formats for batteries using LFP/NMC chemistries, BMS integration and module/pack/charging infrastructure design and architecture.

14. From 2022 - 2023, I served as the Chief Operating Officer of Nextech Batteries in Carson City, Nevada. I was responsible for all functional areas, including logistics, engineering, and production, which included setting up global manufacturing facilities for lithium sulfur chemistry-based cells.

15. From 2023 - 2024, I was Chief Executive Officer and Chairman of the Board for Nevada Technology Corporation, which specializes in lithium ion battery recycling, including repurposing used batteries into second life batteries and developing advanced cell technologies to overcome current rechargeability, cost, and life limitations.

16. From 2022 - 2024, I was the Chief Advisor to Lohum Americas, which is a provider of advanced recycling technologies for lithium ion batteries using principles of Hydrometallurgy. They currently operate a recycling plant in India with a capacity of 800MWh. This will be scaled up to over 2GWh in the next 2-3 years. They also signed agreements to establish recycling facilities in the Middle East, Eastern Europe and Africa.

17. In March 2025, I became the Vice President of Operations at Fractal Energy Storage Consultants, for which I serve as a consultant to a variety of companies in the energy sector. I am currently providing my consulting services to Duesenfeld through Fractal.

III. LEVEL OF SKILL IN THE ART AND BASIS FOR OPINIONS

18. For purposes of this Declaration, I do not dispute the level of skill for a person of ordinary skill in the art (“POSITA”) as set forth on page 10 of the Petition (*i.e.*, a B.S. degree in electrical engineering, materials science, chemical engineering, or an equivalent field, as well as at least 2 to 3 years of academic or industry experience in the recycling or processing of lithium-ion batteries.).

19. I believe that I am qualified to render opinions regarding the technology described and claimed in the ’463 patent, based on my experience and education. Based on my expertise and qualifications, I believe that I am qualified to provide opinions as to the state of the art and what a POSITA would have understood, known, or concluded as of the priority date of the ’463 patent, which I understand to be October 20, 2016. I have been working in the lithium battery field, including supervising the processing of lithium ion batteries, since 2012. My career has continued in the battery recycling field, and I have participated in various industry organizations relating to battery recycling technologies. I have familiarized myself with the state of the art at the time of invention as it relates to battery recycling technology, as set forth herein. I have provided my declaration herein from the perspective of a person of ordinary skill in the art in the time frame of the invention of the ’463 patent, *i.e.*, as of October 20, 2016.

20. In reaching my opinions and conclusions, I have relied upon my education, my work experience in the relevant field, and my training, and considered and relied upon my review and analysis of the materials listed in **Appendix B.**

IV. RELEVANT LEGAL PRINCIPLES

21. For the purposes of this declaration, I have been informed about certain aspects of the law that are relevant to my analysis and opinions. I have applied these legal principles in rendering my opinions below.

A. Obviousness

22. I understand that under U.S. patent law, 35 U.S.C. § 103, a claim is invalid as obvious if the differences sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.

23. I am informed that an obviousness analysis requires an assessment of the scope and content of the prior art, the differences between the art and the claims at issue, and the level of ordinary skill in the art. I am told that it is against this backdrop that obviousness is assessed.

24. I am informed that a POSITA is a hypothetical person who is presumed to be aware of all the pertinent prior art. I am also informed that an

obvious analysis may take account of the inferences and creative steps that a POSITA would employ.

25. I am informed that assessing which prior art references to combine and how they may be combined to match the challenged claim may not be based on hindsight reconstruction or *ex-post* reasoning. Hindsight reconstruction is using the challenged patent itself as a road map for recreating the invention. In assessing obviousness, only what was known before the invention was made can be considered. I also understand that a guard against such hindsight reconstruction is a determination whether a person of ordinary skill in the art would have been motivated, taught, or suggested to combine the relevant teachings of the prior art to duplicate the challenged claim at the time of the filing of the application on the patented invention.

V. OVERVIEW OF ASSERTED PRIOR ART

A. Overview of Hanisch '438 Publication

26. I have reviewed Petitioner's reliance on United States Patent Application Publication No. 2014/0290438, which was published to Christian Hanisch ("Hanisch," or "the Hanisch '438 Publication"). I understand that the Hanisch '438 Publication is from the same application that was issued as U.S. Patent No. 9,780,419 ("the Hanisch '419 Patent").

27. The Hanisch '419 Patent is the basis of the challenge that Ascend

Elements, Inc. (“Ascend”) has already made against claims of Duesenfeld’s U.S. Patent No. 11,050,097 (“the ’097 Patent”) in co-pending IPR2024-00948. I have already submitted opinions about the Hanisch ’419 patent in IPR2024-00948. *See* IPR2024-0098, Ex. 2022.

28. Hanisch recognizes a problem in the art of incomplete separation of the active material from its support material. Ex. 1021 at [0003]. In particular, Hanisch notes that while it was known to shred a cell into fragments and then heat those fragments to decompose the binder that bonds the active material to the support, the active material was extremely difficult to remove from the support. Ex. 1021 at [0011]. Hanisch is directed to solving this problem of incomplete removal, and it teaches doing so by “air jet sieving”: smashing the heat-treated cell fragments into an air jet sieve at high speeds to separate the active material from the support. *Id.*

29. Given the problem that Hanisch seeks to solve, the patent publication focuses on techniques for achieving a more complete separation of active material from the support. To achieve separation, Hanisch teaches heating the crushed battery material to extremely high temperatures—350°C to 800°C—to decompose the binder that binds the active material to the support. Ex. 1021 at [0028]. The high temperature oven is operated “under inert gas or in a vacuum” to prevent the aluminum and copper supports from oxidizing. *Id.* at [0026]. Hanisch teaches that

by preventing aluminum and copper oxidation, the anode and cathode can be processed together, resulting in copper recovery “with a high degree of purity” (*id.* at [0026]) as well as reducing the cost of subsequent processing of the active material due to lower aluminum oxide contamination. Thus, Hanisch discloses using inert gas or vacuum for ventilation purposes to reduce the amount of oxygen to avoid oxidizing the material. *Id.*

30. Hanisch then teaches an air-jet sieving step, in which “the support, with the active material still adhered to it, powerfully impacts upon the sieve.” Ex. 1004 at [0011]. According to Hanisch, the impact “removes the active material hitherto adhered to the support so that it can be retrieved.” *Id.*

31. In addition to the decomposition and air-jet sieving steps, Hanisch teaches an optional pre-drying step, which is set up “behind the cell crushing device and before the oven.” Ex. 1021 at [0046]. According to Hanisch, the purpose of the pre-drying step is to retrieve additional electrolyte. As the published application explains, “the cell fragments are dried at a drying temperature, so that dry cell fragments and drying vapours are formed, whereby the drying vapours are at least partly condensed. This has the advantage that the electrolyte solvent can be retrieved.” Ex. 1021 at [0025].

32. Hanisch is therefore concerned with improved techniques for separating active material from carrier films. As I discuss further below, Hanisch is

33. These processes in Hanisch are done through a continuous process.

34. Hanisch's process is illustrated in Figure 1, annotated below, to show the flow of material through the system: the pre-dryer, the oven, and the nitrogen tank which provides an inert atmosphere through the system:



35. Hanisch does not show any vacuum pump connected to either the pre-

dryer or the decomposition oven and there is no discussion about how strong the vacuum in any step of the disclosed process would be. Ex. 1021 (Figure 1).

Hanisch does not show any condenser coupled to the high temperature oven (*id.*), which confirms that electrolyte solvents are not recovered from that oven.

B. Overview of Tomioka

36. I have reviewed Japanese Patent Application Publication No. JPH10255861, which is published in the name of Yoshiki Tomioka (“Tomioka”). See Ex. 1005. Tomioka discloses techniques for processing batteries for recycling.

37. Tomioka acknowledges the risks of processing batteries. Tomioka notes the “significant risk of ignition and explosion” when processing lithium-containing batteries. Ex. 1005 at [0004].

38. Tomioka emphasizes the need for safety in the processing of batteries. Ex. 1005 at [0005] (“When the disposal item is a battery pack, it is crucial to first efficiently separate and remove the resin package so that the internal battery units can be extracted safely, enabling the recovery of useful resources.”).

39. To mitigate risks, Tomioka notes that batteries can be processed through “manual disassembly,” but recognizes that this is “not suitable for large-scale disposal processing.” Ex. 1005 at [0005]

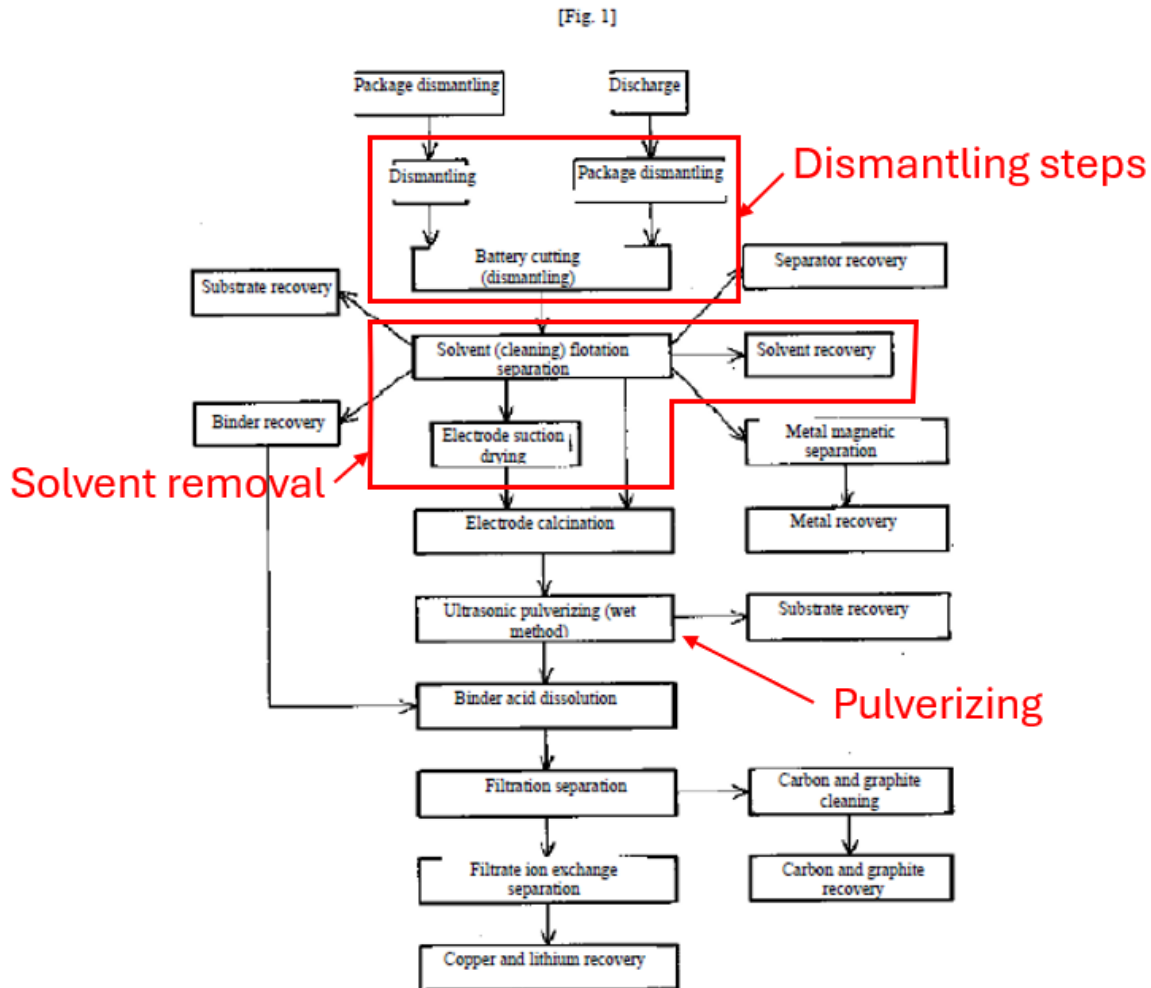
40. Tomioka also notes that batteries could be processed by “mechanically crushing the disposal battery backs collectively,” but counsels

against this approach because “there is a risk of sparking due to residual voltage if the battery units are damaged in the process.” Ex. 1005 at [0005]

41. Instead of “manual disassembly” and instead of “mechanically crushing” the batteries, Tomioka teaches a technique for processing of batteries that involves automated dismantling of the batteries.

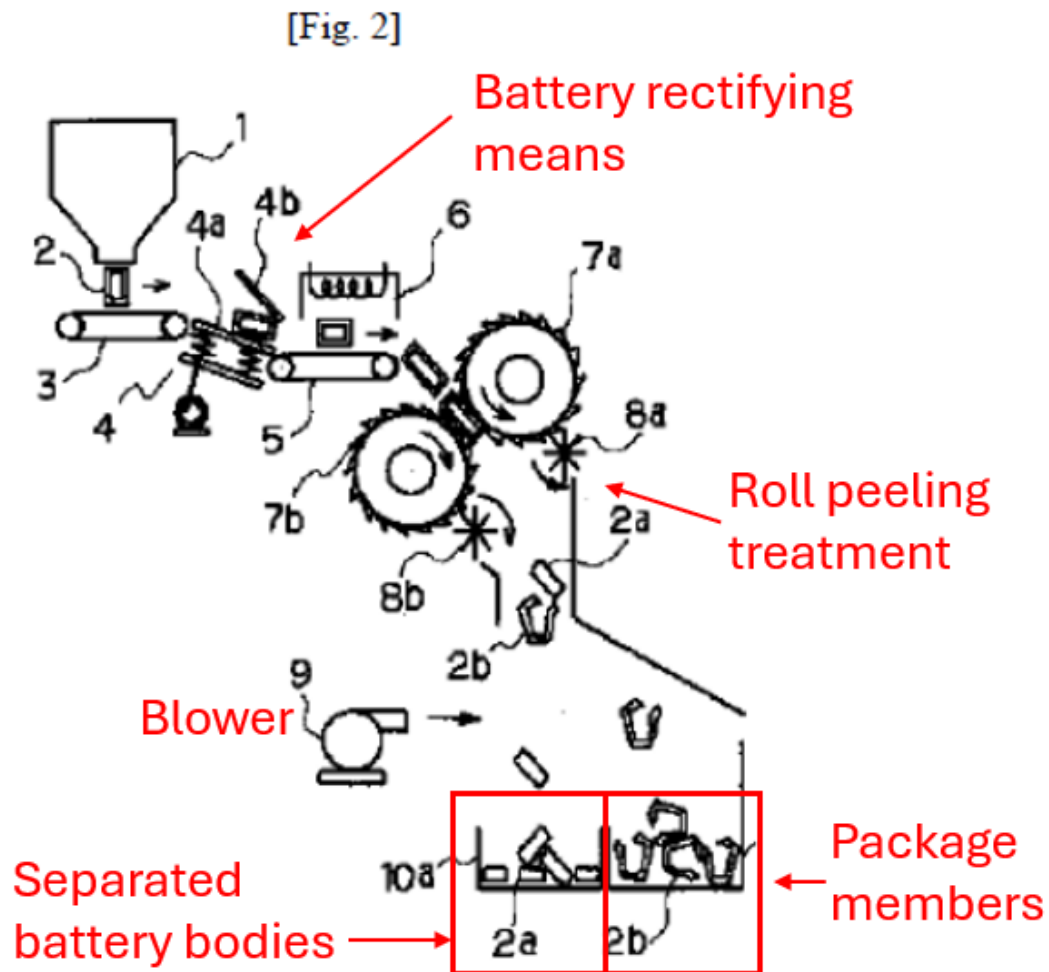
42. Tomioka defines dismantling as follows: “Furthermore, ‘dismantling’ means cutting the outer casing of the individual battery or the battery pack to extract the electrode element components such as the positive electrode, negative electrode, and separator, and if necessary, cutting them into strip-like pieces.” Ex. 1005 at [0012].

43. Tomioka provides a flowchart, annotated below, that teaches dismantling the batteries, followed by removal of the solvents, and thereafter pulverizing the batteries:



Ex. 1005, Figure 1 (annotated)

44. Tomioka teaches an automated process for dismantling the batteries, which allows the battery elements to be extracted. Tomioka discloses the following device, which contains a “battery rectifying means” to guide the batteries into a “pair of rollers.” *Id.* at [0044]. The rollers are precisely spaced, and rotate at different speeds, to conduct a “roll peeling process” that will “selectively destroy” the battery package. *Id.* at [0046]. The intact battery bodies fall down, while the packages are blown aside by a “air classification blower.” *Id.* at [0046].

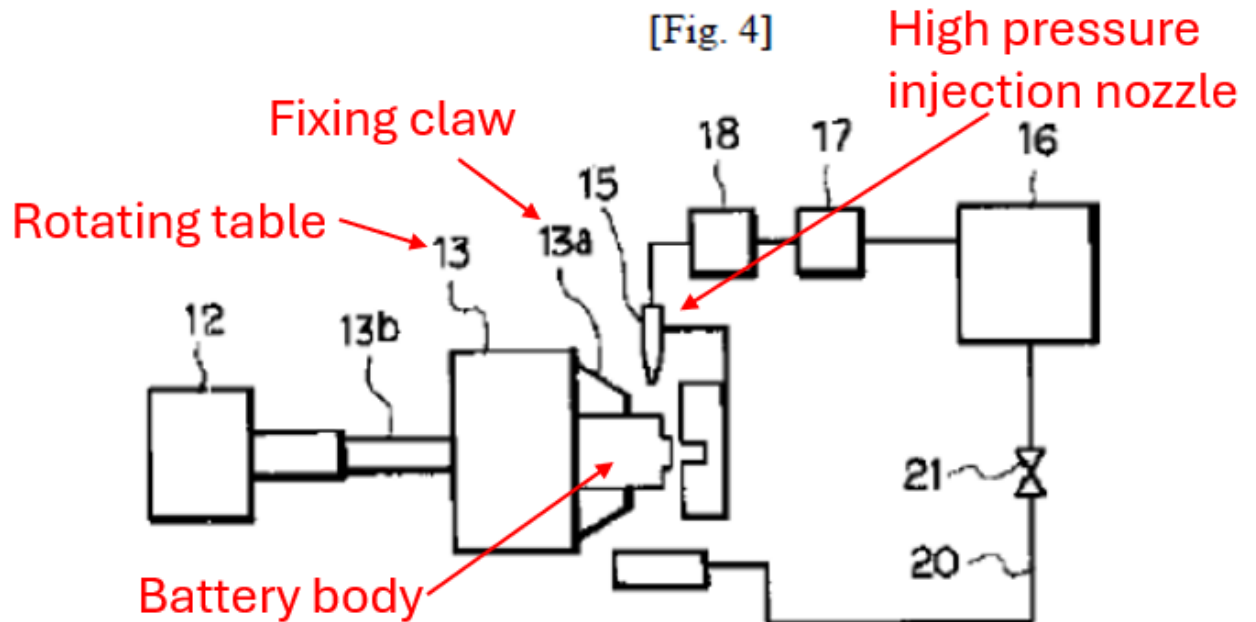


Ex. 1005 at Fig. 2 (annotated)

45. This device is structured to avoid damage to the internal components of the batteries. *See id.* at [0028] (setting parameters of dismantling device “in order to avoid damaging the battery body”); [0026] (configuring dismantling device “to be greater than the thickness of the battery body to avoid damaging it”).

46. Tomioka teaches then that the separated batteries should be further dismantled to allow removal of the battery elements. As shown below in an

annotated version of Figure 4, the separated battery bodies are mounted on a rotating table, and “an insulated oil is injected from a high-pressure injection nozzle” in order to “cut and open the terminal lead-out side of the battery body”:



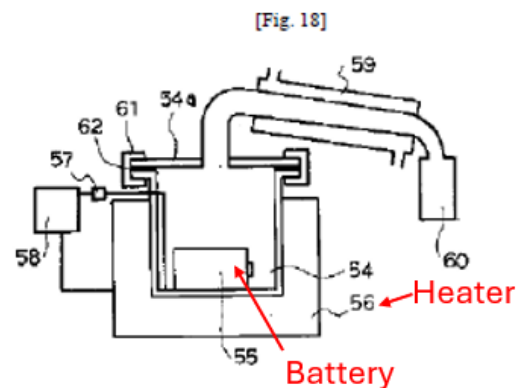
Ex. 1005 at [0048] & Fig. 4 (annotated).

47. Following this dismantling, the “battery element part is removed through the cutting/opening section of the battery body.” *Id.* at [0049]. The removed battery elements are then “immersed in isopropyl alcohol for approximately 10 minutes of shaking cleaning,” and then dried under vacuum. *Id.* at [0049].

48. Tomioka teaches various alternatives for removing the solvents from the batteries “to enhance the safety of the dismantling operation.” *Id.* at [0088]. By removing the solvents from the batteries, Tomioka avoids the hazards of the electrolyte solvents causing short circuits during the disassembly process. *See id.* at [0088] (“These flammable solvents may ignite due to short circuits between the positive and negative electrodes during the disassembly process or generate harmful gases such as hydrofluoric acid; thus, it is desirable to remove and recover them as much as possible.”).

49. Tomioka teaches that batteries can be heated in a chamber until they rupture, as a way to remove the solvents.

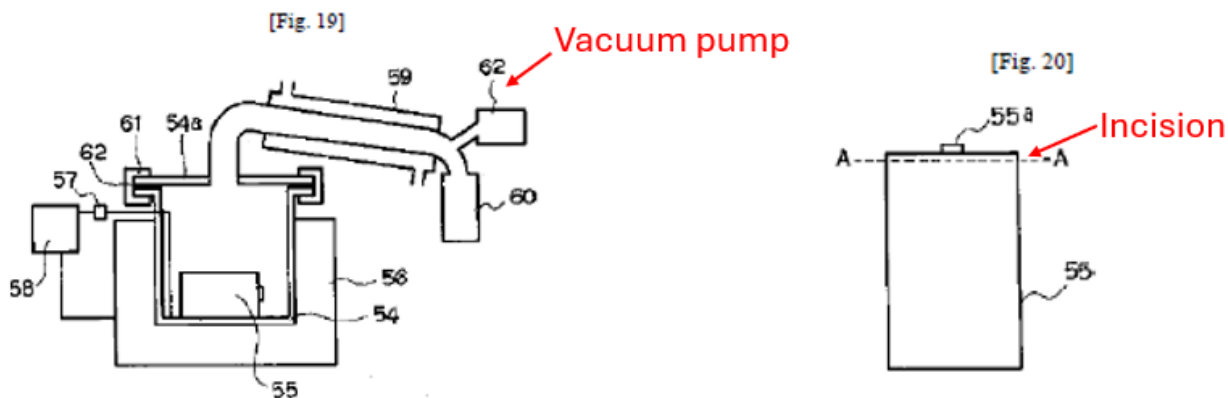
Figure 18 shows placing a battery in a chamber which is heated to 350°C. Tomioka describes that “[t]hrough this heating treatment, the safety valve opens under high pressure inside the aforementioned recovered battery 55.” *Id.*



at [0091]. The released vapors are then condensed and collected. *See Ex. 1005 at Fig. 18 (annotated).*

50. Alternatively, Tomioka proposes another approach by making an “incision” in the battery, or whereby the battery is cut to remove the battery element, and the solvents are evaporated through vacuum drying. *See id.* at [0093]

(“As shown in Fig. 20 from a side view, in the case of a cylindrical secondary battery 55, an incision is made along the A-A line approximately 1 to 4 mm inward on the protruding surface of the positive terminal to partially open it, or the battery element can be extracted by cutting it open.”). This cut serves to dismantle the battery to open the top. *Id.* at [0093] (“In addition, when a portion of the recovered battery is opened by cutting, and the liquid inside the battery is vaporized for condensation and recovery, it can be performed as follows.”); *see also id.* at [0012] (“Furthermore, ‘dismantling’ means cutting the outer casing of the individual battery or the battery pack to extract the electrode element components....”).



Ex. 1005 at Figs. 19-20 (annotated).

51. Once this incision, or cut, is made, the battery is introduced into a chamber as shown in Figure 19, applying vacuum. *Id.* at [0092-93]. The solvents are condensed and recovered.

52. Tomioka teaches that the solvents should be removed prior to further steps for processing of the battery, to promote safety:

Similarly to the aforementioned Embodiment 1, by carrying out the extraction and recovery of the solvent within the battery during the separation and recovery of the battery body as well as after the discharge processing and during the battery dismantling process, the working environment and safety for battery dismantling operations are significantly improved. Consequently, subsequent steps such as cleaning treatment of the separated battery dismantling products, heating treatment of the electrode elements, delamination processing of the active material layer, and treatment and recovery of the delaminated active material layer can proceed smoothly, leading to efficient waste processing with good productivity.

Ex. 1005 at [0094].

VI. GROUNDS 1-5: TOMIOKA DOES NOT TEACH COMMINUTING BATTERIES THAT CONTAIN ELECTROLYTE SOLVENT

53. I understand that Petitioner contends that claims 1-14 of the '463 patent would have been obvious over Tomioka, including in view of other prior art references. I disagree, because Petitioner fundamentally mischaracterizes Tomioka. Tomioka does not disclose comminuting batteries that still contain electrolyte solvent.

54. A person of ordinary skill in the art would understand the distinction between dismantling batteries and comminuting batteries.

55. “Comminution” refers to a variety of techniques for breaking down batteries into small pieces. The '463 patent contains the following description:

The comminution unit should be understood especially to mean a device which, when operating, comminutes the batteries. For example, the comminution unit (i) is a pressure comminution unit whereby the batteries are crushed between two tool surfaces, (ii) a striking comminution unit whereby the batteries lie on a tool surface and are smashed by striking them with a second moveable tool, (iii) a cropping comminution unit whereby the batteries are comminuted by two tool surfaces that move in opposite directions, (iv) a cutting comminution unit whereby the batteries are cut into two parts by means of two blades and/or (v) an impact comminution whereby the batteries are thrown against a wall, impact against a moving tool or two particles collide. Of course, the comminution unit may also work by way of two or more of the named comminution mechanisms.

Ex. 1001 at 2:62-3:9.

56. In all these examples of comminution units, comminution is destructive. By crushing, smashing, cropping, cutting, or impacting the batteries, the battery is damaged and destroyed.

57. This understanding from the patent is consistent with the way a person of ordinary skill in the art would understand the term “comminuting.” Indeed, dictionary definitions reflect this same understanding. Attached as Exhibit 2002 is a collection of dictionary definitions, and these definitions are all consistent with the way the patent describes comminution. *See* Ex. 2002. That is, comminution is a destructive approach whereby the batteries are broken down into smaller pieces.

58. The term “dismantling,” by contrast, is used to describe the careful disassembly of a battery. *See* Ex. 1005 at [0012] (quoted above). In particular, Tomioka describes “dismantling” as a cutting of the outer casing of a battery “to

extract the electrode element components such as the positive electrode, negative electrode, and separator.” Ex. 1005 at [0012]. Dismantling is a way to harvest the individual components within a battery.

59. The ’463 patent recognizes the distinction between comminution and dismantling. The ’463 patent uses the term “dismantling” to refer to separating out the smaller subcomponents of a battery:

Prior to being comminuted, the used batteries are preferably dismantled. This means that larger battery systems are dismantled into their smaller subcomponents, the modules or stacks, or even that the cells which contain the electrochemically active material are separated from the control electronics.

See Ex. 1001 at 4:2-8

60. The way that the term “dismantling” is used in the ’463 patent and in Tomioka is consistent with the way a person of reasonable skill in the art would understand this term.

61. With this understanding of the meaning of the terms “comminuting” and “dismantling,” it is clear that Tomioka does not teach comminuting the batteries while the batteries still contain electrolyte solvent.

62. To the contrary, Tomioka expressly counsels against comminuting the batteries while they contain solvent. See Ex. 1005 at [0005] (“Alternatively, ***mechanically crushing*** the disposal battery packs collectively, followed by wind separation and specific gravity sorting, could be considered as a mass producing

method; however, there is also a *risk of sparking* due to residual voltage if the battery units are damaged in the process.”) (emphasis supplied).

63. Figure 20 depicts dismantling a battery, not comminuting it. This is confirmed by Tomioka, itself, which expressly describes Figure 20 as “an explanatory diagram to describe another embodiment of the dismantling and separation of recovered batteries.” Ex. 1005 at Brief Description of Drawings; *see also id.* at [0012] (“Furthermore, ‘dismantling’ means cutting the outer casing of the individual battery or the battery pack to extract the electrode element components such as the positive electrode, negative electrode, and separator, and if necessary, cutting them into strip-like pieces.”).

64. Tomioka describes Figure 20 as simply removing the outer casing of the battery so that the internal components can be extracted. *See id.* at [0093] (“As shown in Fig. 20 from a side view, in the case of a cylindrical secondary battery 55, an incision is made along the A-A line approximately 1 to 4 mm inward on the protruding surface of the positive terminal to partially open it, or the battery element can be extracted by cutting it open.”). Unlike the acts of comminution described by the ’463 patent (see Ex. 1001 at 2:62-3:9), the dismantling of the top of the battery as shown in Figure 20 does not destroy the components of the battery. Rather, the battery components are extracted, with only the outer casing cut away.

A person of ordinary skill would understand that this is an act of dismantling, not of comminution.

**VII. GROUNDS 6-9: HANISCH DOES NOT TEACH INACTIVATING
COMMINUTED BATTERY MATERIAL, AND DOES NOT TEACH
THE REQUIRED PRESSURE CONDITIONS**

**A. Hanisch does not teach inactivating the comminuted material in the
low-temperature pre-dryer**

65. A POSITA would not have understood the “pre-drying” step in Hanisch to teach “inactivating the comminuted material and obtaining inactivated comminuted material as a result,” as claimed in the ’463 patent. Hanisch explains that “the cell fragments are dried at a drying temperature, so that dry cell fragments and drying vapours are formed, whereby the drying vapours are at least partly condensed. *This has the advantage that the electrolyte solvent can be retrieved.*” Ex. 1021 at [0025] (emphasis added). In view of this disclosure, a POSITA would have understood that the purpose of the pre-drying step in Hanisch is not to inactivate the comminuted material, but rather to condense out additional electrolyte for recovery. Ex. 1021 at [0025] (“This has the advantage that the electrolyte solvent can be retrieved.”). Hanisch has no express teaching of inactivating the material in this pre-drying step, and it provides no guidance whatsoever as to how much of the electrolyte solvent to retrieve. As I explain below, a POSITA would not have understood Hanisch to teach drying the comminuted material for long enough to remove a sufficient amount of the

electrolyte solvent to achieve inactivation.

66. To the contrary, a POSITA would have understood Hanisch to be concerned with speed and more particularly with maintaining a high throughput in extracting electrolyte and separating the active material from the support. Hanisch expressly teaches that the method is “preferably performed as [sic] continual process and not in batches.” Ex. 1021 at [0020]. Consistent with this disclosure, Figure 1 of Hanisch (reproduced above) illustrates the pre-dryer (28) as having a conveyer belt, on which comminuted material would pass through the dryer at a constant rate in a continuous manner. A POSITA would have understood the conveyer belt to move material through the dryer continuously, again consistent with processing at high throughput.

67. A POSITA would have understood the advantages of using a continuous process, rather than a batch process, in Hanisch. Shredded battery material is toxic, and Hanisch clearly wanted to avoid accumulation of this toxic material, which could undergo various undesired reactions, and could potentially catch fire, or explode, or release toxic hydrogen fluoride gas. By using a continuous process, Hanisch minimized the hazard, by promptly removing electrolyte and sending the material to the pyrolytic furnace as fast as possible. A continuously operating dryer reduces the risk of explosions because it ensures that only small quantities of undried, comminuted batteries are present in the pre-dryer

at any given time.

68. That Hanisch refers to the dryer 28 as a “pre-dryer” would also have indicated to a POSITA that comminuted material is not dried for a sufficiently long time to inactivate it. Rather, a POSITA would have understood the pre-dryer to perform a short treatment step prior to decomposition.

69. Further, Hanisch teaches that the battery material goes from the pre-dryer to the decomposition oven, where it will be subjected to temperatures of at least 350°C. Ex. 1021 at [0028]. A POSITA would have understood that whatever solvent remains in the comminuted battery material through the pre-dryer will be destroyed in this furnace. Thus, a POSITA would understand that there is no need to take the caution and incur the cost to dry the material to the endpoint result of inactivation.

70. Hanisch does not include the necessary technical detail to instruct how to achieve inactivation of battery material using the pre-dryer. Specifically, the reference lacks any disclosure regarding the duration of time the material must spend in the pre-dryer or the pressure conditions required to achieve inactivation. Additionally, Hanisch does not provide any guidance on how to assess whether the material has reached a sufficiently dry state. Furthermore, it fails to address the variability in electrolyte solvents that would be encountered depending on the types of batteries being processed, nor does it include any discussion of the

specific drying conditions needed to ensure the complete evaporation of these solvents. A POSITA would have understood that this lack of detail renders the pre-dryer unsuitable for achieving inactivation, as it fails to address the fundamental parameters and conditions necessary to ensure the material is adequately processed to become inactivated.

71. The pre-dryer operates as a continuous process, introducing inherent challenges in maintaining precise control over parameters such as temperature and pressure. Continuous systems are prone to leaks at interfaces and junctions, which can result in fluctuations in pressure and inconsistencies in temperature regulation. Unlike batch systems, which allow for controlled and isolated conditions, continuous processes are less suited for achieving the uniform and stable environment required for precise drying. A POSITA would have understood that these limitations make the pre-dryer unsuitable for reliably achieving inactivation of the comminuted material. Even if Hanisch is interpreted as disclosing a batch process (which I disagree with), Hanisch still teaches no controls to ensure that the comminuted battery material is inactivated; to the contrary, by sending the comminuted material to the decomposition oven, there would be no need to implement such controls.

72. Further, a POSITA would have understood that the rate of electrolyte extraction is inversely proportional to the volume of electrolyte extracted. In other

words, as more electrolyte is extracted in the pre-drying process, it takes longer and longer to extract additional electrolyte. Given these indications that Hanisch is concerned with speed at the pre-dry stage — describing a “pre”-dryer rather than a dryer and recommending a continuous, rather than batch, process — a POSITA would not have understood Hanisch to teach leaving the comminuted battery material in the pre-dryer for the substantial amount of time required to evaporate enough electrolyte to achieve inactivation. A POSITA would have understood Hanisch to teach, at most, partial removal of the electrolyte in this low-temperature, pre-drying process. A POSITA would not have understood Hanisch to teach removing a sufficient amount of electrolyte in the pre-drying process to inactivate the comminuted battery material and make it safe for transport. Hanisch was concerned with energy consumption, and it would have run counter to this goal to extract electrolyte solvent to the point of inactivation. Ex. 1021 at [0033].

73. Therefore, a POSITA would not have understood Hanisch to teach “inactivating the comminuted material and obtaining inactivated comminuted material as a result” in the pre-dryer. And Hanisch’s high-temperature oven, which operates at a temperature of at least 350°C, is far in excess of the temperature range of the claims of the ’463 patent (*i.e.*, not more than 80°C).

B. Hanisch does not teach using a pressure of less than 300 hPa

74. Hanisch does not disclose what pressure to conduct any of the drying operations, either in the pre-dryer or in the decomposition furnace. I have reviewed Mr. Juzkow's declaration, and I note that he does not contend that Hanisch discloses the 300 hPa limitation of the '463 patent. See Ex. 1003 at ¶¶195-197.

75. There are unspecified references to a "vacuum" in Hanisch. Hanisch does not have any disclosure of the strength of the vacuum.

76. A person of skill would recognize that the vacuum level in Hanisch's system would have to be weak. This is because Hanisch discloses a continuous process. Ex. 1021 at [0020]. This means that chunks of shredded battery material are continuously moving into, through, and out of the process outlined in Hanisch. In order for such comminuted material to move through the system continuously, it would be extremely difficult to maintain a substantial vacuum in the system. As Dr. van Schalkwijk previously testified, a slight vacuum of about 18 hPa would be sufficient to create a "considerable breeze" such that "everything that's generated is moved on out of the – out of the chamber...." Ex. 2004 at 70:5-19. As he testified, a stronger vacuum would be disadvantageous, because it could mobilize particulate matter that could damage the seals of the system. Ex. 2004 at 107:5-19.

77. I note that Petitioner also attempts to combine teachings from Yosuke, LithoRec, and Perry. However, Petitioner is not relying on these additional references to address the 300 hPa limitation of the '463 patent. Accordingly, for

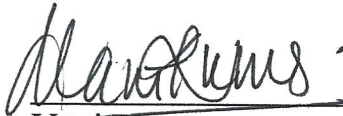
purposes of this declaration, it is sufficient to show that the proposed combination of Hanisch and Hayashi is unworkable.

VIII. ADDITIONAL REMARKS

78. I reserve any right that I may have to supplement this declaration if further information becomes available or if I am asked to consider additional information. Furthermore, I reserve any right that I may have to consider and comment on any additional expert statements and testimony of Petitioner's experts in this matter.

79. I hereby declare that all statements made of my own knowledge are true and that all statements made on information and belief are believed to be true. I further declare that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application, or any patents issued thereon.

Dated: June 15, 2025



Vani Dantam, .

Appendix A

VANI K. DANTAM

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EXECUTIVE SUMMARY

Accomplished global C-suite executive with 40+ years of strategic leadership experience in Energy Generation (SMR/MMR Nuclear, Renewables), Storage, Utilities, Smart Grid, Data Center and Electric Vehicle (EV) Infrastructure, and Defense industries. Managed multinational operations with substantial growth in highly complex and regulated sectors. Extensive expertise in managing large teams, design, construction and launch of global plants, and executing global mergers, acquisitions, and joint ventures. Proven ability to scale operations, increase profitability, and implement innovative technologies such as advanced energy storage solutions. Deeply involved in setting global industry standards for battery technologies as a member of SAE and UL committees. Fluent in Spanish, Portuguese, Hindi, and Telugu, with a strong international proficiency in key markets including North America, South America, Europe, and Asia. U.S. Navy veteran, recognized for public speaking and guest lectures at prestigious institutions.

CAREER HIGHLIGHTS

- **Global Leadership & Strategy:** Over 15 years of experience as VP and at C-Suite level and Board Member/Advisor to leading global companies in the energy, materials, and defense sectors. Built a career on operational excellence, growth strategy, and business transformation across diverse geographies and industries.
- **IPO Experience:** Played a key role in leading the Initial Public Offerings (IPOs) for industry leaders like Landis+Gyr, Axion Power, and Remy International, raising significant capital.
- **Advanced Storage and Generation Technology Expertise:** Decades of experience in Renewables, lead acid batteries, multiple lithium-ion chemistries and other advanced battery technologies. Successfully managed the full lifecycle of energy storage projects including project financing, feasibility studies, plant construction, and operations.
- **Global Operations/Partner Management:** Directed joint ventures and acquisitions in China, Brazil, Mexico, and India, managed OEM partnerships, manufacturing, and global energy storage/generator/motor plant (10) construction/launch in Mexico, Brazil, South Korea, France, Hungary, Poland and India. Deep expertise in energy management including, data centers, EV infrastructure, SMR/MMR reactors, smart grid technologies in utility sector.
- **Revenue Growth & Business Development:** Demonstrated success in building and managing business pipelines worth over \$200 million. Achieved a 670% increase in global sales at Remy Electric, growing international annual revenue from \$18M to \$120M in six years.
- **Leadership & Industry Recognition:** Frequent speaker at major global conferences on advanced battery technologies, EV infrastructure, and energy storage solutions. Active member of global technical committees (SAE, UL) responsible for developing and implementing industry standards. Advisor and guest lecturer at multiple universities, including Purdue University and Harvard University.

PROFESSIONAL EXPERIENCE

- **Fractal Energy Storage Consultants, Austin, TX** **Present**
Vice President Operations
- Manage over 12GWh/8GW Global Energy Projects (Generation, Renewables, Energy Storage, Management & Cyber Security), Modular/Micro Nuclear reactors, Data Centers, Plant Construction, Commissioning, and Operational Support, Patent & IP Analysis
- **Vanderbilt University, Nashville, TN** **Present**
Advisor – School of Engineering
- Provide advice on undergraduate & graduate curricula in Energy (Generation, Storage, & Management) Engineering and recruiting doctoral and post-doctoral candidates.
- **Robins & Kaplan LLP (Global Law Firm)** **Present**
Duesenfeld (Li-ion Battery Recycling Firm)
Industry Expert/Advisor
- Provide advice on lithium-ion battery recycling technology related intellectual property (IP) and patent infringement. Appraise technical documentation and prepare expert declarations.
- **SAE & UL Committees** **Present**
Committee Member
- Develop global standards for EV battery packs, recharging protocols, and second-life applications for energy storage technologies. Curricula development for engineering institutions and technical colleges, focused on EV infrastructure and battery technologies.
- **NanoX (Rare-earth Materials Firm, Netherlands),**
B.K. Batteries (Non-Li-ion Battery firm, South Korea) **Present**
Chief Strategic Consultant & Board Member
- Provide technical advice on rare earth and magnetic materials. Advise on market entry/plant construction and financing strategies, global partnerships to drive innovation and commercialization of new battery technologies.
- **Capattery (Advanced Lithium-Graphene Materials/Battery Manufacturer)** **2024-25**
Chief Strategic Advisor & Board Member
- Provide advice on financing, partnerships, development of new applications and market expansion strategies.
- **Quantum Copper (University of Nevada, Las Vegas Startup)** **2023-24**
Chief Advisor - Testing, Standardization & Certification
- Lead initiatives to develop testing and certification protocols for advanced separator materials in energy storage applications. Collaborate with university researchers and industry stakeholders to standardize new technologies.
- **UTILTYX - Cybersecurity software provider to utilities, (Milpitas, CA)** **2021-Present**
Chief Advisor - Financing & Business Development, Strategic Planning & Global Partnerships
- **Nevada Technology Corporation (Battery Recycling & Repurposing Company)** **2023-24**
CEO & Chairman of the Board
- Managed technology providers, investor relations and strategic partnerships for the company's expansion.

- **Lohum CleanTech - Noida, India** **2022-24**
 - Provider of Advanced Recycling Technologies of Lithium-ion batteries
Chief Advisor - Strategy
- **NexTech Batteries (Carson City, NV)** **2022-23**
Chief Operating Officer
 - Responsible for managing all operational functions, including HR, procurement, logistics, engineering, production, business development and pilot projects with CAISO
 - manage manufacturing facility design & development for lithium-sulfur battery technology.
 - Collaborated with external partners such as IBM to develop hybrid electrode technology and raised funding for research projects.
- **Canadian Storage & Solar (Edmonton & Toronto, Canada)** **2020- 21**
 Developer and converter of Natural Gas PPPs to solar and storage
Chief Project Consultant
 - Acquire Midwest PPP's (MISO territory), convert them to solar and storage-based units for smart grid integration with long term financing and PPAs
- **Lucas TVS (Chennai, India) & 24m Technologies (Cambridge, MA)** **2019-21**
Chief Project Consultant
 - Managed plant feasibility and project/product viability studies to develop semi-solid-state Li-ion battery technology in India on behalf of Lucas-TVS under license from 24m.
 - Led the financing, design, and construction of pilot and commercial-scale manufacturing plants for energy storage systems.
- **Landis+Gyr (Toshiba), Alpharetta, GA** **2015-19**
Vice President, Partner Relations & Strategic Planning **2017-19**
 - Member - IPO Team (Landis+Gyr divestiture). Rationalized and managed over 130+ partnerships with utilities and vendors across all product lines and services worldwide
 - Oversaw development of scalable grid connected and islanded microgrid design and development, predictive and prescriptive analytics, integrating these into NOCs and coaching Sales Managers to develop multiyear service and maintenance contracts with utilities.
- Vice President, Business Development & Sales** **2015-17**
 - Managed grid energy storage, smart grid analytics & control system project design, development, pricing, financing and installation for utilities and private/institutional investors for energy arbitrage, with and without renewable integration with LTO (from Toshiba), LFP and NMC chemistries as appropriate in different ISO regions.
 - Recruited, managed, and mentored Regional Sales managers, engineers, and analysts.
 - Led partner development for lithium-ion batteries and power electronics.
- **Axion Power International (Start-up Manufacturer of Lead-Carbon Batteries)** **2012-15**
Senior Vice President, Business Development & Sales
 - Led business development, sales, and marketing efforts for grid energy storage, controls and analytics systems, company's IPO, capital raises from PE and venture capital firms.
 - Developed revenue and cash flow models for large-scale energy storage arbitrage projects in different ISO/RTO territories, including integration with renewable energy sources.

- **Ener1 (Lithium Ion Battery Manufacturer), Indianapolis, IN** **2010-12**
Vice President, Business Development & Sales
(EV/Hybrid Transportation, Renewables, & Smart Grid Networks)
- Directed business development and sales for lithium-ion battery systems in electric vehicles (EV), hybrid electric vehicles (HEV), and utility-scale energy storage projects.
- Managed relationships with major automakers and utility companies.
- **Remy International - Global Manufacturer of EV Motor/Generators, Starter Motors & Alternators (Anderson, IN)** **1994-2010**
Global Director - EV/Hybrid & Traction Motor Sales and Business Development **2008-10**
Global Director - Heavy Duty Sales & Marketing (Daimler, Volvo & PACCAR) **2003-08**
Global Director - Automotive Motor/Generator Sales & Marketing **2000-03**
Director - International Sales, Engineering & Operations **1994-2000**
- **Delco Remy (Division of General Motors)** **1991-94**
Operations Director
- **General Motors Truck & Bus** **1989-91**
Chief Resident Electrical Engineer
- **Delco Remy (Division of General Motors)** **1984-89**
Senior Product Manager **1987-89**
Test & Development Engineer **1984-87**
- **U.S. Navy & Reserves** **1982-91**
Lieutenant (Junior Grade)
- **Vanderbilt University, Nashville, TN** **1979-82**
Civilian Researcher
- **Tata Iron & Steel, Jamshedpur, India** **1978**
Summer Intern
- **Kolar Gold Fields, Kolar, India** **1977**
Summer Intern

EDUCATION

- **MBA - 1988 (Finance & International Business), Indiana University, USA**
- **MS - 1982 (Mechanical Engineering), Vanderbilt University, USA**
- **B.Tech - 1979 (Metallurgical Engineering), Indian Institute of Technology (IIT-BHU), India**
- **Churchill Scholar - Trinity College, University of Cambridge, UK**

CERTIFICATIONS & CONTINUING EDUCATION

- **APQP Quality Engineering Certification - GM Quality Institute, Kettering University**
- **Mercosur/NAFTA and Eurozone Certifications - Indiana University & Purdue University**
- **Continuing education in Contracts, Corporate Taxation, and Export/Import Classifications, Wharton School of Business**

VOLUNTEER EXPERIENCE

- **Board Member – Chirala(my native place in India) Medical & Educational Trust** **2018-Present**

- **Advisor & Primary Benefactor** - Our Children Our Planet (501c3) **2016-Present**
- **Organic/Non-GMO Farmer** - promoting sustainable farming practices through an agricultural cooperative **2014-Present**
- **Board Member** - Thrive Solar Private Ltd. **2016**
- **Guest Lecturer** - Indiana University, Harvard University, Purdue University & other institutions
- **Board Member** - YMCA of Madison County, IN **2003-2008**

Appendix B

Materials Considered

- Ascend Element, Inc.’s Petition for Post-Grant Review (PGR2025-00037), including all materials attached thereto.
- The Deposition of Volker Spies, taken June 13, 2025.
- The Depositions of Walter van Schalkwijk, taken February 6, 2025 and June 6, 2025
- U.S. Published Patent Application No. 2008/0050295 to Uchida.
- Dictionary definitions of “comminution,” as referenced herein.
- Ascend Elements, Inc.’s Initial Invalidity Contentions in *Duesenfeld GmbH v. Ascend Elements, Inc.*, Case No. 23-1194-JFM (D. Del.).
- Petition for *Inter Partes* Review by Ascend Elements, Inc., Case No. IPR2024-00948.
- Petitioner’s Reply to Patent Owner’s Response by Ascend Elements, Inc., Case No. IPR2024-00948, and accompanying exhibits.
- Joint Claim Construction Chart in *Duesenfeld GmbH v. Ascend Elements, Inc.*, Case No. 23-1194-JFM (D. Del.)
- PTAB Preliminary Guidance on Patent Owner’s Motion to Amend, Case No. IPR2024-00948

Any other materials referenced in my Declaration.