UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ZHUHAI COSMX BATTERY CO., LTD.,
Petitioner

v.

NINGDE AMPEREX TECHNOLOGY LIMITED,
Patent Owner

Case IPR2026-00408
U.S. Patent No. 11,699,808 B2

DECLARATION OF ULRICH VON SACKEN, PH.D. IN SUPPORT OF PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 11,699,808

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I. INTRODUCTION

1. I, Ulrich von Sacken, have been retained on behalf of Zhuhai CosMX Battery Co., Ltd ("Petitioner" or "CosMX") to provide an analysis of U.S. Patent No. 11,699,808 ("the '808 patent"). I understand that Petitioner is requesting that the Patent Trial and Appeal Board ("PTAB" or "Board") institute an *inter partes* review ("IPR") proceeding of the '808 patent.

2. I have been asked to provide my independent analysis of the '808 patent in light of the prior art publications cited below.

3. I am not, and never have been, an employee of Petitioner. I received no compensation for this declaration beyond my normal hourly compensation based on my time actually spent analyzing this patent, the prior art publications cited below, and the issues related thereto, and I will not receive any added compensation based on the outcome of any IPR or other proceeding involving these patents.

II. MY PROFESSIONAL EXPERIENCE AND QUALIFICATIONS

4. A copy of my curriculum vitae ("CV") is submitted with this declaration as Exhibit 1004. As my CV indicates, I am an Expert Consultant residing in Sidney, British Columbia, Canada.

5. I have a B.Sc. (Hon) in Physics and an M.Sc. in Physics from the University of British Columbia. I also received a Ph.D. in Physics from the

University of Waterloo in 1985.

6. Since earning my PhD, I have had over 35 years of professional experience in the areas of design, manufacture, testing, and failure analysis of lithium-ion batteries.

7. Between 1987 and 2007, I was employed at E-One Moli Energy Canada and its predecessor companies. E-One Moli was a world leading manufacturer and developer of lithium-ion batteries. E-One Moli pioneered the development of lithium-ion technology and owned various patents and trade secrets related to cell production processes, alternative technologies, cell design, and the advancement of energy and power density of lithium-ion battery technology. During my time at E-One Moli, I rose to the position of General Manager of Research & Development and oversaw the commercialization of advanced lithium-ion cell designs, including the first manganese (Mn) oxide spinel power cells specifically designed for cordless power tools.

8. Between 2007 and 2013, I was VP of R&D at BAK Battery Canada. During my time at BAK, I was involved with many aspects of BAK's Li-ion cell manufacturing in China, particularly product quality, reliability and safety issues for cylindrical, prismatic, and polymer cells.

9. At both Moli and BAK, I led numerous battery failure investigations. The types of failures ranged from relatively benign issues such as self-discharge to

serious incidents such as fires involving multi-cell packs. I have been involved in more than 150 failure analysis investigations including dozens of a serious nature. I am familiar with various battery safety mechanisms, including the use of insulating tapes and adhesives integrated into the structure of a battery cell to prevent issues such as internal shorts and lithium plating. I have analyzed battery cell designs including such safety mechanisms to assess their impact on improving the reliability and safety of the battery cells.

10. Since 2013, I have been working as a consultant, providing analysis and advice regarding Lithium and Li-ion batteries to my clients, particularly on issues relating to failure analysis and cell design.

11. I am a named inventor on more than 13 patents and have authored more than 12 publications.

Granted Patents:

- J.S. Xue, A.M. Wilson, J.R. Dahn, Y. Liu, U. von Sacken, Qiming Zhong, Tao Zheng, "Pre-graphitic carbonaceous insertion compounds and use as anodes in rechargeable batteries," U.S. Patent No. 6,316,144 (granted Nov. 13, 2001).
- Tatsuji Numata, Junji Tabuchi, Yuichi Kumeuchi, Atsushi Ochi, Ulrich von Sacken, Zoon Kuimii, "Positive Electrode Active Material for Organic Electrolyte Secondary Battery," JP3363007 (granted Oct.

25, 2002).

- Yu Wang, Meiji Zhang, Ulrich von Sacken, Brian Way, "Additives for improving cycle life of non-aqueous rechargeable lithium batteries," U.S. Patent No. 6,045,948 (granted Apr. 4, 2000); EP0903798 (granted Oct. 17, 2001); JP11149943 (granted June 2, 1999); CA2215756 (granted Apr. 4, 2006).
- Huanyu Mao and Ulrich von Sacken, "Aromatic monomer gassing agents for protecting non-aqueous lithium batteries against overcharge," U.S. Patent No. 6,033,797 (granted Mar. 7, 2000); U.S. Patent No. 5,776,627 (granted July 7, 1998); JP3061759 (granted Apr. 28, 2000); EP0776058 (granted Aug. 29, 2001).
- Huanyu Mao, Ulrich von Sacken, Jan Reimers, "Additives for improving cycle life of non-aqueous rechargeable lithium batteries," U.S. Patent No. 5,891,592 (granted Apr. 6, 1999); JP10223258 (granted Aug. 21, 1998); EP0856901 (granted May 15, 2002).
- Qiming Zhong, Ulrich von Sacken, Jan Reimers, "Method of Reducing the Surface Area of Carbonaceous Powders," JP10059703 (granted Mar. 3, 1998); CA2176452 (granted Dec. 2, 2008).
- Qiming Zhong and Ulrich von Sacken, "Use of P2O5 in non-aqueous rechargeable lithium batteries," U.S. Patent No. 5,789,105 (granted

Aug. 4, 1998); CA2150877 (granted Apr. 16, 2002).

- Ulrich von Sacken, Wendy Chow, Allen Shkuratoff, "Battery with improved safety during mechanical abuse," U.S. Patent No. 5,747,188 (granted May 5, 1998).
- U. von Sacken, Q. Zhong, Yuan Gao and J.R. Dahn, "Methods for Preparing Li1+xMn2-xO4 with Improved High Temperature Electrochemical Performance," CA 2164385 (granted June 13, 2000); U.S. Patent No. 5,700,597 (granted Dec. 23, 1997).
- Qiming Zhong and Ulrich von Sacken, "Low viscosity electrolyte comprising P2O5 for use in non-aqueous rechargeable lithium batteries," U.S. Patent No. 5,650,245 (granted July 22, 1997).
- J.R. Dahn, U. von Sacken and R. Fong, "Lithiated Nickel Dioxide and Secondary Cells Prepared Therefrom," U.S. Patent No. 5,264,201 (granted Nov. 23, 1993); CA2038631A (filed March 19, 1991); Filed in Japan, May 20, (1991), Hei-3-145,396; EP0468942 (granted Dec. 1, 1999); EP0702421 (granted Dec. 16, 1998).
- Ulrich von Sacken, "Hydrides of lithiated nickel dioxide and secondary cells prepared therefrom," U.S. Patent No. 5,180,574 (granted Jan. 19, 1993).
- U. von Sacken, T. Van Buuren and J.R. Dahn, "VO2(B) Metastable

Phase Cells and Process," U.S. Patent No. 4,965,150, (granted Oct. 23 1990).

Publications:

- Qiming Zhong and U von Sacken, "Crystal structures and electrochemical properties of LiAlyNi1−yO2 solid solution" Journal of Power Sources, **54**, 221-223 (1995)
- U. von Sacken, E. Nodwell, A. Sundher and J.R. Dahn, Comparative Thermal Stability of Carbon Intercalation Anodes and Lithium Metal Anodes for Rechargeable Lithium Batteries, Journal of Power Sources, **54**, 240-245 (1995).
- Tao Zheng, Yinghu Liu, E.W. Fuller, Sheilla Tseng, U. von Sacken and J.R. Dahn,
- Lithium Insertion in High Capacity Carbonaceous Materials, J. Electrochem. Soc., **142**, 2581-2590 (1995).
- U. von Sacken, E. Nodwell, A. Sundher and J.R. Dahn, Comparative Thermal Stability of Carbon Intercalation Anodes and Lithium Metal Anodes for Rechargeable Lithium Batteries, Solid State Ionics, **69**, 284-290 (1994).
- J.R. Dahn, E.W. Fuller, M. Obrovac, U. von Sacken, Thermal Stability of LixCoO2, LixNiO2 and λ-MnO2 and Consequences for

the Safety of Li-ion cells, Solid State Ionics, **69**, 265-270 (1994).

- J.R. Dahn, A.K. Sleigh, Hang Shi, J.N. Reimers, B.M. Way, Q. Zhong, U. Von Sacken, Carbons and Graphites as Substitutes for the Lithium Anode, in Lithium Batteries; New Materials, New Perspectives, ed. by G. Pistoia, Elsevier - North Holland, Dec. pp. 1-47 (1993).
- J.N. Reimers, J.R. Dahn and U. Von Sacken, Effect of Impurities on the Electrochemical Properties of LiCoO2, J. Electrochem. Soc., **140**, 2752-2754 (1993).
- J.N. Reimers, J.R. Dahn, J.E. Greedan, C.V. Stager, G. Liu, I. Davidson and U. von Sacken, Spin-Glass Behaviour in the Frustrated Antiferromagnet LiNiO2. J. Solid State Chemistry, **102**, 542 (1993).
- J.R. Dahn, U. von Sacken, H. Al Janaby and M.W. Juzkow, Rechargeable LiNiO2/Carbon Cells, J. Electrochem. Soc., **138**, 2207 (1991).
- I. Davidson, J.E. Greedan, U. von Sacken, C.A. Michael and J.R. Dahn, Structure of 1TLi2NiO2 from Powder Neutron Diffraction, Solid State Ionics, **46**, 243-247 (1991).
- J.R. Dahn, U. von Sacken and C.A. Michael, Structure and Electrochemistry of Li1+yNiO2 and a New Li2NiO2 Phase with the

Ni(OH)2 Structure, Solid State Ionics, **44**, 87-97 (1990).

- Rosamaria Fong, U. von Sacken and J.R. Dahn, Studies of Li Intercalation into Carbons Using Non-Aqueous Electrochemical Cells, J. Electrochem. Soc., **137**, 2009-2013 (1990).
- U. von Sacken and J.R. Dahn, TGA/MS Studies of the Thermal Decomposition of NH4VO3, J. Power Sources, **26**, 461-465 (1989).

III. LEGAL PRINCIPLES

12. In forming my analysis and conclusions expressed in this declaration, I have applied the legal principles described in the following paragraphs, which were provided to me by counsel for Petitioner.

13. I have been informed that prior art is that which was known or used by others in the U.S., or was patented or published anywhere, before the Applicant's invention. I further have been informed that prior art includes that which was patented or published anywhere, or was in public use, on sale, or offered for sale in this country, more than one year prior to the filing date of the patent application (critical date). I have also been informed that prior art includes that which was described in a U.S. patent granted on an application for a patent (or in a published application for a U.S. patent) that was effectively filed by another in the U.S. before the date of invention for such a claim.

A. Obviousness

14. I have been informed that a patent claim is invalid as "obvious" in light of one or more prior art references if it would have been obvious to a person of ordinary skill in the art at the time of the alleged invention ("POSA"), taking into account (1) the scope and content of the prior art, (2) the differences between the prior art and the claims, (3) the level of ordinary skill in the art, and (4) any so called "secondary considerations" of non-obviousness, which include: (i) "long felt need" for the claimed invention, (ii) commercial success attributable to the claimed invention, (iii) unexpected results of the claimed invention, and (iv) "copying" of the claimed invention by others.

15. I understand that a patent cannot be properly granted for subject matter that would have been obvious to a POSA at the time of the alleged invention, and that a patent claim directed to such obvious subject matter is invalid under 35 U.S.C. § 103. It is also my understanding that in assessing the obviousness of claimed subject matter one should evaluate obviousness over the prior art from the perspective of a POSA at the time the invention was made (and not from the perspective of either a layman or a genius in that art).

16. I have been informed that a claim can be obvious in light of a single prior art reference or multiple prior art references.

17. A patent can be obvious in light of a single prior-art reference if it

would have been obvious to modify that reference to arrive at the patented invention. To be obvious in light of a single prior art reference or multiple prior art references, there must be a reason that would have prompted a POSA to modify the single prior art reference, or combine two or more references, in a manner that provides the elements of the claimed invention. This reason may come from a motivation to combine, or may come from the reference(s) themselves, the knowledge and "common sense" of a POSA, or from the nature of the problem to be solved, and this reason may be explicit or implicit from the prior art as a whole. I have been informed that, under the law, the combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results. In addition, I have been told the inferences and creative steps a POSA would employ are also relevant to the determination of obviousness. I also understand it is improper to rely on hindsight in making the obviousness determination.

18. In determining whether a prior art reference would have been combined with another prior art reference or other information known to a POSA, I have been told that the following principles may be considered:

- A combination of familiar elements according to known methods is likely to be obvious if it yields predictable results;
- The simple substitution of one known element for another is likely to

be obvious if it yields predictable results;

- The use of a known technique to improve similar devices, products, or methods in the same way is likely to be obvious if it yields predictable results;
- The application of a known technique to a prior art reference that is ready for improvement is likely obvious if it yields predictable results;
- Any need or problem known in the field and addressed by the reference can provide a reason for combining the elements in the manner claimed;
- A skilled artisan often will be able to fit the teachings of multiple references together like a puzzle; and
- The proper analysis of obviousness requires a determination of whether a POSA would have a "reasonable expectation of success"—not "absolute predictability" of success—in achieving the claimed invention by combining prior art references.

19. I understand that a dependent claim contains all of the limitations of the independent claim from which it depends. Thus, to establish unpatentability, every limitation set forth in a dependent claim as well as the independent claim from which it depends must be found in the prior art or be obvious from the prior art.

B. Claim Construction

20. I understand that, for purposes of my analysis in this *inter partes* review proceeding, the terms appearing in the patent claims should be interpreted according to their "ordinary and customary meaning." In determining the ordinary and customary meaning, the words of a claim are first given the plain meaning that those words would have had to a POSA. I understand that the structure of the claims, the specification, and the file history also may be used to construe a claim insofar as the plain meaning of the claims cannot be understood. Moreover, treatises and dictionaries may be used, albeit under limited circumstances, to determine the meaning attributed by a person of ordinary skill in the art to a claim term at the time of filing. I have followed this approach in my analysis and provide additional discussion in Section VIII.D., below.

21. I also understand that the words of the claims should be interpreted as they would have been interpreted by a POSA at the time the alleged invention was made (not today).

IV. MATERIALS CONSIDERED AND BASIS OF OPINIONS

22. My opinions are based on more than 40 years of working with battery systems, components and reliability. My opinions are also based on investigation and study of the relevant materials, including the patent at issue and its file history, and the prior art. In the course of forming my opinions I have reviewed the

following exhibits of record and any other materials referenced herein:

Exhibit #	Description
1001	U.S. Patent No. 11,699,808 B2 to Tao ("the '808 patent")
1002	Prosecution File History of U.S. Patent No. 11,699,808 B2 ("'808 File History")
1005	Korean Patent No. 10-0591439 B1 to Kim
1006	Japanese Patent App. Pub. No. 2001-250515 to Ueda
1007	U.S. Patent App. Pub. No. 2020/0111999 to Kim
1008	U.S. Patent App. Pub. No. 2014/0017556 to Liu
1009	Chinese Patent Pub. No. 205122651 U to Duan
1010	Japanese Patent App. Pub. No. JP2002-25512 to Arai
1011	U.S. Patent No. 9,350,041 B2 to Chen
1012	U.S. Patent App. Pub. No. 2009/0023058 to Kim
1013	U.S. Patent App. Pub. No. 2007/0264535 to Lee
1014	U.S. Patent No. 6,482,544 B1 to Shiota
1015	U.S. Patent No. 9,178,194 B2 to Park
1016	U.S. Patent App. Pub. No. 2014/0065474 to Werner
1017	U.S. Patent No. 9,379,371 B2 to Ahn
1018	U.S. Patent App. Pub. No. 2016/0087252 to Hong
1019	U.S. Patent No. 9,853,259 B2 to Lee
1020	U.S. Patent App. Pub. No. 2015/0364729 to Jang
1021	Korean App. No. 10-2016-0174845 to Kim
1022	Complaint filed in *Ningde Amperex Technology Ltd. V. Zhuhai CosMX Battery Co., Ltd.*, Case No. 2:26-cv-00139 (E.D. Tex.)

Exhibit #	Description
1023	Infringement Chart, Exhibit 14, filed *Ningde Amperex Technology Ltd. V. Zhuhai CosMX Battery Co., Ltd.*, Case No. 2:26-cv-00139 (E.D. Tex.)
1024	U.S. Patent No. 8,790,817 B2 to Hong

23. I confirm that to the best of my knowledge the accompanying exhibits are true and accurate copies of what they purport to be, and that an expert in the field would reasonably rely on them to formulate opinions such as those set forth in this Declaration.

24. I may rely upon these materials and/or additional materials to rebut arguments raised by the patent owner. Further, I may also consider additional documents and information in forming any necessary opinions – including documents that may not yet have been provided to me.

25. My analysis of the materials relevant to this proceeding is ongoing and I will continue to review any new material as it is provided. This report presents only those opinions I have formed to date. I reserve the right to revise, supplement, and/or amend my opinions stated herein based on new information and on my continuing analysis of the materials already provided.

26. In my opinion, claims 1-27 of the ’808 patent are unpatentable as obvious in view of the prior art. The following table summarizes the grounds that are detailed below that I believe show unpatentability.

Ground	Prior Art Combination	Claims
1	Kim-439, Ueda	1-18, 20, 23, 24, 25, 27
2	Kim-439, Ueda, Kim-999	19, 21, 22, 26

V. DESCRIPTION OF THE RELEVANT FIELD AND A PERSON OF ORDINARY SKILL IN THE RELEVANT FIELD (ART)

27. In my opinion, "a person of ordinary skill in the relevant field" is a hypothetical person to whom an expert in the relevant field could assign a routine task with reasonable confidence that the task would be successfully carried out. I have been informed that evidence of the level of ordinary skill in the art can be determined based on information about the field including: the types of problems encountered, known solutions, the speed of innovation, sophistication, and the educational level of active workers. I have considered these types of information along with my own educational and industry background in the field to reach my conclusion.

28. I have been advised that a person of ordinary skill in the "relevant field" (art), (a POSA), must be able to make and use the claimed invention based on the information disclosed in the specification of the patent. Accordingly, where information is required to make and use the claimed invention but has not been expressly disclosed in the specification, the patentee effectively acknowledges that such information should be considered to be within the knowledge of the

hypothetical POSA. Whether I use the acronym POSA or not, all of my opinions throughout this declaration are based on the understanding of a POSA at the time of the effective filing date of the '808 patent.

29. Based on my analysis of the '808 patent, it is my opinion that a POSA at the date attributed to the invention would have had a Bachelor's Degree in Physics or an Engineering field relevant to battery technology (e.g., an Electrical Engineering degree or Mechanical Engineering degree) and at least two years of industry experience in battery manufacturing and/or design. Based on my educational background and industry experience, I qualify as at least a POSA at the time of the alleged invention of the patents. And, based on my experience, I have an understanding of the capabilities of a person of ordinary skill in the relevant field. I have supervised, directed, and instructed many such persons over the course of my career.

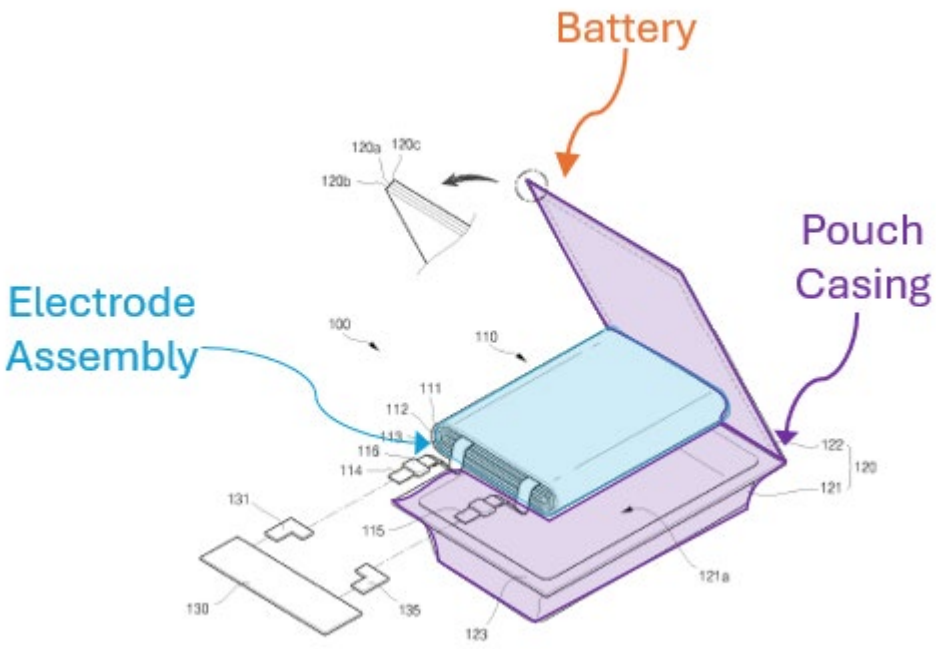
VI. THE DATE OF THE PATENT

30. The '808 patent was filed on July 13, 2021, as a continuation of U.S. Patent Application No. 16/166,142, filed on October 21, 2018, which claims priority to Chinese Application No. 201721567327.2, filed on November 17, 2017. For purposes of my analysis here, I have been advised by counsel to assume a date of November 17, 2017, as the date governing my obviousness analysis.

VII. BACKGROUND OF CONVENTIONAL POUCH-TYPE BATTERY TECHNOLOGY

A. Encapsulating electrode assemblies in pouch-type packages was common practice to provide thin, light-weight batteries.

31. Years before the earliest possible priority date of the '808 patent, manufacturers routinely produced "pouch-shaped secondary batteries" designed to be "thin enough to be applied to products, such as mobile phones." EX1018, ¶[0002]; *see also* EX1005, p. 2; EX1007, ¶¶[0003]-[0004]. The industry demonstrated sustained "interest" in these pouch-shaped batteries due to their "low manufacturing costs, light weight, easy modification in shape, etc." EX1018, ¶[0004]; *see also* EX1010, ¶[0002]. These benefits made pouch-type batteries particularly attractive for portable electronics, where space constraints and weight reduction were critical design considerations. EX1005, p. 2; EX1013, ¶[0004] ("recent trend toward the miniaturization of mobile devices has been increasing the demand of the prismatic battery or the pouch-shaped battery, which has small thickness."); EX1018, ¶[0002].

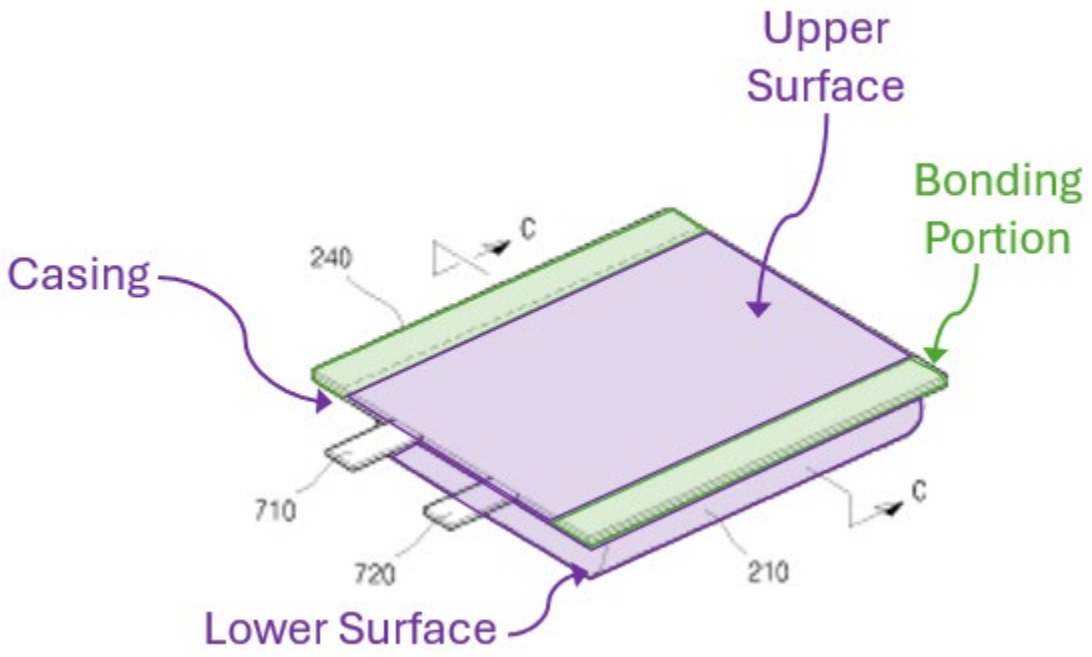


EX1005, FIG. 1a (annotated).

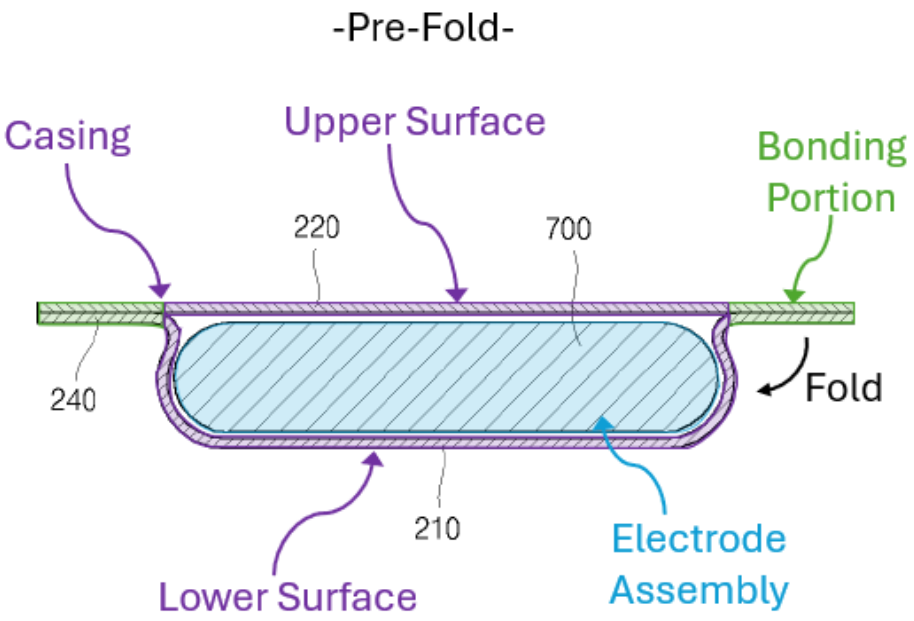
32. Conventional lithium-ion pouch-type batteries include "an electrode assembly and an electrolyte" that are "included in a pouch-shaped case," also known as a package, "made of a laminate sheet comprising a resin layer and a metal layer in a sealed state." EX1013, ¶[0005]; EX1006, ¶[0002]; EX1007, ¶[0004]. The types of electrode assemblies typically housed in the packages include "a jelly-roll (winding) type electrode assembly or a stacking type electrode assembly." EX1013, ¶[0005]; *see also* EX1012, ¶[0006].

33. The process of forming a pouch-type battery package was likewise well known. EX1005, pp. 3-5. As shown in Figures 4a-b and 5c of Kim-439, reproduced below, the pouch-shaped packages are formed by spatially separating opposing upper and lower laminate sheets to define a "space for accommodating

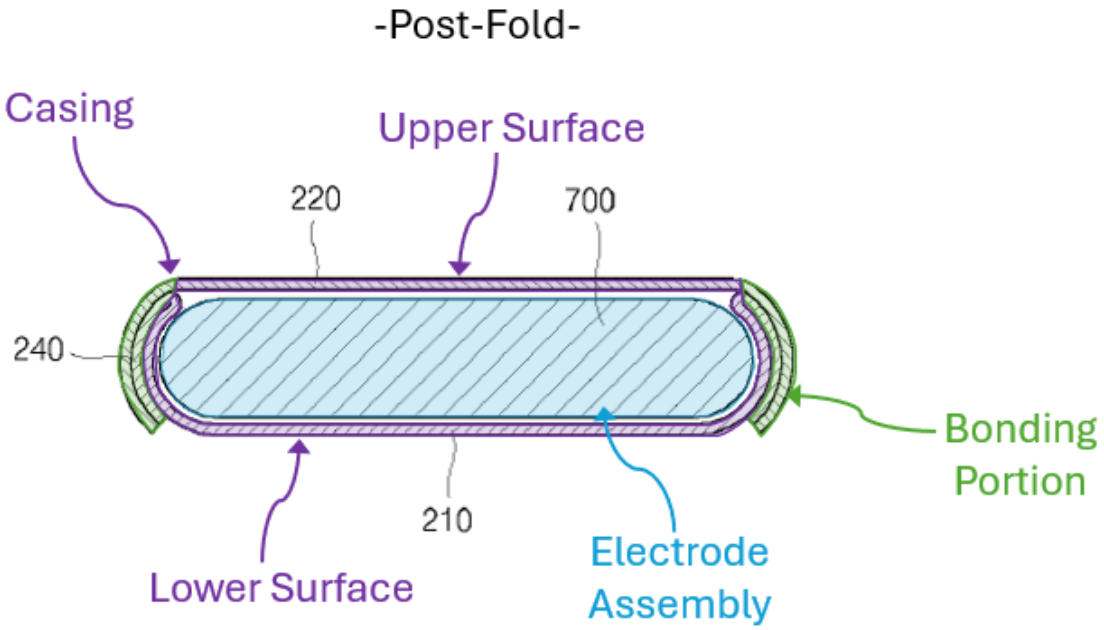
the electrode assembly." EX1005, p. 3. The opposing laminate sheets (e.g., upper and lower surfaces) of the package are brought together around the periphery of the electrode assembly and sealed along their peripheral edges to encapsulate the electrode body. EX1005, p. 3; *see also* EX1005, pp. 4-5. The sealed portions of the opposing sheets, also referred to as a flange, a bonding portion, or a second part, are folded over the side of the package to "reduce the width occupied by the side seals." EX1009, ¶[0002].



EX1005, FIG. 4b (annotated).



EX1005, FIG. 4a (annotated).



EX1005, FIG. 5b (annotated).

34. The sides of the packaging were often formed with curved geometries. EX1005, pp. 3-5. These curved sidewalls were designed to correspond to the shape

of the enclosed electrode assembly, which often included rounded edges due to its wound structure. EX1005, pp. 3-5. Forming the pouch package with outwardly rounded sides, such as through molding or pressing operations disclosed in Kim-439, allowed the package to conform closely to the electrode assembly, thereby minimizing unused internal space. EX1005, p. 5. This reduction in internal void space directly improved volumetric energy density by ensuring that more of the package volume was occupied by active battery components. EX1005, pp. 3-5.

35. It was also common practice to curve the second part of the package via "a rounding process" for a number of reasons. EX1012, ¶[0052]; *see also* EX1005, p. 5; EX1013, ¶¶[0012]-[0013]. First, the curved shape of the second part "absorb[s] additional impact energy" compared to extending the second part in an upright position. EX1012, ¶[0052]; EX1014, 5:43-55 (describing that "seal portion 16 is curled toward the electrode assembly receiving portion 10 to form a cylindrical shape," providing the "advantage[] … that the crack occurrence in the metal layer is reduced"). Second, shaping the second part into a curve that corresponds to a curved side of the package minimizes the second part from protruding away from the package, thereby reducing the battery footprint. EX1012, ¶[0052]; *see also* EX1013, ¶¶[0012]-[0013], [0068]; EX1019, 6:17-26, 7:29-52. Third, curving the second part also improves overall volumetric efficiency by conforming the battery exterior to complementary curved housings or internal

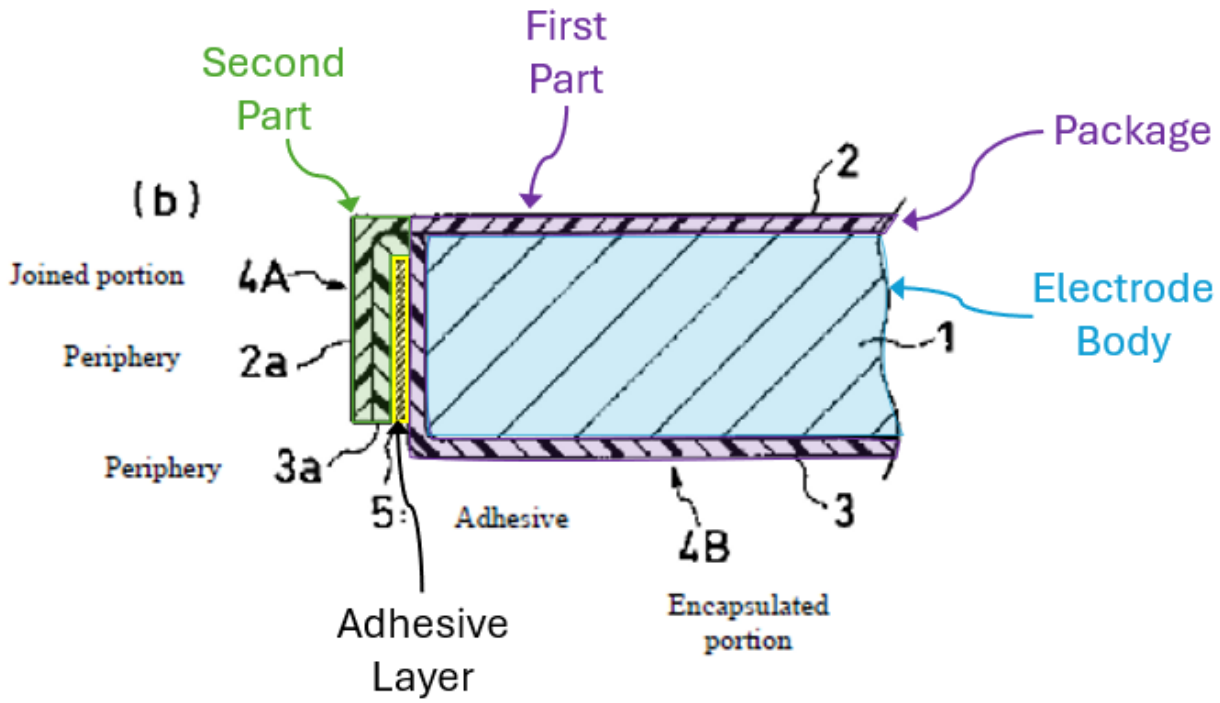
geometries, thereby reducing unused space and increasing effective capacity or packing density. EX1005, 5; EX1013, ¶¶[0040]-[0042]; EX1016, ¶¶[0002], [0021].

B. Adhering the flange of the package to its side face was a common technique to improve the structural integrity of the battery.

36. Despite the benefits of pouch-type packaging, conventional designs exhibited certain mechanical limitations. In particular, the flexible laminate materials used for the casing could allow deformation of the sidewalls or separation of the flange during handling or operation. EX1006, ¶[0006]; EX1012, ¶[0008]; EX1016, ¶[0030]. For example, Ueda teaches that the "low" rigidity of the package's side surfaces created "a risk that the side surfaces may deform" when "external force is applied to the side surfaces," thereby "causing a short circuit between the positive electrode and the negative electrode." EX1006, ¶[0004]. As another example, the elasticity of polymer or resin layers in the package's laminate sheets can "provide a restoring bias to [the] metal core layer" of the package's laminate sheets such that the second part "tend[s] to migrate from a substantially vertical or perpendicular orientation to a more horizontal or parallel orientation, as defined with respect to [the] major surfaces" of the packaging. EX1016, ¶[0030]; *see also* EX1015, 4:8-45.

37. A common technique for overcoming these problems of package deformation or separation of the package's second part was applying an adhesive layer between the casing's side face and the flange. EX1006, ¶¶[0018], [0081];

EX1007, ¶[0063]; EX1008, ¶¶[0004], [0022]; EX1009, ¶¶[0005], [0013], [0018]-[0019], [0040], [0046]; EX1011, 1:25-35; EX1016, ¶[0031]; EX1017, 7:8-11; EX1018, ¶¶[0016], [0060]. For example, both Ueda and Kim-999, disclose applying an adhesive layer between a folded flange (second part) and the package's side surface to secure the two structures together, thereby preventing fluttering, bending, or separation of the flange and improving structural integrity of the battery package. EX1006, ¶¶[0006]-[0008], [0015], [0081]; EX1007, ¶¶[0057]-[0068]. It was well known that applying an adhesive layer between the package's second part and side face improves sealing reliability to prevent leakage of the electrolyte and maintains the compactness of the battery to improve volume energy density of the battery. EX1008, ¶¶[0004], [0022]; EX1009, ¶¶[0005], [0013], [0018]-[0019], [0040], [0046]; EX1016, ¶[0013]; EX1017, 6:66-7:3; EX1018, ¶¶[0016], [0060]; EX1019, 3:65-4:5, 6:5-26, 7:36-48.



EX1006, FIG. 1b (annotated).

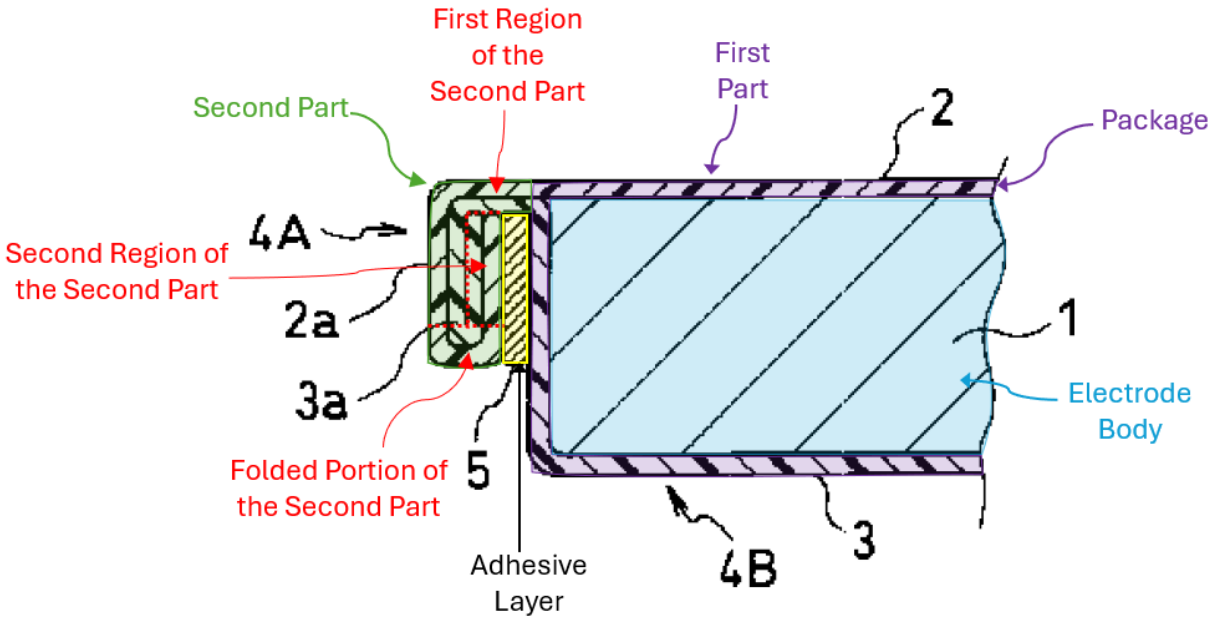
38. The prior art further recognized that the amount of adhesive applied per unit length or area should be controlled to adjust both the placement and extent of adhesive to achieve adequate bonding while avoiding unnecessary bulk or separation between the second part and the case. EX1007, ¶[0065]. For example, Kim-999 teaches that adhesive 30 "may be injected between the entire height of the folding part 23 and ½ or more of the entire height of the folding part 23," thereby identifying a controllable range for how much adhesive is applied and where it is positioned. EX1007, ¶[0065]. Chen likewise teaches that "[e]xcessive glue volume will cause the risk of glue overflow, while inadequate glue volume will cause the risk of unfolding due to the insecure bonding between the secondarily folded edge and the battery cell body." EX1011, 1:32-35. Duan further

teaches to "regulate the amount of glue" applied between the second part and the side face of the package to maintain a compact battery footprint. EX1009, ¶[0030]. Accordingly, a skilled artisan would have understood that adhesive amount is a result-effective variable that must be deliberately controlled—both in volume and placement—to balance sufficient bonding strength against minimizing excess material and preventing defects.

C. Inwardly folding the package's flange was well known to improve the battery's sealing reliability and minimize the battery's footprint.

39. Additionally, the prior art recognized that folding the casing's flange inward provided further benefits. EX1006, ¶¶[0013], [0023], [0030]; EX1007, ¶¶[0052]-[0056]; EX1009, ¶¶[0013], [0040]; EX1011, 6:4-6:57; EX1014, 3:26-31; EX1020, ¶¶[0013], [0043]-[0056]. For example, Ueda teaches that interposing the leading edge of the second part between second part's first region and the package's side face shields the leading edge from external contact and moisture to preserve the seal at package's boundary. EX1006, ¶¶[0013] (describing that when "the leading edge of the joined tab portion is interposed between the joined tab portion and the encapsulated portion ... the leading edge of the joined tab portion is isolated from the outside air, and intrusion of moisture, air or the like through the leading edge."), [0023] ("the intrusion [of] moisture and air from the joined tab portion can be more effectively prevented"), [0030] ("intrusion of moisture or the

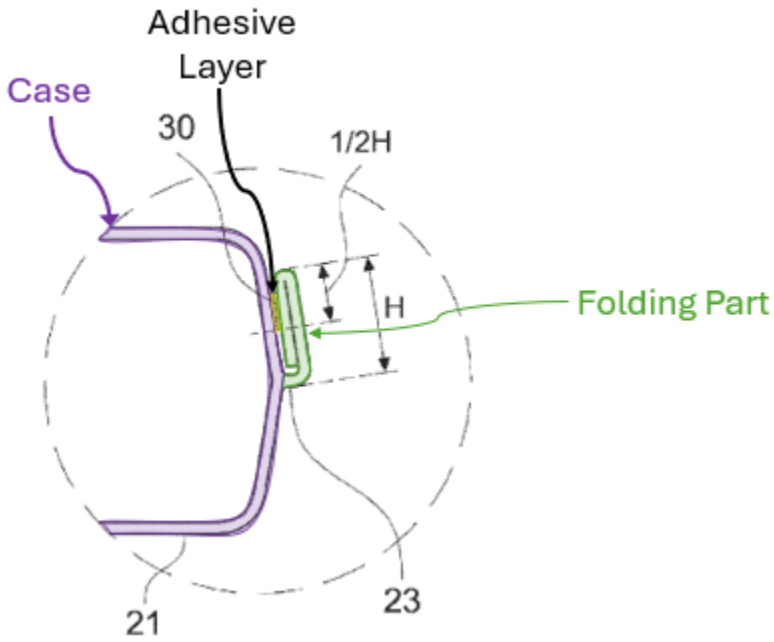
like into the bonding interface of the peripheral portions 2a and 3a from the leading edge of the joined tab portion 4A is more reliably prevented"). Thus, multi-fold arrangements improve sealing reliability by increasing contact area between the flange and casing and reducing susceptibility to deformation.



EX1006, FIG. 2 (annotated).

40. Moreover, folding the flange inwardly allows protruding sealing portions to be repositioned along the side surface of the casing, thereby reducing the overall volumetric footprint of the battery. EX1020, ¶¶[0043]-[0056] (recognizing that the height of the folded portion can be adjusted to provide "stable positioning" and avoid "excessively large thickness"). For example, Kim-999 teaches adjusting the height of the folding part 23 to be "smaller than the thickness of the electrode assembly 11" so that the second fold of folding part 23 does not

protrude above the first surface of the package. EX1007, ¶[0055]-[0056]. Doing so "prevent[s] an unnecessary space from being formed between the adjacent secondary batteries by the folding part 23 when assembling the secondary battery module." EX1007, ¶[0056].



EX1007, FIG. 4 (annotated).

VIII. THE '808 PATENT

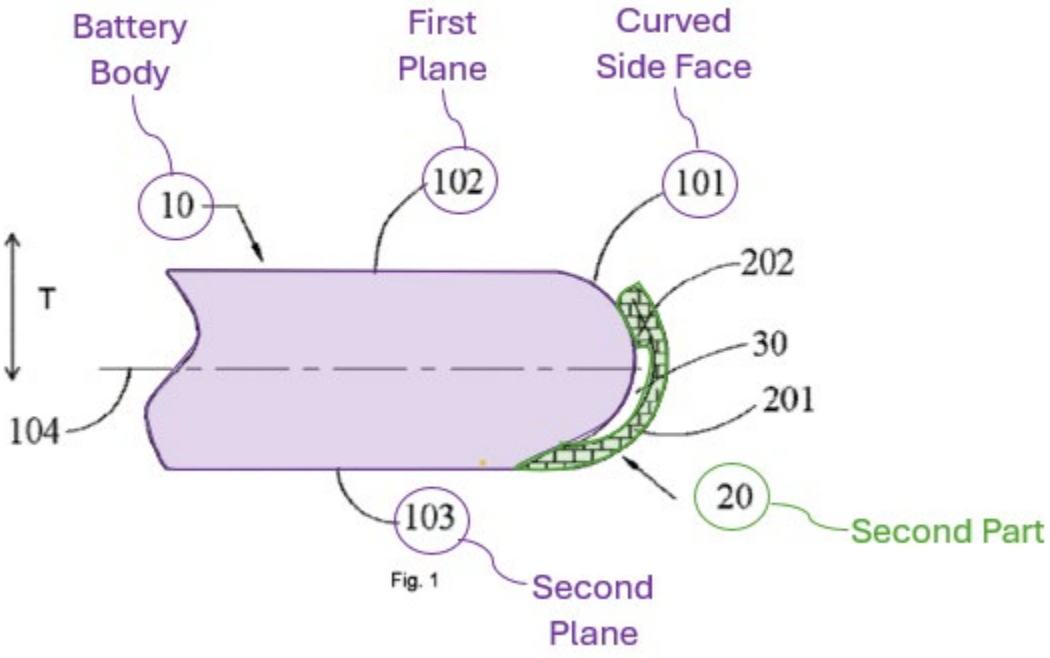
A. Summary of the '808 patent

41. The '808 patent was filed as Application No. 17/374,803 on July 13, 2021. The '808 patent is a continuation in a chain of patents that claim priority to Chinese App. No. 201721567327.2. EX1001, cover (63). In particular, the '808 patent is a continuation of U.S. Patent Application No. 16/166,142, filed on October 21, 2018, which claims priority to Chinese Application No.

201721567327.2, filed on November 17, 2017. EX1001, 1:7-11.

42. The ’808 patent is titled “Battery” and lists Bollin Zhou as the sole inventor. EX1001, cover (54), (72).

43. The claims of the ’808 patent are directed to batteries. EX1001, 5:56-8:17. The ’808 patent discloses a “battery [that] includes a battery body 10” and “a bare battery [that] is wrapped in the battery body 10.” EX1001, 1:57-58. Given that the battery body 10 wraps around the bare battery, a POSA would have understood that battery body 10 in the specification is an example of the claimed “package” covering the “electrode body.” This is because battery body 10 serves as an enclosure rather than the active electrode body structure itself (the “bare battery” mentioned in the ’808 patent’s specification).

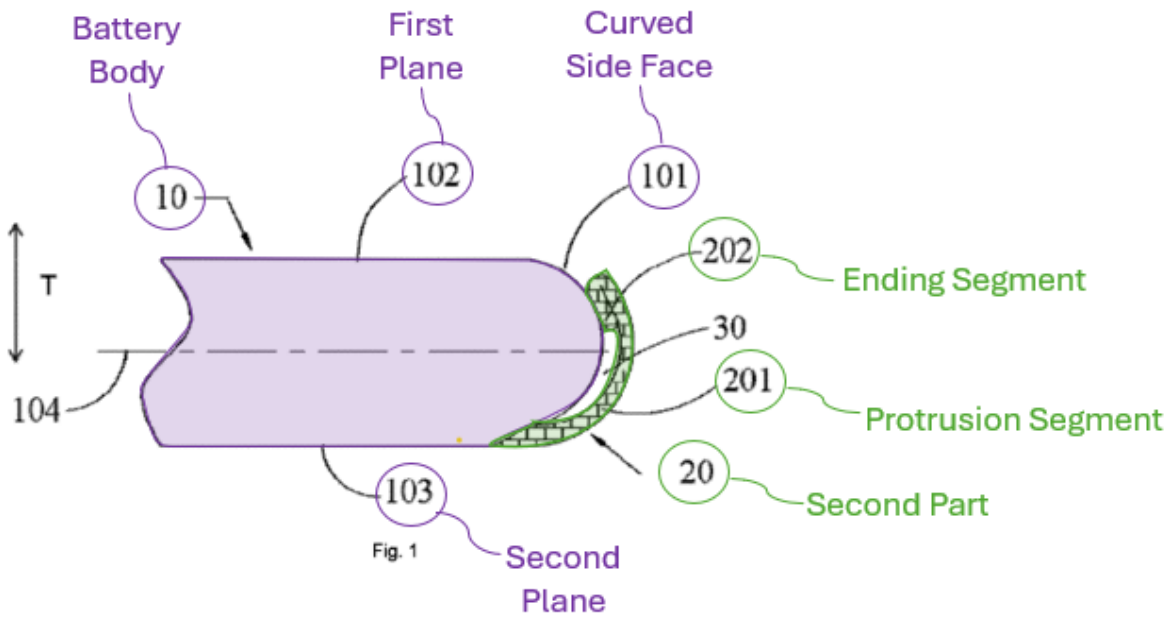


EX1001, FIG. 1 (annotated).

44. The ’808 patent’s “battery body 10 includes a side face 101, and a first plane 102 and a second plane 103,” in which “the first plane 102 and the second plane 103 are respectively connected at both ends of the side face 101,” and “side face 101 protrudes toward the outside of the battery body 10.” EX1001, 1:64-2:8. The ’808 patent further describes that “side face 101 is an arc-shaped structure,” confirming that the surface between the two planes is curved. EX1001, 4:1-3. A POSA would have understood that side face 101, first plane 102, and second plane 103 in the specification collectively provide an example of the claimed “first part” because these features together define the portion of the battery that surrounds and houses the internal electrode body, consistent with the claimed

"first part" of the package that covers the electrode body's surfaces.

45. As shown below, the '808 patent's battery includes a flange portion 20 with a "protrusion segment 202 [that] is connected to the battery body 10" and "protrudes away from the battery body 10." EX1001, 2:10-13, 2:37-49. A POSA would have understood that flange portion 20 described in the '808 patent specification is one example of the claimed "second part" because flange portion 20 extends outwardly from the primary structure (side face 101, first plane 102, and second plane 103) that collectively enclose the electrode body of the battery.

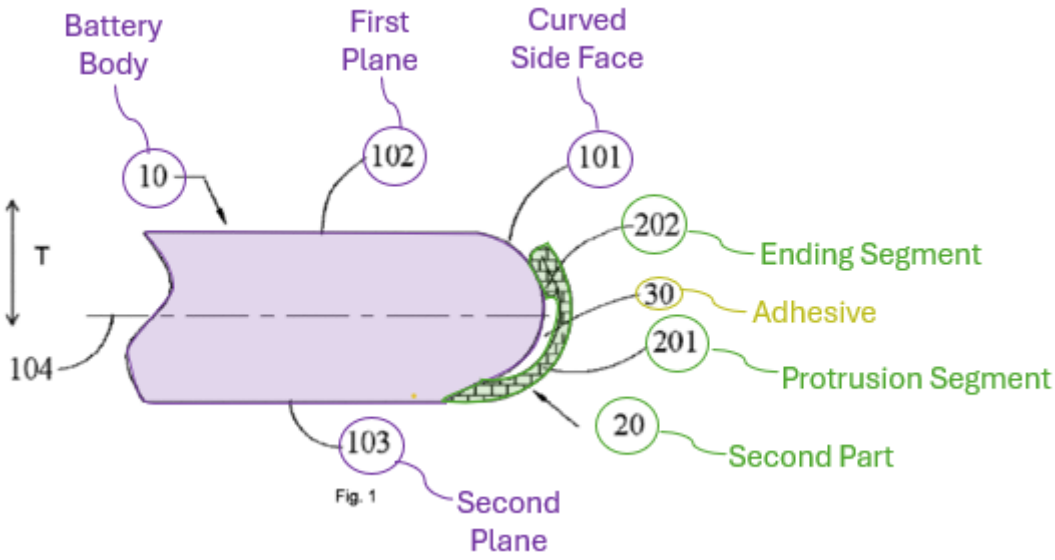


EX1001, FIG. 1 (annotated).

46. The '808 patent describes that flange portion 20 may further include an "ending segment [that] is connected to an end of the protrusion segment 201" and "connected to the side face 101" of battery body 10. EX1001, 2:40-49. To

form the shape of flange portion 20, "protrusion segment 201 is bent from the end of the second plane 103 toward the side where the first plane 102 is located, and the ending segment 202 is bent from the end of the protrusion segment 201 to the side where the second plane 103 is located." EX1001, 3:10-14.

47. A POSA would have understood that protrusion segment 201 in the specification is an example of the "first region" of the claimed "second part" because the specification describes protrusion segment 201 as the portion of the flange that initially extends and bends outward from the battery body. A POSA would also have understood that ending segment 202 in the specification is an example of the "second region" of the claimed "second part" because the specification describes ending segment 202 as a further bent portion extending from the protrusion segment 201 back toward and into contact with the side face 101 of the battery body, thereby forming a distinct, subsequent segment that is positioned closer to and interfaces with the battery body.



EX1001, FIG. 1 (annotated).

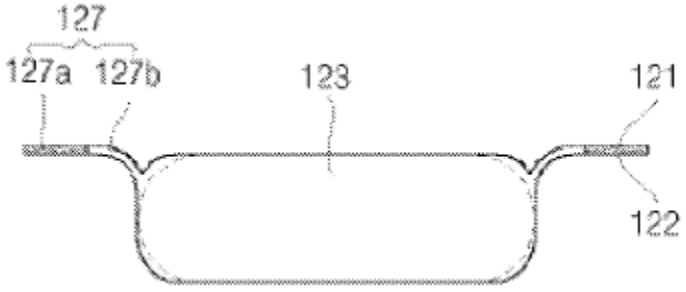
48. As shown above, the ’808 patent’s “battery further includes an adhesive layer 30” disposed between “the flange portion 20 and the battery body 10” to “further prevent the opening of the flange portion 20 during transportation, use, or placement.” EX1001, 4:51-65. Specifically, “[a]ny adjacent two of the protrusion segment 201, the ending segment 202, and the side face 101 are bonded by the adhesive layer 30.” EX1001, 4:54-65. That is, the ’808 patent’s adhesive layer 30 bonds protrusion segment 201 and ending segment 202 of the flange portion 20 directly to side face 101 of battery body 10 (corresponding to the claimed “package”), not the bare battery (corresponding to the claimed “electrode body”). EX1001, 1:57-58, 4:51-65.

B. Prosecution History of the ’808 patent

49. The ’808 patent issued from U.S. Application No. 17/374,803 (the

’803 application), filed as a continuation of U.S. Application No. 16/166,142 (the ’142 parent application) on July 13, 2021. EX1001, 1:6-11, cover (63).

50. The Office issued a single Office Action before ultimately allowing the claims. EX1002, 39-46, 75-84. The Examiner rejected: (1) claims 1-7 and 26-28 as being anticipated by Korean Patent No. 100670438B1 to Kim (Kim-438), and (2) claims 8-25 as being obvious over Kim-439 in view of U.S. Patent App. Pub. No. 2014/0212717 to Ariga (Ariga). EX1002, 75-84. The Examiner alleged that wing portion 127 of Kim-438’s pouch 120 corresponds to the recited “second part” of claim 1 and that the heat sealing layer in the laminate sheet used to form Kim-438’s pouch 120 corresponds to the recited “adhesive layer” of original claims 20 and 21. EX1002, 77-82.



EX1002, 70 (showing Figure 6 of Kim-438).

51. In response, Patent Owner amended independent claim 1 to specify that the second part curves around and is adhered to a curved side face of the electrode body, as reflected below:

an electrode body, and

a package, wherein the package comprises:

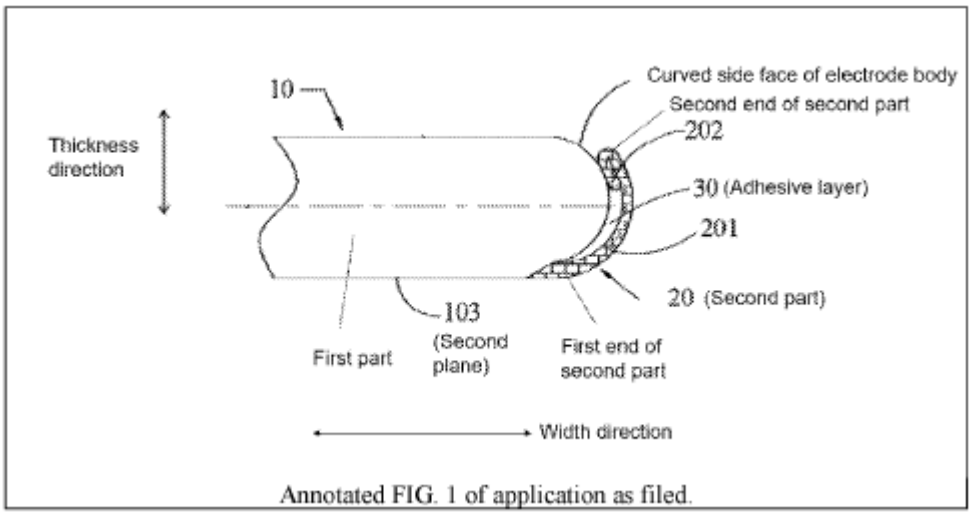
a first part covering a second plane of the electrode body;[,]]

and

a second part protruding from the first part in a [[first]] width direction of the electrode body, wherein the second part comprises a curved ~~portion~~ structure, the curved structure curves around a curved side face of the electrode body in a thickness direction perpendicular to the width direction, the second part including a first end connected to the first part and a second end opposite to the first end in the thickness direction, and the second part is adhered to the curved side face of the electrode body via an adhesive layer.

EX1001, 63-71.

52. Patent Owner also presented an annotated version of Figure 1, reproduced below:



Annotated FIG. 1 of application as filed.

EX1002, 69: Patent Owner's Annotated Version of Figure 1 of the '803 Application.

53. Patent Owner labeled battery body 10 as corresponding to the recited "first part" of the package, and identified side face 101 of battery body 10 as the "side face" of the electrode body. EX1001, 69. However, the '808 patent describes side face 101 as part of the *battery body* (that is, the way it describes its package), which connects opposing surfaces of the package—not the electrode body itself (referred to by the '808 patent only as "bare battery"). EX1002, 129-130 (¶¶[0011]-[0013] of the filed specification).

54. This makes sense because the adhesive layer described in the '808 patent is between the flange portion (second part) and the side face of the battery body, not any surface of the internal electrode body ("bare battery," e.g., the electrode assembly). EX1002, 133-134 (¶[0024] of the filed specification).

55. The Examiner accepted Patent Owner's arguments and issued a Notice of Allowance, stating that the cited art did not disclose "the second part being adhered to the curved side face of the electrode body via an adhesive layer." EX1002, 44. The Examiner appears to have treated this adhesive-based attachment as the primary distinguishing feature over the prior art. In doing so, the heat sealant layer in the laminate sheet of Kim-438's pouch was overcome as applied to the "adhesive layer" of issued claim 1. EX1002, 44.

C. '808 Patent Claims

56. Independent claim 1 is reproduced below.

1. A battery, comprising:

an electrode body, and

a package, wherein the package comprises:

a first part covering a second plane of the electrode body; and

a second part protruding from the first part in a width direction of the electrode body, wherein the second part comprises a curved structure, the curved structure curves around a curved side face of the electrode body in a thickness direction perpendicular to the width direction, the second part including a first end connected to the first part and a second end opposite to the first end in the thickness direction, and the second part is adhered to the curved side face of the electrode body via an adhesive layer.

EX1001, 5:57-6:4.

D. Claim Construction

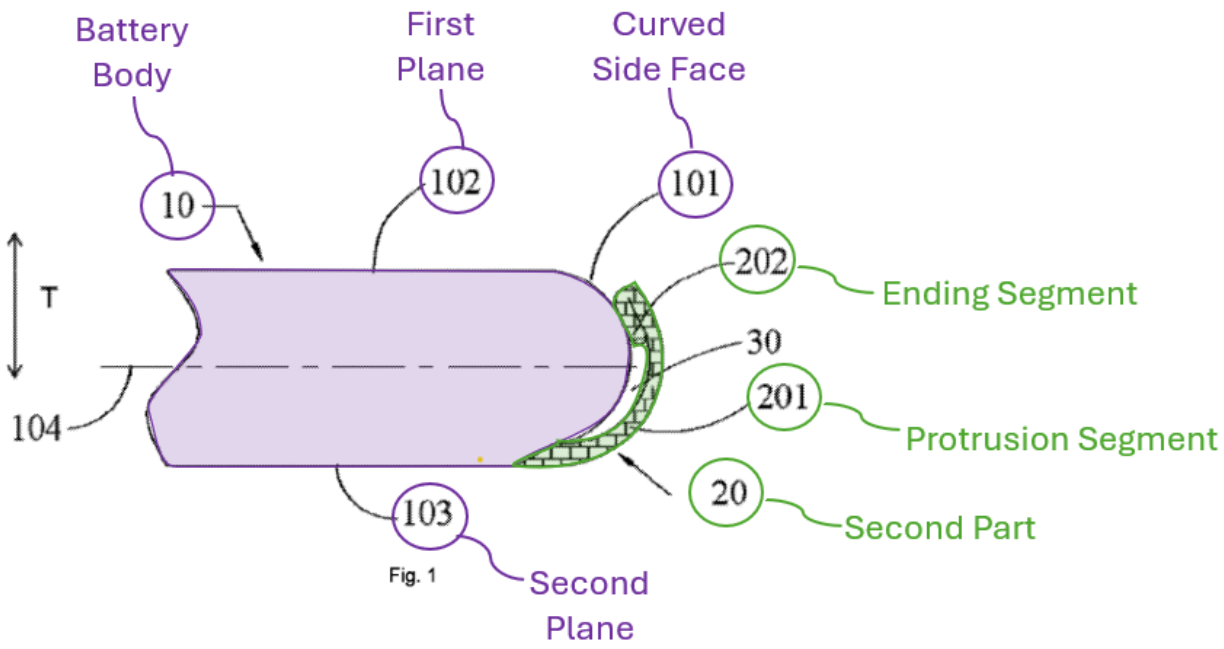
57. The Board should construe the claim elements in view of the discussion below. All other claim terms should receive their plain and ordinary meaning, in the context of the ’808 patent specification.

1. Claim 1: “the second part is adhered to the curved side face of the electrode body via an adhesive layer”

58. This element in independent claim 1 should not be construed as requiring direct contact between the second part and the electrode body’s curved side face. The plain language of the claim does not exclude the presence of an intervening layer. And nothing in the claim suggests a further requirement of direct adherence or otherwise disclaim any intermediate layer(s). Thus, indirect

adherence of the second part to the area where the curved side face of the electrode body is located satisfies this element.

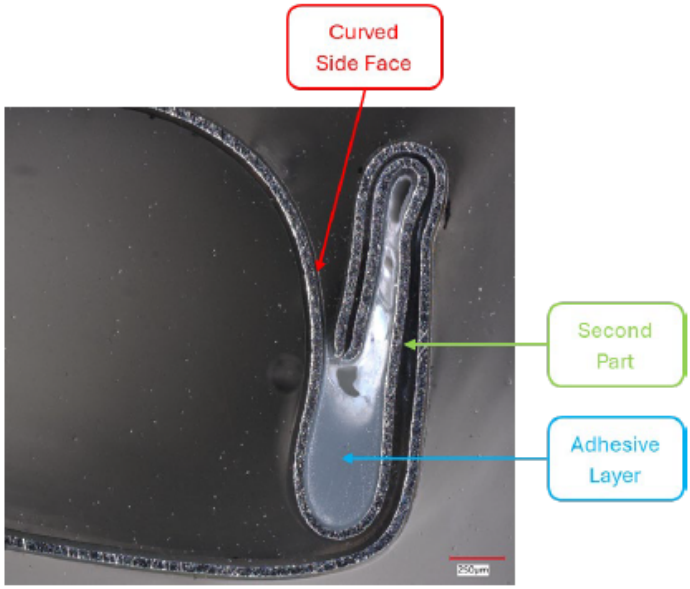
59. The specification supports this construction in describing that the adhesive layer bonds the protrusion segment 201 and ending segment 202 of the flange portion 20 (corresponding to the claimed "second part") to the side face (101) of the battery body 10 (the claimed "package"), not the bare battery (the claimed "electrode body"). EX1001, 1:57-58, 4:51-65.



EX1001, FIG. 1 (annotated).

60. Moreover, Patent Owner's infringement allegations apply the limitation to accused products that include intervening package layers between what Patent Owner labels as the second part and the electrode body, respectively. Patent Owner labels an adhesive layer as bonding a labeled second part to a first

part of the package:

and the second part is adhered to the curved side face of the electrode body via an **adhesive layer**.	The CosMX Cell CA3072C5P-Q2 has a package where the second part is adhered to the curved side face of the electrode body via an adhesive layer. 

Patent Owner's own infringement chart, EX1023, 3-8.

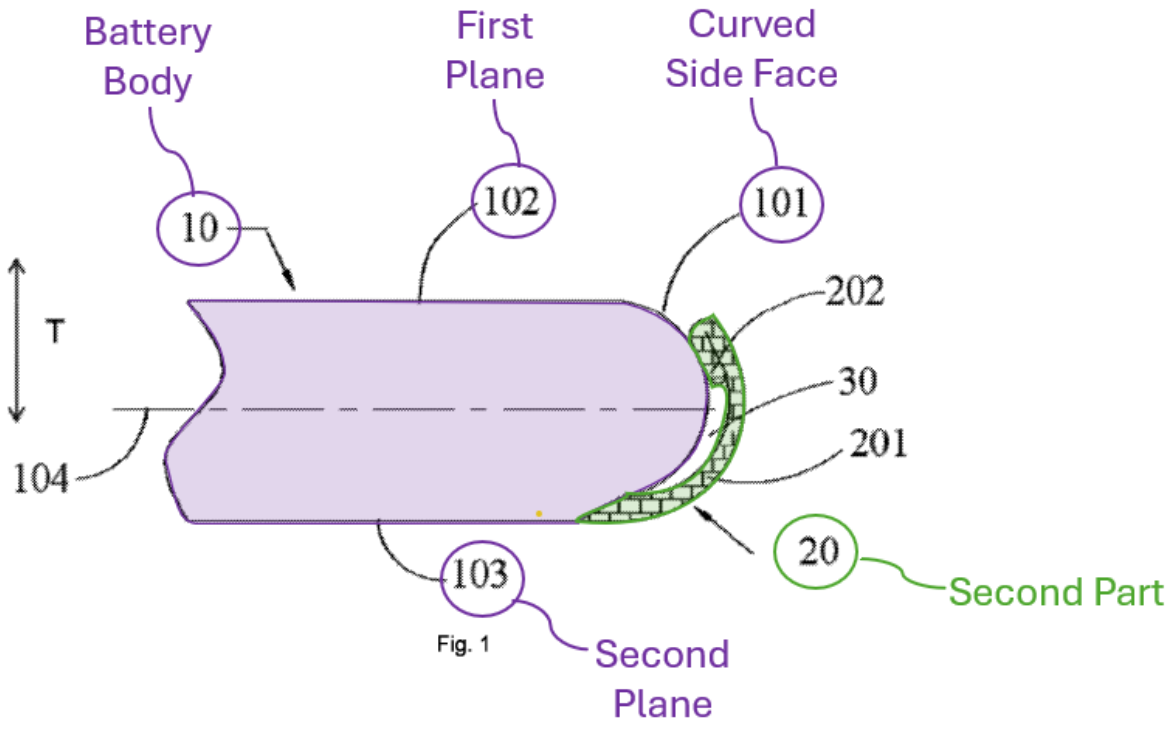
61. So, the Board should not construe claim 1 to require a direct adhesive bond to the electrode body itself, but rather interpret claim 1 as being satisfied by an indirect adhesive bond where the second part is bonded to the package's curved side face.

2. Claim 5: "the first part comprises: … [a] curved side face [that] connects the first surface and the second surface"

62. The recited "curved side face" in this element of claim 5 should be construed as a structural element of the recited "first part" of the recited "package," not the "electrode body," to be consistent with the '808 patent disclosure. This further supports that claim 1 includes an indirect adhesive bond between the

recited "second part" and "curved side face" of the "electrode body."

63. In view of the '808 patent's written description (EX1001, 1:50-2:1, 4:1-2), a POSA would have understood that battery body 10 corresponds to the recited "package," as it wraps a bare battery (in other words an "electrode assembly"). EX1001, 1:57-58 ("a bare battery is wrapped in the battery body 10"). Furthermore, a POSA would have understood that side face 101 of battery body 10 corresponds to the recited "curved side face" of claim 5 because it is the surface that connects the opposing first and second surfaces of the package and possesses the disclosed curved geometry. The claim language itself supports this, reciting that the curved side face "connects the first surface and the second surface."



EX1001, FIG. 1 (annotated).

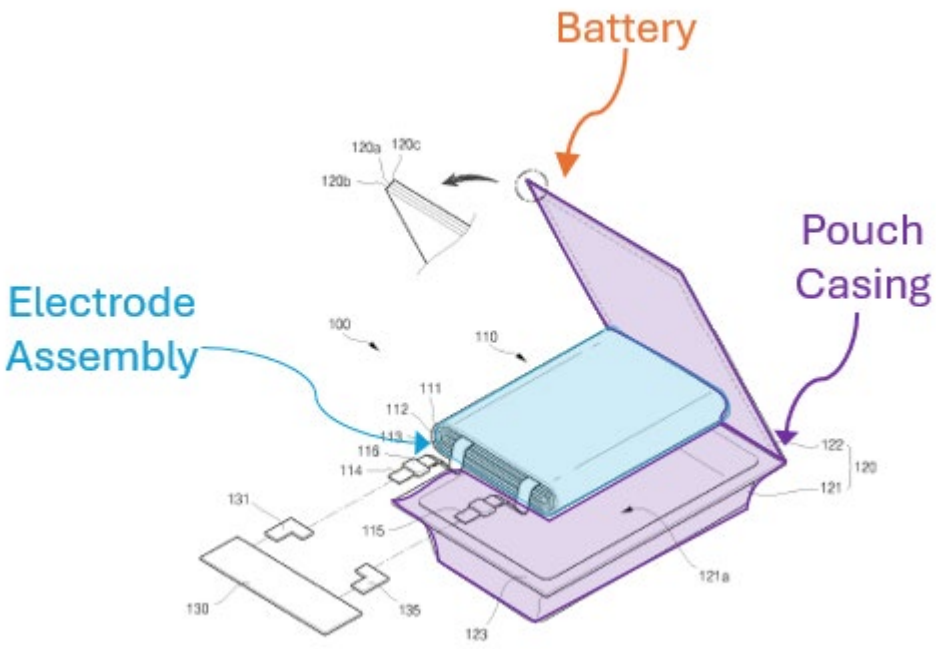
64. The prosecution history of the ’808 patent reinforces this interpretation. Specifically, the originally filed-claims recited the “side surface” as part of the structure of the first part of the package. EX1002, 136-138. Accordingly, both the written description and prosecution history support that the “curved side face” is a structural element of the first part that connects its first and second surfaces.

IX. GROUND 1: CLAIMS 1-18, 20, 23-25, AND 27 WOULD HAVE BEEN OBVIOUS IN VIEW OF KIM-439 AND UEDA.

A. Korean Patent No. 10-0591439 to Kim (Kim-439)

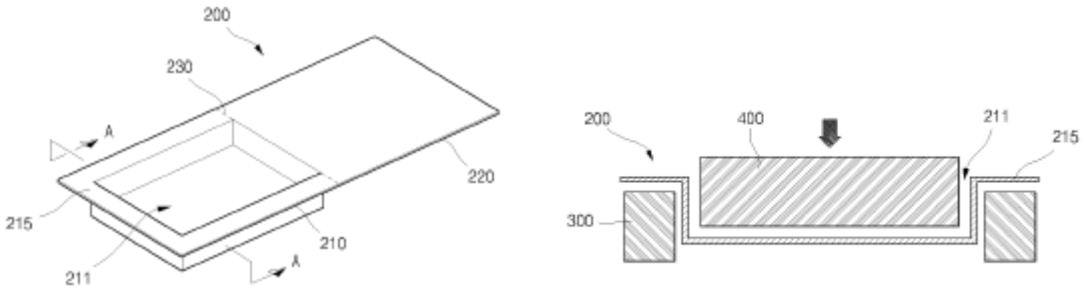
65. Korean Patent No. 10-0591439 to Kim published on June 2, 2006. Kim-439’s publication date precedes the ’808 patent’s earliest effective filing date of November 17, 2017, by almost twelve years.

66. Kim-439 discloses a “pouch-type lithium secondary battery” similar to the ’808 patent. EX1005, Abstract; EX1001, 1:54-58. As shown in Figure 1a, reproduced below, Kim-439’s pouch-type lithium secondary battery 100 includes “an electrode assembly (110) generating a voltage difference during charging and discharging” and “pouch casing (120) accommodating the electrode assembly (110).” EX1005, p. 4.



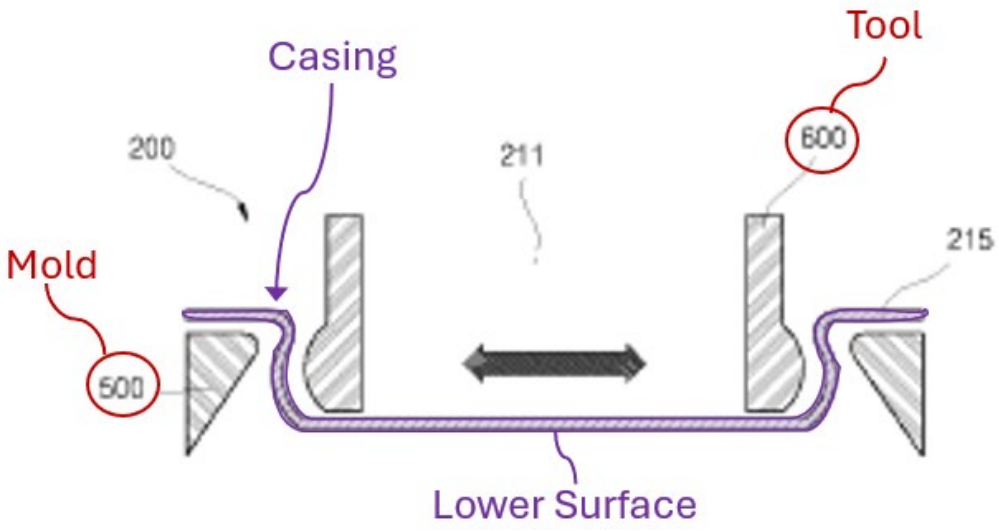
EX1005, FIG. 1a (annotated).

67. Kim-439 describes "a method of manufacturing a pouch-type lithium secondary battery," illustrated in Figures 2a-5b. EX1005, p. 4. The manufacturing process shown in Figures 2a–5b corresponds to the formation of the pouch-type lithium secondary battery 100 depicted in Figures 1a–1b. Kim-439's pouch casing 120/200 is formed by placing a lower surface 210 of casing 120/200 "in a mold (300)" and "pressing a portion of the pouch casing (200) using a press (400)" to form a "space (211) for accommodating the electrode assembly." EX1005, p. 5.



EX1005, FIGs. 2A, 2B

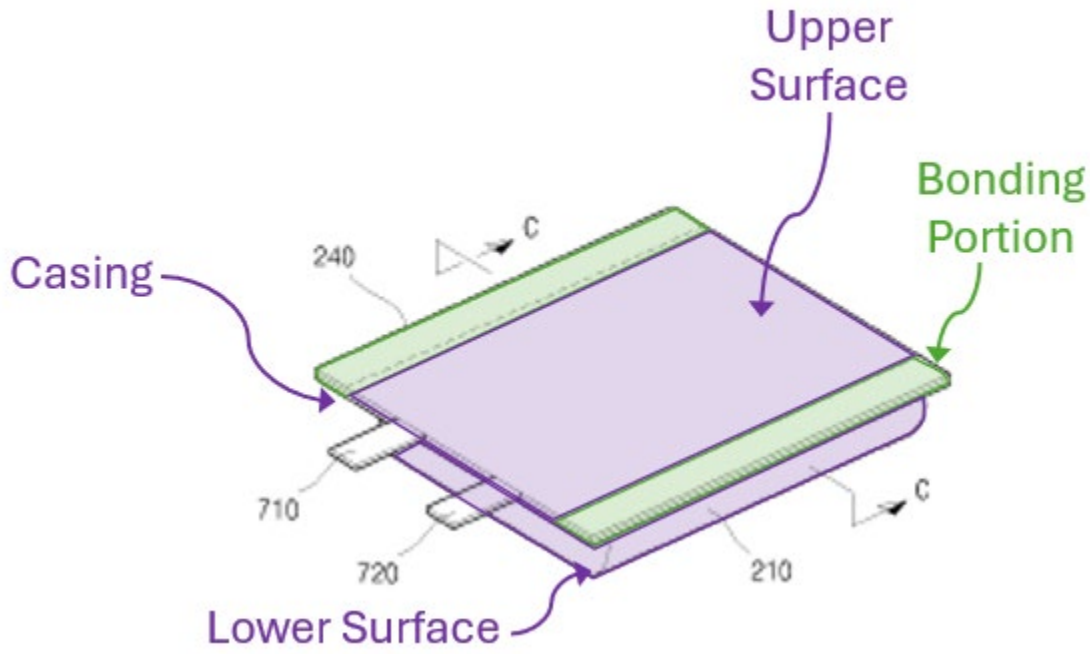
68. After molding Kim-439's lower surface 210 into shape to define space 211, "two opposing sides" of Kim-439's pouch casing 120/200 are pressed between "a mold (500)" and "a tool (600) provided with a rounded protrusion (610)" to form "outwardly rounded sides." EX1005, p. 5.



EX1005, FIG. 3b (annotated).

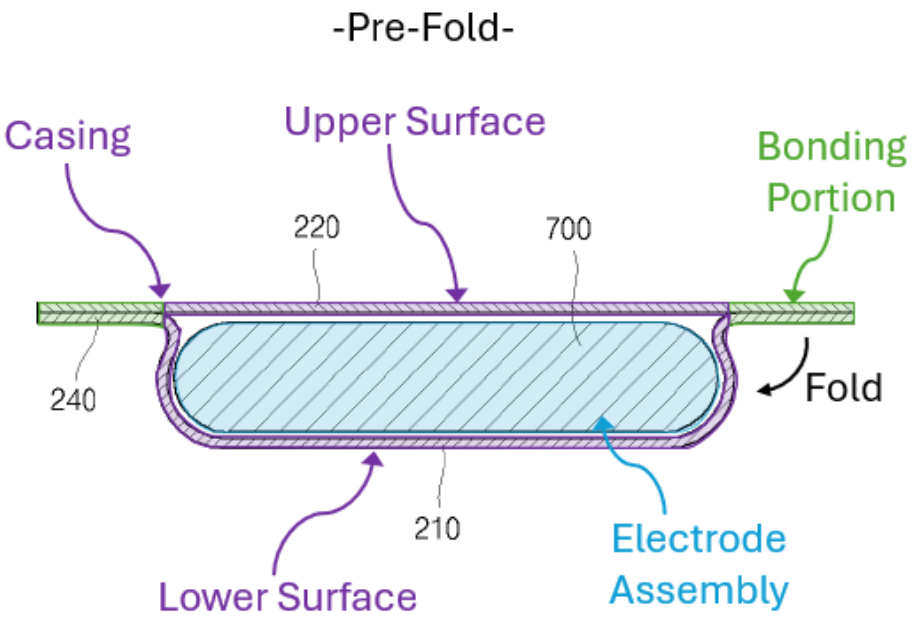
69. Then, Kim-439's "upper surface (220) is folded along the fold line (230) so that the upper surface (220) contacts the flange (215) of the lower surface (210), and the pouch casing (200) is sealed to manufacture a pouch bare cell."

EX1005, p. 5. Kim-439 bonds "the portion where the flange (215) of the lower surface (210) and the upper surface (220) contact each other" to form a "bonding portion (240)." EX1005, p. 5.

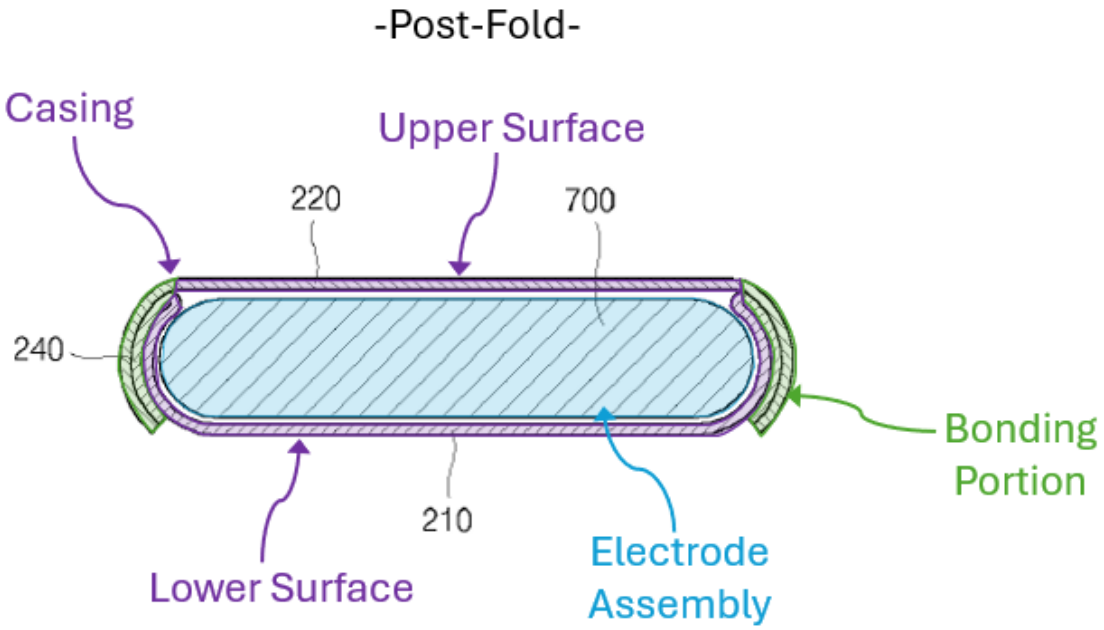


EX1005, FIG. 4 (annotated).

70. As shown below in Figures 5b and 5a, Kim-439's "bonding portion (240) is folded along the outwardly rounded sides of the space (211) for accommodating the electrode assembly." EX1005, p. 5.



EX1005, FIG. 5a (annotated).



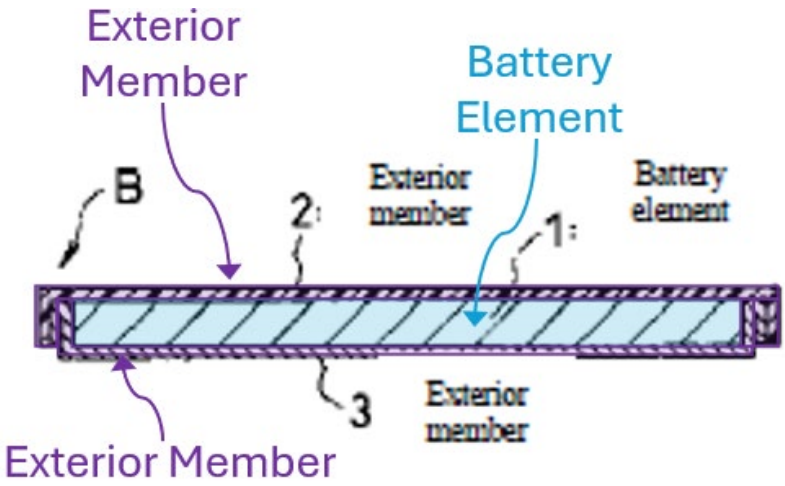
EX1005, FIG. 5b (annotated).

B. Japanese Patent Pub. No. 2001-250515 to Ueda *et al.* (Ueda)

71. Japanese Patent Pub. No. 2001-250515 to Ueda *et al.* published on September 14, 2001. Ueda's publication date precedes the '808 patent's earliest

effective filing date of November 17, 2017, by almost 16 years.

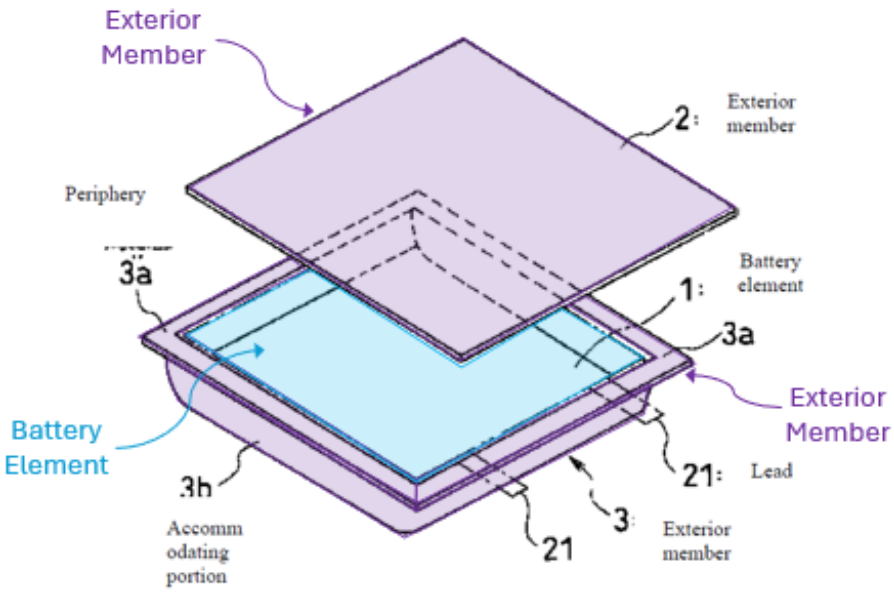
72. Ueda discloses a pouch-type battery similar to Kim-439 and the '808 patent. EX1006, Abstract; EX1005, Abstract; EX1001, 1:54-58; Ueda's battery includes a "battery element 1 [that] is encapsulated with exterior members 2 and 3." EX1006, ¶¶[0014]-[0015]. Ueda's "battery element is formed by laminating a positive electrode and a negative electrode with an electrolyte layer interposed therebetween." EX1006, ¶¶[0058]-[0059].



EX1006, FIG. 1a (annotated).

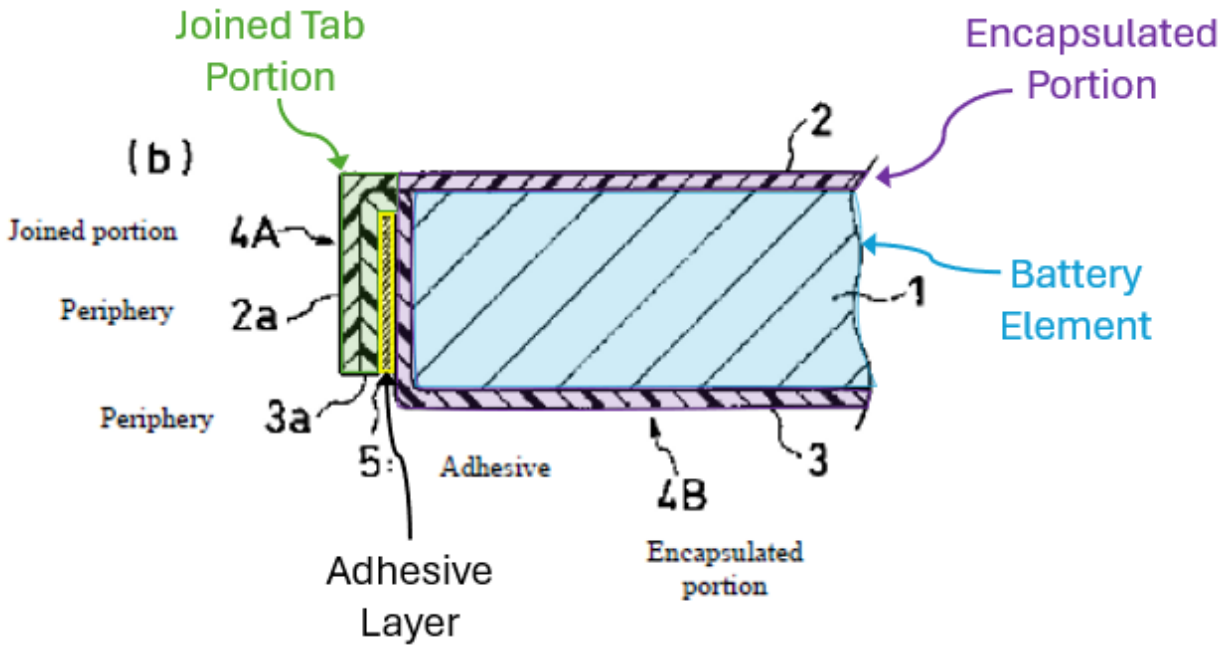
73. As shown below in Figure 4, Ueda's "exterior member 2 is flat," and Ueda's "exterior member 3 is in the shape of a shallow lidless box having an accommodating portion 3b" and "peripheral portion 3a projecting outward in a flange shape from the four peripheral edges of the accommodating portion 3b." EX1006, ¶[0016]. Ueda's "battery element 1 is accommodated within the accommodating portion 3b of this exterior member 3, and the exterior member 2 is

placed thereover." EX1006, ¶[0017].



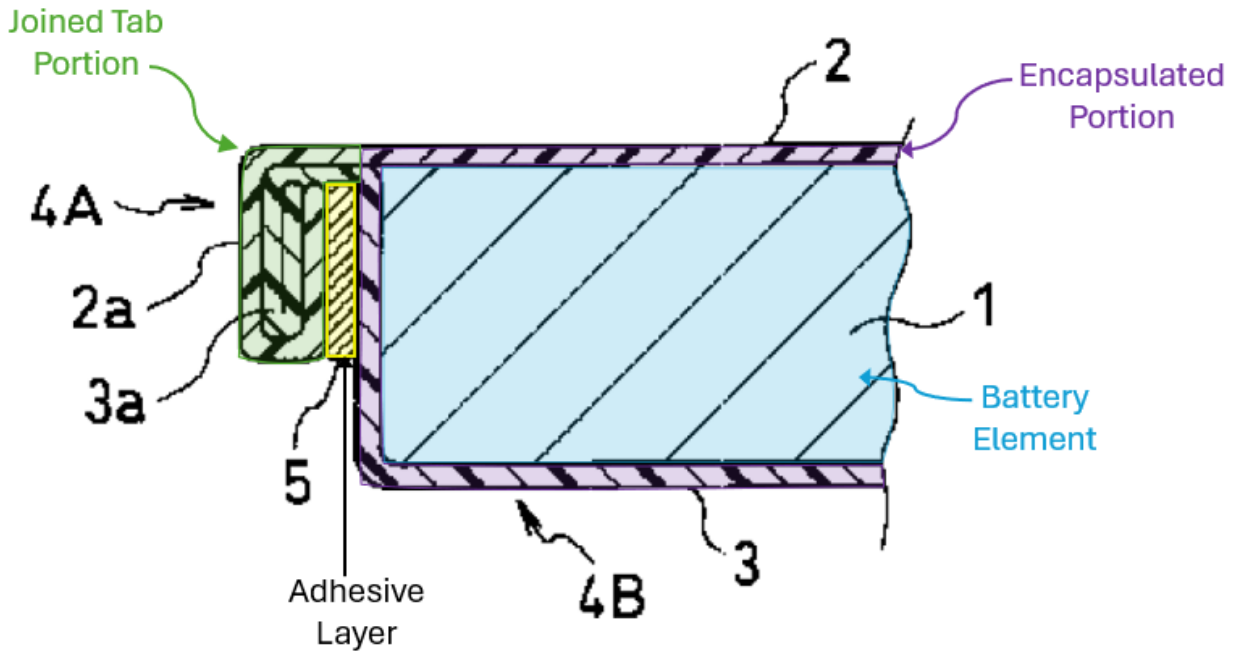
EX1006, FIG. 4 (annotated).

74. "[T]he peripheral portions 2a and 3a at the four peripheral edges of the exterior members 2 and 3 are airtightly joined to each other" to form a "joined tab portion 4A" that "projects outward from an encapsulated portion 4B that encapsulates the battery element 1." EX1006, ¶¶[0017]-[0018]. Ueda's "joined tab portion 4A is folded so as to follow the encapsulated portion 4B and is adhered to a side surface of the encapsulated portion 4B with an adhesive 5." EX1006, ¶[0018]. Adhering joined tab portion 4A to a side surface of encapsulated portion 4B "prevents the folded joined tab portion from separating from the encapsulated portion." EX1006, ¶¶[0008], [0081].



EX1006, FIG. 1b (annotated).

75. Ueda's joined tab portion 4A can be "folded only once along its base," as shown above in Figure 1b. EX1006, ¶[0023]. Alternatively, Ueda's joined tab portion 4A can "be folded once more partway as shown in FIG. 2, such that the leading edge of the joined tab portion 4A is interposed between the joined tab portion 4A and the side surface of the encapsulated portion 4B," to shield leading edge of the joined tab portion 4A from "the intrusion of moisture and air." EX1006, ¶[0023].



EX1006, FIG. 2 (annotated).

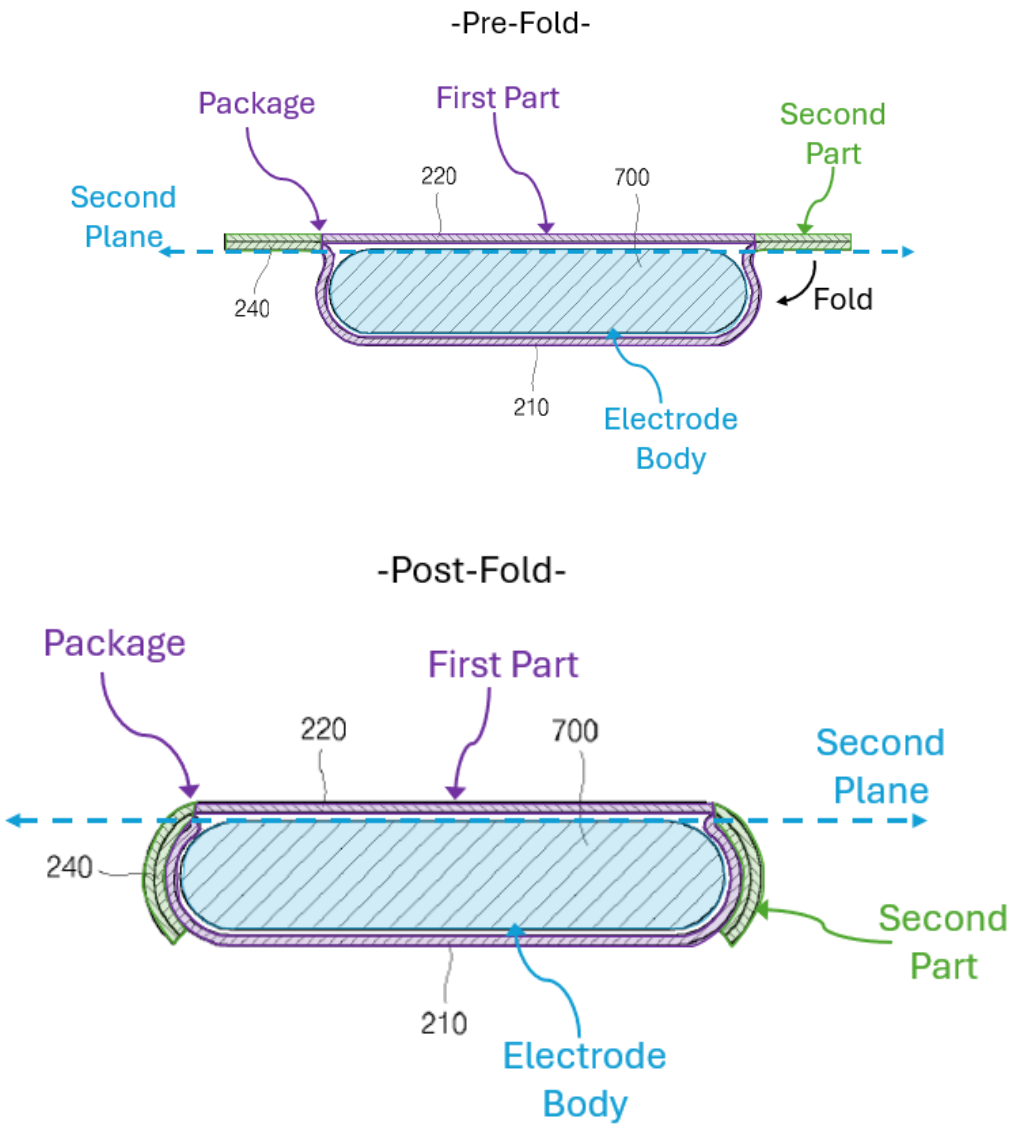
C. A POSA would have been motivated to combine Ueda with Kim-439 with a reasonable expectation of success.

1. Adhering Kim-439's Second Part to the Curved Side Face

76. A POSA would have been motivated to adhere the second part (bonding portion 240) of Kim-439's package (pouch casing 200) to its curved side face to prevent the second part from separating from the package, thereby preserving compactness of the battery and improving the package's structural integrity, as taught by Ueda. EX1006, ¶¶[0006]-[0011], [0029], [0081].

77. Kim-439, Ueda, and the '808 patent are from the same field of endeavor—pouch-type, soft-pack batteries. EX1001, 1:54-58; EX1005, Abstract, p. 2; EX1006, ¶¶[0001], [0006]. Kim-439, Ueda, and the '808 patent each disclose a package (e.g., Kim-439's pouch casing, Ueda's battery) having (i) a first part

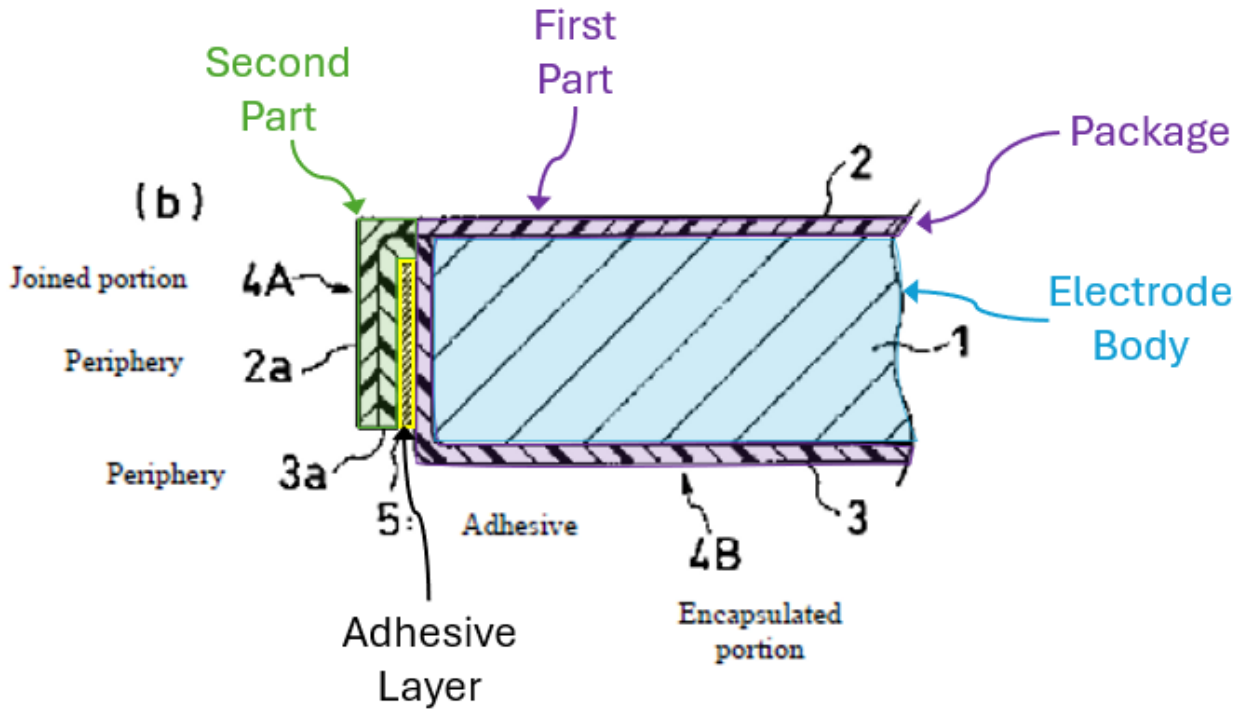
(e.g., upper, lower, and side surfaces of Kim-439's pouch casing, Ueda's encapsulated portion) accommodating the battery's electrode body and (ii) a second part (e.g., Kim-439's bonding portion, Ueda's tab portion) projecting outward from the first part. The second parts in Kim-439's and Ueda's packages are both formed by bonding opposing laminate sheets together around the electrode body's periphery to produce an outwardly-projecting flange. EX1005, p. 5; EX1006, ¶[0018]. While Kim-439 folds its second part (e.g., bonding portion 240) over the package's curved side face to achieve a rounded side profile as illustrated in the annotated figures below, Kim-439 does not explicitly disclose the use of adhesives to secure the second part to the curved side face. But a POSA would have recognized that the interface between the folded second part and the curved side face would have the potential for lift, separation, or reduced contact uniformity at least due to elastic recovery of the laminated pouch materials (material spring back for thinner metal sheets) or exposure to impact forces. See EX1006, ¶¶[0004], [0008]; EX1015, 4:8-10, 4:34-45 (describing that casing materials have some elasticity and can recover back to their original shape); EX1016, ¶[0030] (describing that battery pouch casing layers have a "restoring bias" such that "seal structures 16 tend to migrate from a substantially vertical or perpendicular orientation to a more horizontal or parallel orientation.").



EX1005, FIGs. 4b, 5b (annotated).

78. With this recognition, a POSA would have appreciated that Ueda addresses this concern by teaching that the second part (joined tab portion 4A) can: (i) "follow the encapsulated portion" and (ii) bond to the side surface using an adhesive. EX1006, ¶¶[0006]-[0008] (describing a solution to this problem where the adhesive "prevents the folded joined tab portion from separating from the

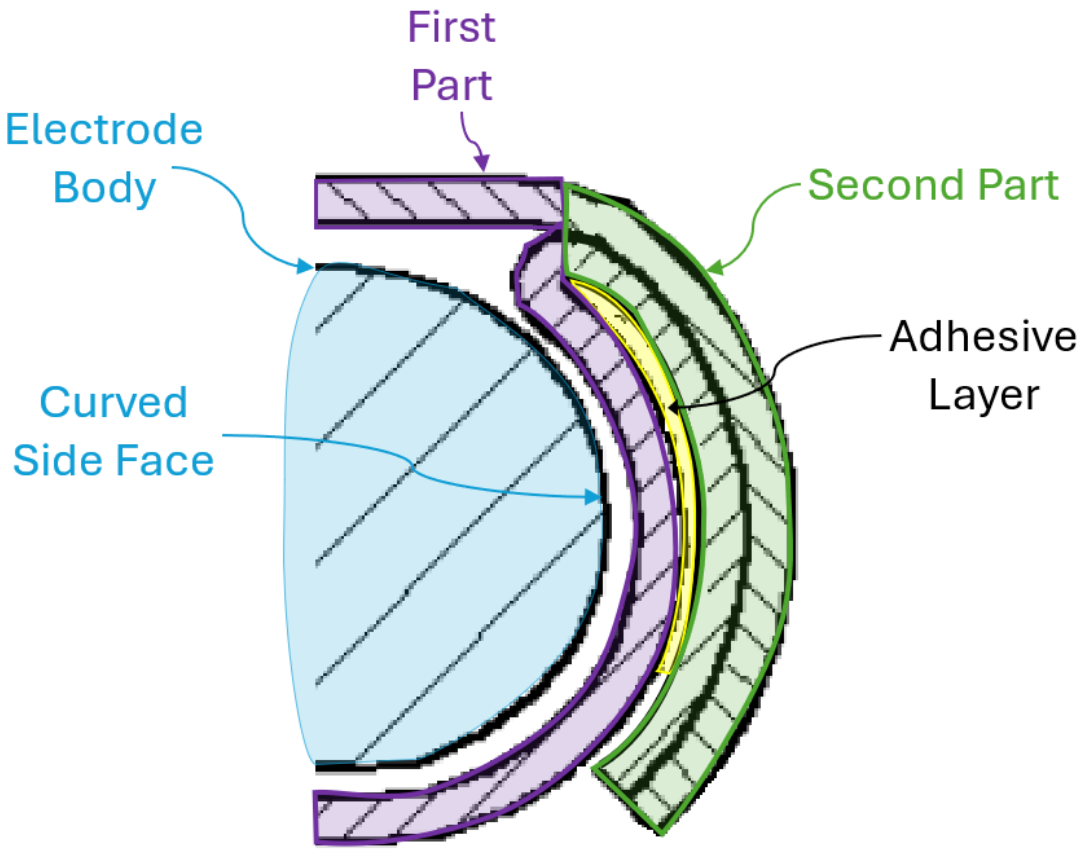
encapsulated portion" and improves "the strength and rigidity of the side surfaces of the battery."); *see also* EX1006, ¶¶[0015], [0018], [0029]. Ueda further explains the adhesive bonding provides an additional solution by preventing separation of the package's second part and increases the strength and rigidity of the package. EX1006, ¶¶[0008], [0081]. Thus, Ueda provides a known solution to the potential for structural instability at the second part-to-side interface of Kim-439's package without this adhesive. An annotated version of Ueda's FIG. 1 is below:



EX1006, FIG. 1 (annotated).

79. A POSA would have been motivated to provide an adhesive layer to adhere the second part (bonding portion) of Kim-439's package to its curved side face, as taught by Ueda, to prevent Kim-439's second part from separating from

the package's side, while preserving Kim-439's goal of maintaining a compact, rounded battery profile. Ueda teaches that such adhesive bonding increases the package's side face rigidity, prevents separation of the second part, and maintains a compact structure by holding the second part flush against the side face. EX1006, ¶¶[0008], [0081]. This adhesive bonding would also reduce localized deformation and fluttering of the second part during handling or operation, thereby further enhancing the durability and reliability of the package structure. These benefits would apply equally to Kim-439's structure, particularly given its curved side faces, where maintaining contact between the second part and package's side face preserves Kim-439's rounded profile and structural integrity.



Rendering of Kim-439's Modified Battery.

80. A POSA would have had a reasonable expectation of success in combining Ueda's adhesive layer technique with Kim-439 because this modification would improve the structural integrity of Kim-439's battery without significantly increasing its profile. Indeed, a POSA would have applied Ueda's teachings by simply applying adhesive between Kim-439's second part and the packaging's curved side face. Each of these potential applications supported by Ueda's teachings represents a conventional manufacturing variation requiring no undue experimentation. It is the application of a known technique (applying an adhesive layer between the casing's side face and flange) to a known device (Kim-439's battery) to reliably secure the second part to the side face of the package. This modification would have also simply been the combination of known prior art elements (Ueda's adhesive layer with Kim-439's package) according to known methods (Ueda's technique of applying adhesive between the casing side's face and flange) to yield the predictable result of keeping the second part secured to the first part of the package.

81. Furthermore, a POSA would have understood how to maintain the curved-side profile of Kim-439's battery while applying the adhesive between the package's second part and side face, based on Ueda's disclosure. First, Ueda teaches that the "joined tab portion is folded so as to follow the encapsulated

portion and is adhered to the encapsulated portion by an adhesive." EX1006, ¶[0006]. Additionally, Ueda teaches that the package's exterior members 2,3 "have shape variability" such that the "shape of the battery can be easily changed in various ways." EX1006, ¶[0069]. Recognizing Ueda's teaching to have the folded flange "follow" the package's side, a POSA would have understood that Kim-439's second part (bonding portion 240) would continue to follow the curved side face of the battery even with the addition of the adhesive layer taught by Ueda, so as to preserve the curved profile of Kim-439's battery. Moreover, a POSA would have understood that such adhesive layers are applied in very small thicknesses—selected to provide sufficient bonding while avoiding unnecessary bulk or spacing—and conform to the applied surfaces such that the adhesive would not materially alter the curvature or dimensional profile of Kim-439's package. *See* EX1007, ¶[0070] (describing an adhesive layer having a thickness in the width direction between 0.5 mm and 2.0 mm). Thus, implementing Ueda's adhesive-layer technique would not require any substantial change to the overall structure or folding process, but merely the addition of a known bonding agent at an existing interface, as already known in the art.

2. Folding Kim-439's Second Part Inward

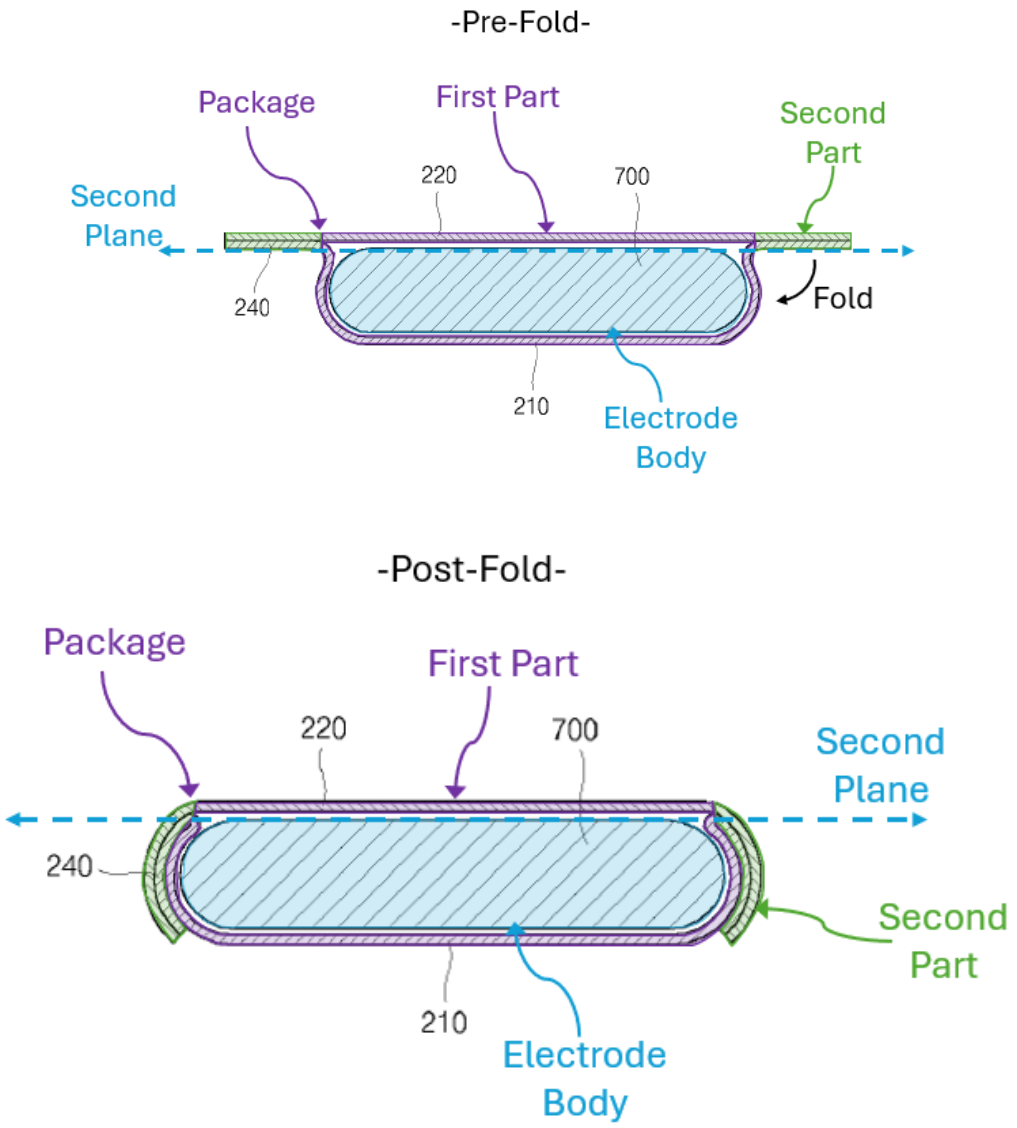
82. Additionally, a POSA would have been motivated to fold the second part of Kim-439's package inward, as taught by Ueda, to shield the leading edge of

the second part from moisture and external forces, preserving the structural integrity of Kim-439's package.[1] EX1006, ¶¶[0013], [0023].

83. As shown below, Kim-439's bonding portion 240—formed by bonding and folding the upper and lower films of the pouch casing—terminates in a thin, exposed leading edge that is exposed to ambient conditions and susceptible to mechanical damage, deformation, or fraying if left exposed. A POSA would have understood that the resin-backed laminate films possess sufficient elasticity to resist conforming tightly to the casing side, a condition that can be addressed by applying an adhesive to secure the films in place. At the same time, leaving the leading edge of the flange exposed subjects it to impact forces that can result in damage or deformation of the flange. This susceptibility arises from the leading edge being subjected to localized bending stresses and tension due to the curvature of the side surface, increasing the likelihood of edge lifting or fatigue over time. The leading edge of Kim-439's second part is exposed on the exterior of the battery and is thus particularly vulnerable to external mechanical interactions during normal handling, assembly, and use. These interactions risk deforming, curling, or fraying the flange's edge. Moreover, exposing the second part's leading end to moisture could delaminate the laminate structure of Kim-439's second part,

[1] This rationale addresses dependent claims 8-22.

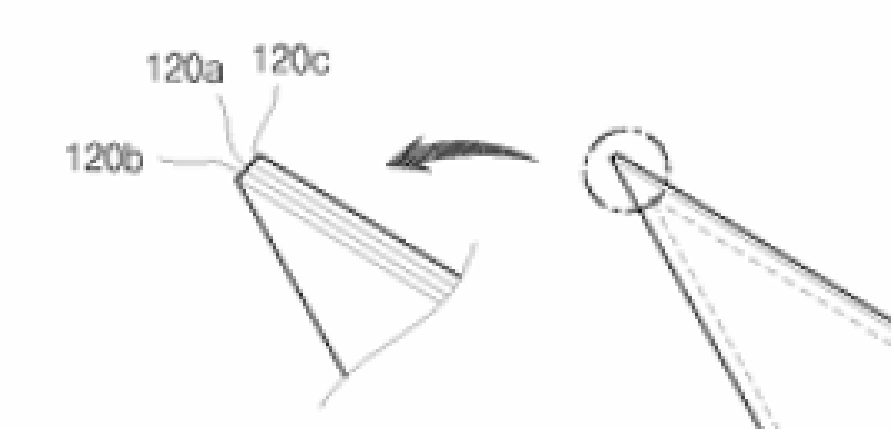
compromising the seal integrity.



EX1005, FIGs. 4b, 5b (annotated).

84. Furthermore, when bonding portion 240 of Kim-439 is folded over the side of the pouch casing, the core metal layer 120a of the laminate sheet, as shown below, becomes exposed at the leading edge. This exposed metal edge is particularly problematic because it is not fully insulated by surrounding polymer

layers, increasing the likelihood of unintended electrical contact between adjacent components. As a result, the exposed metal layer can create an unintended conductive pathway capable of shorting cells within the battery. This risk is well recognized in the art. For example, Liu explains that the "exposed aluminum layer of a battery edge" presents a risk of "short circuit," underscoring the dangers associated with leaving such conductive material unprotected at a battery edge. EX1008, ¶[0002].



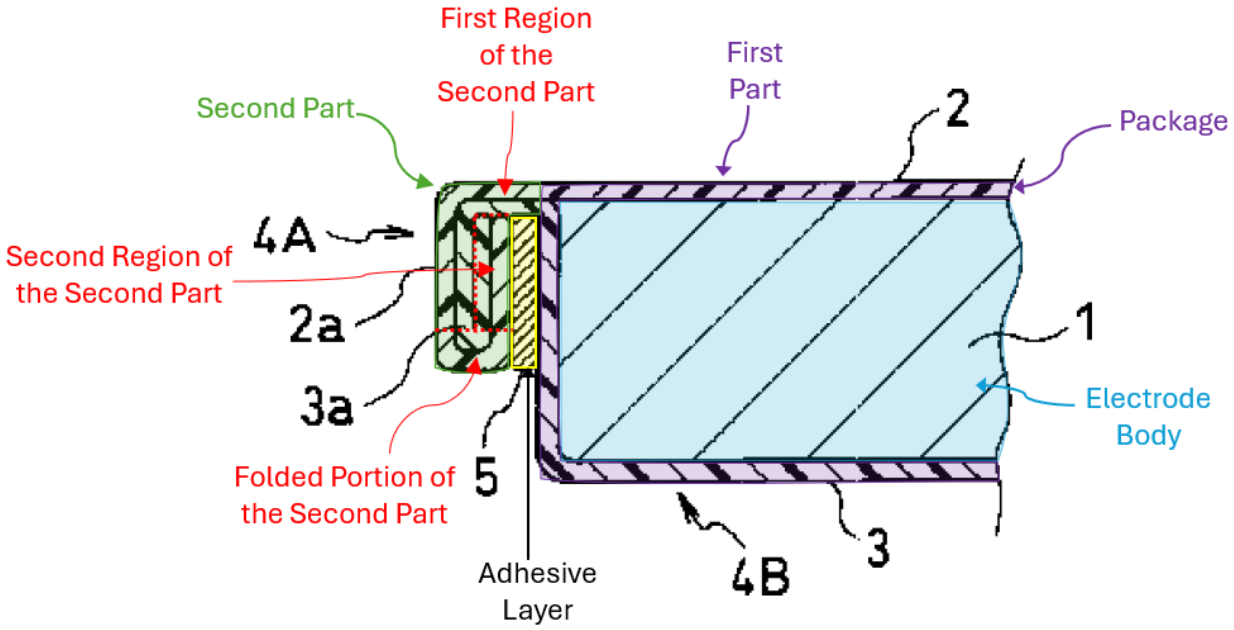
EX1005, FIG. 1A (partial).

85. In addition, leaving the leading edge exposed introduces a distinct and serious risk of degradation of Kim-439's core metal layer, itself. In pouch-type laminate films, the core metal layer is typically protected by the laminated polymer sheets. However, if the exposed aluminum edge is inadvertently placed at an anode potential—for example, triggered by unintended contact with other conductive components—the aluminum layer is susceptible to electrochemical corrosion.

EX1024, 1:33-43 (describing that "the metal layer [of a pouch-type case] may be corroded by an electrochemical reaction" when "a short may occur" with the "metal layer" of the "free end[]"). This corrosion progressively degrades the integrity of the metal layer, causing pitting, thinning, and eventual breach of the pouch casing. EX1024, 1:40-46, 5:56-65. These effects can cascade into additional failure modes, including electrolyte contamination and leaking. EX1018, ¶[0009] ("moisture may easily permeate into the battery case, and the electrolyte may leak from the battery case"); EX1006, ¶¶[0013], [0022]. Accordingly, a POSA would have understood that exposing the aluminum layer at the leading edge is highly undesirable not only for electrical reasons, but also because it undermines the fundamental barrier function of the pouch casing.

86. Ueda addresses these concerns by folding the second part (tab portion 4A) inward such that the leading edge of the second part is interposed between the second part's first region and the package's side face, shielding the leading edge from external contact and moisture to preserve the seal at package's boundary. EX1006, ¶¶[0013] (describing that when "the leading edge of the joined tab portion is interposed between the joined tab portion and the encapsulated portion ... the leading edge of the joined tab portion is isolated from the outside air, and intrusion of moisture, air or the like through the leading edge."), [0023] ("the intrusion [of] moisture and air from the joined tab portion can be more effectively

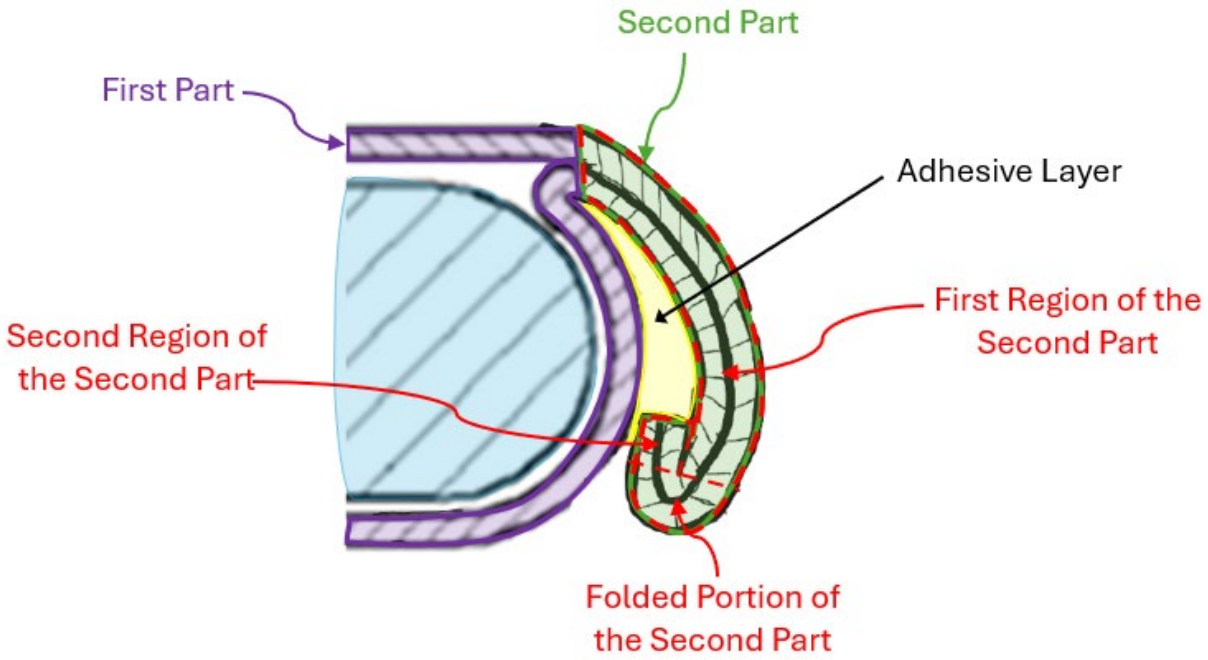
prevented"), [0030] ("intrusion of moisture or the like into the bonding interface of the peripheral portions 2a and 3a from the leading edge of the joined tab portion 4A is more reliably prevented"). Ueda's inward-folding of the second part not only shields the package's leading edge from external contact, but also converts the exposed leading edge into a layered interface, where stresses are distributed across overlapping laminated layers rather than concentrated at a single exposed termination. EX1006, ¶¶[0005] ("provide a battery that has a reduced bulk and high strength and rigidity at the side surfaces"), [0008].



EX1006, FIG. 2 (annotated).

87. A POSA would have been motivated to apply Ueda's inward-folding technique to Kim-439's second part to improve durability and sealing reliability. Doing so would shield the interface of Kim-439's laminate materials in the second

part (bonding portion 240) from the "intrusion of moisture or the like." EX1006, ¶[0030]. Moreover, folding the leading edge of Kim-439's second part inward would reinforce the leading edge within a layered configuration, thereby improving the robustness of Kim-439's second part.



Rendering of Kim-439's Modified Battery.

88. A POSA would have had a reasonable expectation of success applying Ueda's inward-folding technique to Kim-439's second part because both references use similar package materials—thin, laminated exterior members for non-aqueous (e.g., lithium) secondary batteries—where peripheral portions are joined/sealed and then folded to manage package profile and robustness. EX1005, pp. 4-5; EX1006, ¶[0018]. Ueda confirms that converting a single-fold configuration to a more protective multi-fold configuration was well within

ordinary skill. EX1006, ¶[0023], FIGs. 1b, 2. Indeed, Ueda expressly teaches that the second part (joined tab portion 4A) "may be folded only once … or … folded a plurality of times." EX1006, ¶[0013]. More specifically, Ueda teaches a configuration in which the second part is folded again so that the leading edge is interposed between layers to better prevent moisture/air intrusion. EX1006, ¶¶[0013], [0023], [0030]. Because Ueda presents this as a routine design option (fold once or fold multiple times) for the same joined peripheral structure (EX1006, ¶¶[0013], [0023]), a POSA would have expected the same approach to translate to Kim-439's analogous folded bonding portion 240 without undue experimentation. Accordingly, modifying Kim-439 to implement Ueda's inward-folding technique represents the application of a known technique (inwardly folding the leading edge) to a known device (Kim-439's flange), yielding the predictable result of preventing the intrusion of moisture and enhancing structural integrity.

D. Independent Claims 1 and 11

89. For clarity, I provide the following chart identifying selected terms as described or claimed in the '808 patent[2] along with corresponding terms used in

[2] The '808 patent claims recite features not included *haec verba* in the specification.

the prior art.

Claim 1	**'808 Patent Specification[3]**	**Kim-439[4]**	**Ueda[5]**	**Kim-999[6]**
Electrode Body	Bare Battery	Electrode Assembly (110, 700)	Battery Element (1)	Electrode Assembly (11)
Package	Battery Body (10)	Pouch casing (120, 200)	Exterior Members (2, 3)	Case (21)
First Part	Side Face, First Plane, Second plane (101, 102, 103)	Upper Surface Lower Surface (122/220, 121/210)	Encapsulated Portion (4B)	Pouch Film (212)

[3] EX1001, 1:57-58, 1:64-2:8, 2:9-19.

[4] EX1005, pp. 4-5.

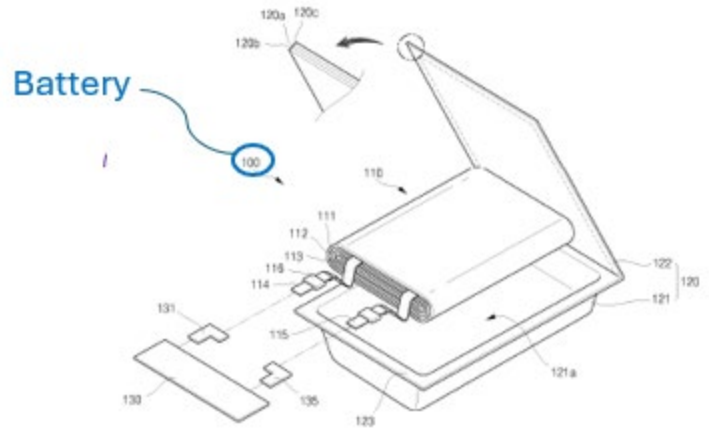
[5] EX1006, ¶¶[0014]-[0015], [0018].

[6] EX1007, ¶¶[0045]-[0049], [0080]-[0085].

Claim 1	'808 Patent Specification[3]	Kim-439[4]	Ueda[5]	Kim-999[6]
Second Part	Flange Portion (20)	Bonding Portion (123, 240)	Joined Tab Portion (4A)	Folding Part (23)

1. [1.P] A battery

90. Kim-439 discloses a "battery," particularly a pouch-type lithium secondary battery 100. EX1005, pp. 3 (describing "a method of manufacturing a pouch-type lithium secondary battery in which sides of a pouch casing are formed to have an outwardly rounded shape after sealing, whereby the design rule is improved and battery capacity is increased."), 4 (describing "a pouch-type lithium secondary battery (100)" shown in Figures 1a and 1b), 4 ("FIGS. 2a, 3a, 4a, and 5a are process perspective views for illustrating a method of manufacturing a pouch-type lithium secondary battery"), Abstract ("a method of manufacturing a pouch-type lithium secondary battery in which sides of a pouch casing are formed to have an outwardly rounded shape after sealing").



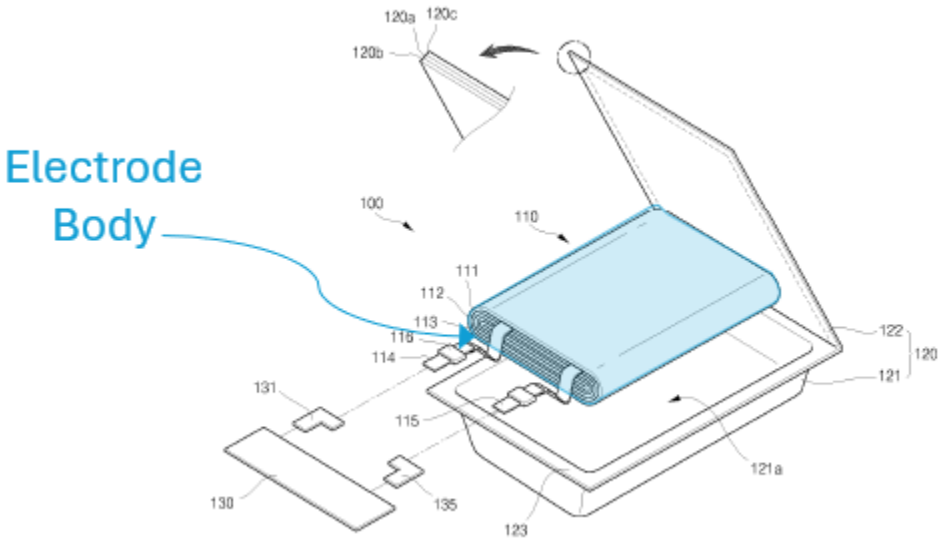
EX1005, FIG. 1a (annotated).

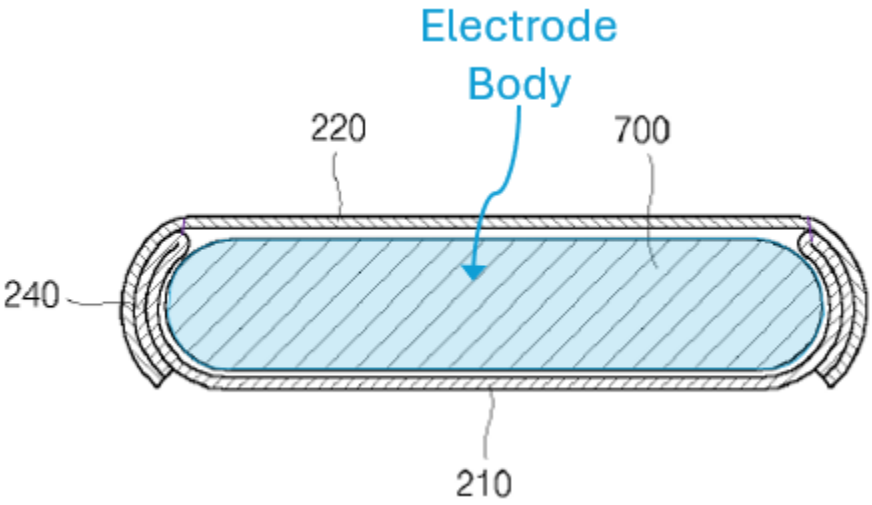
91. Figures 1a–1b and Figures 2a–5b of Kim-439 all describe the same embodiment of a pouch-type lithium secondary battery and its corresponding manufacturing method. Kim-439's Figures 2a–5b illustrate process views "of manufacturing a pouch-type lithium secondary battery," while Figures 1a–1b illustrate the resulting battery structure. EX1005, p. 2. The manufacturing process shown in Figures 2a–5b therefore corresponds to the formation of the pouch-type lithium secondary battery (100) depicted in Figures 1a–1b. Accordingly, the features illustrated across Figures 1a–5b are not separate or alternative configurations, but rather collectively describe a single embodiment encompassing both the structure of the battery and the process used to produce it.

2. [1.A] "an electrode body"

92. Kim-439 discloses the recited "electrode body" as electrode assembly 110, 700 that includes a first electrode plate coated with a positive electrode active

material and a second electrode plate coated with a negative active material. EX1005, pp. 4-5 ("electrode assembly (110) comprises a first electrode plate (111) coated with one of a positive electrode active material and … a second electrode plate (112) coated with … a negative electrode active material."), Abstract. A POSA would have understood that Kim-439's electrode assembly corresponds to the recited "electrode body" because Kim-439's electrode assembly is an internal electrochemically active structure that stores electrical energy within the battery.



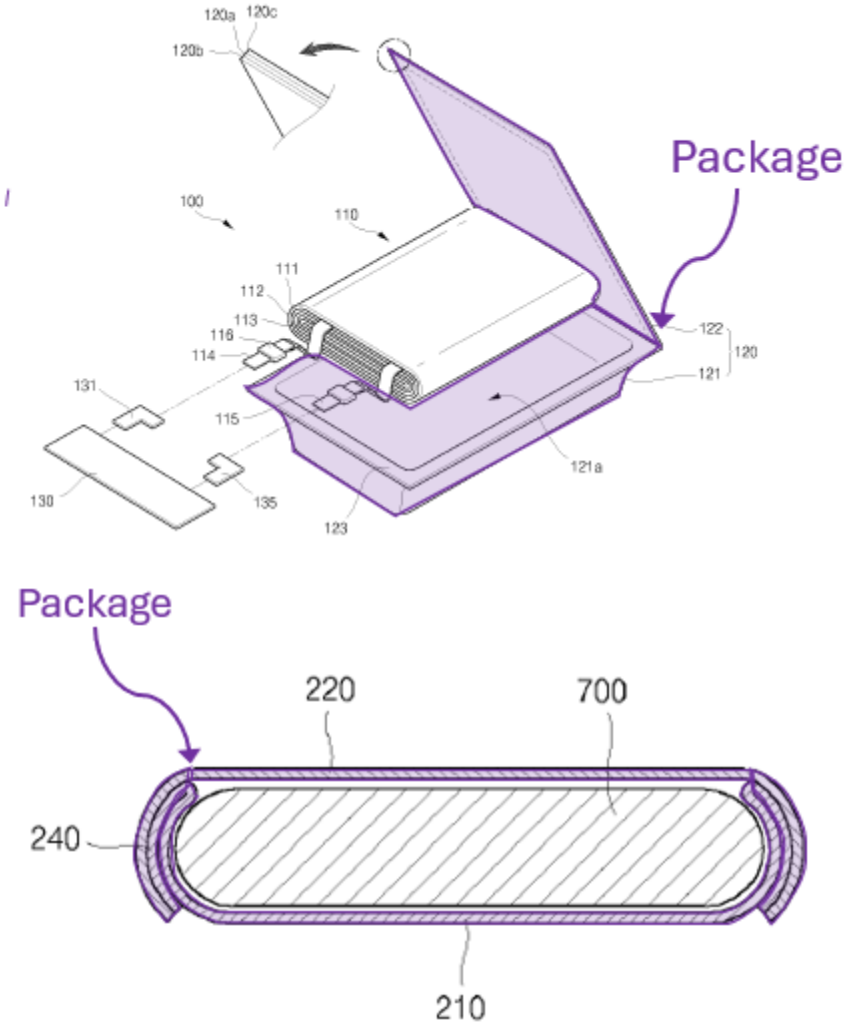


EX1005, FIGs. 1a, 5b (annotated).

93. Accordingly, a POSA would have understood that Kim-439 discloses Element [1.A].

3. [1.B] "a package, wherein the package comprises"

94. Kim-439 discloses the recited "package" as a pouch-casing 120, 200 that "accommodat[es] the electrode assembly." EX1005, pp. 4-5 ("a pouch casing (120) accommodating the electrode assembly (110)"), 5 ("[r]eferring to FIGS. 2a and 2b, first, a pouch casing (200) is prepared."). A POSA would have understood that Kim-439's pouch-casing 120, 200 corresponds to the recited "package" because Kim-439's pouch-casing 120, 200 defines an exterior enclosure formed of laminate sheets that surrounds, contains, and seals the electrode assembly to form the completed battery cell.



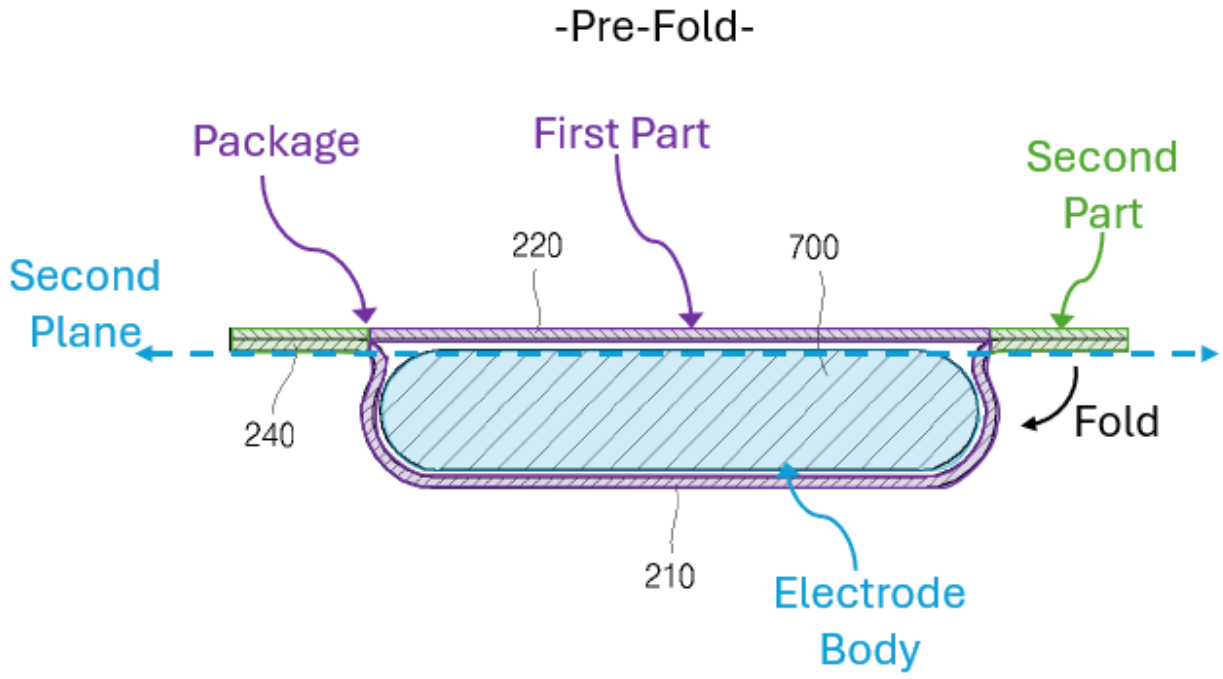
EX1005, FIGs. 1a, 5b (annotated).

95. Accordingly, a POSA would have understood that Kim-439 discloses Element [1.B].

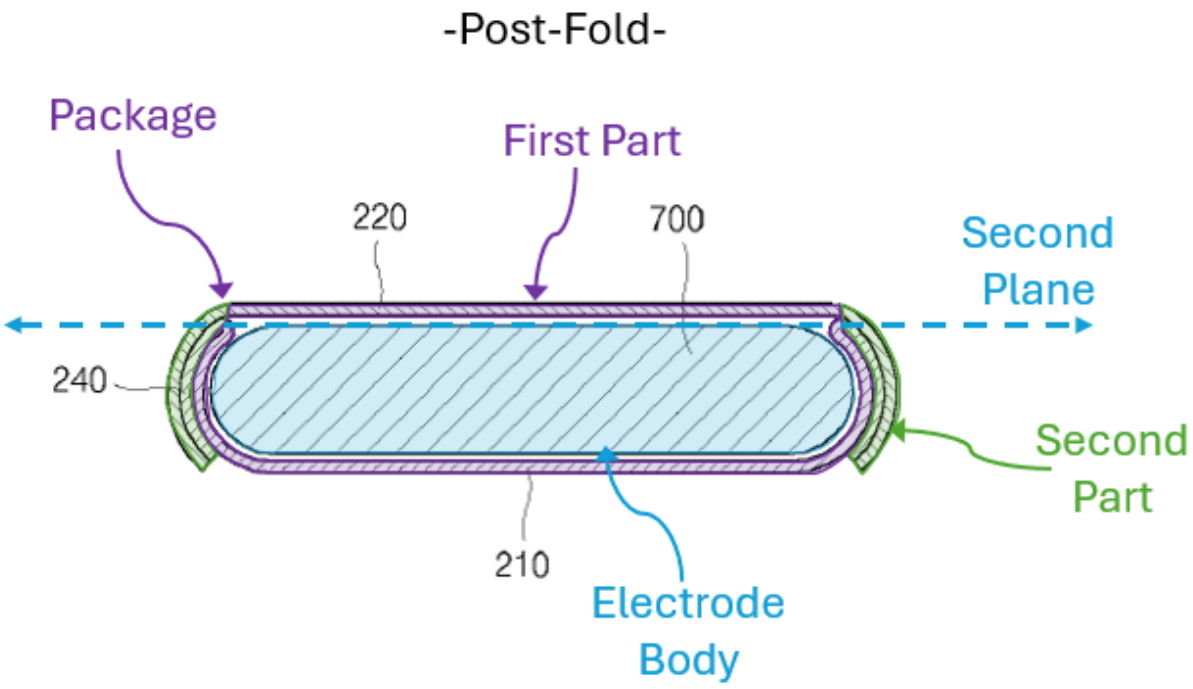
4. [1.C] "a first part covering a second plane of the electrode body"

96. Kim-439's package includes the recited "first part" as the portion of the pouch where the lower surface 121, 210 and upper surface 122, 220 are not joined together and are spaced apart to define "a space (211) for accommodating

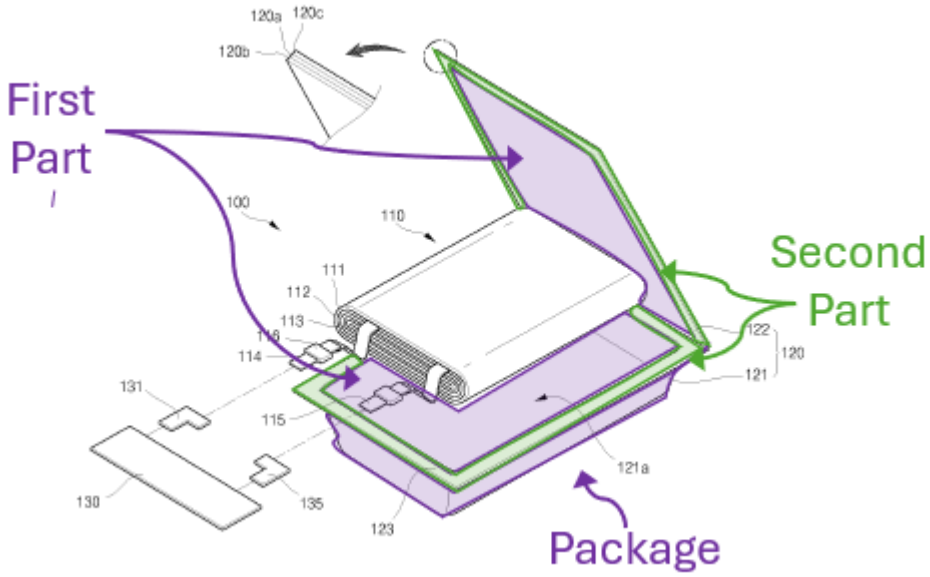
an electrode assembly." EX1005, pp. 4-5. A POSA would have understood that Kim-439's upper surface 122, 220 and lower surface 121, 210 correspond to the recited "first part" because these opposed laminate layers define the primary body of the pouch casing that encloses and covers the electrode assembly. As annotated in Figure 5b below, upper surface 220 of Kim-439's pouch covers a second plane of electrode assembly 700. EX1005, pp. 4-5.



EX1005, FIG. 4b (annotated).



EX1005, FIG. 5b (annotated).

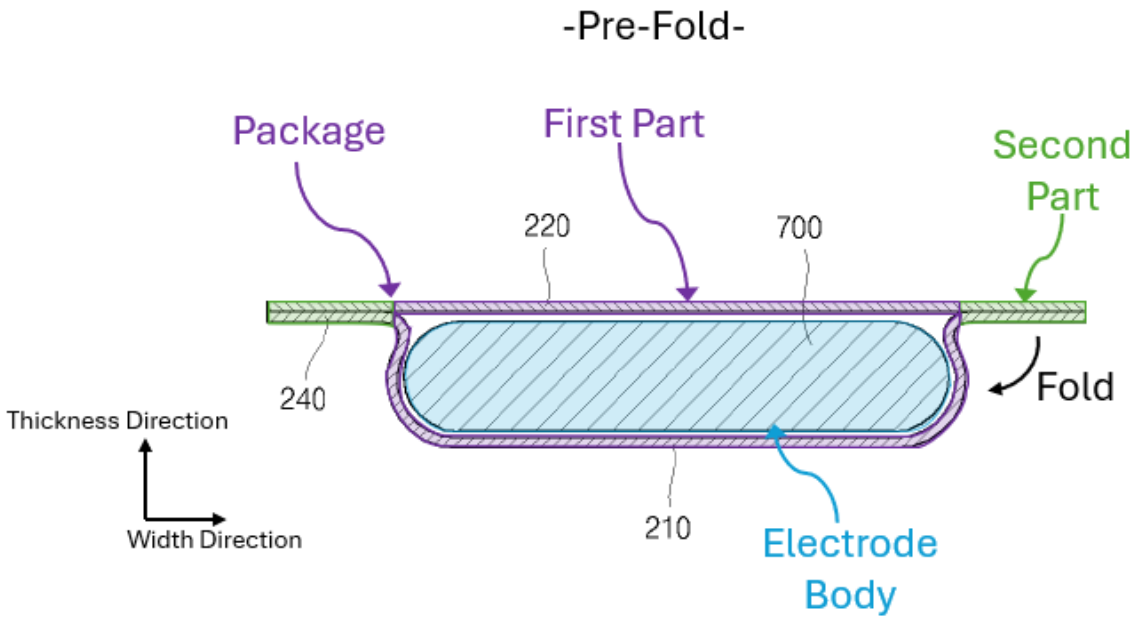


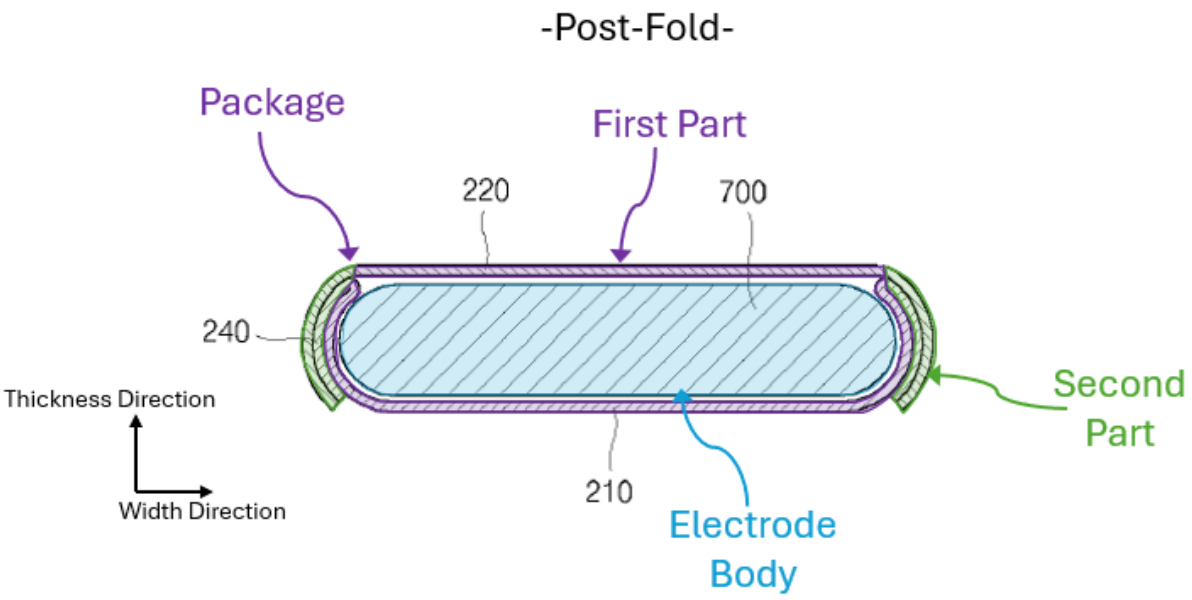
EX1005, FIG. 1A (annotated).

97. Accordingly, a POSA would have understood that Kim-439 discloses Element [1.C].

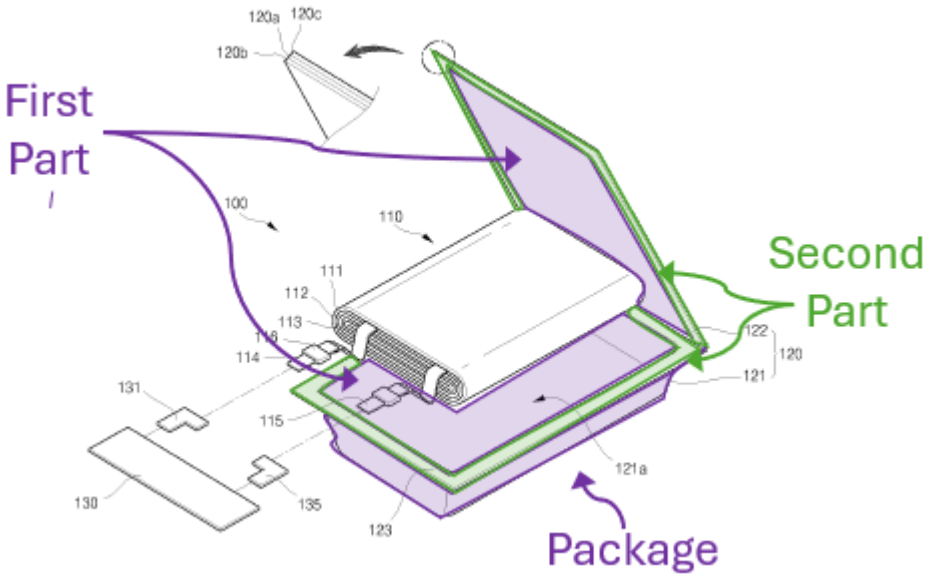
5. [1.D] "a second part protruding from the first part in a width direction of the electrode body"

98. Kim-439's package includes the recited "second part" as a bonding portion 123, 240 where the lower surface 121, 210 and upper surface 122, 220 of pouch casing 120, 200 form a flange that protrudes from the pouch in a width direction. EX1005, pp. 4-5 ("[T]he portion where the flange (215) of the lower surface (210) and the upper surface (220) contact each other and are bonded and sealed serves as a bonding portion (240)"). A POSA would have understood that Kim-439's bonding portion 123, 240 corresponds to the recited second part because Kim-439's bonded portion 123, 240 defines a distinct portion of the package (pouch case 120, 200) formed by sealing the opposing laminate layers together at the edges and extending outward from the main body of the package.





EX1005, FIGs. 4b, 5b (annotated).

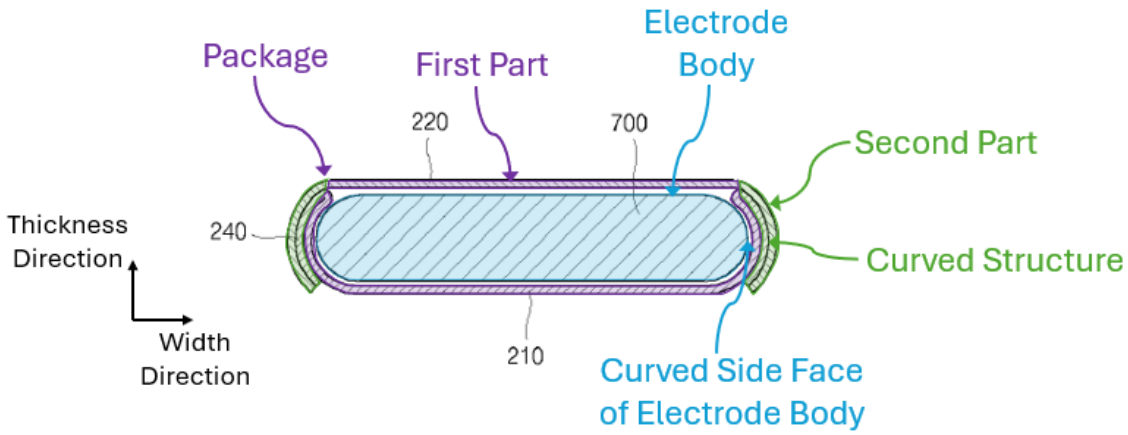


EX1005, FIG. 1A (annotated).

99. Accordingly, a POSA would have understood that Kim-439 discloses Element [1.D].

6. [1.E] "wherein the second part comprises a curved structure, the curved structure curves around a curved side face of the electrode body in a thickness direction perpendicular to the width direction"

100. Kim-439's second part (bonding portion 123, 240) includes a curved structure (annotated) that curves around a curved side face of the electrode assembly 700 in a thickness direction perpendicular to the width direction, as annotated below in Figure 5b. EX1005, pp. 4-5 ("[T]he bonding portion (240) is folded along the outwardly rounded sides of the space (211) for accommodating the electrode assembly."), 5 ("[T]he overall shape of the pouch casing (200) accommodating the electrode assembly (700) is a box shape with two opposing sides that are outwardly rounded"). A POSA would have understood that Kim-439's bonding portion 123, 240 curves around the curved side face of electrode assembly 700 because Kim-439 discloses that the sides of the pouch casing 200 are formed to be "outwardly rounded" to correspond to the shape of the electrode assembly and that the bonded portion 240 is then folded along those rounded sides. EX1005, p. 5.



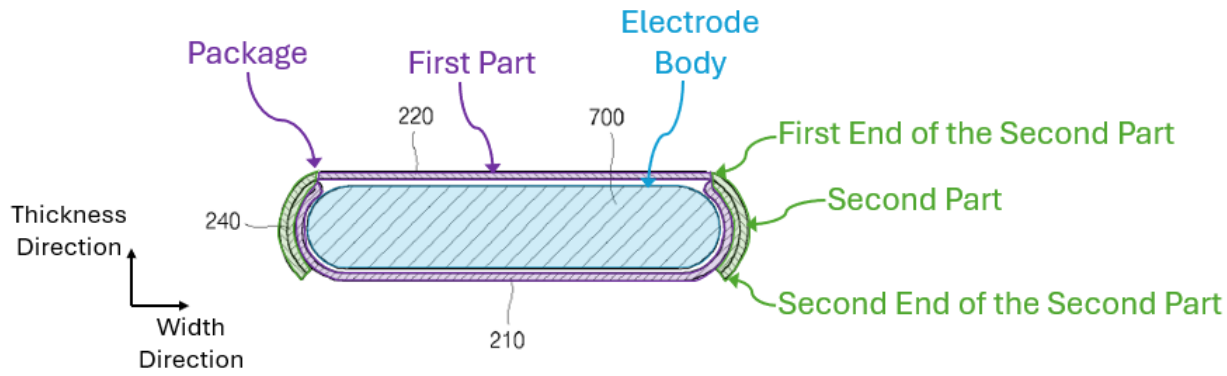
EX1005, FIG. 5b (annotated).

101. Accordingly, a POSA would have understood that Kim-439 discloses Element [1.E].

7. [1.F] "the second part including a first end connected to the first part and a second end opposite to the first end in the thickness direction"

102. Kim-439's second part (bonding portion 123, 240) includes a first end connected to the first part (non-bonding portions of casing 120, 200) and a second end opposite the first end in the thickness direction, as annotated below in Figure 5b. EX1005, pp. 4-5 ("[T]he portion where the flange (215) of the lower surface (210) and the upper surface (220) contact each other and are bonded and sealed serves as a bonding portion (240)"). A POSA would have understood that the end of the bonded portion 240 extending from the unbonded portions of upper surface 220 and lower surface 210 corresponds to the recited "first end" because the bonding portion 240 is formed by joining those opposing upper surface 220 and lower surface 210 at their periphery such that the bonded portion 240 originates

directly from, and is continuously connected to, the non-bonded laminate regions that define the main body of the pouch casing 200. And a POSA would have understood that the leading edge of bonded portion 240 corresponds to the recited "second end" because it is the outwardmost edge of the bonded portion 240 that terminates opposite the connection point with the first part in the thickness direction.



EX1005, FIG. 5b (annotated).

103. Accordingly, a POSA would have understood that Kim-439 discloses Element [1.F].

8. [1.G] "the second part is adhered to the curved side face of the electrode body via an adhesive layer"

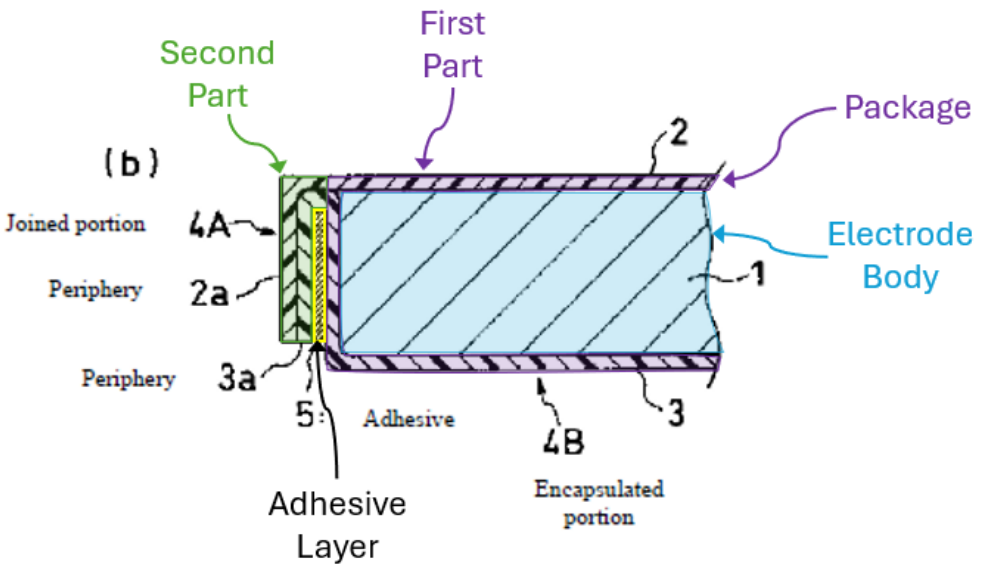
a. Kim-439

104. While Kim-439 describes an adhesive layer used as a "heat-sealing layer (120b)" in the laminate sheet of pouch casing 120, Kim-439 does not explicitly disclose that its second part (bonding portion 123, 240) is adhered to the curved side face of the electrode body via an adhesive layer. However, Ueda

demonstrates that adhering a second part of a package to a side face of an electrode body was obvious.

b. Ueda

105. Ueda's package includes a first part as an "encapsulated portion 4B" that "encapsulates" an electrode body (e.g., battery element 1). EX1006, ¶[0018]. Ueda's package includes a second part as a joined tab portion 4A that "projects outward from [the] encapsulated portion 4B." EX1006, ¶¶[0015], [0018]. Ueda further discloses adhering the joined tab portion 4A "to a side surface of an encapsulated portion 4B with an adhesive 5." EX1006, ¶[0015]; *see also* EX1006, ¶¶[0008]-[0009], [0018], [0029]. Consistent with the construction that I provided in Section VIII.D.1, Ueda discloses the recited "adhesive layer" as an adhesive layer between tab portion 4A and a side surface of encapsulated portion 4B enclosing the side face of battery element 1, thereby fixing tab portion 4A (indirectly, as is sufficient) against the side face of battery element 1. EX1006, ¶[0017]. A POSA would have understood that Ueda's adhesive 5 corresponds to the recited "adhesive layer" because adhesive 5 is a bonding material disposed at an interface between tab portion 4A and side of encapsulated portion 4B to adhere tab portion 4A to the side of encapsulated portion 4B.

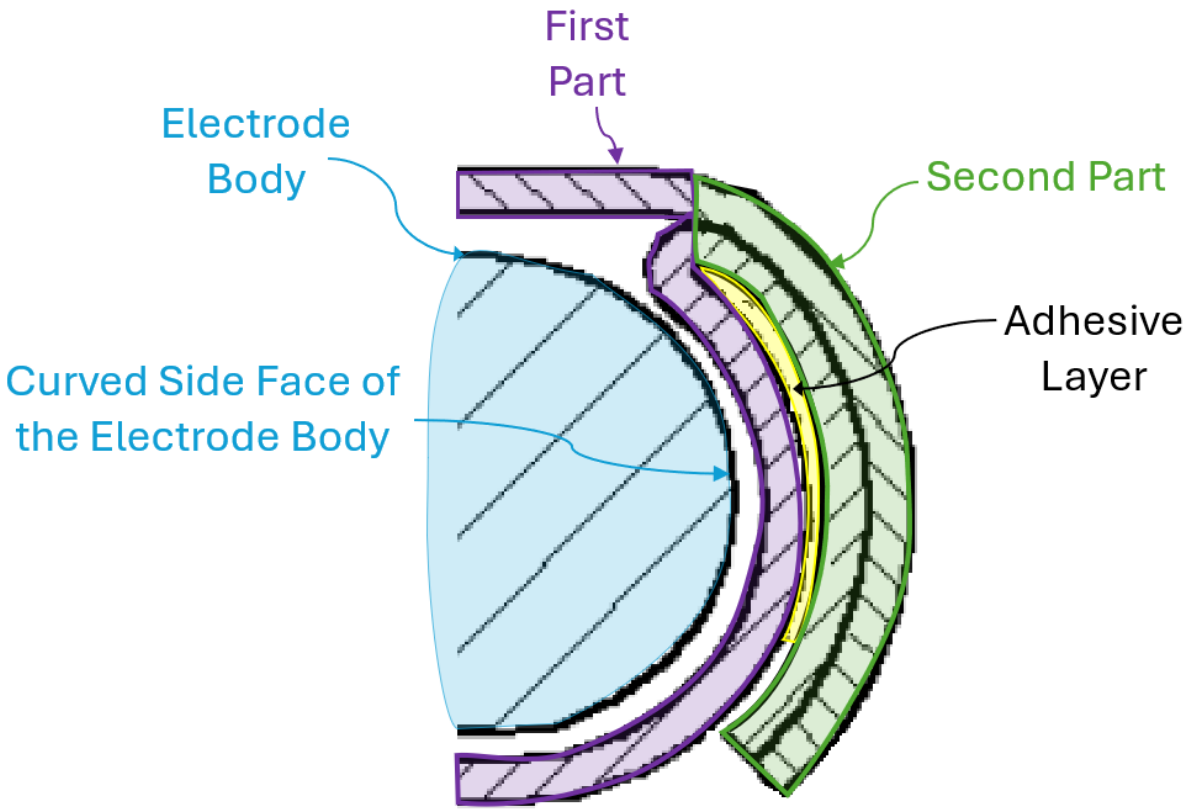


EX1006, FIG. 1 (annotated).

c. Kim-439/Ueda Combination

106. As I discussed in Section IX.C.1, it would have been obvious to adhere Kim-439's second part (bonding portion 240) to a curved side face of its electrode assembly by applying an adhesive between Kim-439's second part (bonding portion 240) and a side of its package, as shown below in view of Ueda's disclosure. Ueda teaches that such adhesive bonding increases the package's side face rigidity, prevents separation of the second part, and maintains a compact structure by holding the second part flush against the side face. EX1006, ¶¶[0008], [0081]. A POSA would have also been motivated to apply Ueda's adhesive layer technique to Kim-439's bonding portion because doing so would prevent deformation, separation, and insufficient rigidity at the side surface. EX1006, ¶¶[0006]-[0008], [0015], [0081]; EX1007, ¶¶[0057]-[0068]. Thus, this

modification would ensure that Kim-439's second part (bonding portion 240) remains secured to the side of the package to maintain a compact structure while increasing the casing's rigidity. This modification would have simply been applying a known technique (Ueda's adhesive) to a known device (Kim-439's battery) to improve the structural integrity of Kim-439's battery. See Section IX.C.1.



Rendering of Kim-439's Modified Battery.

107. Accordingly, a POSA would have understood that the combined disclosures of Kim-439 and Ueda render Element [1.G] obvious.

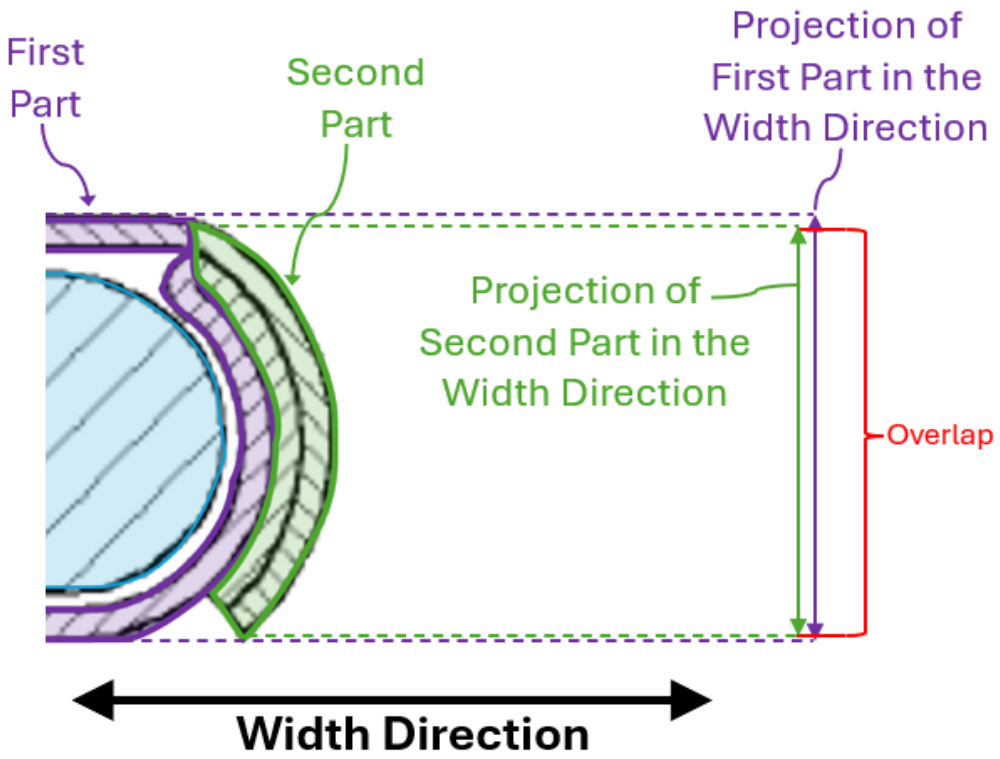
E. Dependent Claim 2

108. Claim 2 depends from claim 1 and further recites "wherein a projection of the first part in the width direction overlaps with a projection of the second part in the width direction."

109. A projection[7] of Kim-439's first part (upper and lower surfaces 210, 220) in the width direction overlaps with a projection of its second part (bonding portion 240) in the width direction, as annotated below in Figure 5b. In particular, when viewed along the width axis, the height of the projection of Kim-439's second part does not extend beyond the height of the projection of Kim-439's first part, thereby overlapping in the width direction. A POSA would have understood

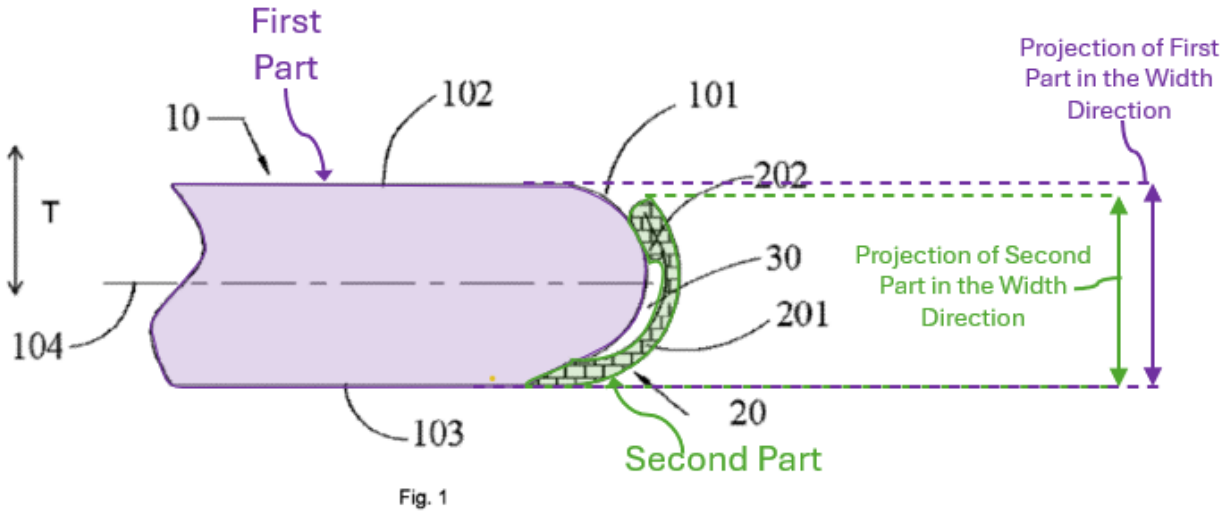
[7] A POSA would have understood a "projection" in the context of the '808 patent to mean the two-dimensional outline of a three-dimensional structure when viewed along (i.e., collapsed onto) a specified direction, such that the structure's extent in the orthogonal directions is represented on a plane. For example, projecting outlines of structural components in the "width direction" corresponds to viewing those components along the width axis to compare their relative extents in the thickness direction. Projecting outlines of structural components in the "thickness direction" corresponds to viewing those components along the thickness axis to compare the their relative extents in the width direction.

this overlapping relationship between the projections of Kim-439's first and second parts in the width direction because Kim-439's second part (bonding portion 240) is contained within the lateral profile of pouch casing 200.



EX1005, FIG. 5b (enlarged partial, annotated).

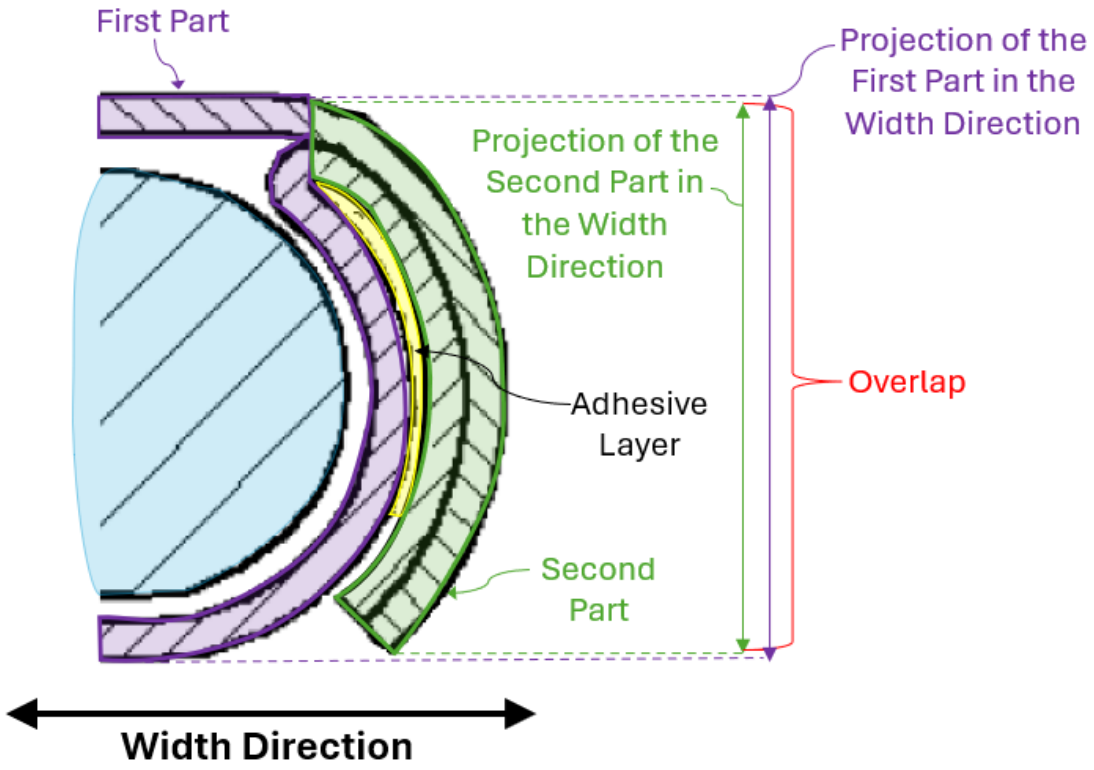
110. The projection of Kim-439's second part overlaps the projection of Kim-439's first part in the width direction similarly as the second part (flange portion 20) disclosed by Figure 1 of the '808 patent:



EX1001, FIG. 1 (annotated).

111. Furthermore, a POSA would have understood or found it obvious that the projections would remain overlapped in the width direction in the Kim-439/Ueda combination, as annotated in the rendering below, because Kim-439's second part (bonding portion 240) would not extend beyond the top and bottom surfaces of the first part even with the presence of an adhesive layer. This modification is consistent with Ueda's teachings, showing the joined tab portion 4a not extending beyond the top and bottom surfaces of encapsulated portion 4B "to provide a battery that is compact in size." EX1006, Abstract. Given that both Kim-439 and Ueda emphasize maintaining a compact battery profile, a POSA would have been motivated to not extend the leading edge of Kim-439's bonding portion beyond the package's lower surface, as doing so would unnecessarily increase the battery's overall dimensions and undermine the design objective of

compactness. Accordingly, a POSA would have recognized that maintaining this overlapping relationship in Kim-439's battery is a predictable solution that preserves the compact profile of the battery.



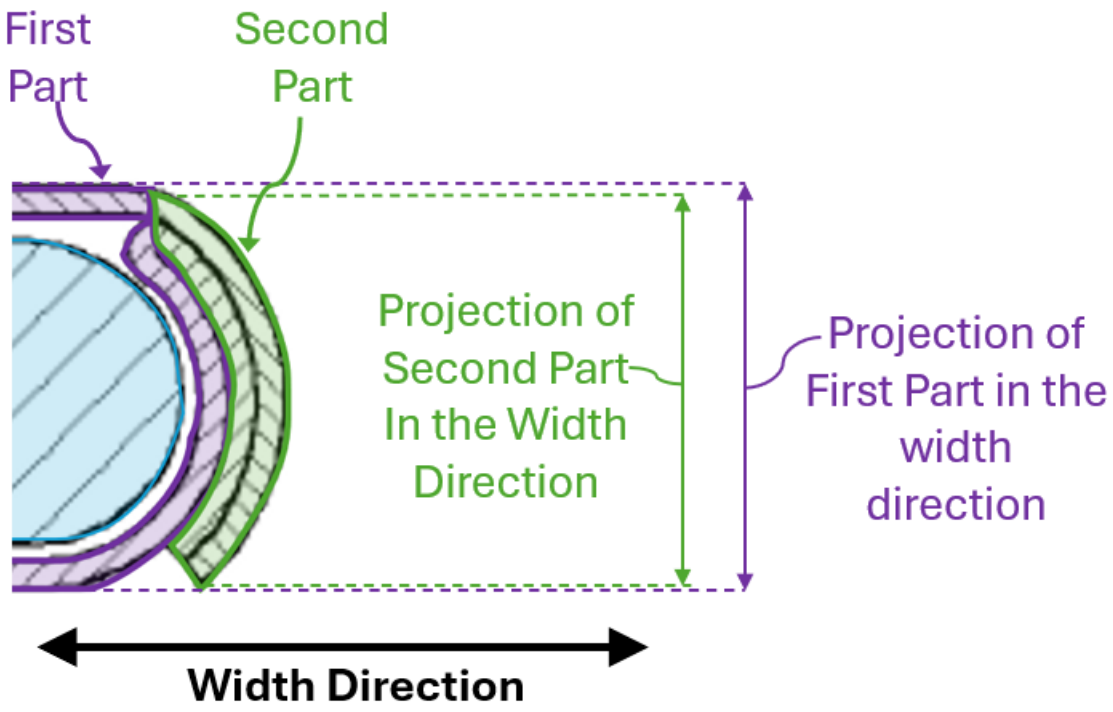
Rendering of Kim-439's Modified Battery.

F. Dependent Claim 3

112. Claim 3 depends from claim 2 and further recites that "the projection of the second part in the width direction is located within the projection of the first part in the width direction."

113. As annotated in Figure 5b of Kim-439, reproduced below, a projection of Kim-439's second part (bonding portion 240) in the width direction is located within the projection of its first part (upper and lower surfaces 210, 220) in the

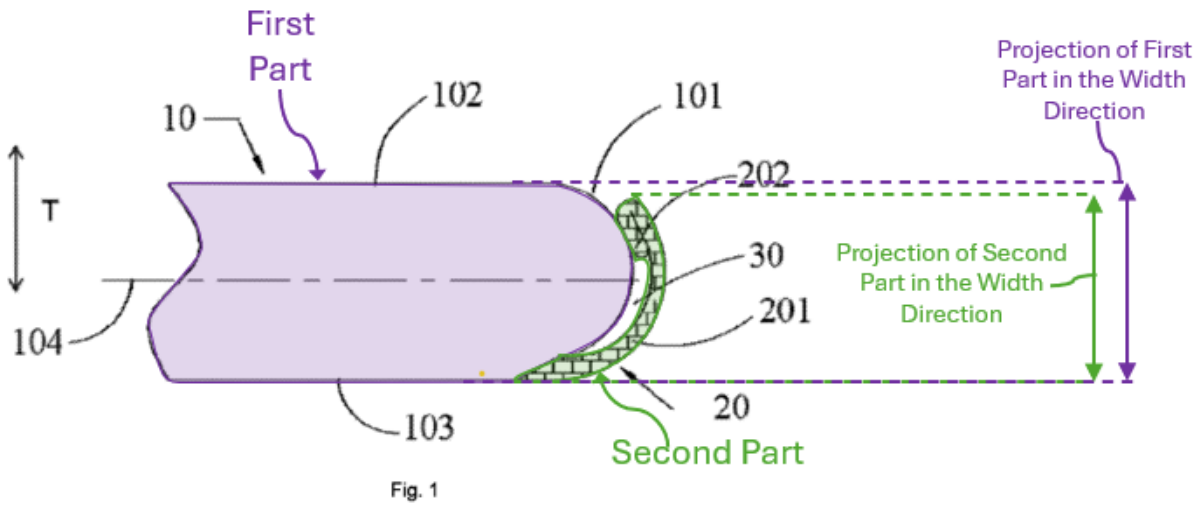
width direction. In particular, when viewed along the width axis, the height of the projection of Kim-439's second part does not extend beyond the height of the projection of Kim-439's first part. Instead, the projection of Kim-439's second part remains contained within the projection of its first part. A POSA would have understood that the projection of Kim-439's second part in the width direction is located within the projection of Kim-439's first part because Kim-439's second part (bonding portion 240) is contained within the lateral profile of pouch casing 200.



EX1005, FIG. 5b (enlarged partial, annotated).

114. The projection of Kim-439's second part is located within the projection of Kim-439's first part in the width direction in the same manner as the

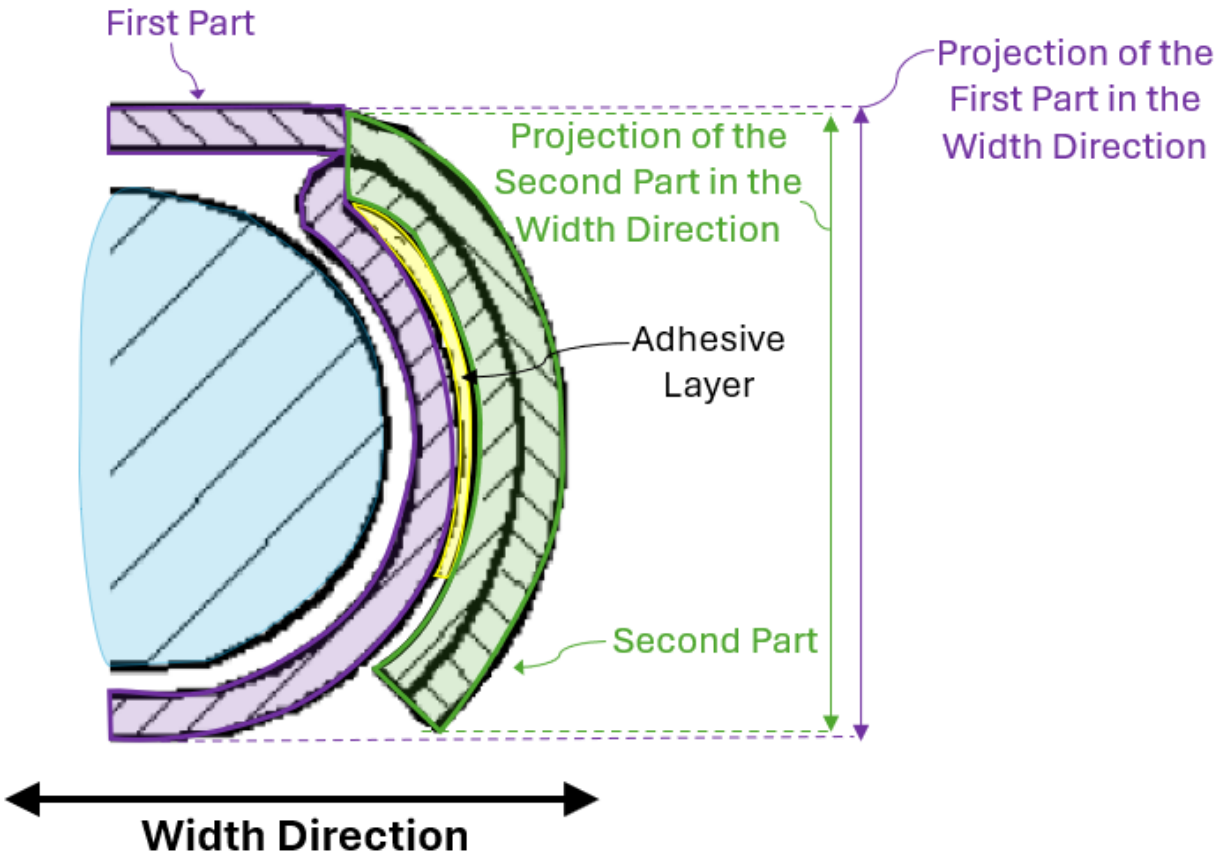
second part (flange portion 20) disclosed by Figure 1 of the '808 patent:



EX1001, FIG. 1 (annotated).

115. Furthermore, a POSA would have understood or found it obvious that Kim-439's second part's projection in the width direction would remain within the first part's projection in the width direction in the Kim-439/Ueda combination, as annotated in the rendering below. This is because Kim-439's second part (bonding portion 240) would not extend beyond the top and bottom surfaces of the first part even with the presence of an adhesive layer. This modification is consistent with Ueda's teachings, showing the joined tab portion 4A not extending beyond the top and bottom surfaces of encapsulated portion 4B "to provide a battery that is compact in size." EX1006, Abstract. Given that both Kim-439 and Ueda emphasize maintaining a compact battery profile, a POSA would have been motivated not to extend the leading edge of Kim-439's bonding portion beyond the

package's lower surface, as doing so would unnecessarily increase the battery's overall dimensions and undermine the design objective of compactness. Accordingly, a POSA would have recognized that maintaining this arrangement in Kim-439's battery is a predictable solution that preserves the compact profile of the battery.

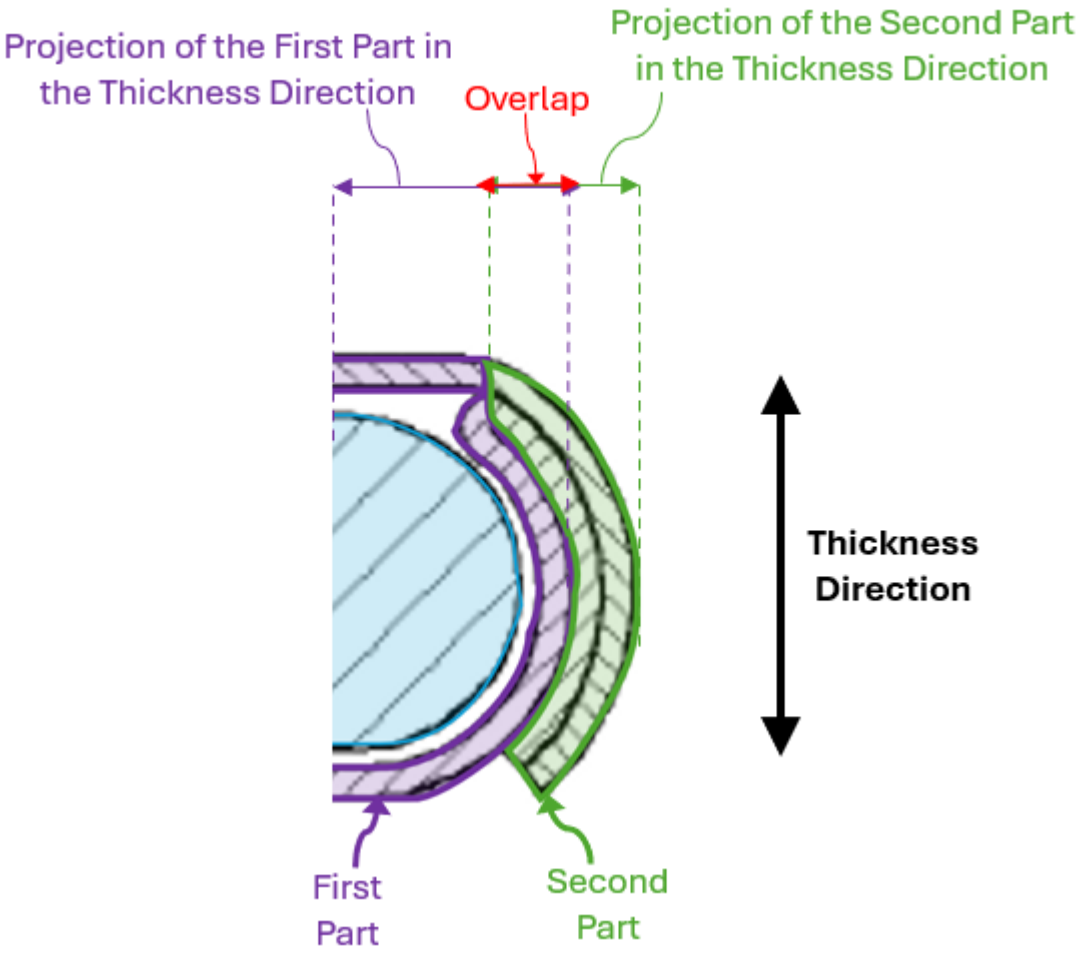


Rendering of Kim-439's Modified Battery.

G. Dependent Claim 4

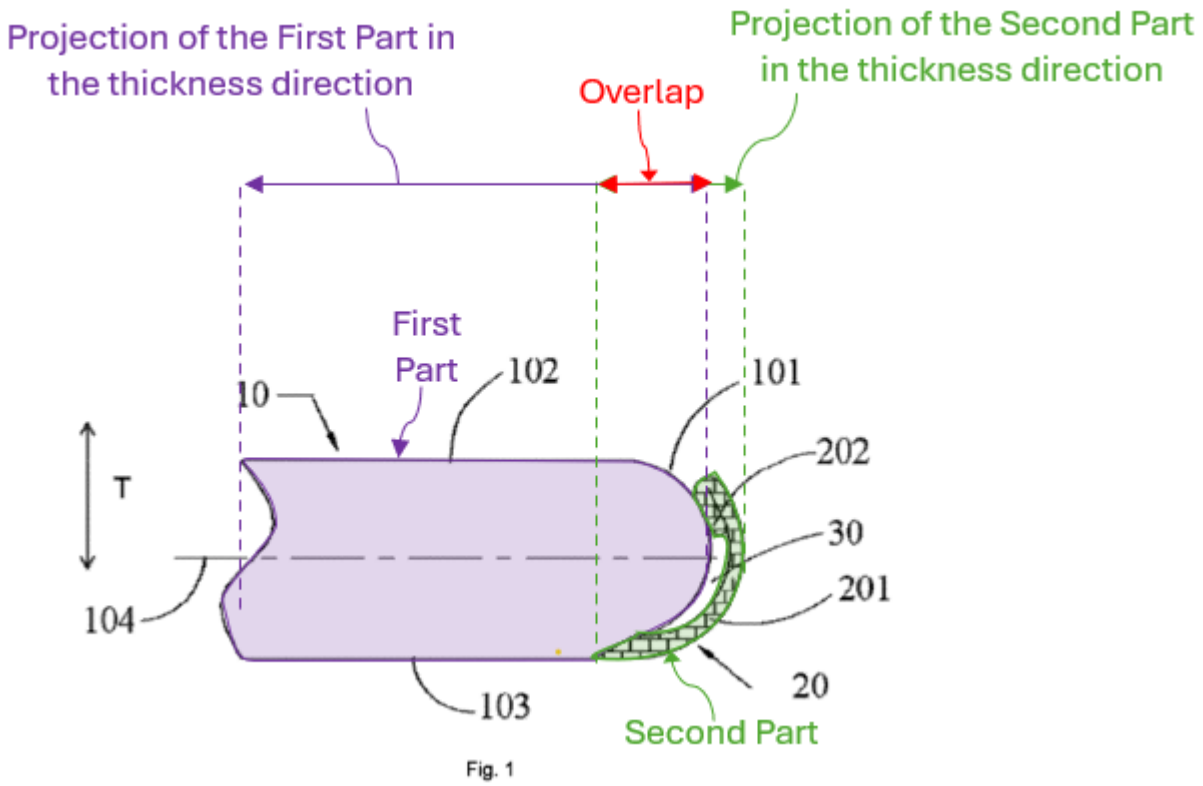
116. Dependent claim 4 depends from claim 2 and further recites "wherein a projection of the first part in the thickness direction overlaps with a projection of the second part in the thickness direction."

117. As annotated in Figure 5b of Kim-439, reproduced below, a projection of Kim-439's first part (upper and lower surfaces 210, 220) in the thickness direction overlaps with a projection of its second part (bonding portion 240) in the thickness direction. In particular, when viewed along the thickness axis, the projection of Kim-439's second part extends into and overlaps a portion of the projection of Kim-439's first part, rather than being entirely offset in front of or behind it. A POSA would have understood that the projection of Kim-439's first part in the thickness direction overlaps the projection of Kim-439's second part in the thickness direction because Kim-439's second part (bonding portion 240) curves around a portion of the side of Kim-439's first part (lower surface 210 and upper surface 220).



EX1005, FIG. 5b (enlarged partial, annotated).

118. The projection of Kim-439's second part overlaps the projection of Kim-439's first part in the thickness direction in the same manner as the second part (flange portion 20) disclosed in Figure 1 of the '808 patent:

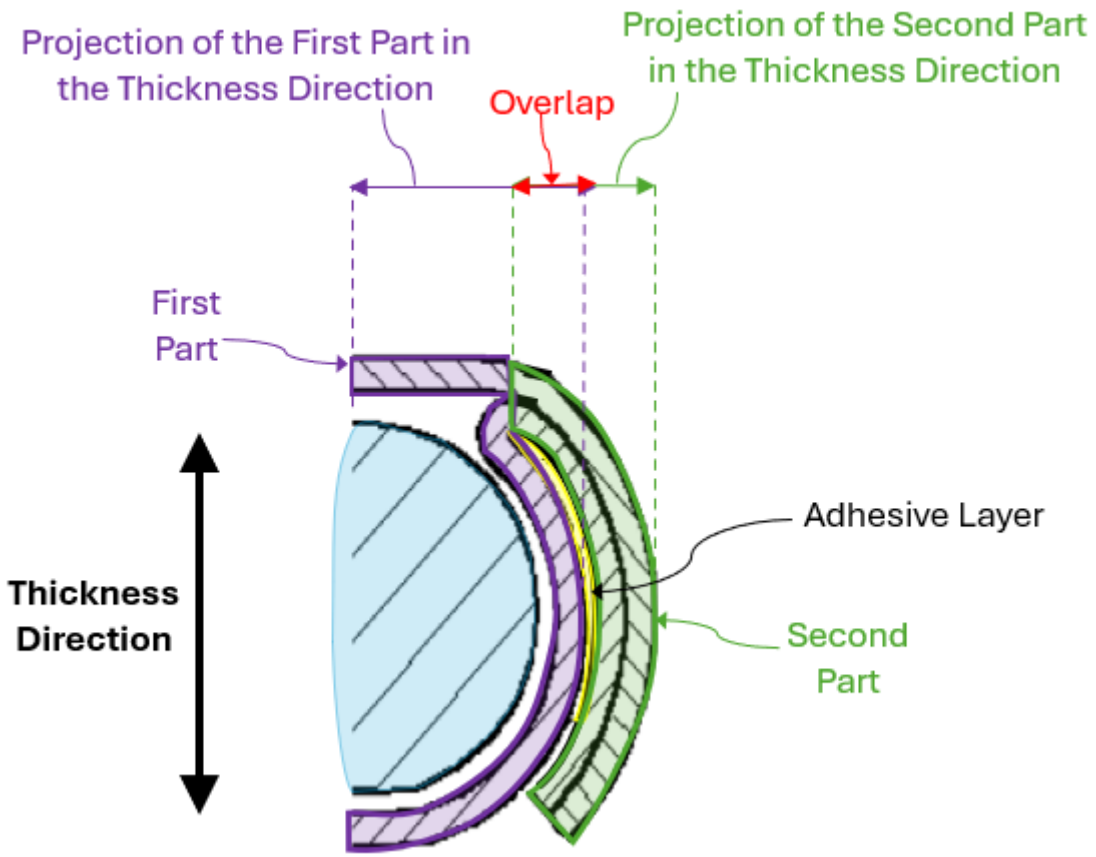


EX1001, FIG. 1 (annotated).

119. Furthermore, a POSA would have understood or found it obvious that the projections would remain overlapped in the thickness direction of Kim-439 as modified, because Kim-439's second part (bonding portion 240) would continue to bend around the side face of the casing, as taught by Ueda. EX1006, ¶[0006] ("[A]t least a part of the joined tab portion is folded so as to *follow* the encapsulated portion.")[8]. This bending configuration would have been maintained even with the presence of an adhesive layer because the adhesive layer would conform to and occupy the interface with limited thickness between Kim-439's curved bonding

[8] Emphasis is added throughout except where otherwise noted.

portion and the curved side face of the package, thereby bonding those surfaces without altering their geometric relationship. A POSA would have also been motivated to maintain this configuration because, in both Kim-439 and Ueda, the purpose of folding the bonded portion is to conform it closely to the exterior contour of the battery body. EX1005, pp. 3-5; EX1006, ¶[0006]. Accordingly, a POSA would have recognized that this overlapping relationship is a result of configuring Kim-439's bonded portion 240 to follow and conform to the curved side face of the pouch casing.



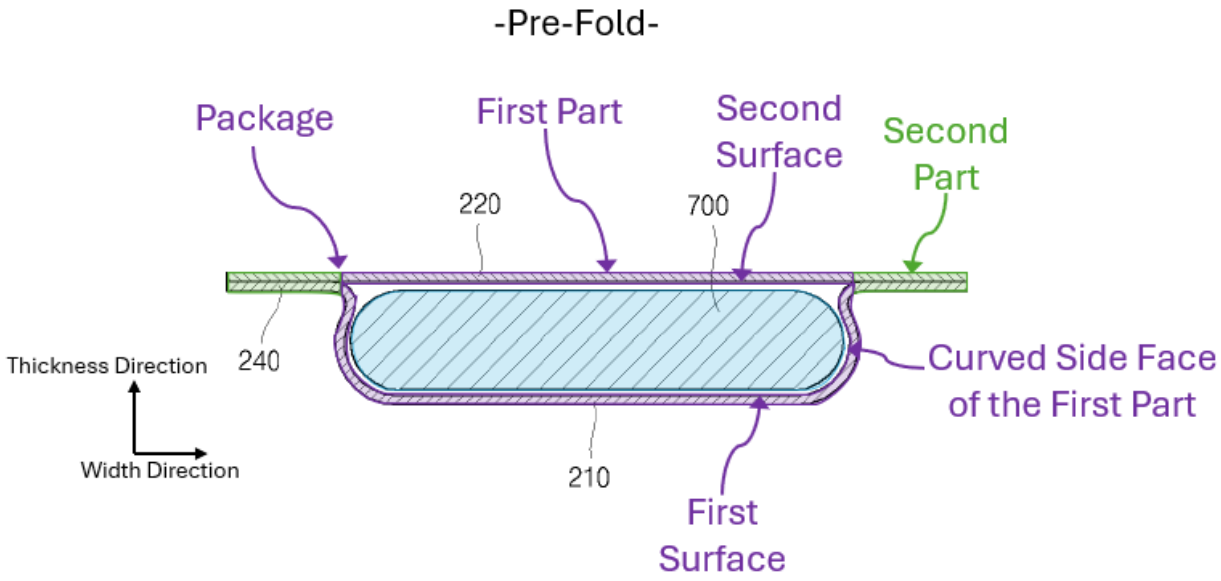
Rendering of Kim-439's Modified Battery.

H. Dependent Claim 5

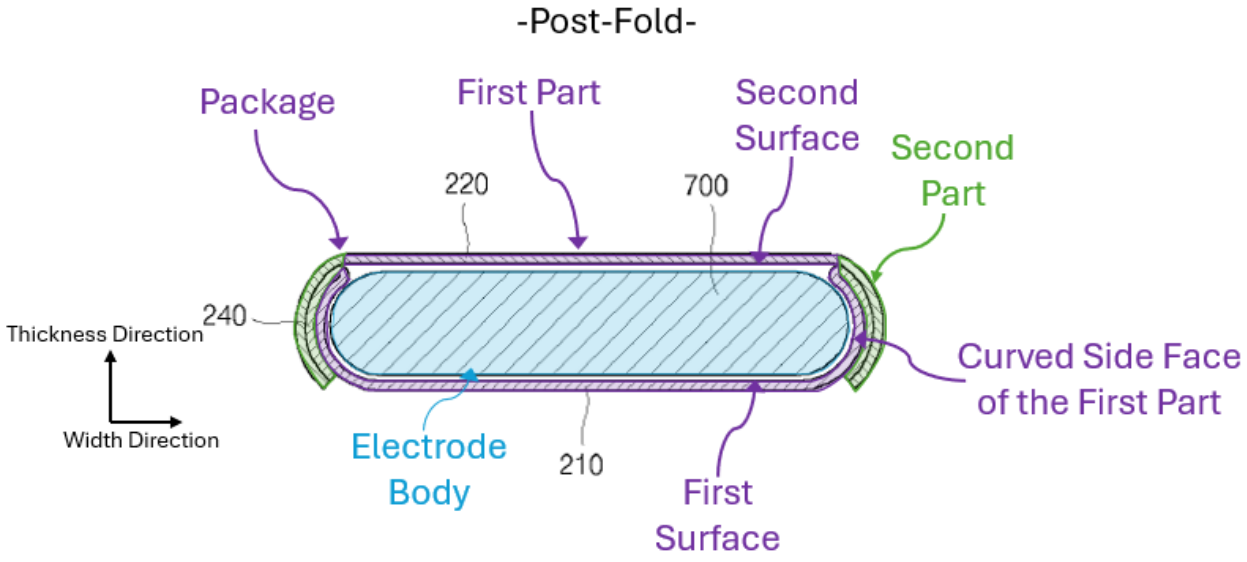
120. Claim 5 depends from claim 1 and further recites:

> **1. "wherein the first part comprises: a first surface extending in the width direction; a second surface extending in the width direction, wherein the second surface is opposite to the first surface in the thickness direction."**

121. As shown below in Figures 4b and 5b, Kim-439's first part includes a "first surface extending in the width direction," as the interior side of Kim-439's upper surface 220, and a "second surface extending in the width direction," as the interior side of Kim-439's lower surface 210. EX1005, p. 5. A POSA would have understood that the interior side of Kim-439's upper surface 220 corresponds to the recited "first surface" because it forms one boundary of the internal space that accommodates the electrode assembly and extends laterally in the width direction across the top of that space. And a POSA would have understood that the interior side of Kim-439's lower surface 210 corresponds to the recited "second surface" because it forms the opposing boundary of that same internal space, extending in the width direction beneath the electrode assembly and being positioned opposite the upper surface in the thickness direction.



EX1005, FIG. 4b (annotated).

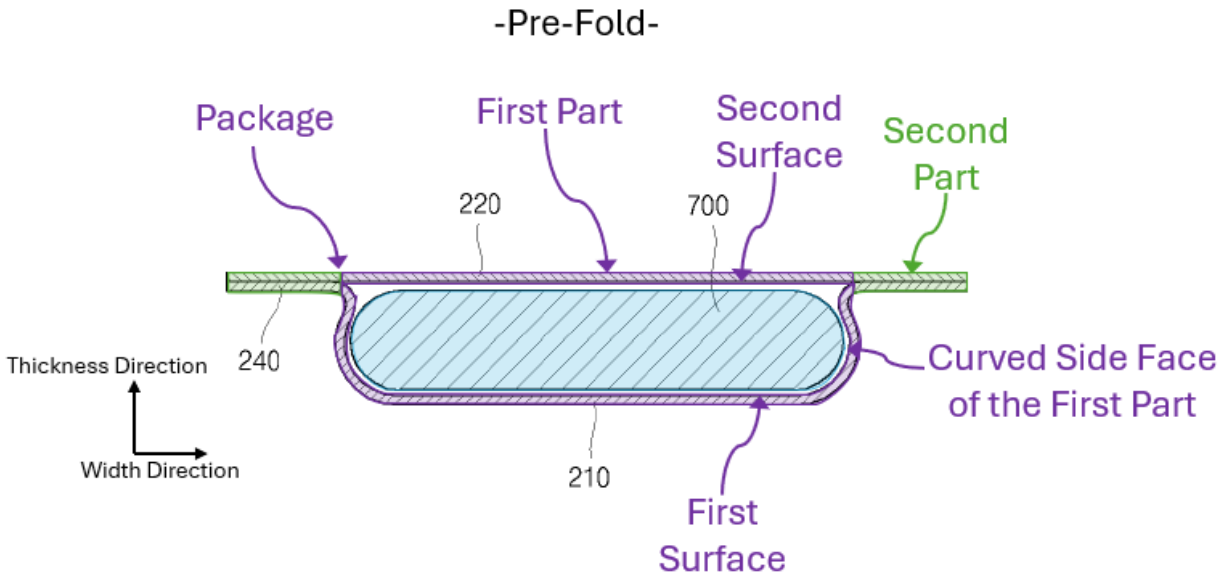


EX1005, FIG. 5b (annotated).

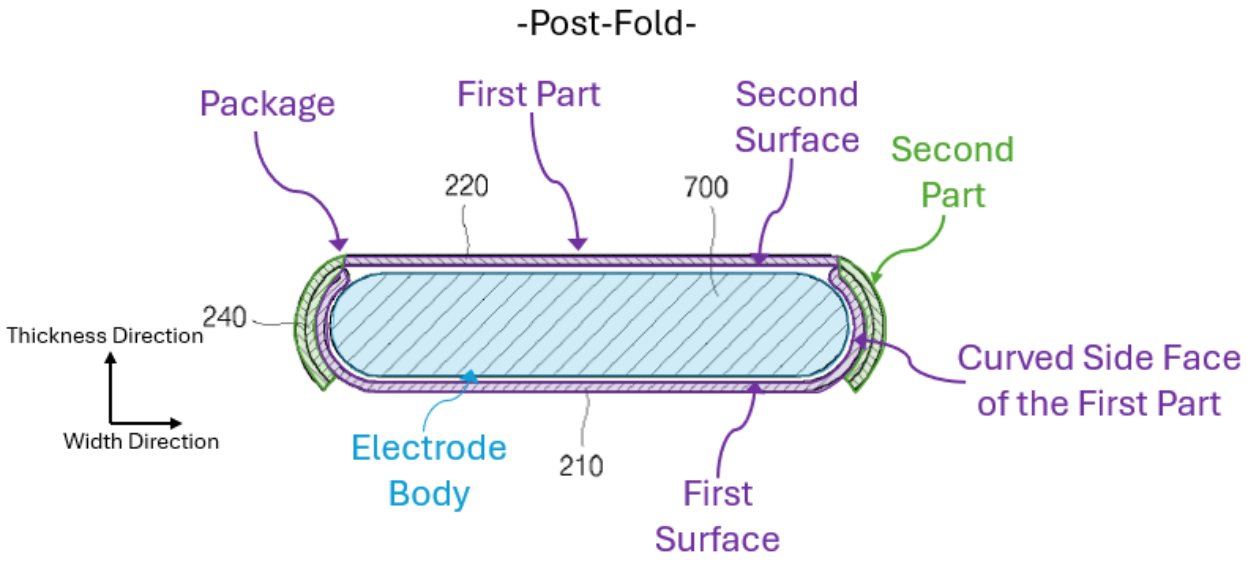
2. "wherein the first part comprises: … the curved side face connects the first surface and the second surface."

122. Consistent with the claim construction provided in Section VIII.D.2, Kim-439 discloses the recited "curved side face," as the "rounded" side of Kim-

439's casing because the rounded side of Kim-439's pouch casing 200 connects the interior side of the pouch casing's upper surface 220 to the interior side of the pouch casing's lower surface 210. EX1005, p. 5. The interior side of both Kim-439's upper surface 220 and lower surface 210 extend in a width direction and are located opposite to each other to define a space 211 for accommodating an electrode body. EX1005, p. 5. The rounded side of Kim-439's casing connects the interior side of Kim-439's upper surface 220 to the interior side of Kim-439's lower surface 210. EX1005, p. 5. A POSA would have understood that the rounded side of Kim-439's casing connects the interior side of both Kim-439's upper surface 220 to the interior side of Kim-439's lower surface 210 because the rounded sides of Kim-439's casing are contiguous with the interior side of Kim-439's upper surface 220 and the interior side of Kim-439's lower surface 210.

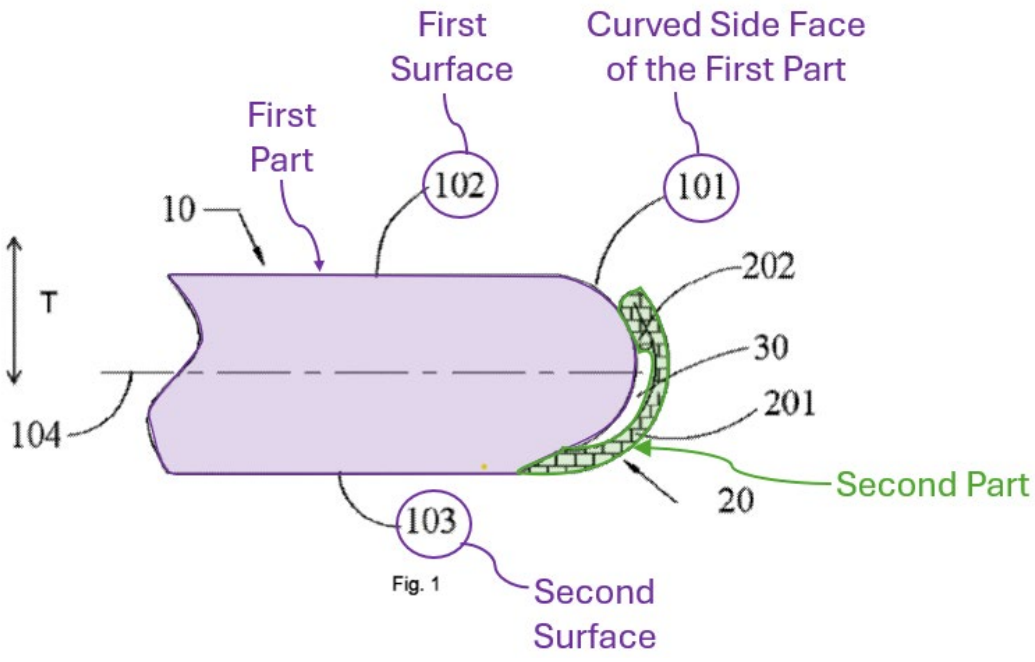


Kim-439, FIG. 4b (annotated).



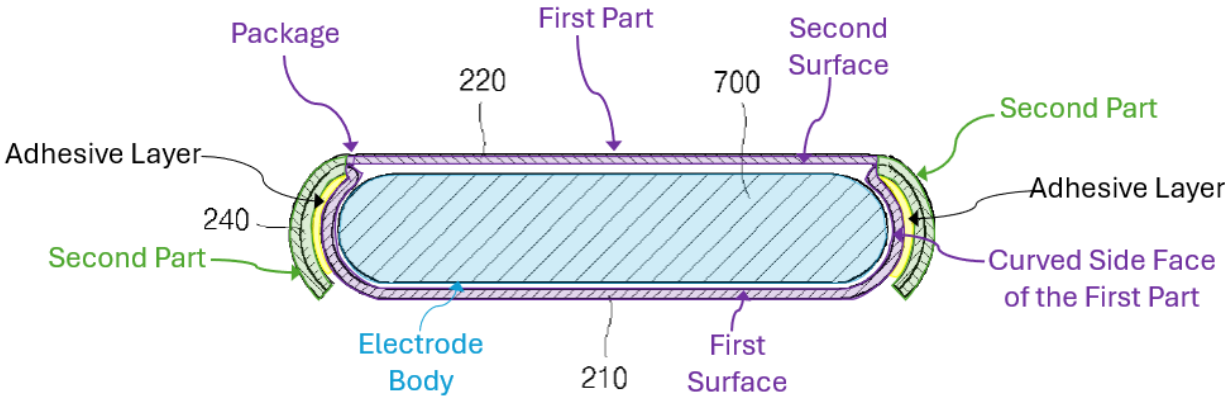
Kim-439, FIG. 5b (annotated).

123. Kim-439's rounded side surface connects upper surface 220 and lower surface 210 of pouch casing 200 in the same manner as the side face 101 disclosed by the '808 patent, as shown below. EX1001, 1:51-2:8.



EX1001, FIG. 1 (annotated).

124. Furthermore, a POSA would have understood or found it obvious that Kim-439's first surface, second surface, and curved side surface would have the same spatial arrangement in the Kim-439/Ueda combination, as annotated in the rendering below, because applying adhesive between Kim-439's second part and the side of package would not alter the structural arrangement of Kim-439's lower surface 210, upper surface 220 and the rounded side of the package. Rather, the adhesive layer would conform to and occupy the interface between Kim-439's curved bonding portion and the curved side face of the package, thereby bonding those surfaces without altering their geometric relationship.



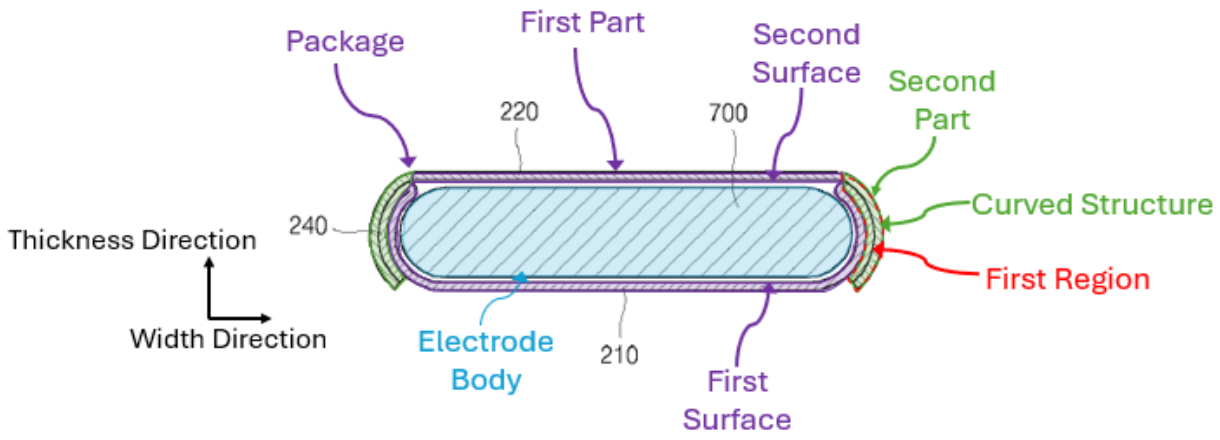
Rendering of Kim-439's Modified Battery.

I. Dependent Claim 6

125. Claim 6 depends from claim 5 and further recites "wherein the second part comprises a first region comprising the curved structure, wherein the first region is connected to the first part."

126. Kim-439's second part (bonding portion 240) comprises a first region

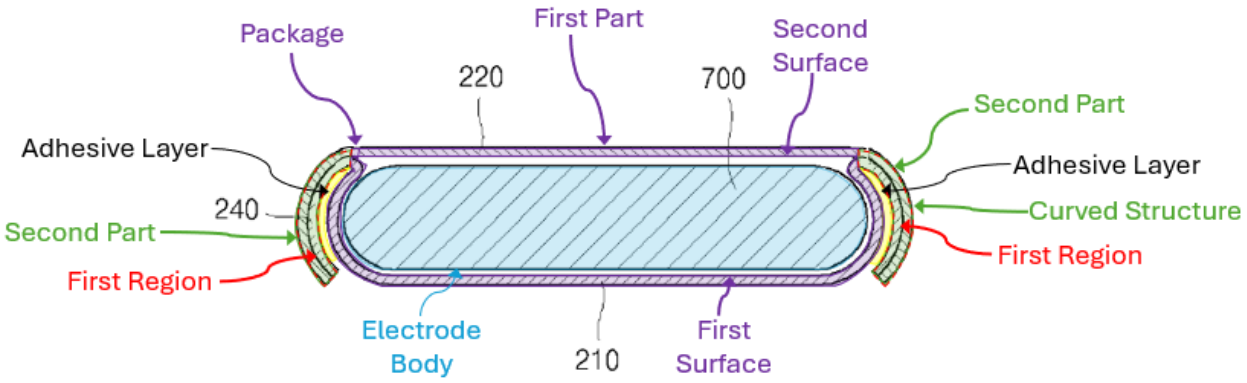
comprising a curved structure, annotated below in Figure 5b. EX1005, p. 5. A POSA would have understood that Kim-439's bonding portion 240 corresponds to the recited "first region" because Kim-439's bonding portion 240 protrudes away from the main body of Kim-439's pouch casing 200. Kim-439's bonding portion 240 (including the curved structure) is connected to the first part (upper and lower surfaces 210, 220), as the bonding portion 240 is integrally formed with the unbonded portions of upper and lower surfaces 210, 220.



Kim-439, FIG. 5b (annotated).

127. Furthermore, a POSA would have understood or found it obvious that Kim-439's second part would have had a curved structure in the Kim-439/Ueda combination, as annotated in the rendering below, because Kim-439's second part (bonding portion 240) would continue to bend around the side face of the package, consistent with Ueda's teaching. EX1006, ¶[0006] ("[A]t least a part of the joined tab portion is folded so as to *follow* the encapsulated portion."). Doing so ensures

that the second part conforms to the exterior contour of the package and maintains intimate contact along that interface to improve structural integrity.



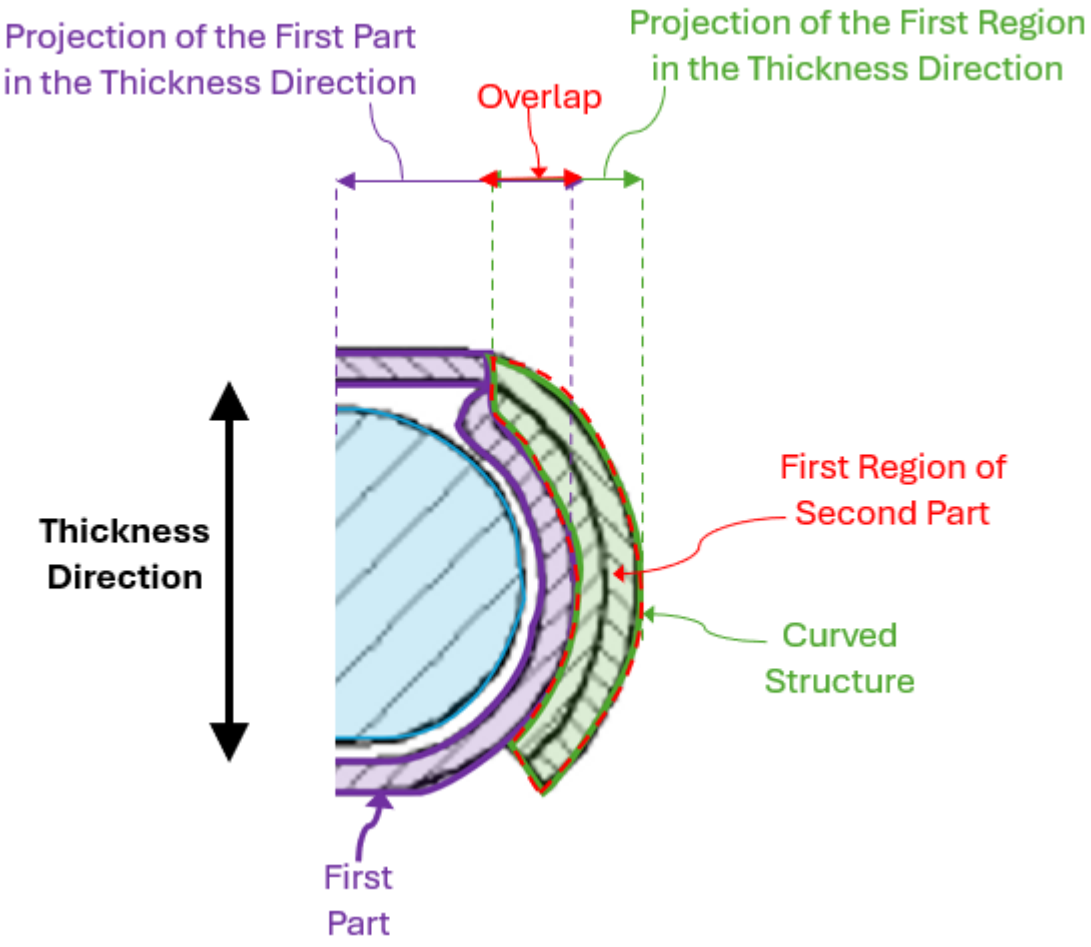
Rendering of Kim-439's Modified Battery.

J. Dependent Claim 7

128. Claim 7 depends from claim 6 and further recites "wherein a projection of the first region in the thickness direction overlaps with a projection of the first part in the thickness direction."

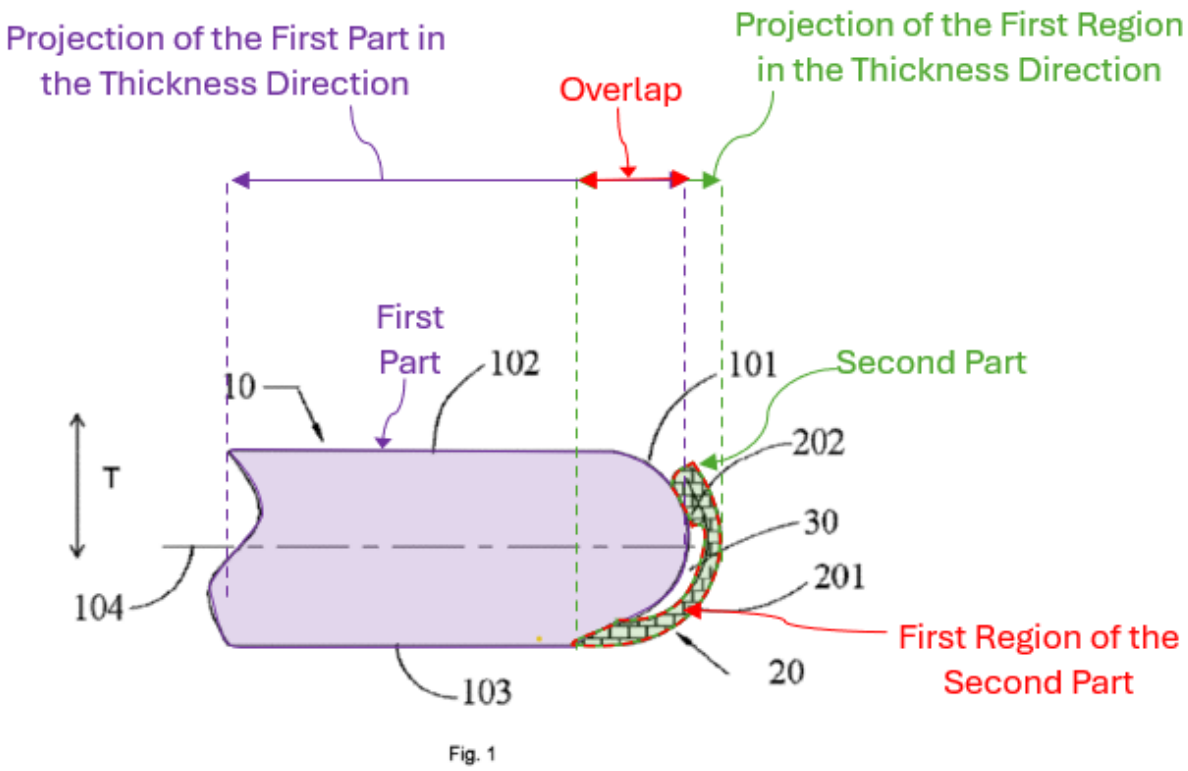
129. A projection of the first region of Kim-439's second part (bonding portion 240) in the thickness direction overlaps with a projection of its first part (upper surface 220, lower surface 210, and side) in the thickness direction, as annotated below in Figure 5b. EX1005, pp. 4-5. In particular, when viewed along the thickness axis, the projection of Kim-439's first region extends into and overlaps a portion of the projection of Kim-439's first part, rather than being entirely offset in front of or behind it. A POSA would have understood that a projection of the first region of Kim-439's second part (bonding portion 240) in the

thickness direction overlaps with a projection of Kim-439's first part in the thickness direction because Kim-439's bonding portion 240 resides at least partially within the same thickness envelope as the first part (Kim-439's upper surface 220, lower surface 210, and side) rather than being entirely displaced outward from it.



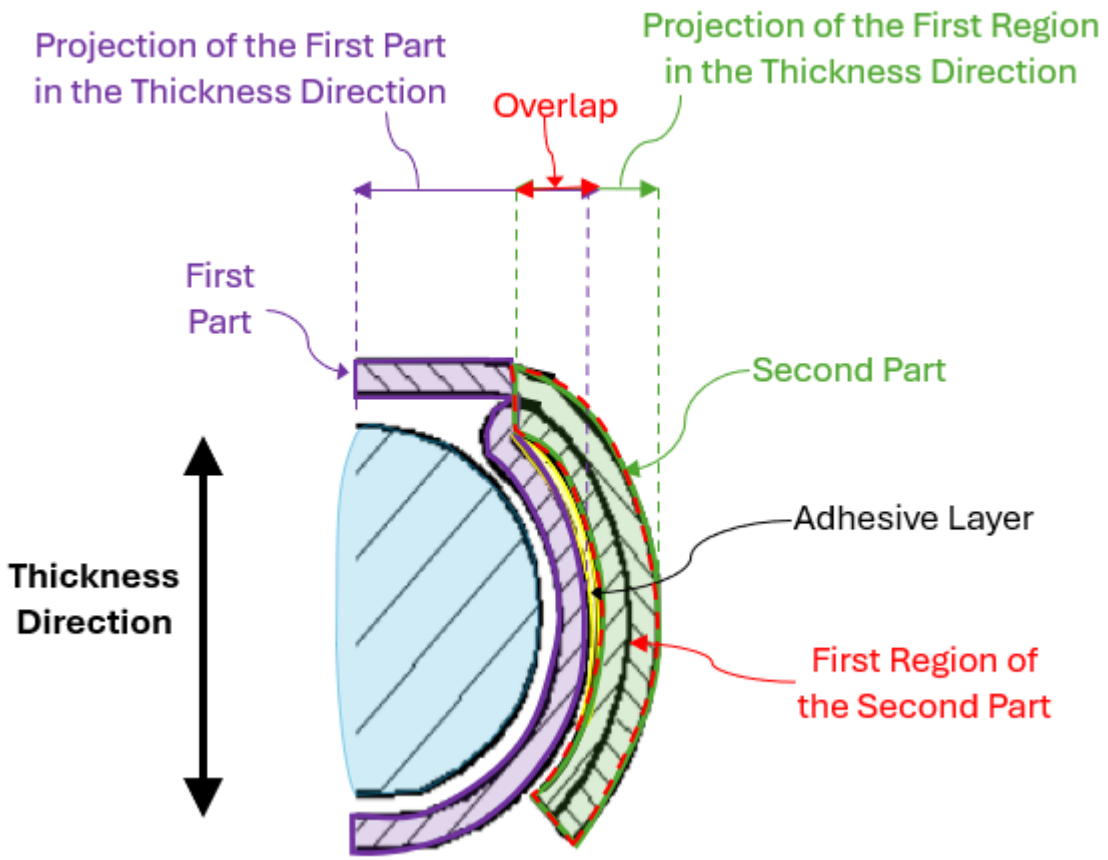
Kim-439, FIG. 5b (enlarged partial, annotated).

130. The projection of Kim-439's first region overlaps the projection of Kim-439's first part in the thickness direction in the same manner as the first part (segment 201) disclosed by Figure 1 of the '808 patent:



EX1001, FIG. 1 (annotated).

131. Furthermore, a POSA would have understood or found it obvious that the projections would remain overlapped in the thickness direction in the Kim-439/Ueda combination, as annotated in the rendering below, because Kim-439's second part (bonding portion 240) would continue to bend around the side face of the package, consistent with Ueda's teaching. EX1006, ¶[0006] ("[A]t least a part of the joined tab portion is folded so as to *follow* the encapsulated portion."). Doing so ensures that the second part conforms to the exterior contour of the package and maintains intimate contact along that interface to improve structural integrity.



Rendering of Kim-439's Modified Battery.

K. Dependent Claim 8

132. Claim 8 depends from claim 6 and further recites "wherein the second part further comprises a second region, and a folded portion connecting the first region and the second region."

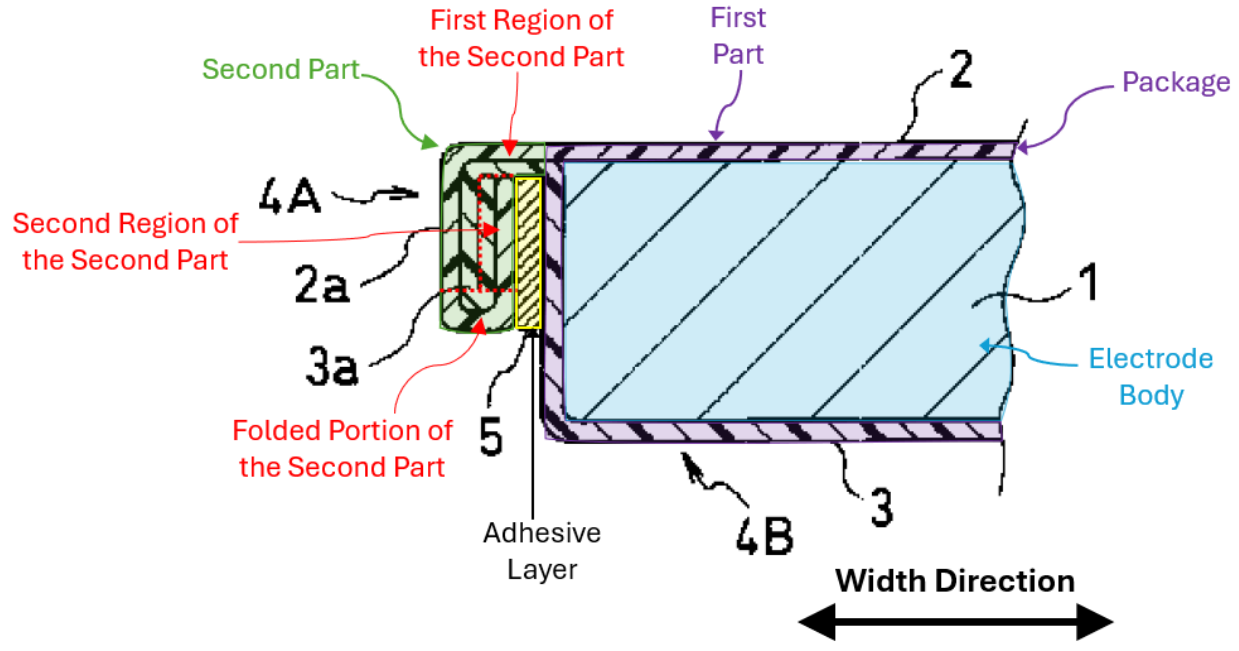
1. Kim-439

133. Kim-439 does not explicitly disclose that the second part comprises a second region and a folded portion connecting the first region and the second region. However, it was well known to fold the second part of a battery package inward such that the second part includes a first region, a second region, and a

folded portion connecting the first and second regions, as evidenced by Ueda.

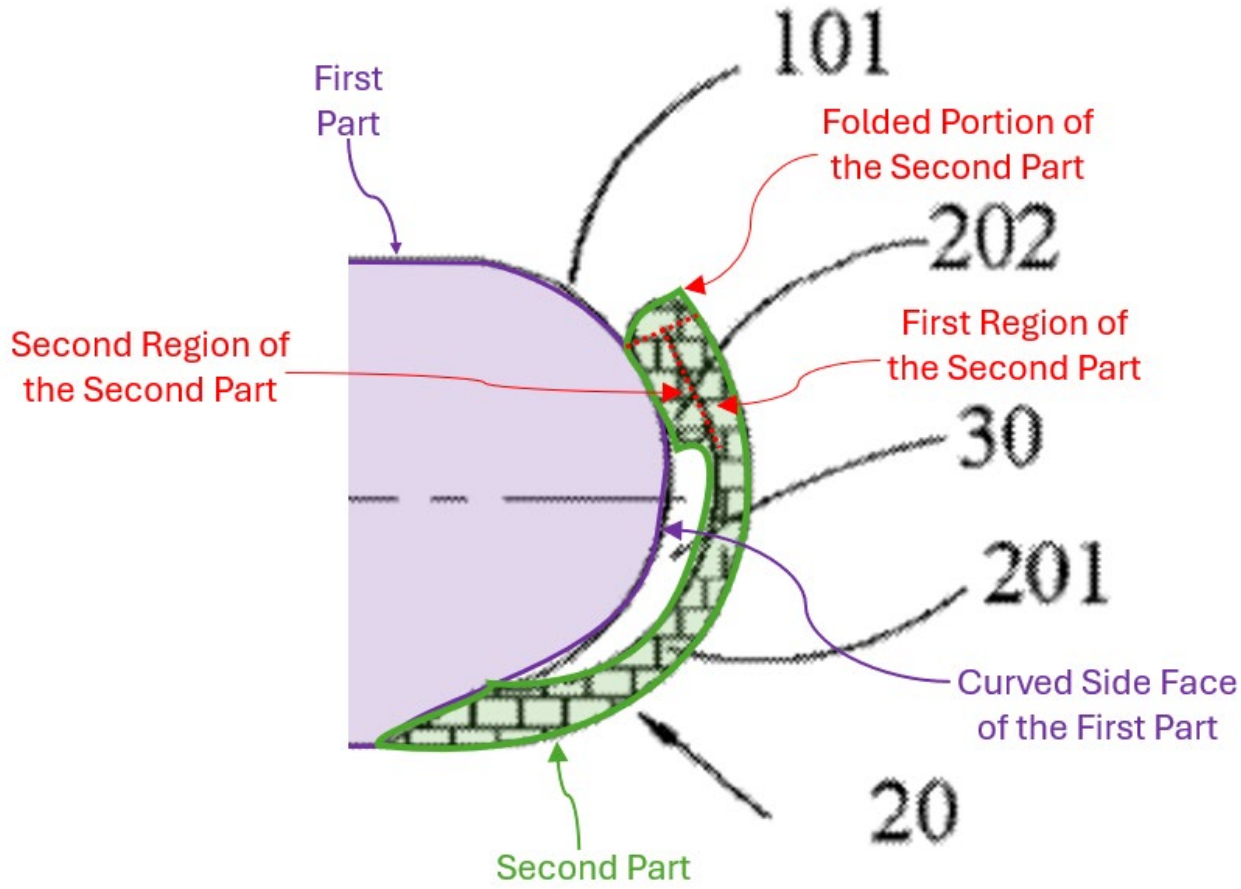
2. Ueda

134. Ueda discloses "the joined tab portion 4A may be folded once more partway as shown in FIG. 2, such that the leading edge of the joined tab portion 4A is interposed between the joined tab portion 4A and the side surface of the encapsulated portion 4B." EX1006, ¶[0023]. In doing so, Ueda's joined tab portion 4A includes a first region connected to the first part, a second region, and a folded portion connecting the first and second regions, as annotated below in Figure 2. Ueda discloses the recited "folded portion" as a second bend in the second part (joined tab portion 4A) that interposes the second region between the first region and the package's side face in the width direction.



EX1006, FIG. 2 (annotated).

135. Ueda's inward folding technique of the second part (joined tab portion 4A) interposes the second region between the second part's first region and the package's side face in the same manner as disclosed by the '808 patent, as shown below. EX1001, 1:51-2:8.

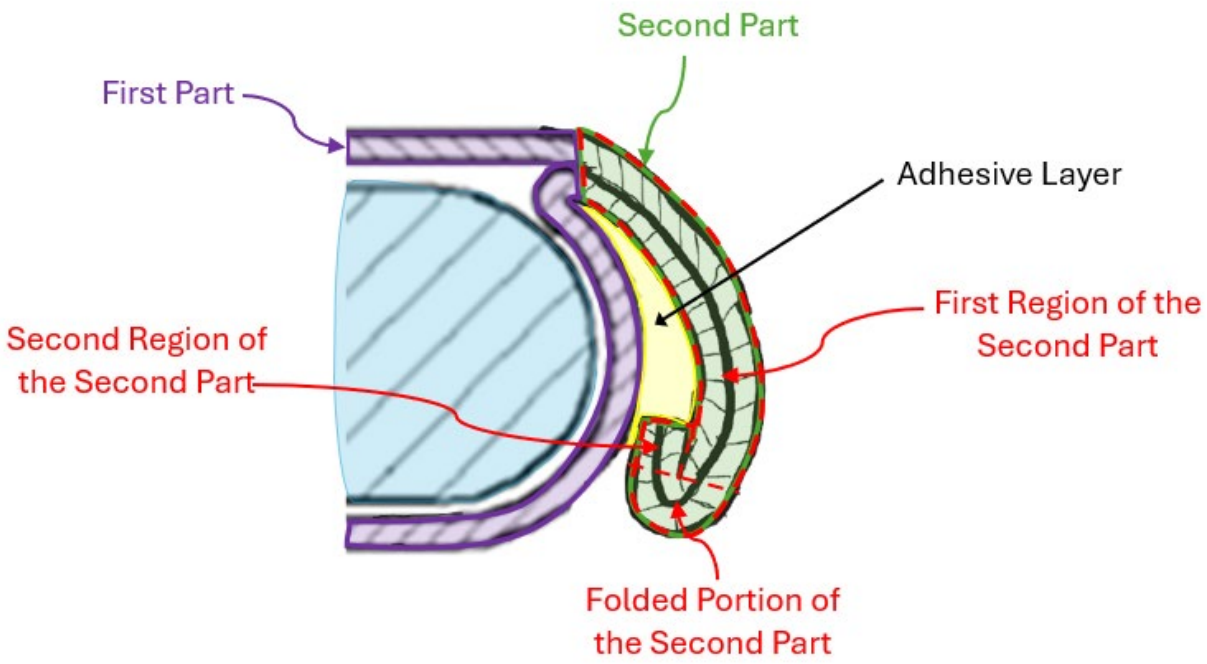


EX1001, FIG. 1 (annotated).

3. Kim-439/Ueda Combination

136. As discussed in Section IX.C.2, it would have been obvious to fold Kim-439's second part (bonding portion 240) inward, as taught by Ueda, to interpose the leading edge of bonding portion 240 between a first region of

bonding portion 240 and a side face of the package, thereby shielding the leading edge from moisture and handling. EX1006, ¶¶[0013], [0023], [0030]. In doing so, a POSA would have understood that this modification would have formed a second bend in Kim-439's second part (bonding portion 240), as identified by the dashed-line shown in the rendering below, redirecting the second part's second region toward the second plane of Kim-439's electrode body. Accordingly, applying Ueda's inward folding configuration with Kim-439's battery would improve the sealing reliability and the durability of Kim-439's pouch case 200.



Rendering of Kim-439's Modified Battery.

137. A POSA would have had a reasonable expectation of success in applying Ueda's inward folding technique to Kim-439's second part because this modification would improve the structural integrity of Kim-439's package without

extending the second part beyond the upper and lower surfaces of the package. This modification would have simply been applying a known technique (Ueda's inward flange folding) to a known device (Kim-439's battery) to protect the seal of the package.

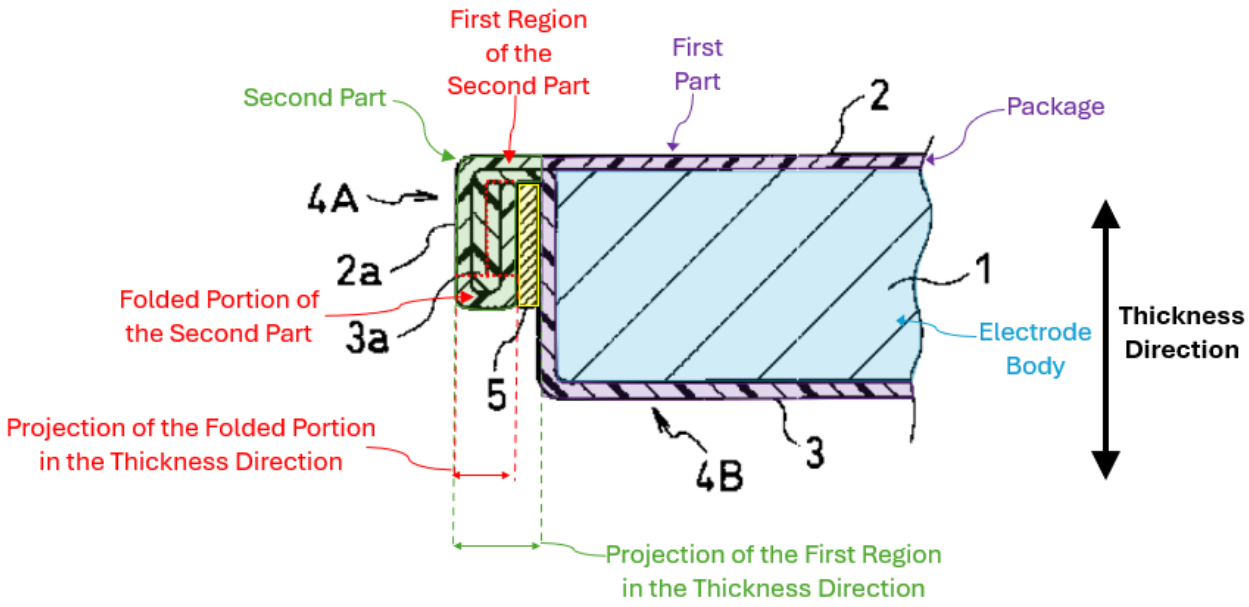
138. Furthermore, a POSA would have understood from basic background knowledge in the art that the second region's height relative to the first region of Ueda's second part is not limited to the specific configuration illustrated in Figure 2. Although Ueda's Figure 2 depicts an embodiment in which the leading edge of the second part engages the first region, I understand this to be merely one example of Ueda's inward folding technique. EX1006, FIG. 2. In other implementations, the leading edge of the second part may remain spatially separated from the first region while still achieving Ueda's stated objectives, including improving structural integrity and protecting the package seal. *See* EX1007, FIG. 4, ¶¶[0052]-[0056]. Accordingly, it is my opinion that a POSA would have understood that, when applying Ueda's inward folding technique to Kim-439, the second part could likewise be folded such that its leading edge remains spatially separated from the first region while still achieving the same structural and sealing benefits.

L. Dependent Claim 9

139. Claim 9 depends from claim 8 and further recites "wherein a projection of the folded portion in the thickness direction is located within a

projection of the first region in the thickness direction."

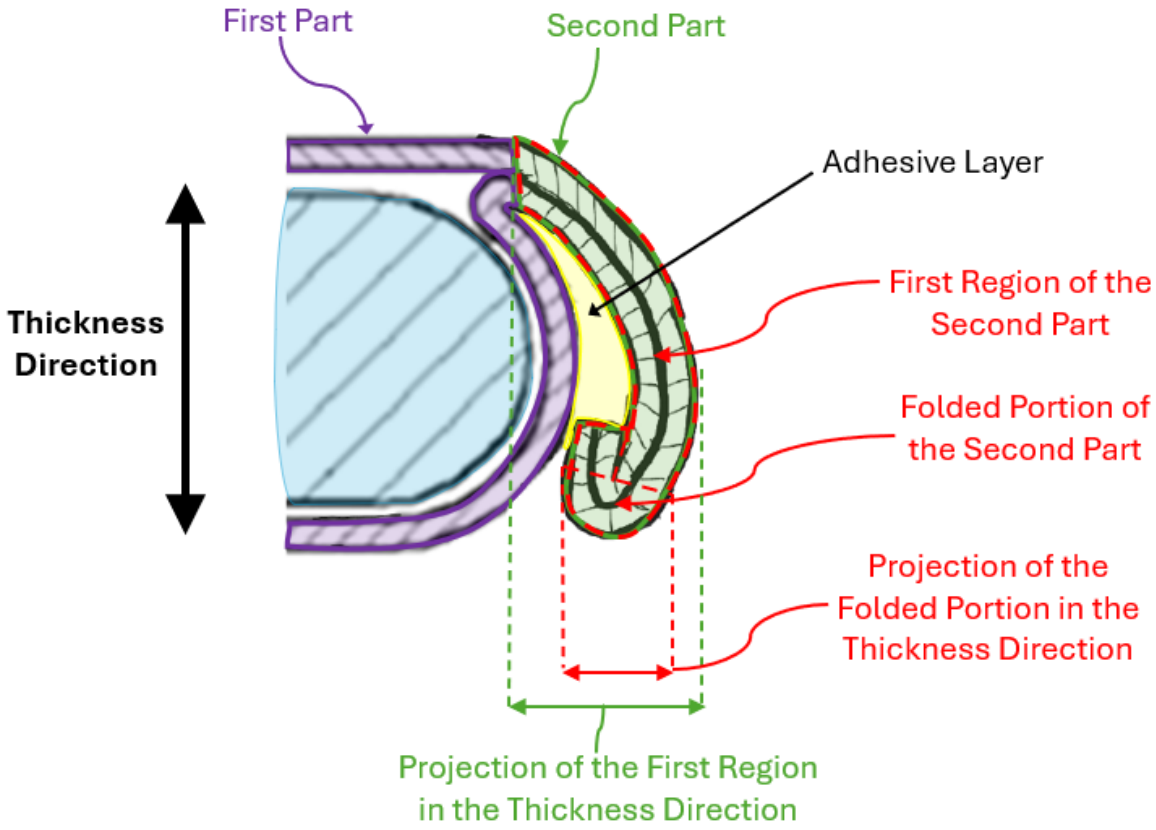
140. Ueda discloses that the projection of the second part's folded portion (second fold of tab portion 4A) in the thickness direction is located within a projection of the first region (first fold of tab portion 4A) in the thickness direction, as annotated below. EX1006, ¶¶[0013], [0023], [0030]. In particular, when viewed along the thickness axis, the width of the projection of the folded portion of Ueda's tab portion 4a does not extend beyond the width of the projection of the first region of Ueda's tab portion 4a.



EX1006, FIG. 2 (annotated).

141. Accordingly, a POSA would have understood or found it obvious that, when Ueda's inward folding technique is applied to Kim-439's bonding portion 240, a similar structural arrangement would be made to minimize the volume

footprint of the battery, as shown below. In particular, a POSA would have recognized that positioning the second fold of Kim-439's bonded portion 240 within the projection of the first fold—as taught by Ueda—keeps the folded portion within the overall thickness envelope of the package, thereby reducing protrusion, preserving compactness, and improving resistance to separation or environmental exposure. Doing so would have simply been the application of a known technique (Ueda's inward folding) to a known device (Kim-439's battery) yielding the predictable result of containing the inwardly-folded bonding portion with the battery's outer profile.



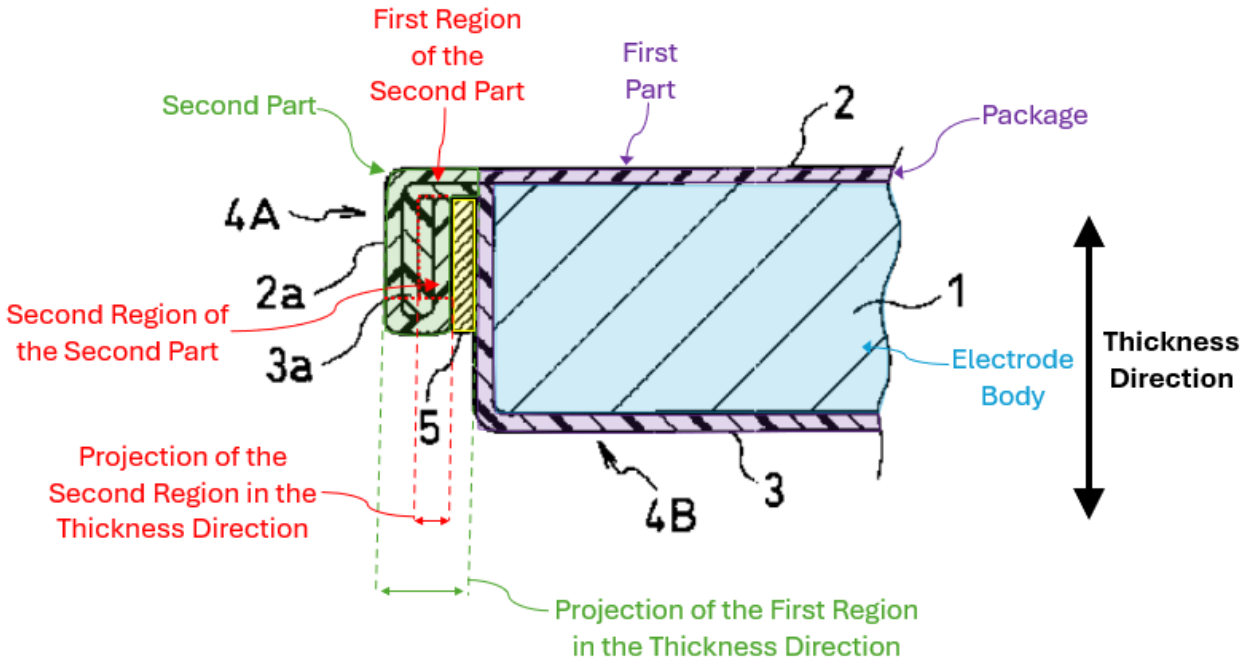
Rendering of Kim-439's Modified Battery.

142. Furthermore, a POSA would have understood from basic background knowledge in the art that the position of the folded portion relative to the first region of the second part can be varied as a result-effective variable. EX1007, ¶¶[0054]-[0056], [0068]. For example, Kim-999 teaches that the height of the second part (folding part 23) can be adjusted so long as the height is smaller than the thickness of the electrode assembly 11. EX1007, ¶¶[0054]-[0056]. Kim-999 further teaches that the angle of the second part relative to the package can be adjusted to maintain adhesion, accommodate adhesive material, and prevent excessive separation from the case surface. EX1007, ¶[0068]. As another example, Jang, teaches adjusting the width of the flange's first region (second bent portion 33b) relative to the flange's second region to optimize structural stability. EX1020, ¶¶[0047]-[0052]. These parameters directly affect the spatial relationship between the folded portion and the first region, including its extension in the thickness direction. Accordingly, a POSA would have been motivated to modify the height and folding angle of Kim-439's second part such that the folded portion remains within a projection of the second part's first region in the thickness direction. EX1007, ¶¶[0054]-[0056], [0068]. Doing so would have simply been the application of a known technique (adjusting the second part's height and folding angle) to a known device (Kim-439's battery) to achieve a compact profile and improved adhesive retention.

M. Dependent Claim 10

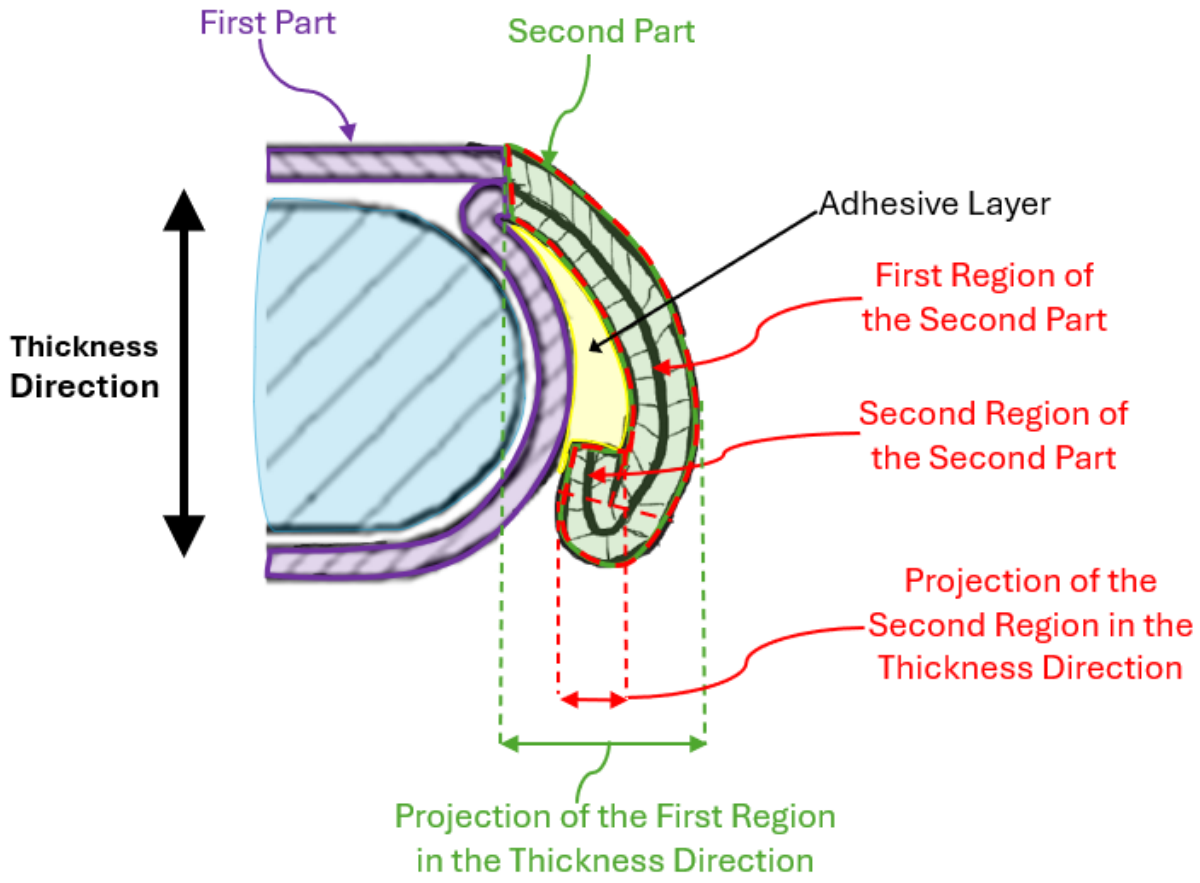
143. Claim 10 depends from claim 8 and further recites "wherein projection of the second region in the thickness direction is located within a projection of the first region in the thickness direction."

144. Ueda discloses that the projection of the second region (leading edge of tab portion 4A) in the thickness direction is located within a projection of the first region (first fold of tab portion 4A) in the thickness direction, as annotated below. EX1006, ¶¶[0013], [0023], [0030]. In particular, when viewed along the thickness axis, the width of the projection of the second region of Ueda's tab portion 4A does not extend beyond the width of the projection of the first region of Ueda's tab portion 4A.



EX1006, FIG. 2 (annotated).

145. Accordingly, a POSA would have understood or found it obvious that, when Ueda's inward folding technique is applied to Kim-439's bonding portion 240, a similar structural arrangement would be made to minimize the volume footprint of the battery. In particular, a POSA would have recognized that arranging the second region within the projection of the first region is consistent with Ueda's teaching of folding the tab portion inward so that it follows the encapsulated portion and remains contained within the battery's outer profile. EX1006, ¶¶[0013], [0023], [0029]-[0030]. Doing so would have simply been the application of a known technique (Ueda's inward folding) to a known device (Kim-439's battery) yielding the predictable result of containing Kim-439's inwardly-folded bonding portion with the battery's outer profile.



Rendering of Kim-439's Modified Battery.

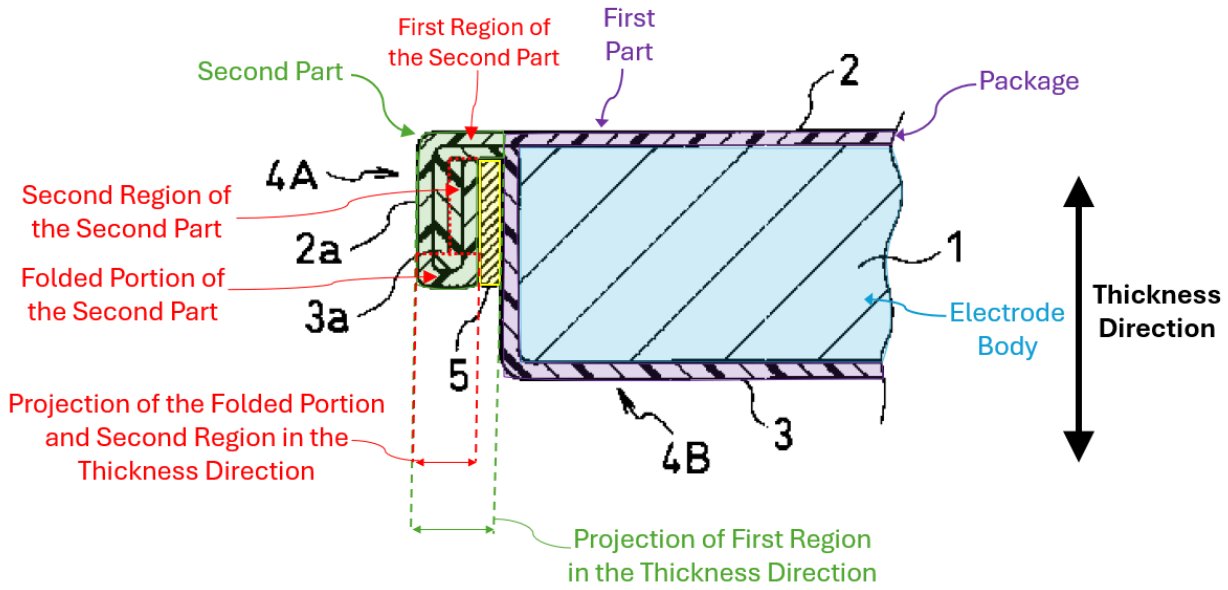
146. For the same reasons discussed for claim 9, a POSA would have understood from basic background knowledge in the art that the spatial arrangement of the second part's second region relative to the first region can be varied as a result-effective variable to optimize the package's volume and structural integrity. *See* EX1007, ¶[0068]; EX1020, ¶¶[0047]-[0052]. For example, Kim-999 teaches adjusting the height of folding part 23 to remain within the electrode assembly thickness, and varying the folding angle to maintain adhesion and control spacing from the case. EX1007, ¶¶[0054]-[0056], [0068]. Accordingly,

a POSA would have been motivated to adjust the height and folding angle of Kim-439's second part to prevent the second part's second region from extending beyond the projection of the second part's first region in the thickness direction to retain adhesive and minimize footprint. Doing so would have simply been the application of a known technique (adjusting the second part's height and folding angle) to a known device (Kim-439's battery) to achieve a compact profile and improved adhesive retention.

N. Dependent Claim 11

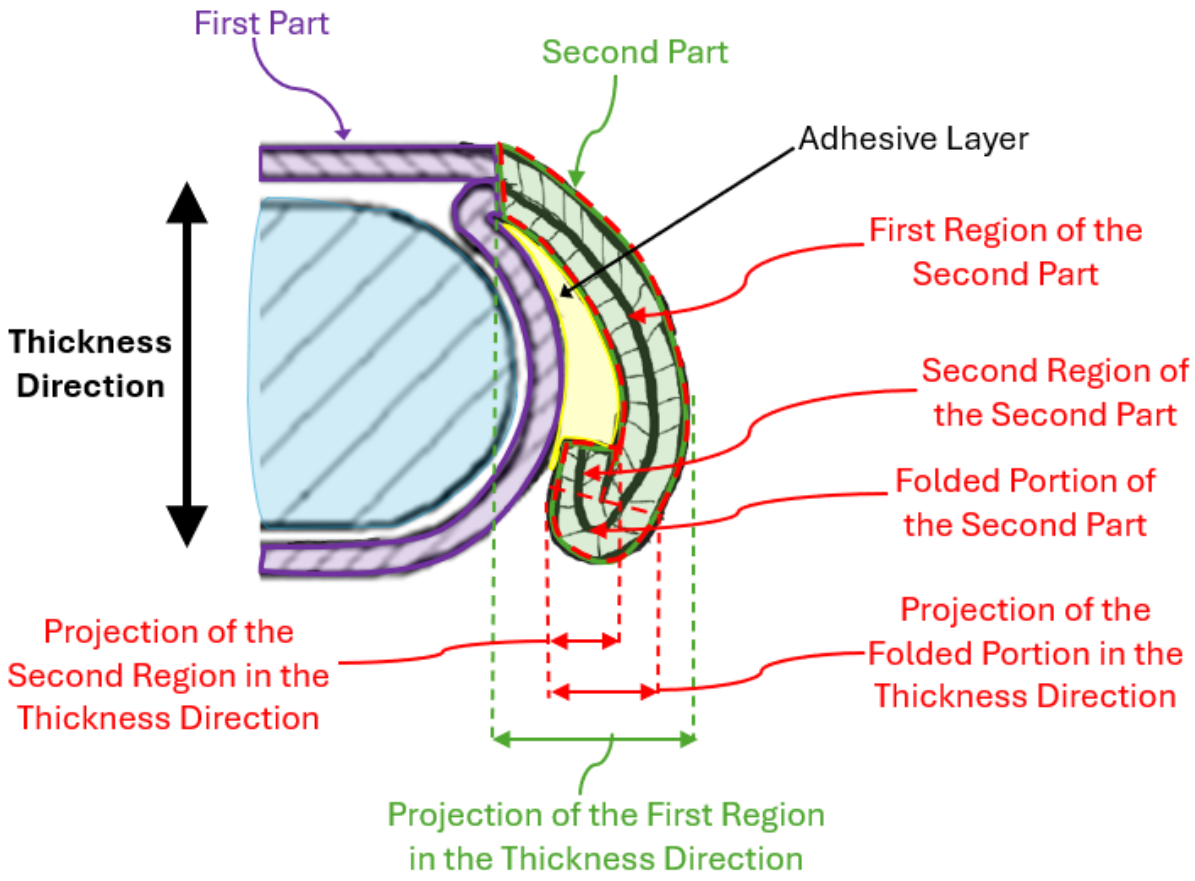
147. Claim 11 depends from claim 8 and further recites "wherein a projection of the folded portion in the thickness direction and a projection of the second region in the thickness direction are located within projection of the first region in the thickness direction."

148. Ueda discloses that a projection of the folded portion (second fold of tab portion 4A) in the thickness direction and a projection of the second region (leading edge of tab portion 4A) in the thickness direction are located within the projection of the first region (first fold of tab portion 4A) in the thickness direction, as annotated below. EX1006, ¶¶[0013], [0023], [0030]. In particular, when viewed along the thickness axis, the widths of the projections of the folded portion and the second region of Ueda's tab portion 4A do not extend beyond the width of the projection of the first region of Ueda's tab portion 4A.



EX1006, FIG. 2 (annotated).

149. Accordingly, a POSA would have understood or found it obvious that, when Ueda's inward folding technique is applied to Kim-439's bonding portion 240, a similar structural arrangement would be made to minimize the volume footprint of the battery. In particular, a POSA would have recognized that arranging the second region and the folded portion within the projection of the first region is consistent with Ueda's teaching of folding the tab portion inward so that it follows the encapsulated portion and remains contained within the battery's outer profile. EX1006, ¶¶[0013], [0023], [0029]-[0030]. Doing so would have simply been the application of a known technique (Ueda's inward folding) to a known device (Kim-439's battery) yielding the predictable result of containing Kim-439's inwardly-folded bonding portion with the battery's outer profile.



Rendering of Kim-439's Modified Battery.

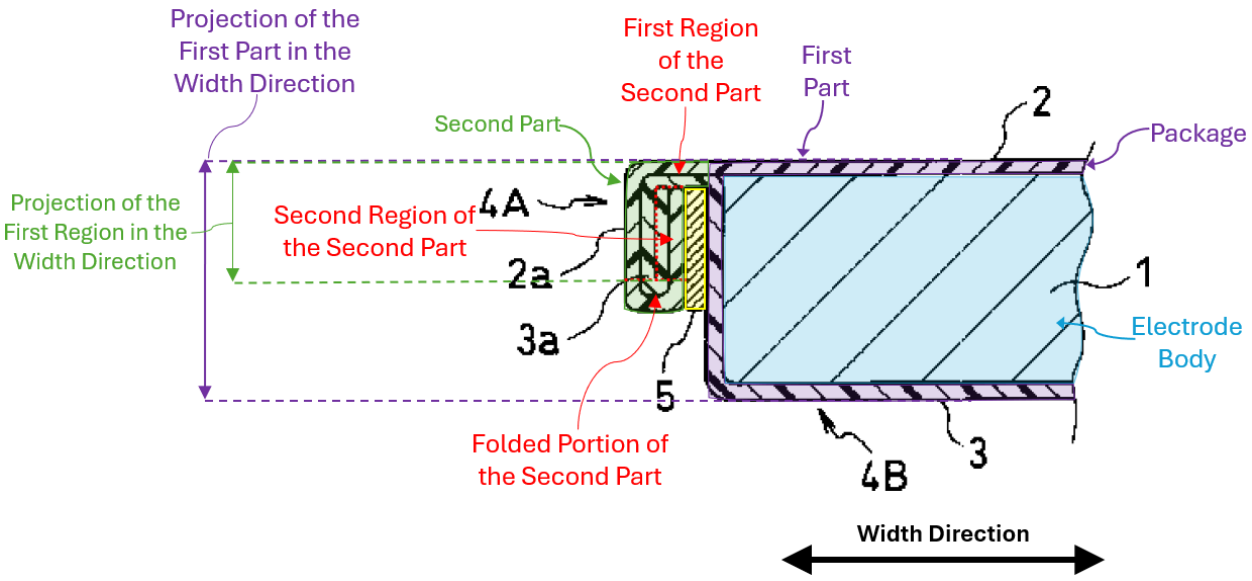
150. For the same reasons discussed for claims 9 and 10, a POSA would have understood from basic background knowledge in the art that the spatial arrangement of the folded portion and the second region relative to the first region can be varied as a result-effective variable to optimize the package's volume and structural integrity. *See* EX1007, ¶[0068]; EX1020, ¶¶[0047]-[0052]. For example, Kim-999 teaches adjusting the height of folding part 23 to remain within the electrode assembly thickness, and varying the folding angle to maintain adhesion and control spacing from the case. EX1007, ¶¶[0054]-[0056], [0068]. Accordingly,

a POSA would have been motivated to adjust the height and folding angle of Kim-439's second part to prevent the second part's folded portion and second region from extending beyond the projection of the second part's first region in the thickness direction to retain adhesive and minimize footprint. Doing so would have simply been the application of a known technique (adjusting the second part's height and folding angle) to a known device (Kim-439's battery) to achieve a compact profile and improved adhesive retention.

O. Dependent Claim 12

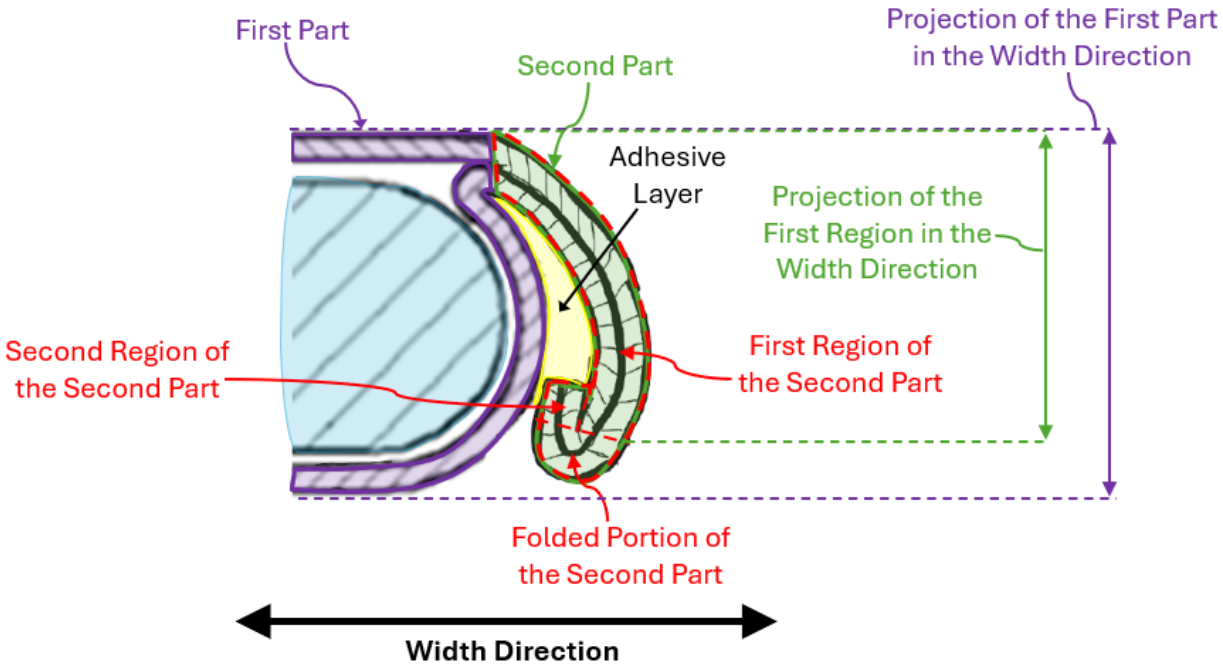
151. Dependent claim 12 depends from claim 8 and further recites "wherein a projection of the first region in the width direction is located within a projection of the first part in the width direction."

152. Ueda discloses that a projection of the first region (first fold of tab portion 4A) in the width direction is located within a projection of the first part (encapsulated portion 4B) in the width direction, as annotated in Figure 2, reproduced below. EX1006, ¶¶[0013], [0023], [0030]. In particular, when viewed along the width axis, the height of the projection of the first region of Ueda's tab portion 4A does not extend beyond the height of the projection of Ueda's encapsulated portion 4B.



EX1006, FIG. 2 (annotated).

153. Accordingly, a POSA would have understood or found it obvious that, when Ueda's inward folding technique is applied to Kim-439's bonding portion 240, a similar structural arrangement would be made to minimize the volume footprint of the battery. In particular, a POSA would have recognized that arranging the first region of Kim-439's bonding portion within the projection of Kim-439's first part in the width direction is consistent with Ueda's teaching of folding the tab portion inward so that it follows the encapsulated portion and remains contained within the battery's outer profile. EX1006, ¶¶[0013], [0023], [0029]-[0030]. Doing so would have simply been the application of a known technique (Ueda's inward folding) to a known device (Kim-439's battery) yielding the predictable result of containing Kim-439's inwardly-folded bonding portion with the battery's outer profile.



Rendering of Kim-439's Modified Battery.

154. Furthermore, a POSA would have understood from basic background knowledge in the art that the height of Kim-439's second part (bonding portion 240) relative to Kim-439's first part (upper surface 220, lower surface 210, and side) can be varied as a result-effective variable because it was well known to modify the height and placement of the folded portion to optimize the volume and structural integrity of the package. *See* EX1007, ¶¶[0052]-[0056]. Specifically, a POSA would have understood that the position of the package's second part relative to the side of the package's first part can be modified without undue experimentation to minimize the volume of the package while ensuring that the second part remains intact. *See* EX1007, ¶¶[0052]-[0056]. For example, a POSA would have understood that the height of the folded portion can be modified so

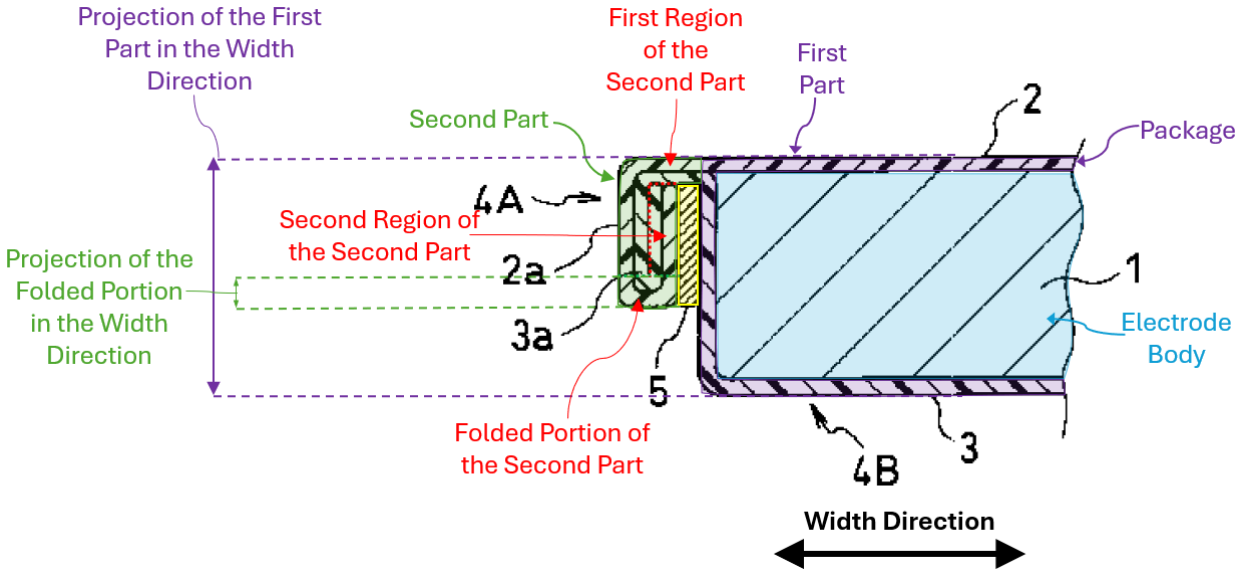
long as the folded portion does not protrude above the upper and lower boundaries of the battery's package to minimize volume footprint. *See* EX1007, ¶¶[0052]-[0056]. Consistent with this teaching, a POSA would have recognized that placing the folded portion within the projection of the package's first part is a predictable and desirable configuration because it ensures that the folded structure remains contained within the envelope of the case, rather than extending outward and increasing the battery's effective thickness. This modification represents a routine application of known folding techniques (e.g., adjusting the second part's height) to control the spatial envelope of the package, yielding the predictable result of a more compact and structurally integrated battery package.

P. Dependent Claim 13

155. Dependent claim 13 depends from claim 8 and further recites "wherein a projection of the folded portion in the width direction is located within a projection of the first part in the width direction."

156. Ueda discloses that a projection of the folded portion (second fold of tab portion 4A) in the width direction is located within a projection of the first part (encapsulated portion 4B) in the width direction, as annotated in Figure 2, reproduced below. EX1006, ¶¶[0013], [0023], [0030]. In particular, when viewed along the width axis, the height of the projection of the folded portion of Ueda's tab portion 4A does not extend beyond the height of the projection of Ueda's

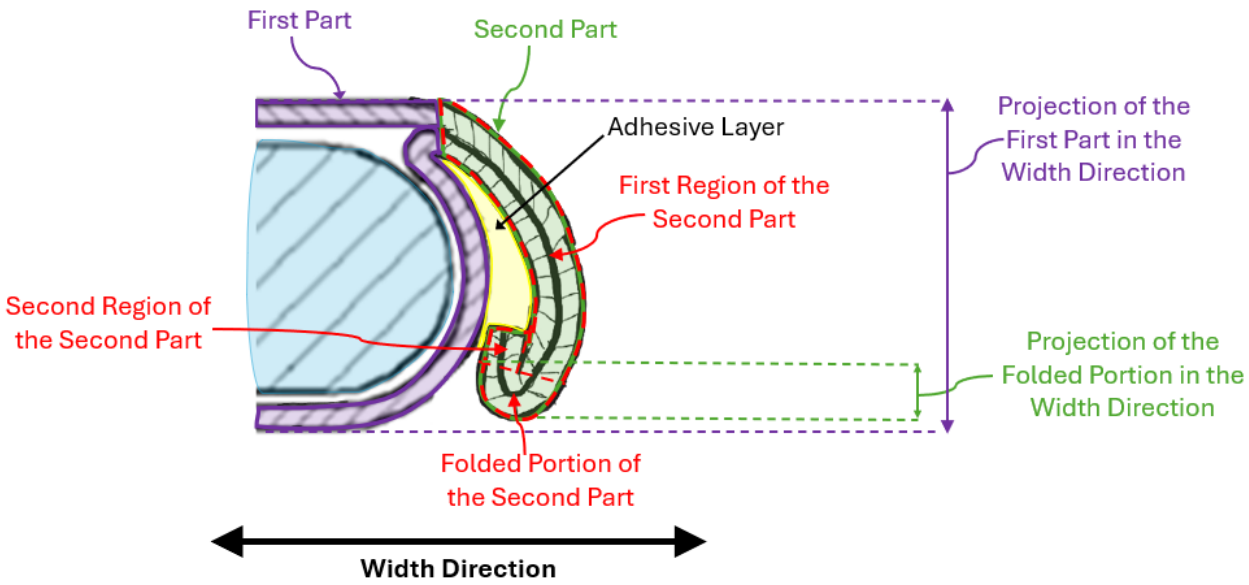
encapsulated portion 4B.



EX1006, FIG. 2 (annotated).

157. Accordingly, a POSA would have understood or found it obvious that, when Ueda's inward folding technique is applied to Kim-439's bonding portion 240, a similar structural arrangement would be made to minimize the volume footprint of the battery. In particular, a POSA would have recognized that arranging the folded portion of Kim-439's bonding portion within the projection of Kim-439's first part in the width direction is consistent with Ueda's teaching of folding the tab portion inward so that it follows the encapsulated portion and remains contained within the battery's outer profile. EX1006, ¶¶[0013], [0023], [0029]-[0030]. Doing so would have simply been the application of a known technique (Ueda's inward folding) to a known device (Kim-439's battery) yielding the predictable result of containing Kim-439's inwardly-folded bonding portion

with the battery's outer profile.



Rendering of Kim-439's Modified Battery.

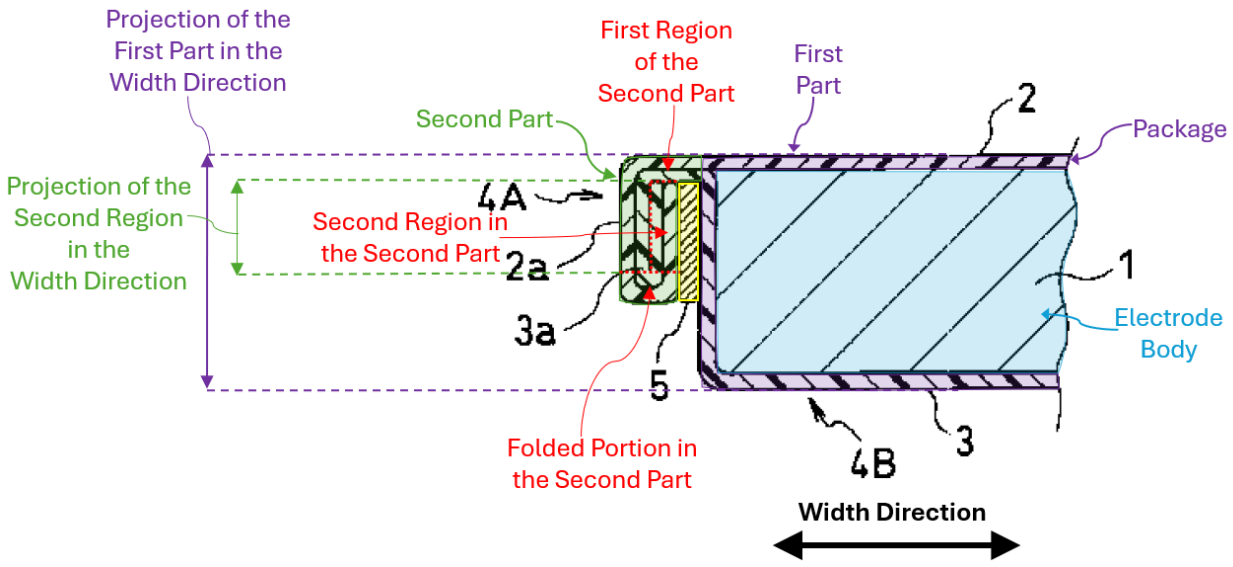
158. For the same reasons discussed for claim 12, a POSA would have understood from basic background knowledge in the art that the height of Kim-439's second part (bonding portion 240) relative to Kim-439's first part (upper surface 220, lower surface 210, and side) can be varied as a result-effective variable to optimize the volume and structural integrity of the package. EX1007, ¶¶[0052]-[0056]. For example, Kim-999 teaches that the height of folding part 23 may be adjusted so long as it remains less than the thickness of the electrode assembly 11, preventing it from extending beyond the first part's top and bottom surfaces. *See* EX1007, ¶¶[0052]-[0056]. Accordingly, a POSA would have been motivated to adjust the height of Kim-439's second part to prevent the folded

portion from protruding beyond the first part's projection in the width direction. Doing so would have simply been the application of a known technique (adjusting the second part's height) to a known device (Kim-439's battery) to achieve a compact profile and improved structural integrity.

Q. Dependent Claim 14

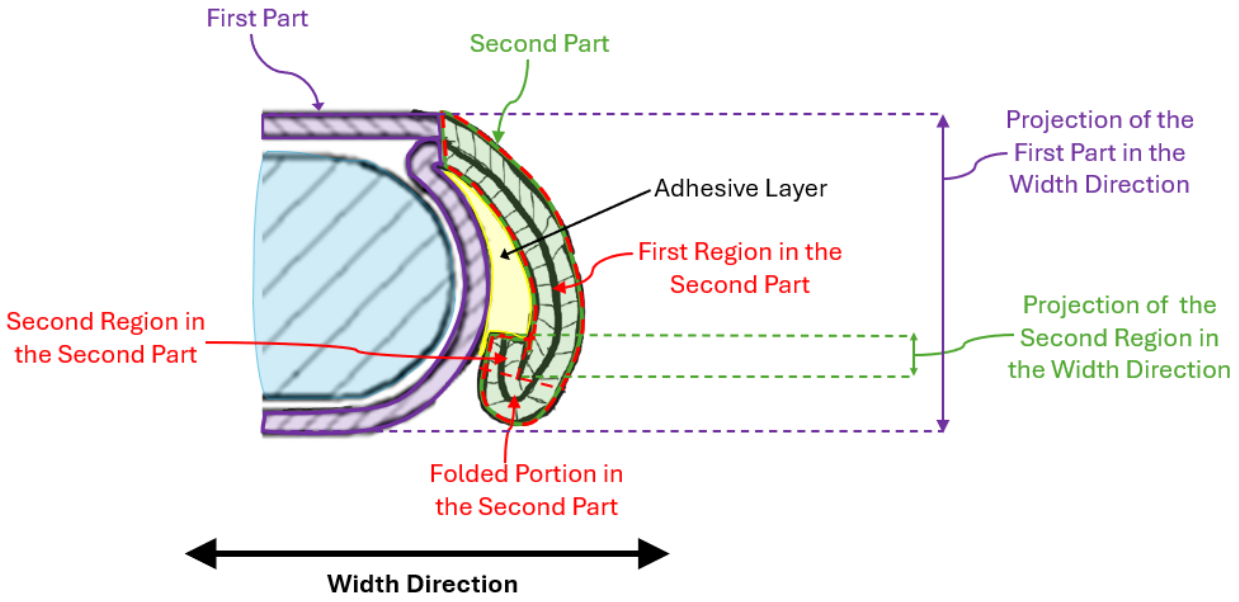
159. Dependent claim 14 depends from claim 8 and further recites "wherein a projection of the second region in the width direction is located within a projection of the first part in the width direction."

160. Ueda discloses that a projection of the second region (leading edge of tab portion 4A) in the width direction is located within a projection of the first part (encapsulated portion 4B) in the width direction, as annotated in Figure 2, reproduced below. EX1006, ¶¶[0013], [0023], [0030]. In particular, when viewed along the width axis, the height of the projection of the second region of Ueda's tab portion 4A does not extend beyond the height of the projection of Ueda's encapsulated portion 4B.



EX1006, FIG. 2 (annotated).

161. Accordingly, a POSA would have understood or found it obvious that, when Ueda's inward folding technique is applied to Kim-439's bonding portion 240, a similar structural arrangement would be made to minimize the volume footprint of the battery. In particular, a POSA would have recognized that arranging the second region of Kim-439's bonding portion within the projection of Kim-439's first part in the width direction is consistent with Ueda's teaching of folding the tab portion inward so that it follows the encapsulated portion and remains contained within the battery's outer profile. EX1006, ¶¶[0013], [0023], [0029]-[0030]. Doing so would have simply been the application of a known technique (Ueda's inward folding) to a known device (Kim-439's battery) yielding the predictable result of containing Kim-439's inwardly-folded bonding portion with the battery's outer profile.



Rendering of Kim-439's Modified Battery.

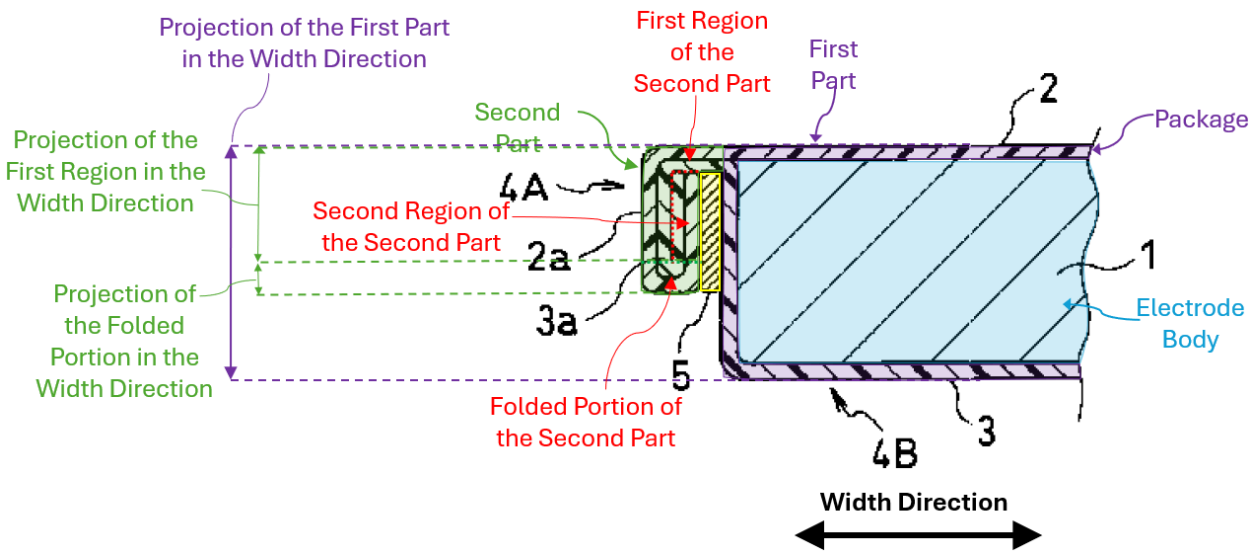
162. For the same reasons discussed for claims 12 and 13, a POSA would have understood from basic background knowledge in the art that the height of Kim-439's second part (bonding portion 240) relative to Kim-439's first part (upper surface 220, lower surface 210, and side) can be varied as a result-effective variable to optimize the volume and structural integrity of the package. EX1007, ¶¶[0052]-[0056]. For example, Kim-999 teaches that the height of folding part 23 may be adjusted so long as it remains less than the thickness of the electrode assembly 11, preventing it from extending beyond the first part's top and bottom surfaces. *See* EX1007, ¶¶[0052]-[0056]. Accordingly, a POSA would have been motivated to adjust the height of Kim-439's second part to prevent the second region from protruding beyond the first part's projection in the width direction. Doing so would have simply been the application of a known technique (adjusting

the second part's height) to a known device (Kim-439's battery) to achieve a compact profile and improved structural integrity.

R. Dependent Claim 15

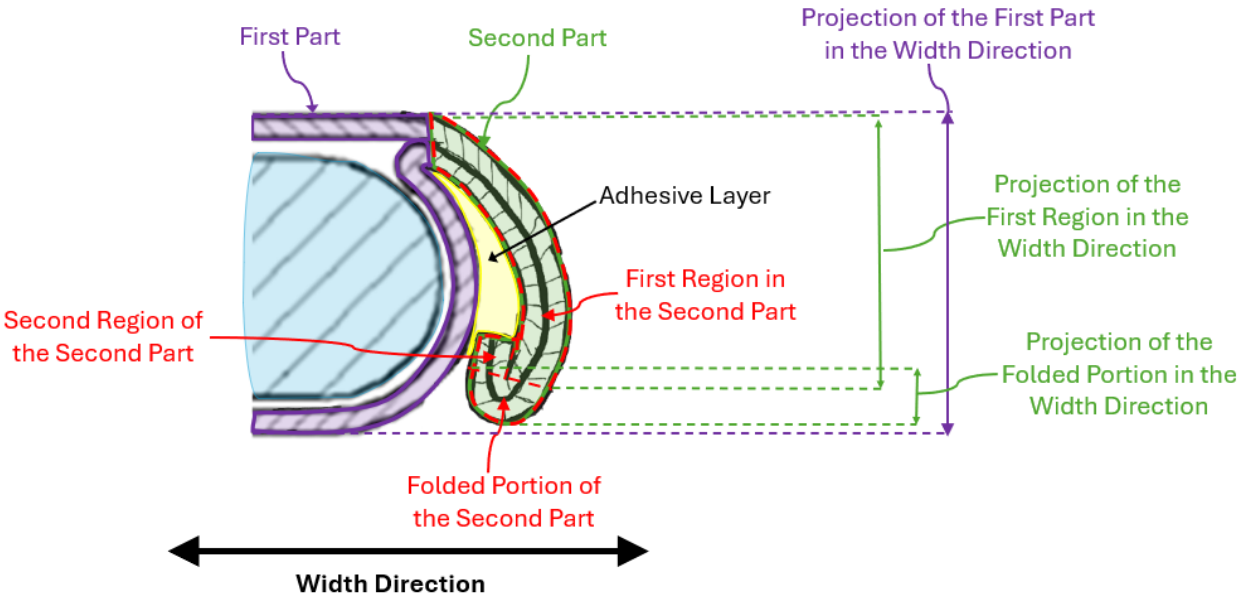
163. Dependent claim 15 depends from claim 8 and further recites "wherein a projection of the first region in the width direction and a projection of the folded portion in the width direction are located within a projection of the first part in the width direction."

164. Ueda discloses that a projection of the first region (first fold of tab portion 4A) in the width direction and a projection of the folded portion (second fold of tab portion 4A) in the width direction are located within a projection of the first part (encapsulated portion 4B) in the width direction, as annotated in Figure 2, reproduced below. EX1006, ¶¶[0013], [0023], [0030]. In particular, when viewed along the width axis, the heights of the projections of the first region and the folded portion of Ueda's tab portion 4A do not extend beyond the height of the projection of Ueda's encapsulated portion 4B.



EX1006, FIG. 2 (annotated).

165. Accordingly, a POSA would have understood or found it obvious that, when Ueda's inward folding technique is applied to Kim-439's bonding portion 240, a similar structural arrangement would be made to minimize the volume footprint of the battery. In particular, a POSA would have recognized that arranging the first region and the folded portion of Kim-439's bonding portion within the projection of Kim-439's first part in the width direction is consistent with Ueda's teaching of folding the tab portion inward so that it follows the encapsulated portion and remains contained within the battery's outer profile. EX1006, ¶¶[0013], [0023], [0029]-[0030]. Doing so would have simply been the application of a known technique (Ueda's inward folding) to a known device (Kim-439's battery) yielding the predictable result of containing Kim-439's inwardly-folded bonding portion with the battery's outer profile.



Rendering of Kim-439's Modified Battery.

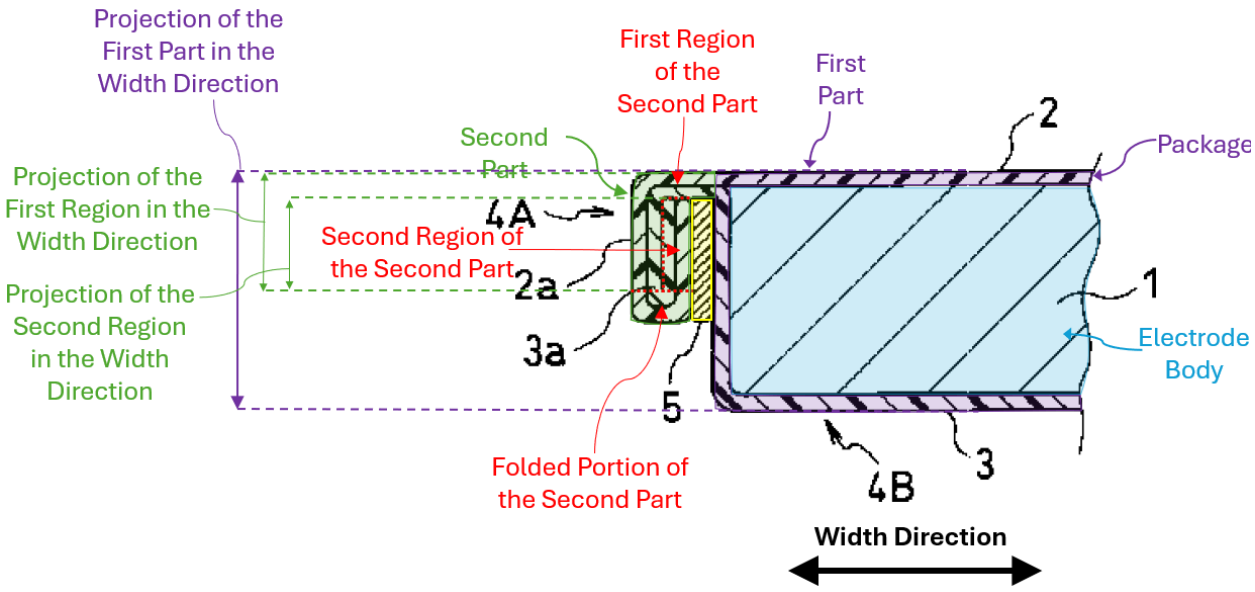
166. For the same reasons discussed for claims 12-14, a POSA would have understood from basic background knowledge in the art that the height of Kim-439's second part (bonding portion 240) relative to Kim-439's first part (upper surface 220, lower surface 210, and side) can be varied as a result-effective variable to optimize the volume and structural integrity of the package. EX1007, ¶¶[0052]-[0056]. For example, Kim-999 teaches that the height of folding part 23 may be adjusted so long as it remains less than the thickness of the electrode assembly 11, preventing it from extending beyond the first part's top and bottom surfaces. *See* EX1007, ¶¶[0052]-[0056]. Accordingly, a POSA would have been motivated to adjust the height of Kim-439's second part to prevent the first region and folded portion from protruding beyond the first part's projection in the width

direction. Doing so would have simply been the application of a known technique (adjusting the second part's height) to a known device (Kim-439's battery) to achieve a compact profile and improved structural integrity.

S. Dependent Claim 16

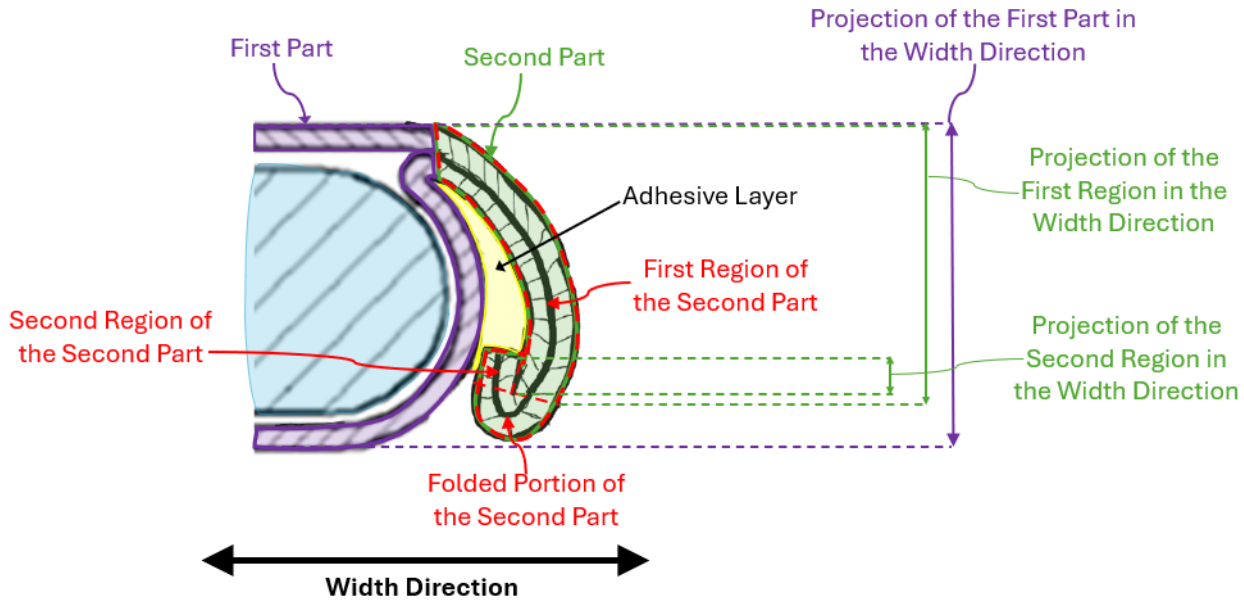
167. Claim 16 depends from claim 8 and further recites "wherein a projection of the first region in the width direction and a projection of the second region in the width direction are located within a projection of the first part in the width direction."

168. Ueda discloses that a projection of the first region in the width direction and a projection of the second region (leading edge of tab portion 4A) in the width direction are located within a projection of the first part (encapsulated portion 4B) in the width direction, as annotated in Figure 2, reproduced below. EX1006, ¶¶[0013], [0023], [0030]. In particular, when viewed along the width axis, the heights of the projections of the first and second regions of Ueda's tab portion 4A do not extend beyond the height of the projection of Ueda's encapsulated portion 4B.



EX1006, FIG. 2 (annotated).

169. Accordingly, a POSA would have understood or found it obvious that, when Ueda's inward folding technique is applied to Kim-439's bonding portion 240, a similar structural arrangement would be made to minimize the volume footprint of the battery. In particular, a POSA would have recognized that arranging the first region and the second region of Kim-439's bonding portion within the projection of Kim-439's first part in the width direction is consistent with Ueda's teaching of folding the tab portion inward so that it follows the encapsulated portion and remains contained within the battery's outer profile. EX1006, ¶¶[0013], [0023], [0029]-[0030]. Doing so would have simply been the application of a known technique (Ueda's inward folding) to a known device (Kim-439's battery) yielding the predictable result of containing Kim-439's inwardly-folded bonding portion with the battery's outer profile.



Rendering of Kim-439's Modified Battery.

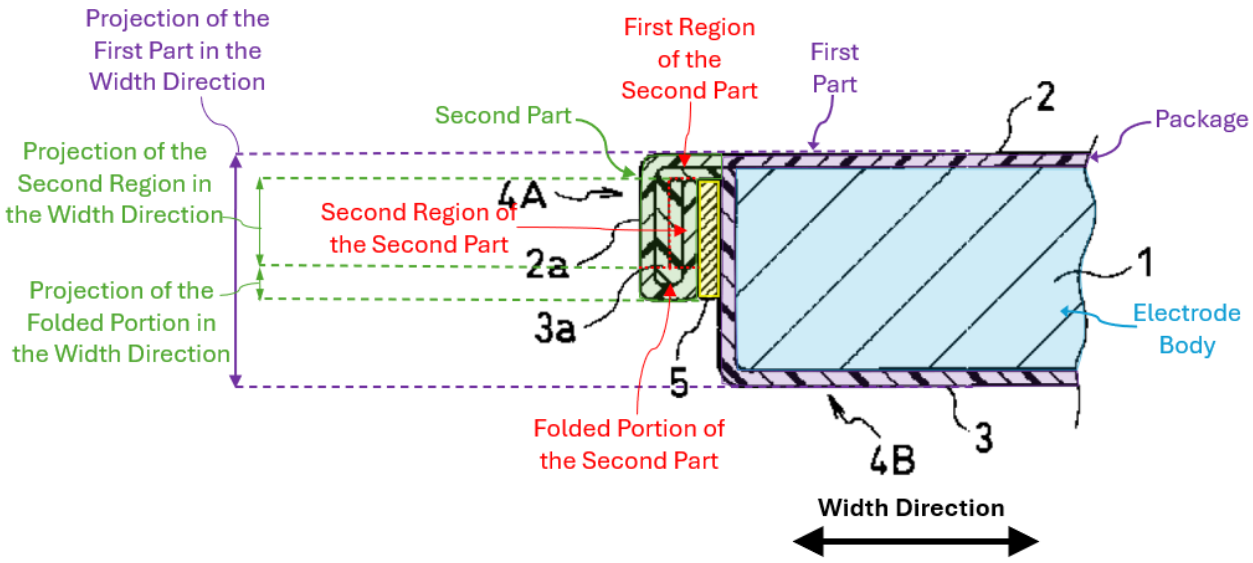
170. For the same reasons discussed with respect to claims 12-15, a POSA would have understood from basic background knowledge in the art that the height of Kim-439's second part (bonding portion 240) relative to Kim-439's first part (upper surface 220, lower surface 210, and side) can be varied as a result-effective variable to optimize the volume and structural integrity of the package. EX1007, ¶¶[0052]-[0056]. For example, Kim-999 teaches that the height of folding part 23 may be adjusted so long as it remains less than the thickness of the electrode assembly 11, preventing it from extending beyond the first part's top and bottom surfaces. *See* EX1007, ¶¶[0052]-[0056]. Accordingly, it would have been obvious for a POSA to configure Kim-439's second part (bonding portion) such that projections of its first and second regions are located within the projection of its first part in the width direction to avoid unnecessary protrusion while maintaining

mechanical stability. Doing so would have simply been the application of a known technique (adjusting the second part's height) to a known device (Kim-439's battery) to achieve a compact profile and improved structural integrity.

T. Dependent Claim 17

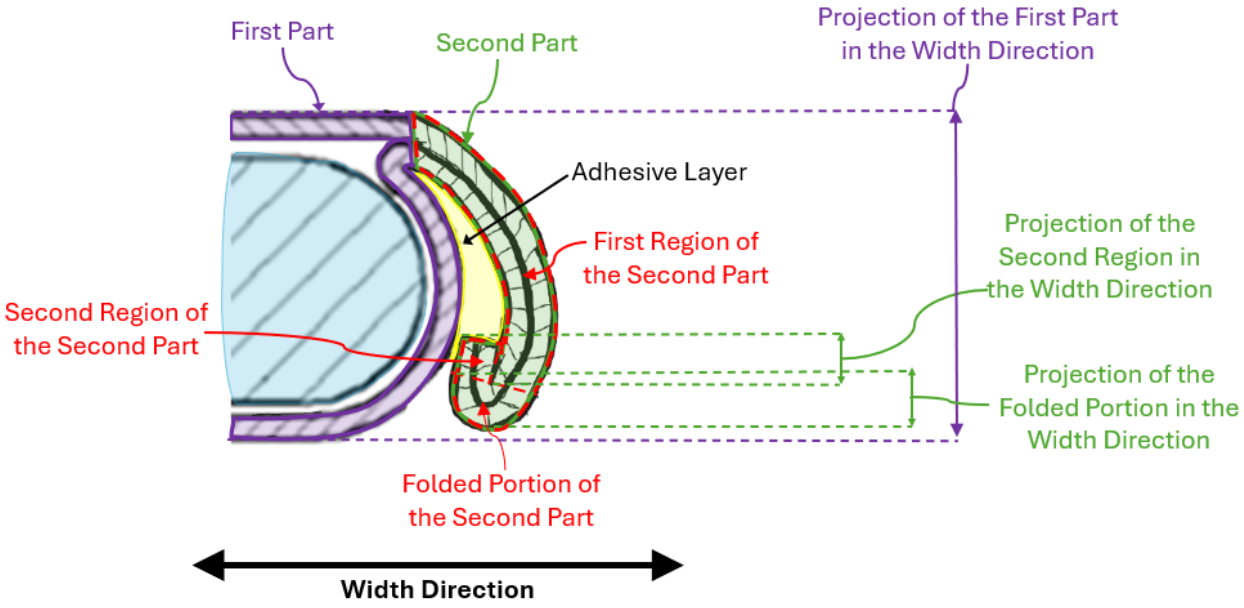
171. Claim 17 depends from claim 8 and further recites "wherein a projection of the folded portion in the width direction and a projection of the second region in the width direction are located within a projection of the first part in the width direction."

172. Ueda discloses that a projection of the folded portion (first fold of tab portion 4A) in the width direction and a projection of the second region (leading edge of tab portion 4A) in the width direction are located within a projection of the first part (encapsulated portion 4B) in the width direction, as annotated in Figure 2, reproduced below. EX1006, ¶¶[0013], [0023], [0030]. In particular, when viewed along the width axis, the heights of the projections of the folded portion and the second region of Ueda's tab portion 4A do not extend beyond the height of the projection of Ueda's encapsulated portion 4B.



EX1006, FIG. 2 (annotated).

173. Accordingly, a POSA would have understood or found it obvious that, when Ueda's inward folding technique is applied to Kim-439's bonding portion 240, a similar structural arrangement would be made to minimize the volume footprint of the battery. In particular, a POSA would have recognized that arranging the folded portion and the second region of Kim-439's bonding portion within the projection of Kim-439's first part in the width direction is consistent with Ueda's teaching of folding the tab portion inward so that it follows the encapsulated portion and remains contained within the battery's outer profile. EX1006, ¶¶[0013], [0023], [0029]-[0030]. Doing so would have simply been the application of a known technique (Ueda's inward folding) to a known device (Kim-439's battery) yielding the predictable result of containing Kim-439's inwardly-folded bonding portion with the battery's outer profile.



Rendering of Kim-439's Modified Battery.

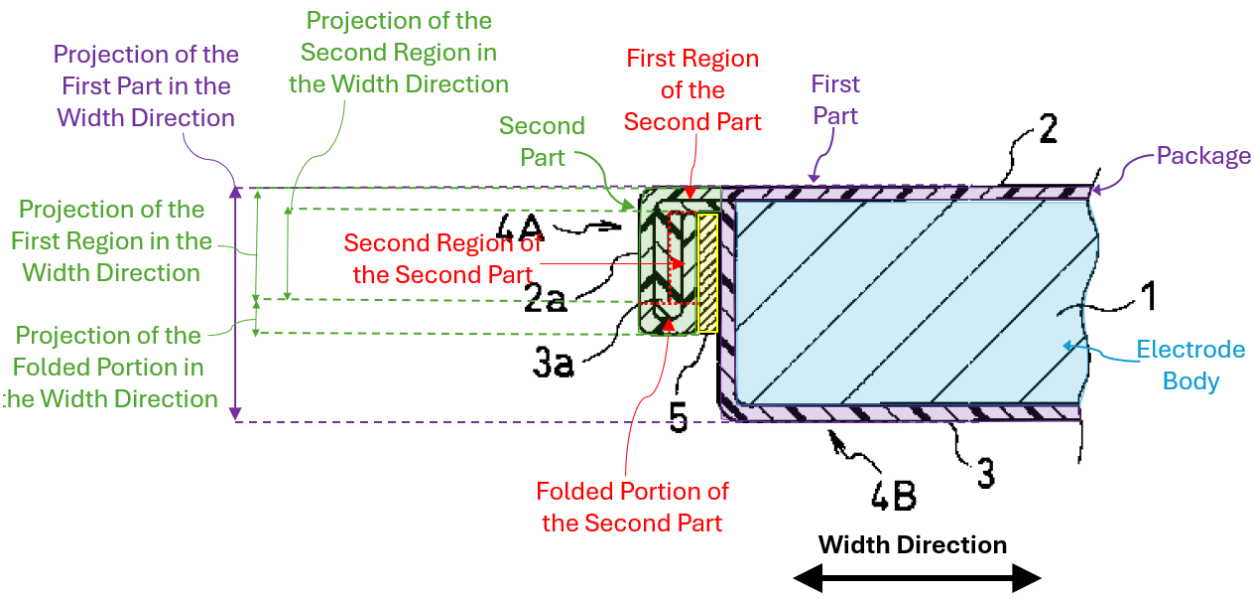
174. For the same reasons discussed for claims 12-16, a POSA would have understood from basic background knowledge in the art that the height of Kim-439's second part (bonding portion 240) relative to Kim-439's first part (upper surface 220, lower surface 210, and side) can be varied as a result-effective variable to optimize the volume and structural integrity of the package. EX1007, ¶¶[0052]-[0056]. For example, Kim-999 teaches that the height of folding part 23 may be adjusted so long as it remains less than the thickness of the electrode assembly 11, preventing it from extending beyond the first part's top and bottom surfaces. *See* EX1007, ¶¶[0052]-[0056]. Accordingly, it would have been obvious for a POSA to configure Kim-439's second part (bonding portion) such that

projections of its folded portion and second region are located within the projection of its first part in the width direction to avoid unnecessary protrusion while maintaining mechanical stability. Doing so would have simply been the application of a known technique (adjusting the second part's height) to a known device (Kim-439's battery) to achieve a compact profile and improved structural integrity.

U. Dependent Claim 18

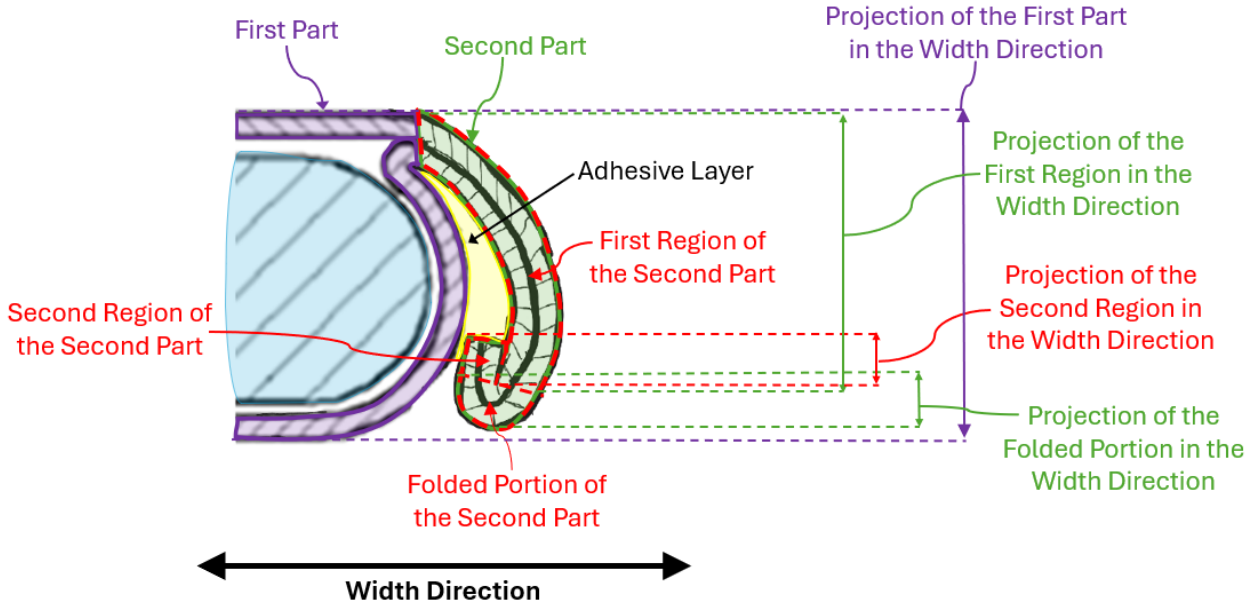
175. Claim 18 depends from claim 8 and further recites "wherein a projection of the first region in the width direction, a projection of the folded portion in the width direction, and a projection of the second region in the width direction are located within a projection of the first part in the width direction."

176. Ueda discloses that a projection of the first region (first fold of tab portion 4A) in the width direction, a projection of the folded portion (second fold of tab portion 4A) in the width direction, and a projection of the second region (leading edge of tab portion 4A) in the width direction are located within a projection of the first part (encapsulated portion 4B) in the width direction, as annotated in Figure 2, reproduced below. EX1006, ¶[0023], FIG. 2. In particular, when viewed along the width axis, the heights of the projections of the first region, the folded portion, and the second region of Ueda's tab portion 4A do not extend beyond the height of the projection of Ueda's encapsulated portion 4B.



EX1006, FIG. 2 (annotated).

177. Accordingly, a POSA would have understood or found it obvious that, when Ueda's inward folding technique is applied to Kim-439's bonding portion 240, a similar structural arrangement would be made to minimize the volume footprint of the battery. In particular, a POSA would have recognized that arranging the first region, the second region, and the folded portion of Kim-439's bonding portion within the projection of Kim-439's first part in the width direction is consistent with Ueda's teaching of folding the tab portion inward so that it follows the encapsulated portion and remains contained within the battery's outer profile. EX1006, ¶¶[0013], [0023], [0029]-[0030]. Doing so would have simply been the application of a known technique (Ueda's inward folding) to a known device (Kim-439's battery) yielding the predictable result of containing Kim-439's inwardly-folded bonding portion with the battery's outer profile.



Rendering of Kim-439's Modified Battery.

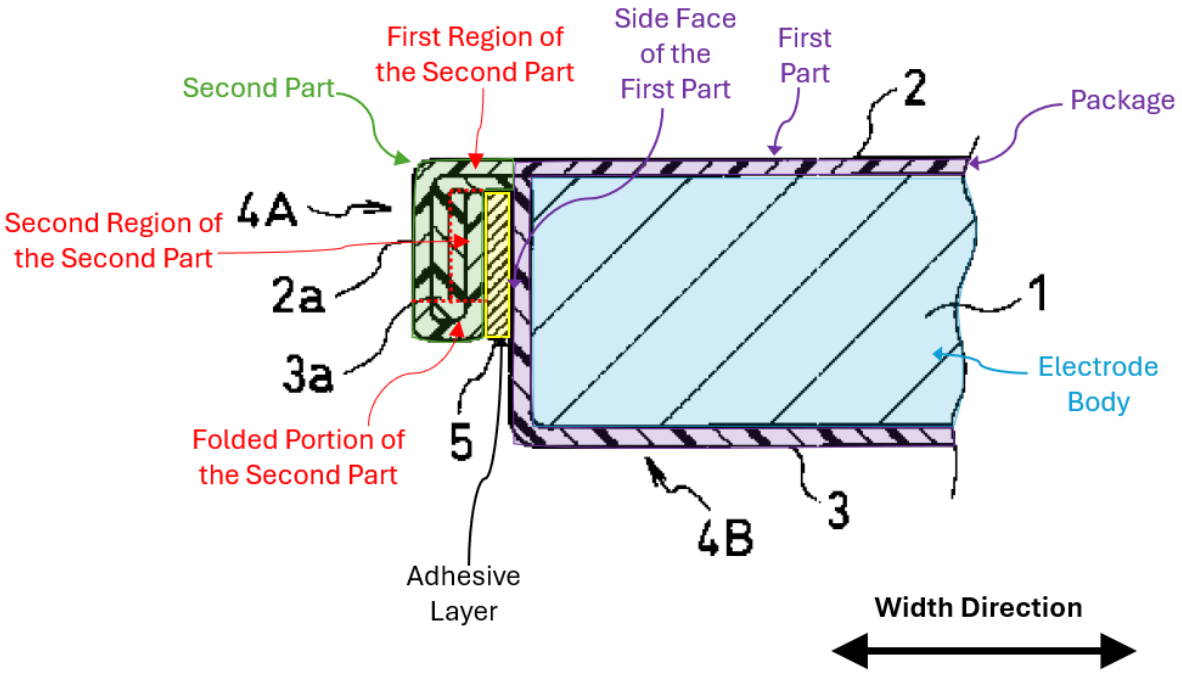
178. For the same reasons discussed for claims 12-17, a POSA would have understood from basic background knowledge in the art that the height of Kim-439's second part (bonding portion 240) relative to Kim-439's first part (upper surface 220, lower surface 210, and side) can be varied as a result-effective variable to optimize the volume and structural integrity of the package. EX1007, ¶¶[0052]-[0056]. For example, Kim-999 teaches that the height of folding part 23 may be adjusted so long as it remains less than the thickness of the electrode assembly 11, preventing it from extending beyond the first part's top and bottom surfaces. *See* EX1007, ¶¶[0052]-[0056]. Accordingly, it would have been obvious for a POSA to configure Kim-439's second part (bonding portion) such that

projections of its first and second regions and folded portion are located within the projection of its first part in the width direction to avoid unnecessary protrusion while maintaining mechanical stability. Doing so would have simply been the application of a known technique (adjusting the second part's height) to a known device (Kim-439's battery) to achieve a compact profile and improved structural integrity.

V. Dependent Claim 20

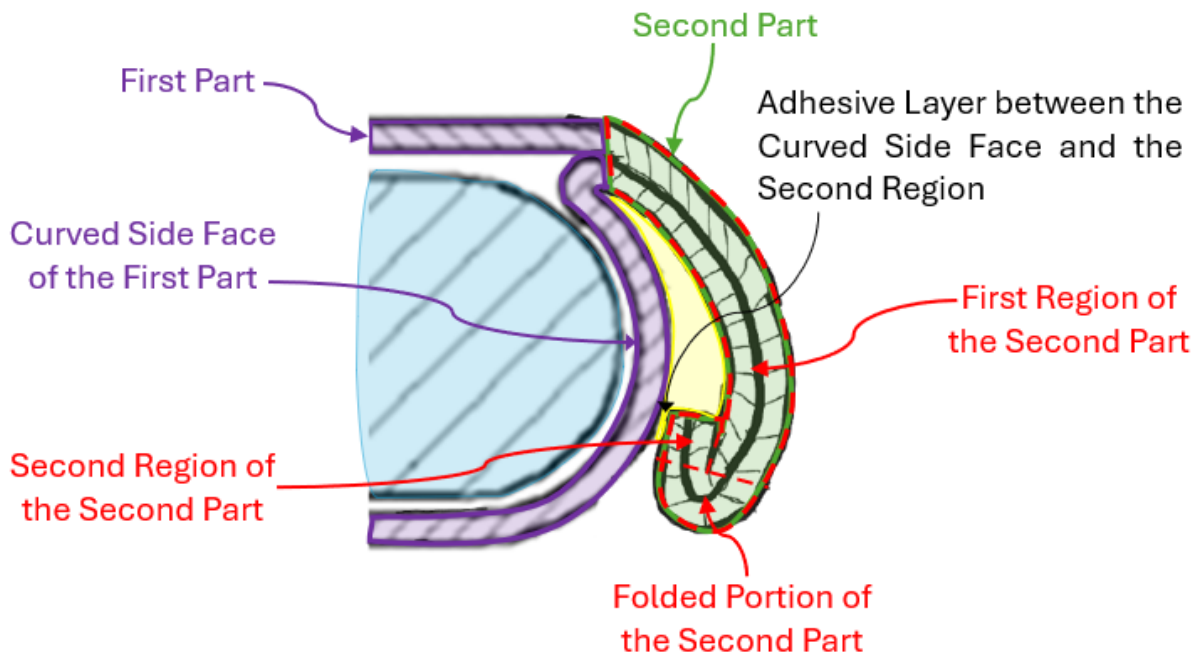
179. Claim 20 depends from claim 8 and further recites "wherein the adhesive layer is provided between the curved side face and the second region in the width direction."

180. Ueda discloses that the adhesive layer (adhesive 5) is provided between the side face (annotated) and the second region (leading edge of tab portion 4A) in the width direction, as shown below. EX1006, ¶¶[0013], [0023], [0030]. In particular, when viewed along the width axis, Ueda's adhesive layer 5 is disposed at the interface between the side surface of encapsulated portion 4B and the inwardly folded second region of tab portion 4A. EX1006, FIG. 2.



EX1006, FIG. 2 (annotated).

181. Accordingly, a POSA would have understood or found it obvious that when Ueda's adhesive is applied between Kim-439's second part (bonding portion 240) and the curved side face, the adhesive layer would be provided between Kim-439's curved side face and second region in the width direction, as shown below.



Rendering of Kim-439's Modified Battery.

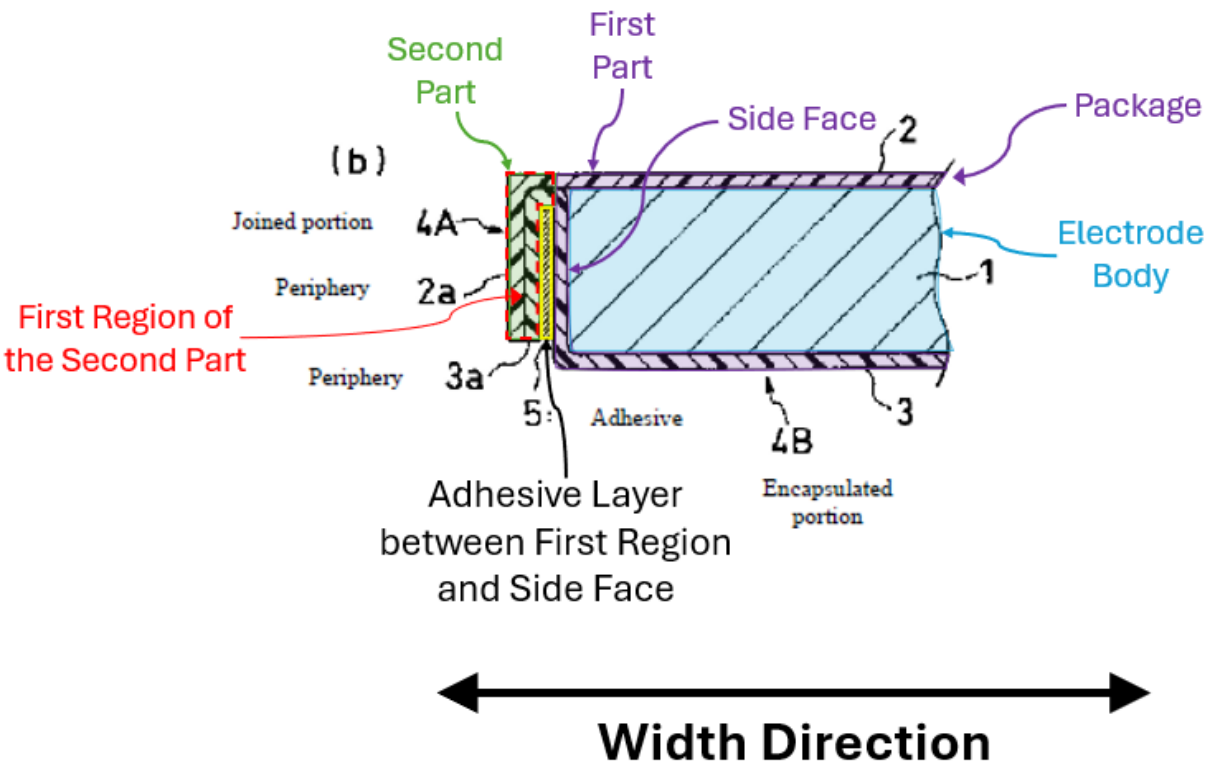
182. Furthermore, a POSA would have understood from basic background knowledge in the art that the placement of adhesive between the curved side face and the second part can be varied as a result-effective variable because it was well known to modify the volume and placement of adhesive to optimize the volume and structural integrity of the package. *See* EX1007, ¶¶[0063]-[0065]. For example, Kim-999 expressly teaches that adhesive is applied between the second part (folded portion 23) and the package's side and that both the position and extent of that adhesive may be adjusted to ensure sufficient bonding while avoiding unnecessary spacing or excess material. EX1007, ¶¶[0063]-[0065]. Ueda teaches the benefit of shielding the terminal end of the second part from "the intrusion of moisture and air." EX1006, ¶[0023]. Accordingly, a POSA would have

been motivated to modify the volume and location of adhesive between the second part's second region and the first part's curved side face to balance competing design considerations such as minimizing overall package volume, maintaining secure attachment of the folded portion, and preserving structural integrity. Doing so would have been the application of a known technique (controlling the amount of applied adhesive) to a known device (Kim-439's battery) to secure the second part to the first part without excess adhesive and maintain a compact profile

W. Dependent Claim 23

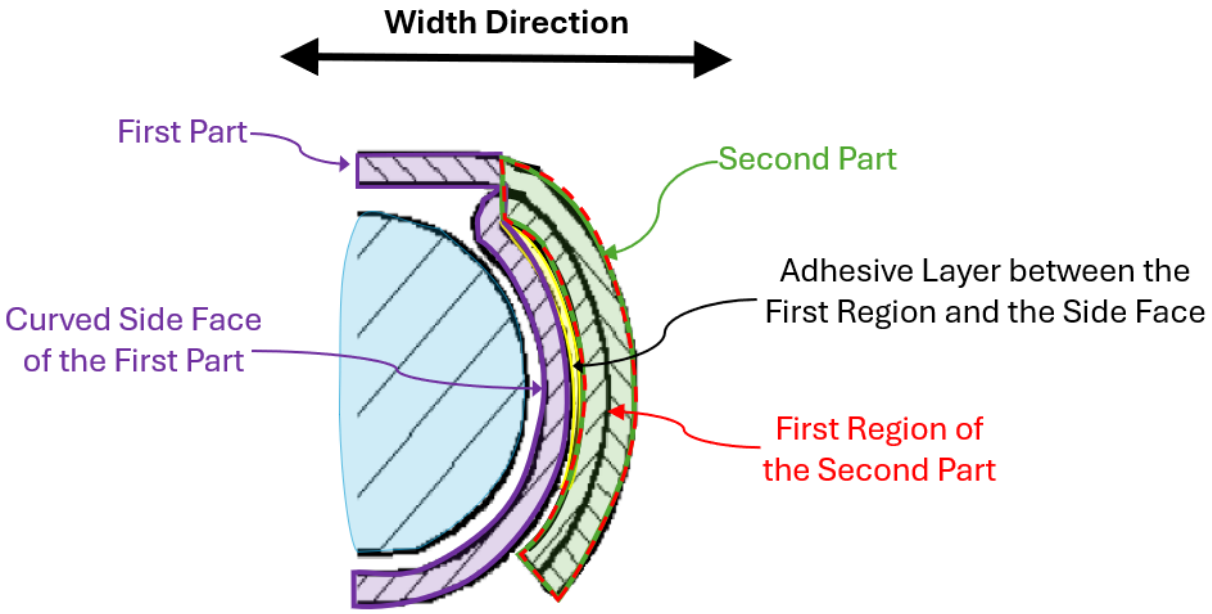
183. Claim 23 depends from claim 6 and further recites "wherein the adhesive layer is provided between the curved side face and the first region in the width direction."

184. Ueda discloses that the adhesive layer (adhesive 5) is provided between the side face (annotated) and the first region in the width direction, as shown in Figure 1b, reproduced below. EX1006, FIG. 1b, ¶¶[0013], [0023], [0030].



EX1006, FIG. 1b (annotated).

185. Accordingly, a POSA would have understood or found it obvious that when Ueda's adhesive is applied between Kim-439's second part (bonding portion 240) and the curved side face, the adhesive layer would be provided between Kim-439's curved side face and first region in the width direction, as shown below.

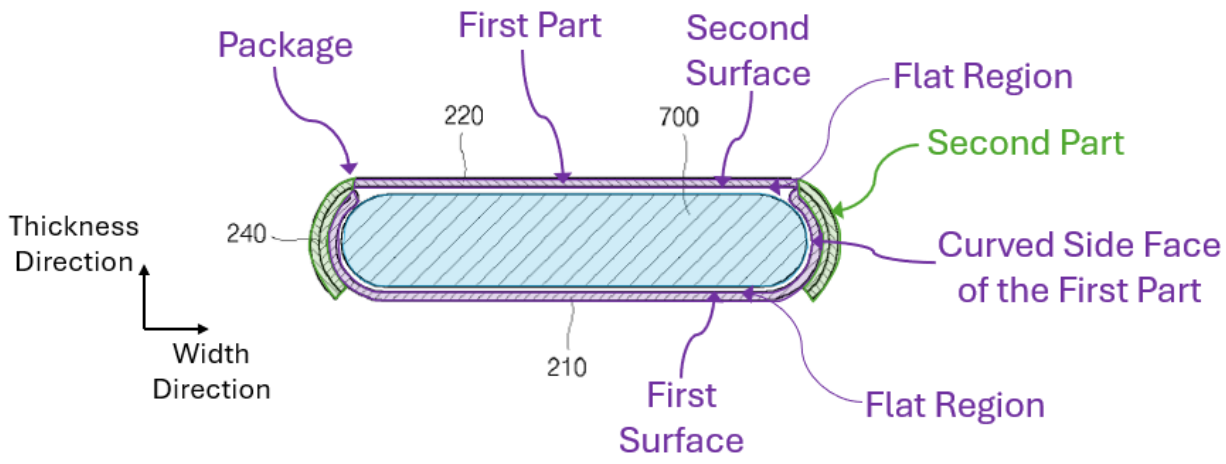


Rendering of Kim-439's Modified Battery.

X. Dependent Claim 24

186. Claim 24 depends from claim 5 and further recites "wherein at least one of the first surface or the second surface has a flat region in the width direction."

187. At least one of Kim-439's first and second surfaces (in fact, both) of the first part have a flat region in the width direction, as shown below in Figure 5b. EX1005, pp. 3-4.

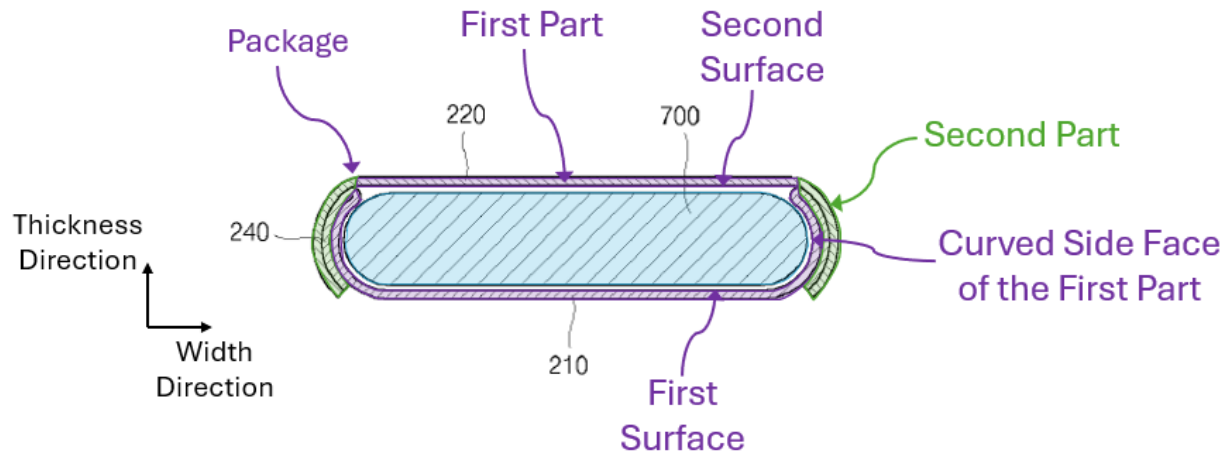


Kim-439, FIG. 5b (annotated).

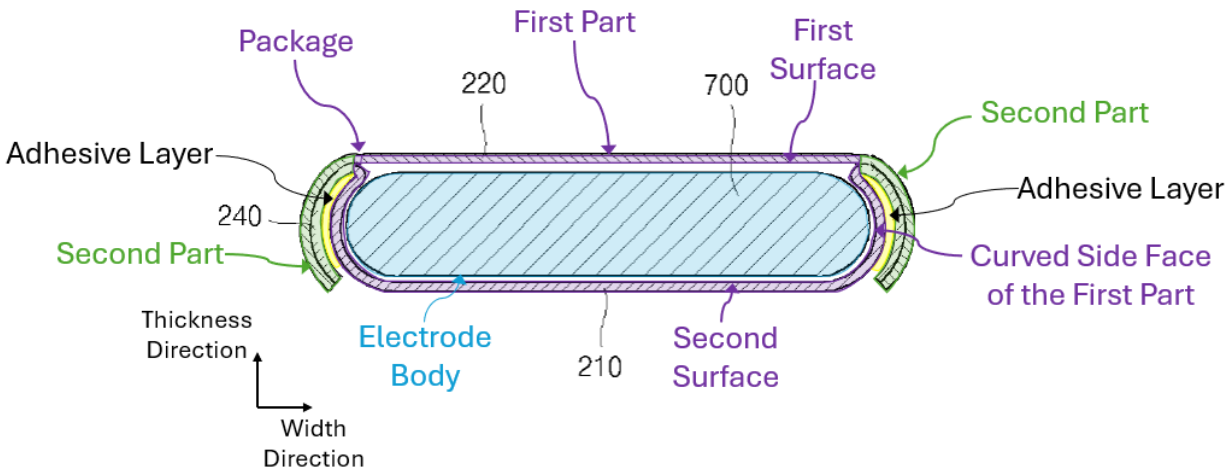
Y. Dependent Claim 25

188. Claim 25 depends from claim 5 and further recites "wherein the curved side face faces to the second part in the width direction."

189. Kim-439's curved side face faces to the second part in the width direction, as shown below in Figure 5b. EX1005, pp. 3-4.



Kim-439, FIG. 5b (annotated).

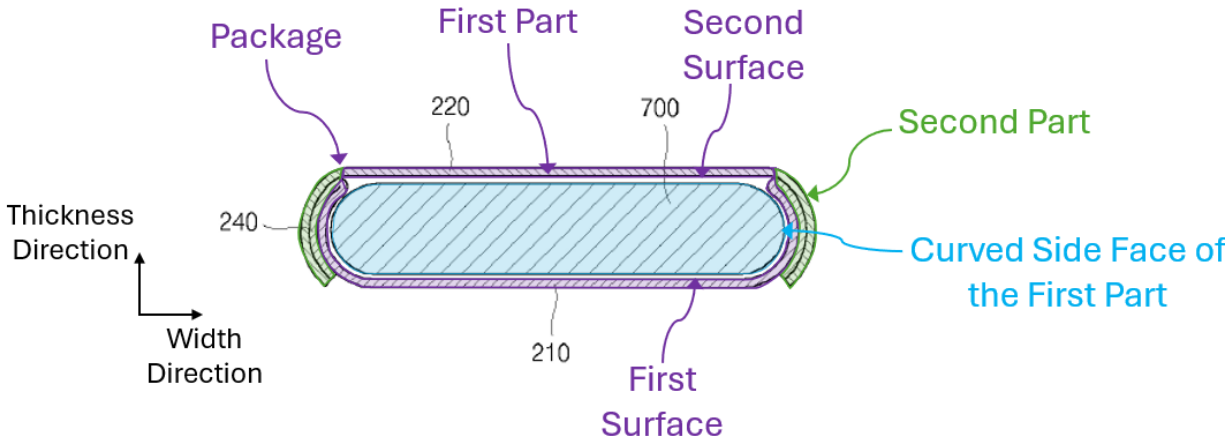


Rendering of Kim-439's Modified Battery.

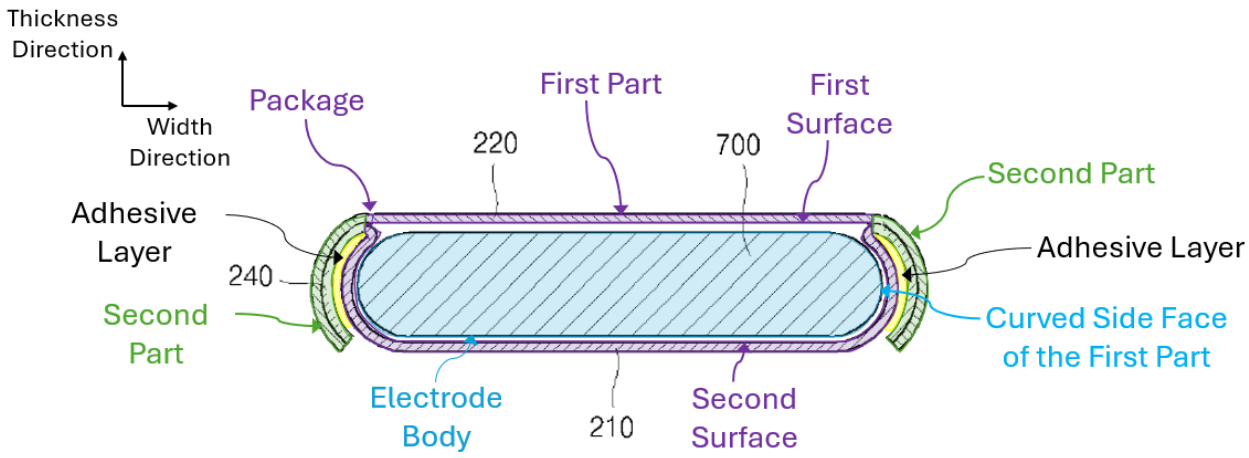
Z. Dependent Claim 27

190. Claim 27 depends from claim 1 and further recites "wherein the curved side face protrudes toward the second part in the width direction."

191. Kim-439's curved side face protrudes toward the second part in the width direction, as shown below in Figure 5b. EX1005, pp. 3-4.



Kim-439, FIG. 5b (annotated).



Rendering of Kim-439's Modified Battery.

X. GROUND 2: CLAIMS 19, 21, 22, AND 26 WOULD HAVE BEEN OBVIOUS IN VIEW OF KIM-439, UEDA, AND KIM-999.

A. Korean Patent No. 10-0591439 to Kim (Kim-439)

192. Kim-439 discloses a battery as I discussed above in Section IX.A.

B. Japanese Patent Pub. No. 2001-250515 to Ueda et al. (Ueda)

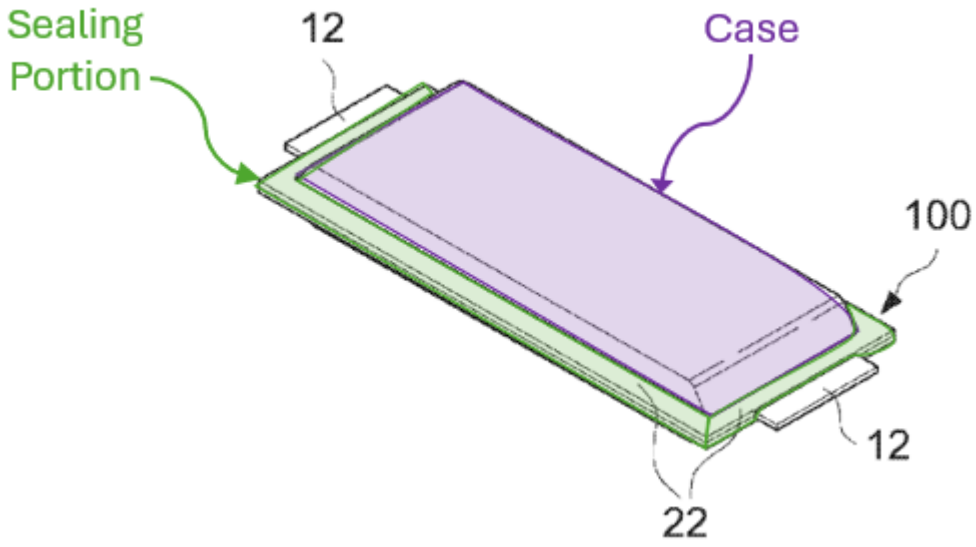
193. Ueda discloses a battery as I discussed above in Section IX.B.

C. U.S. Patent Pub. No. 2020/0111999 to Kim *et al.* (Kim-999)

194. U.S. Patent Pub. No. 2020/0111999 to Kim *et al.* is a national stage entry of PCT Application No. PCT/KR2017/015159 filed on December 20, 2017, which claims priority to Korean patent application number 10-2016-0174845, filed on December 20, 2016, and thus, is effectively filed before the '808 patent's earliest effective filing date of November 17, 2017, by almost 11 months.

195. Kim-999 discloses a pouch-type battery similar to Kim-439, Ueda, and the '808 patent. EX1007, Abstract; EX1006, Abstract; EX1005, Abstract;

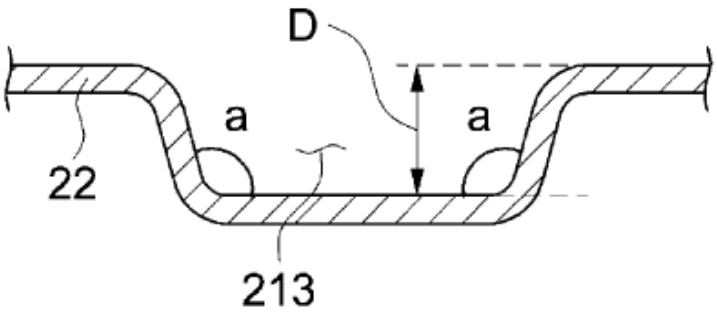
EX1001, 1:54-58; Kim-999's battery "include[s] an electrode assembly 11 and cathode and anode electrode tabs 12 drawn out from the electrode assembly 11." EX1007, ¶[0046]. Kim-999's battery includes a case 21 that "house[s] the electrode assembly 11 from which the electrode tabs 12 are drawn out." EX1007, ¶[0047]; *see also* EX1007, ¶[0080] ("the electrode assembly 11 is packaged with the case 21.")



EX1007, FIG. 1.

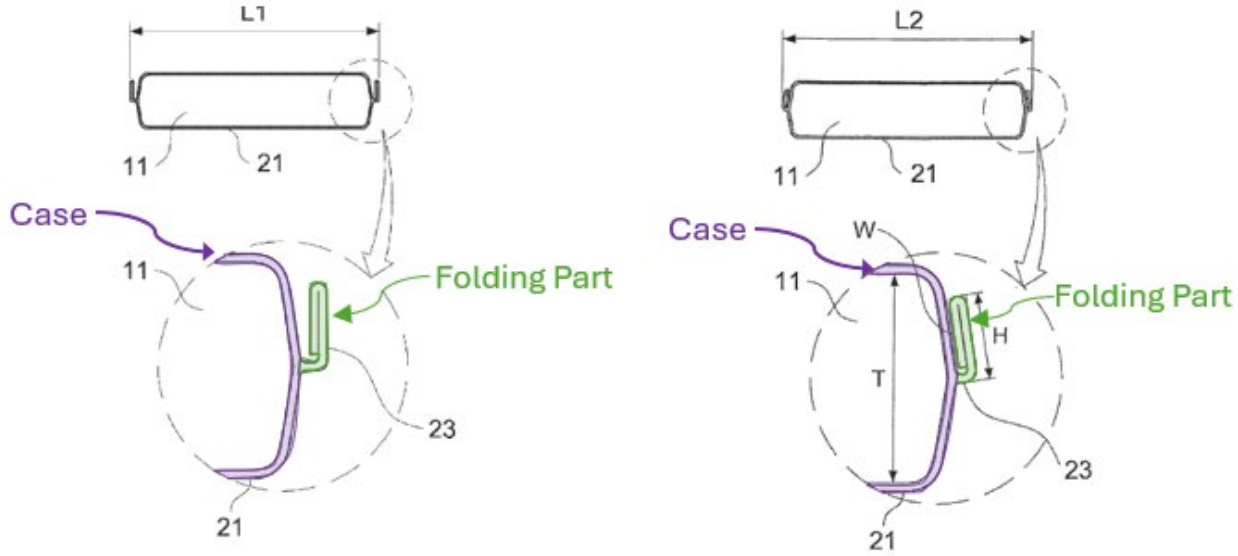
196. Kim-999's case includes "pouch film 212 and the sealing parts 22 formed on the outer circumferences of the pouch film 212." EX1007, ¶[0080]. As shown below in Figure 6B, Kim-999's pouch film 212 is "press[ed] in a recessed shape" to form a "pair of forming parts 213 for housing the electrode assembly 11." EX1007, ¶[0085]. Sealing parts 22 of the opposing forming parts 213 are adhered together "along the outer peripheries of the electrode assembly 11."

EX1007, ¶[0048].



EX1007, FIG. 6B (annotated).

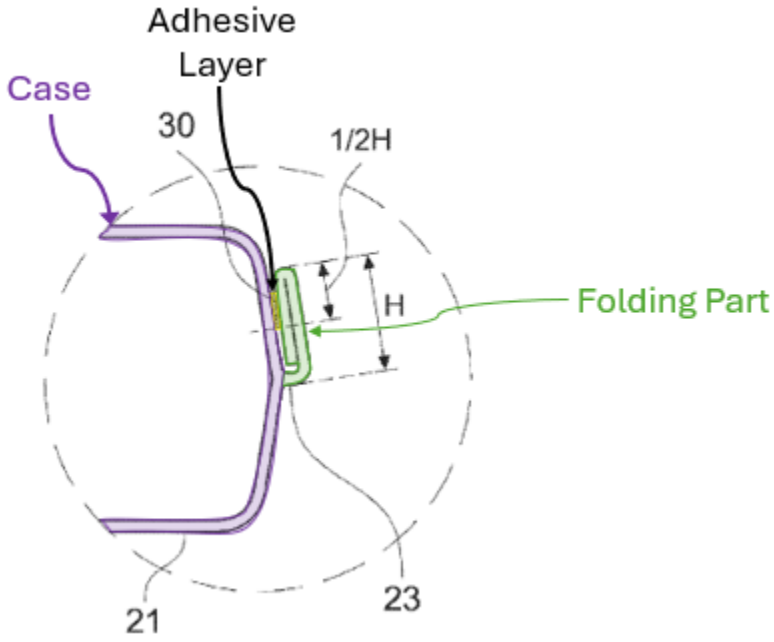
197. As shown in Figures 3A-3B, Kim-999's "sealing parts 22 of the remaining portions are folded to form the folding parts 23, such that the volume of the secondary battery may be reduced." EX1007, ¶[0049].



EX1007, FIGs. 3A-3B.

198. Kim-999's folding part 23 is "attached to one surface of the case 21 by an adhesive member 30." EX1007, ¶[0057]; *see also* EX1007, ¶[0060]. Kim-

999 teaches that the height of the adhesive member 30 between the side face of case 21 and folding part 23 can be adjusted so long as the adhesive is more than one-half of the entire height of the folding part to prevent "fluttering, bending, [and] twisting" of folding part 23. EX1007, ¶¶[0063]-[0066]. Kim-999 further teaches that the "angle between the folded folding part 23 and one surface of the case 21 may be 5 degrees or more and 25 degrees or less" to allow "the adhesive member 30 to be injected between the folding part 23 and the case 21," while preventing "the distance between the folding part 23 and the case 21" from being "too large." EX1007, ¶[0068].



EX1007, FIG. 4 (annotated).

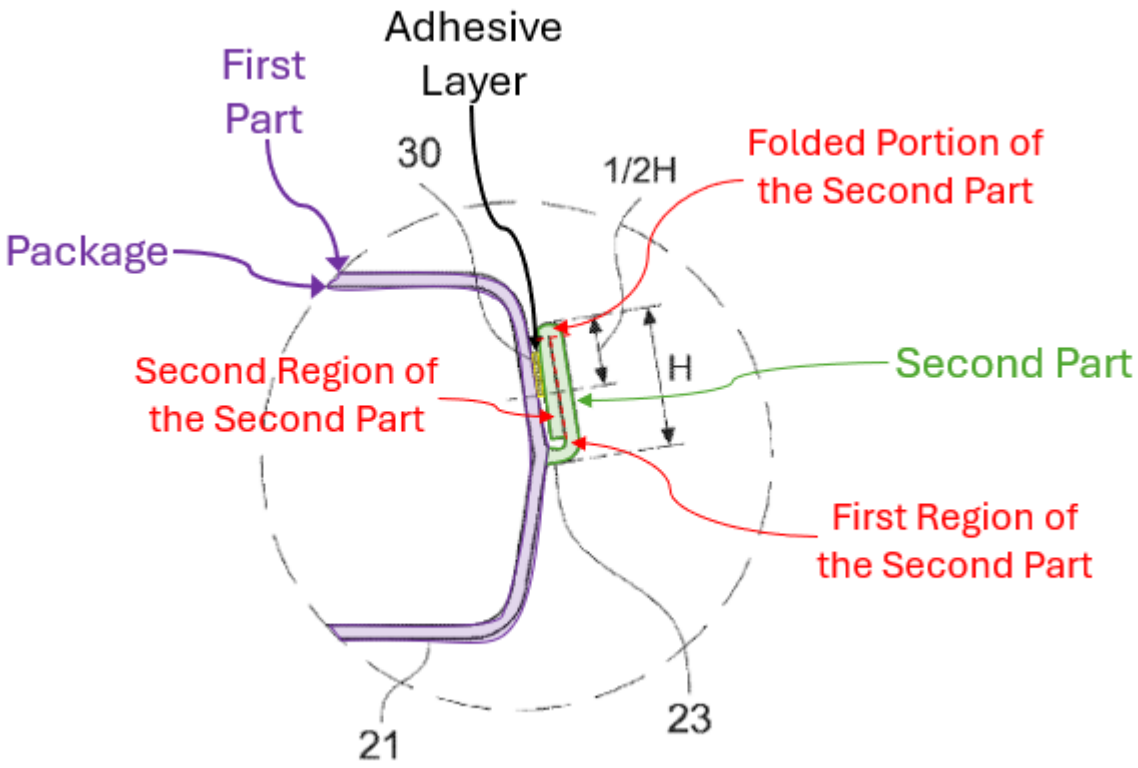
D. A POSA would have been motivated to combine Kim-999 with Kim-439 and Ueda with a reasonable expectation of success.

199. Kim-999, Kim-439, and Ueda are analogous art with respect to the '808 patent, as they all disclose pouch-type batteries. EX1005, ¶[0001]; EX1006, ¶[0001]; EX1007, ¶[0001]; EX1001, Abstract.

200. Kim-999 discloses parameters for adjusting the spatial arrangement of the package's second part (Kim-999's folding part 23) relative to the package's first part (Kim-999's case 21) to balance structural rigidity and adhesive bonding with volume footprint of the package. EX1007, ¶¶[0054]-[0068]. For example, Kim-999 discloses that the height of the second part (Kim-999's folding part 23) can be adjusted so long as the height is smaller than the thickness of the electrode

assembly 11 to prevent the folding part 23 from protruding beyond the boundaries of battery case 21. EX1007, ¶¶[0054]-[0056]. Kim-999 further discloses that "angle between the folded folding part 23 and one surface of the case 21 may be 5 degrees or more and 25 degrees or less" to allow "the adhesive member 30 to be injected between the folding part 23 and the case 21," while preventing "the distance between the folding part 23 and the case 21" from being "too large." EX1007, ¶[0068].

201. Moreover, Kim-999 teaches that adhesive 30 "may be injected between the entire height of the folding part 23 and ½ or more of the entire height of the folding part 23." EX1007, ¶[0065]. Kim-999 further explains that when the adhesive layer is "less than ½ of the entire height of the folding part 23, fluttering, bending, twisting, and the like may occur in the detached portion of the folding part 23." EX1007, ¶[0066]. Accordingly, a POSA would have understood in view of Kim-999 that the folding part's height, the fold angle, and the height of glue are variables that can be jointly adjusted to optimize adhesive spacing and bonding performance.



EX1007, FIG. 4 (annotated).

1. Locating the Second End Portion Between the First Part's Central Plane and First Surface in the Width Direction

202. To the extent that the Kim-439/Ueda combination does not disclose locating the projection of the second end portion in the width direction between the projections of the first part's central plane and first surface in the width direction, it would have been obvious to do so according to the parameters taught by Kim-999 to maintain the structural integrity of the package while keeping the package compact. Kim-999 teaches that it is well known to adjust the height of the package's second part (folding part 23), which directly correlates to the location of the second end portion (leading end) of the second part, in "relationship with the

thickness of the electrode assembly." EX1007, ¶[0054]. Specifically, Kim-999 teaches setting the height of folding part 23 to be "smaller than the thickness of the electrode assembly 11" so that the second fold of folding part 23 does not protrude above the first surface of the package. EX1007, ¶[0055]-[0056]. Doing so "prevent[s] an unnecessary space from being formed between the adjacent secondary batteries by the folding part 23 when assembling the secondary battery module." EX1007, ¶[0056].

203. A POSA would have recognized that modifying the height of Kim-439's bonding portion 240—such as the second part's first and second regions of Kim-439's battery as modified by Ueda—represents a predictable use of known sealing techniques to secure folded structural elements without expanding the footprint of the battery's package. The combination would therefore amount to nothing more than applying a known technique (Kim-999's folding part height-adjustment technique) to a known device (Kim-439's battery as modified by Ueda) to achieve the same benefits of improved sealing and preserved compactness.

204. A POSA would also have had a reasonable expectation of success in combining Kim-999's folding part height-adjustment technique with Kim-439/Ueda because the references employ compatible structures (folded flange or tab portions adjacent a casing) and solve similar problems (securing folded portions to a battery body while controlling thickness and volume). All references

address the same interface—the connection between a second part (folded edge portion) and the first part (casing) of the battery's package—with the same design goals: structural integrity, compactness, and adhesion reliability. Thus, modifying the location of the second end portion of Kim-439's bonding portion, as modified by Ueda and Kim-999, would have been a design refinement well within the level of ordinary skill, rather than a structural overhaul.

2. Providing Adhesive Between First and Second Regions of the Package's Second Part

205. To the extent the Kim-439/Ueda combination does not explicitly disclose providing an adhesive layer between the first region and the second region of the second part in the width direction, it would have been obvious to do so according to the parameters taught by Kim-999 to maintain the structural integrity of the package while keeping the package compact. Specifically, Kim-999 teaches that adhesive placement between the folding part and the case is enabled and controlled through adjustment of spacing, angular orientation, and adhesive height, which directly govern adhesive injection, distribution, and curing efficiency. EX1007, ¶[0068]. A POSA would have recognized that introducing an adhesive layer between adjoining regions of a folded portion—such as the first and second regions of Kim-439 as modified by Ueda—represents a predictable use of known adhesive bonding techniques to secure folded structural elements while preventing deformation (e.g., fluttering or separation). The combination would therefore

amount to nothing more than applying a known technique (Kim-999's expressly taught adhesive-spacing optimization principles) to a known device (Kim-439's battery as modified by Ueda) to achieve the same benefits of improved bonding and preserved compactness.

206. A POSA would also have had a reasonable expectation of success in combining Kim-999's teachings with Kim-439/Ueda because the references employ compatible structures (folded flange or tab portions adjacent a casing) and solve similar problems (securing folded portions to a battery body while controlling thickness and volume). Thus, Kim-999's parameter-driven approach to adhesive spacing, adhesive height, and folding geometry would have been directly applicable to the Kim-439/Ueda structure without requiring undue experimentation. Kim-999 explicitly links geometric parameters (e.g., folding angle, height, and spacing) with adhesive performance outcomes, providing concrete design guidance for a POSA to readily implement in analogous folded configurations. EX1007, ¶¶[0054]-[0056], [0068]. Furthermore, Ueda confirms that adhering folded portions of a pouch battery structure to the battery body was a known and reliable technique for improving rigidity and preventing deformation. EX1006, ¶¶[0018], [0081]. In view of these complementary teachings, a POSA would have reasonably expected that applying Kim-999's spacing and angle optimization to the Kim-439/Ueda's battery would successfully yield improved

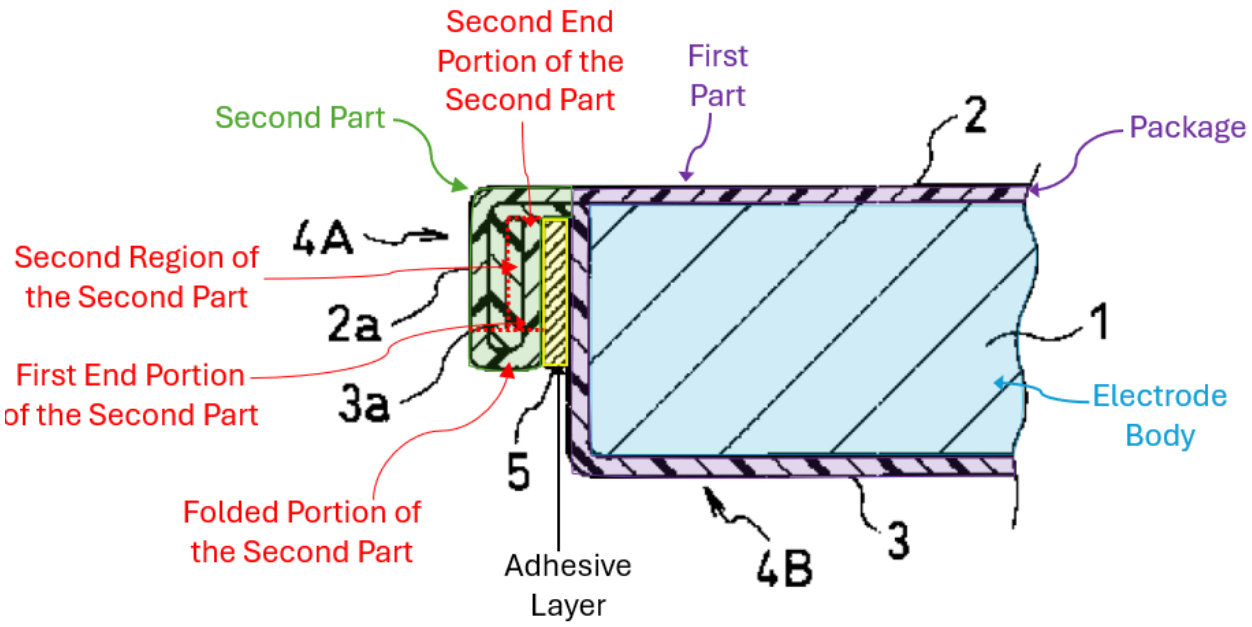
adhesive bonding and structural integrity without compromising volume efficiency.

E. Dependent Claim 19

207. Claim 19 depends from claim 8 and further recites:

1. **[19.A] "wherein the second region comprises a first end portion connected to the folded portion, and a second end portion opposite to the first end portion"**

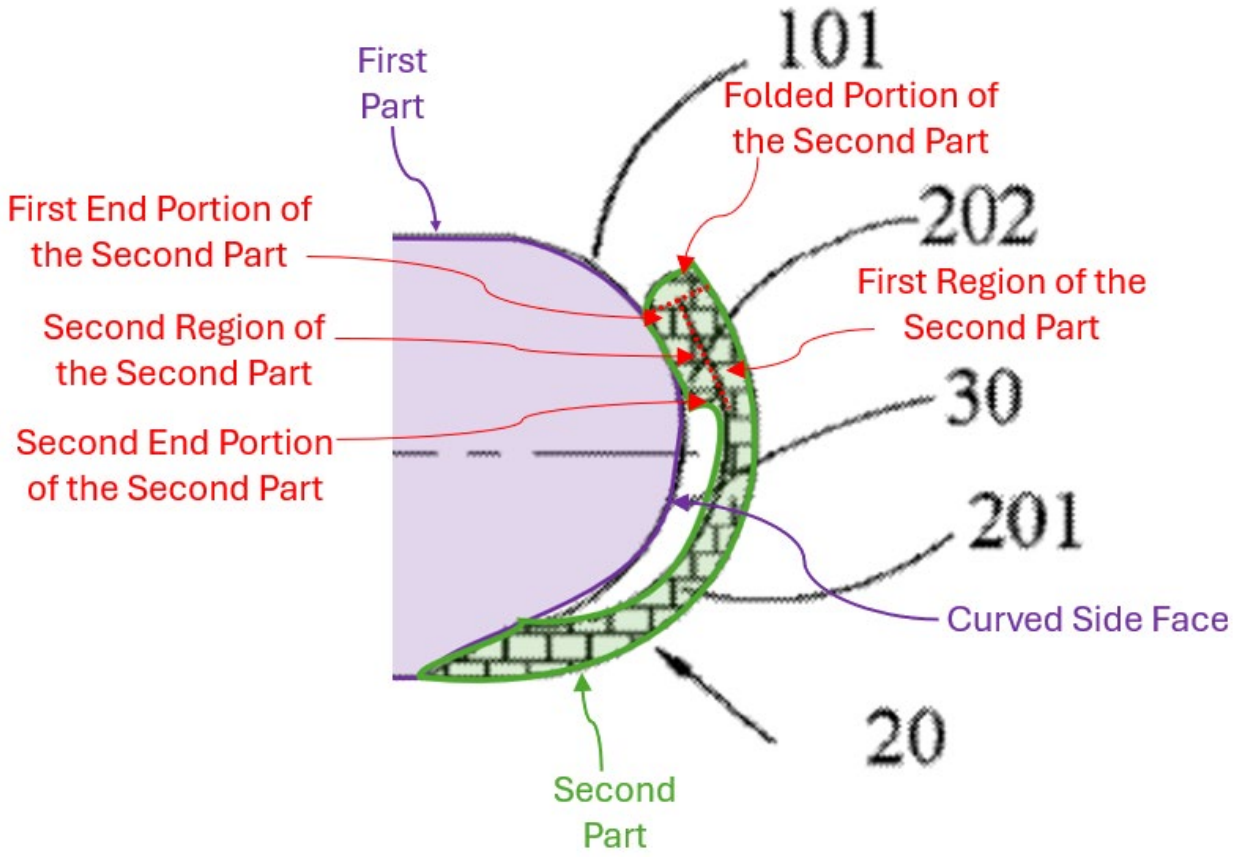
208. Ueda discloses that the second region (leading edge of tab portion 4A) has a first end portion (annotated) connected to the folded portion (second fold of tab portion 4A) and a second end portion (annotated) opposite to the first end portion, as shown below in Figure 2.



EX1006, FIG. 2 (annotated).

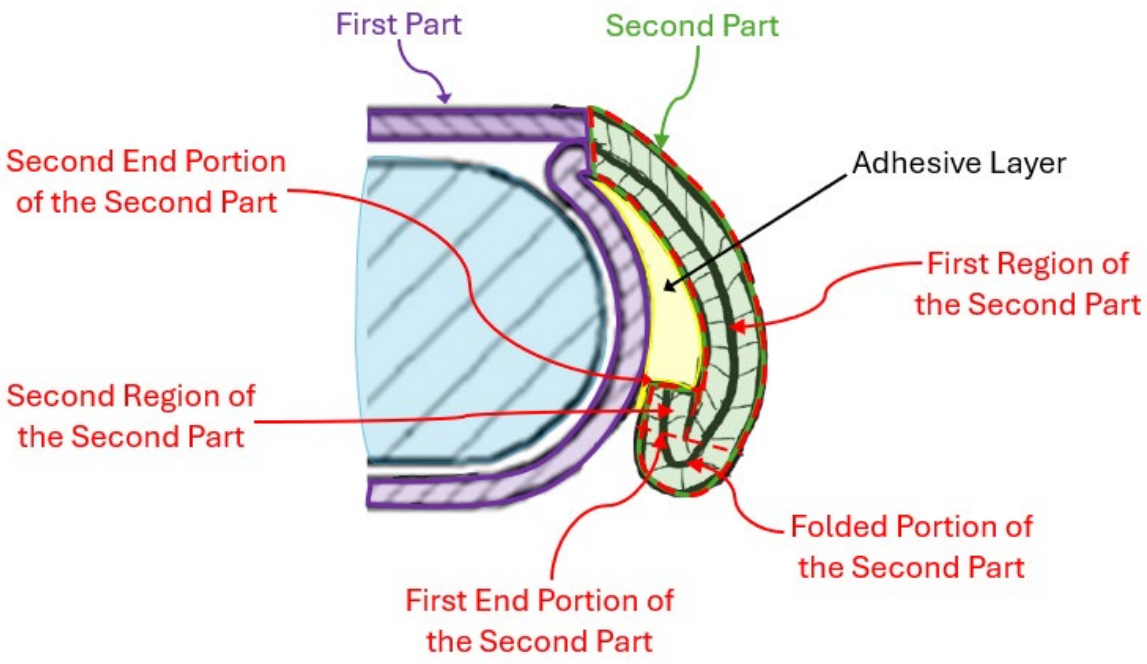
209. Ueda's inward folding technique of the second part (joined tab portion 4A) provides the second region with a first end portion and a second end portion in

the same manner as disclosed by the '808 patent, as shown below. EX1001, 1:51-2:8.



EX1001, FIG. 1 (annotated).

210. Accordingly, a POSA would have understood that, when Ueda's inward folding technique is applied to Kim-439's bonding portion 240, a similar structural arrangement—the second region comprises a first end portion connected to the folded portion, and a second end portion opposite to the first end portion—would be made to minimize the volume footprint of the battery.



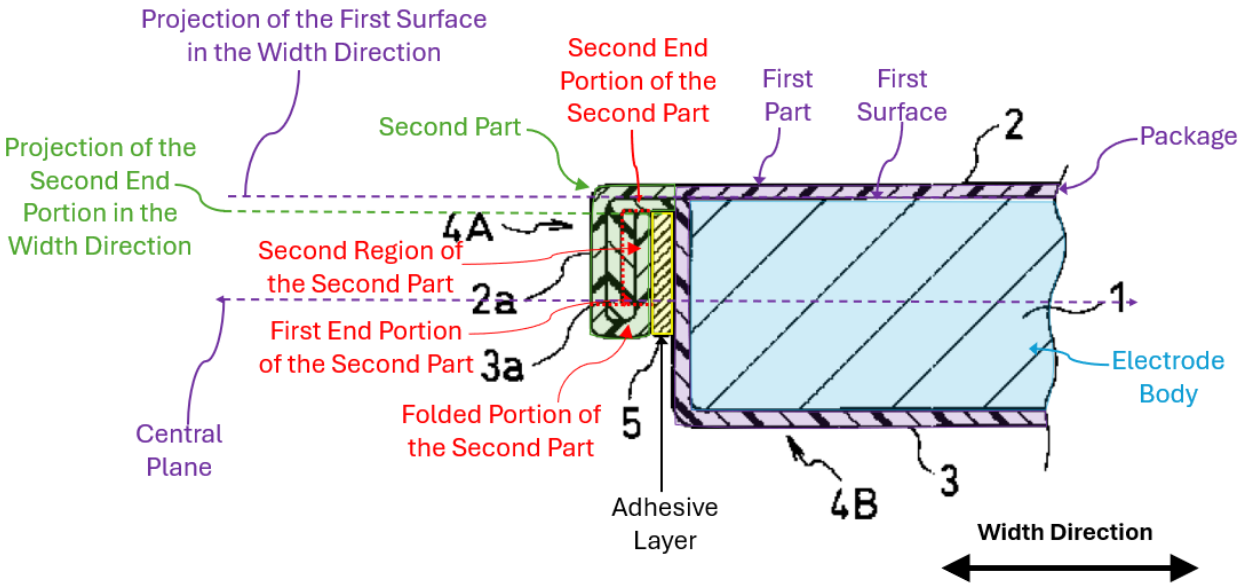
Rendering of Kim-439's Modified Battery.

2. [19.B] "wherein a projection of the second end portion in the width direction is located between a central plane of the first part and a projection of the first surface in the width direction"

a. Kim-439/Ueda

211. For the same reasons discussed for claims 12-18, a POSA would have understood from basic background knowledge in the art that the spatial arrangement of the second end relative to the package's side is a result-effective variable to optimize the volume and structural integrity of the package. *See* EX1007, ¶¶[0052]-[0056]. Accordingly, it would have been obvious for a POSA to configure Kim-439's second part (bonding portion) such that the projection of the second end portion in the width direction is located between a central plane of

Kim-439's first part (upper surface 220, lower surface 210, and side) and a projection of the first surface (interior side of upper surface 220) in the width direction to avoid unnecessary protrusion while maintaining mechanical stability.



EX1006, FIG. 2 (annotated).

212. Should Patent Owner argue that the Kim-439/Ueda combination does not disclose the recited arrangement of the projection of the second end portion in the width direction relative to the central plane and first surface of the first part in the width direction, Kim-999 shows that modifying the location of the second end portion of the second region relative to the central plane and first surface of the first part by adjusting the height of the second part was known and well within the level of ordinary skill in the art.

b. Kim-999

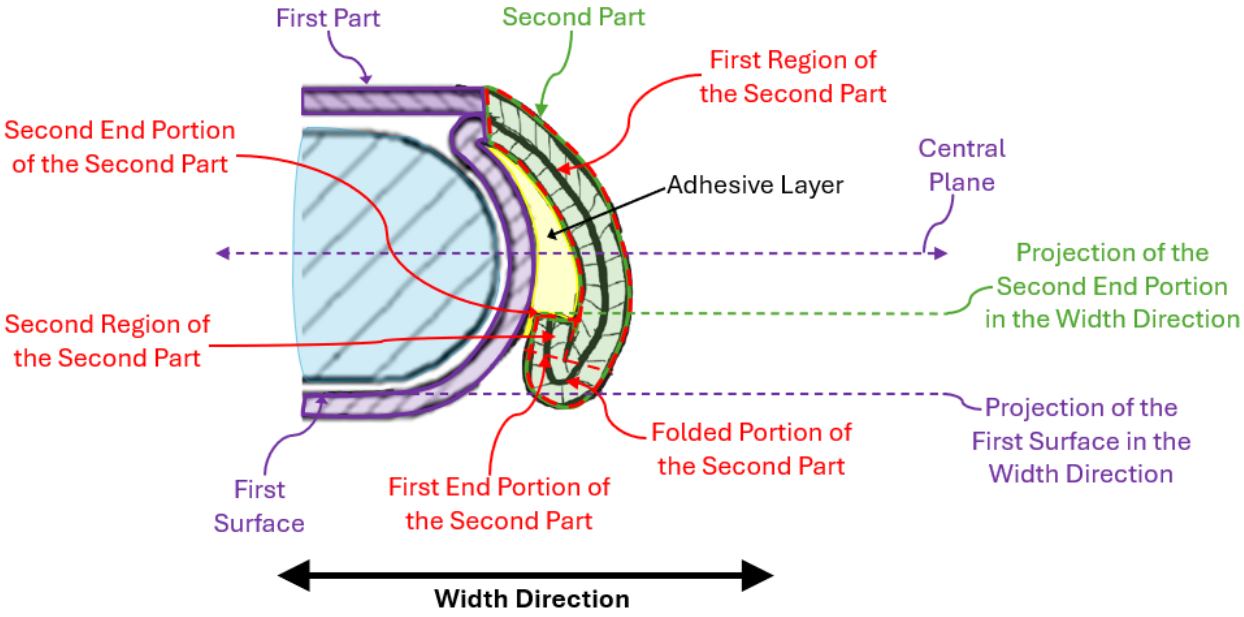
213. Kim-999 teaches that it is well known to adjust the height of the

package's second part (folding part 23), which directly correlates to the location of the second end portion (leading end) of the second part, in "relationship with the thickness of the electrode assembly." EX1007, ¶[0054]. Specifically, Kim-999 teaches setting the height of folding part 23 to be "smaller than the thickness of the electrode assembly 11" so that the second fold of folding part 23 does not protrude above the first surface of the package. EX1007, ¶[0055]-[0056]. Doing so "prevent[s] an unnecessary space from being formed between the adjacent secondary batteries by the folding part 23 when assembling the secondary battery module." EX1007, ¶[0056]. Accordingly, it would have been obvious to a POSA to modify the location of the second end portion of the second region of the package's second part to be located between the first surface and central plane of the package's first part so that the second part has a height less than the electrode body, thereby making the battery's package more compact.

c. Kim-439/Ueda/Kim-999 Combination

214. For the reasons discussed in section X.D, it would have been obvious to modify the height of Kim-439's second part (bonding portion 240) when implementing Ueda's inwardly folding technique such that a projection of the second end portion in the width direction is located between a central plane of the first part (upper surface 220, lower surface 210, and side) and a projection of the first surface (interior side of upper surface 220) in the width direction to minimize

the volume footprint of the battery. For a battery with a curved edge, extending the end portion of the second part beyond the midline can increase the width of the finished cell.



Rendering of Kim-439's Modified Battery.

215. Furthermore, for the same reasons discussed for claims 12-18, a POSA would have understood from basic background knowledge in the art that the spatial arrangement of the second end relative to the package's side is a result-effective variable to optimize the volume and structural integrity of the package. *See* EX1007, ¶¶[0052]-[0056]. Accordingly, it would have been obvious for a POSA to configure Kim-439's second part (bonding portion) such that the projection of the second end portion in the width direction is located between a central plane of Kim-439's first part (upper surface 220, lower surface 210, and

side) and a projection of the first surface (interior side of upper surface 220) in the width direction to avoid unnecessary protrusion while maintaining mechanical stability.

216. Accordingly, a POSA would have understood that the combined disclosures of Kim-439/Ueda/Kim-999 render claim 19 obvious.

F. Dependent Claim 21

217. Claim 21 depends from claim 8 and further recites "wherein the adhesive layer is provided between the first region and the second region in the width direction."

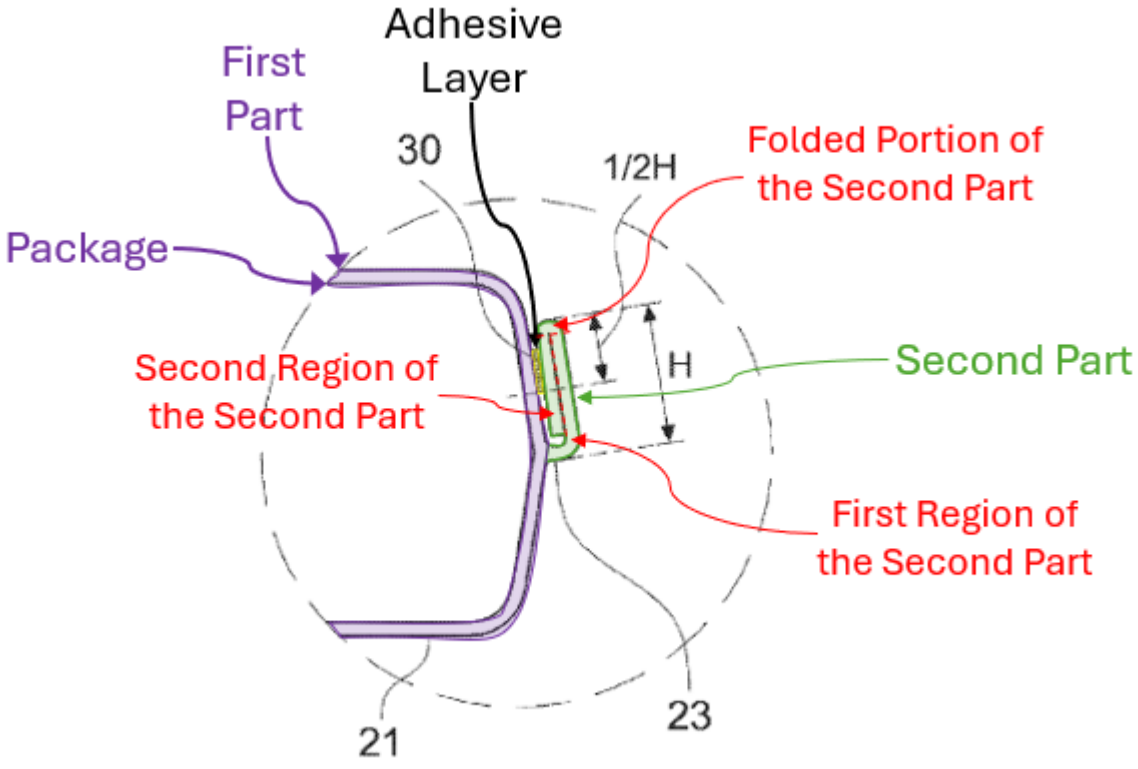
1. Kim-439/Ueda

218. The Kim-439/Ueda combination renders obvious applying an adhesive layer between the first region and the second region in the width direction. As explained above in Section IX.K, a POSA would have understood that the height of Kim-439's second part (bonding portion) and the application of adhesive can be varied as a result-effective variable to control bonding strength and volume footprint. Should Patent Owner argue that the Kim-439/Ueda combination does not disclose the recited placement of adhesive, Kim-999 shows that modifying placement of adhesive relative to the location of the second part was known and well within the level of ordinary skill in the art.

2. Kim-999

219. As shown below, the end of the second region in Kim-999's folding

part 23 is spatially separated from the folding part's first region. EX1007, FIG. 4. Kim-999 teaches that adhesive 30 "may be injected between the entire height of the folding part 23 and ½ or more of the entire height of the folding part 23." EX1007, ¶[0065]. A POSA would have understood that Kim-999's disclosed range of adhesive, such as applying adhesive along the entire height of folding part 23, includes applying adhesive between the first region and the second region in the width direction.

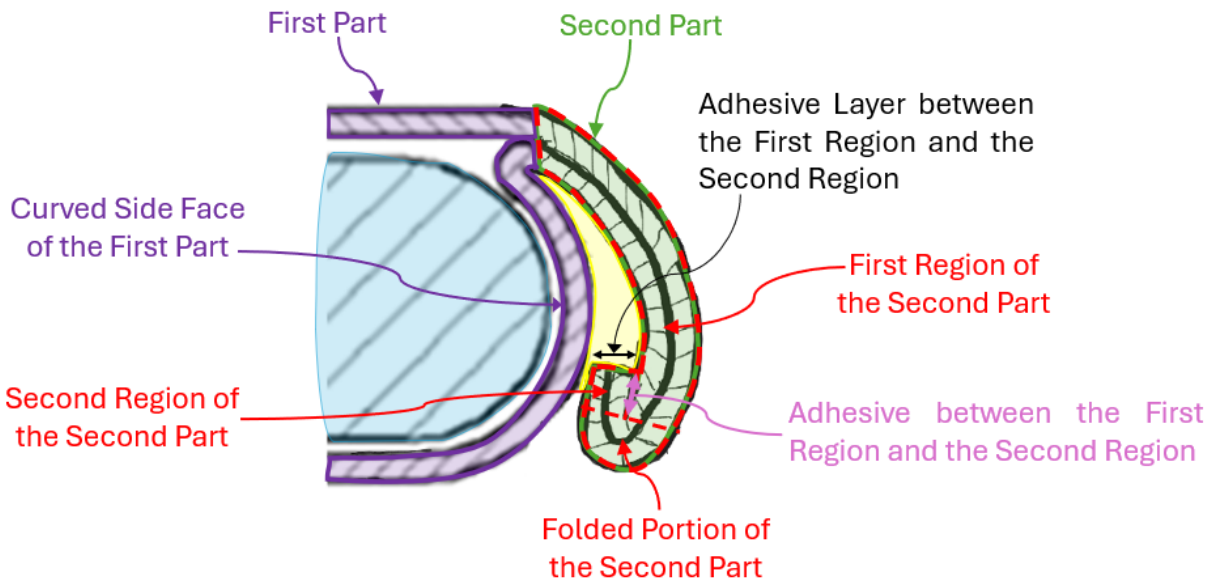


EX1007, FIG. 4 (annotated).

3. Kim-439/Ueda/Kim-999 Combination

220. For the reasons discussed in section X.D, it would have been obvious

to modify the height of Kim-439's second part (bonding portion 240) and the height of adhesive in Kim-439/Ueda's battery such that adhesive is applied between Kim-439's first region and second region in the width direction to improve bonding, reduce material usage, and preserve compactness. Injecting adhesive along the thickness (vertical direction) between Kim-439's second part (bonding portion 240) and first part (upper surface 220 and lower surface 210) would also force adhesive to intrude into the interface between the first and second regions of the second part, as shown below. And a POSA would have had a reasonable expectation of success doing so because Kim-999's parameter-driven approach to adhesive application would have been directly applicable to Kim-439/Ueda's battery.



Rendering of Kim-439's Modified Battery.

G. Dependent Claim 22

221. Claim 22 depends from claim 8 and further recites "wherein the adhesive layer is provided between the curved side face, the first region and the second region in the width direction."

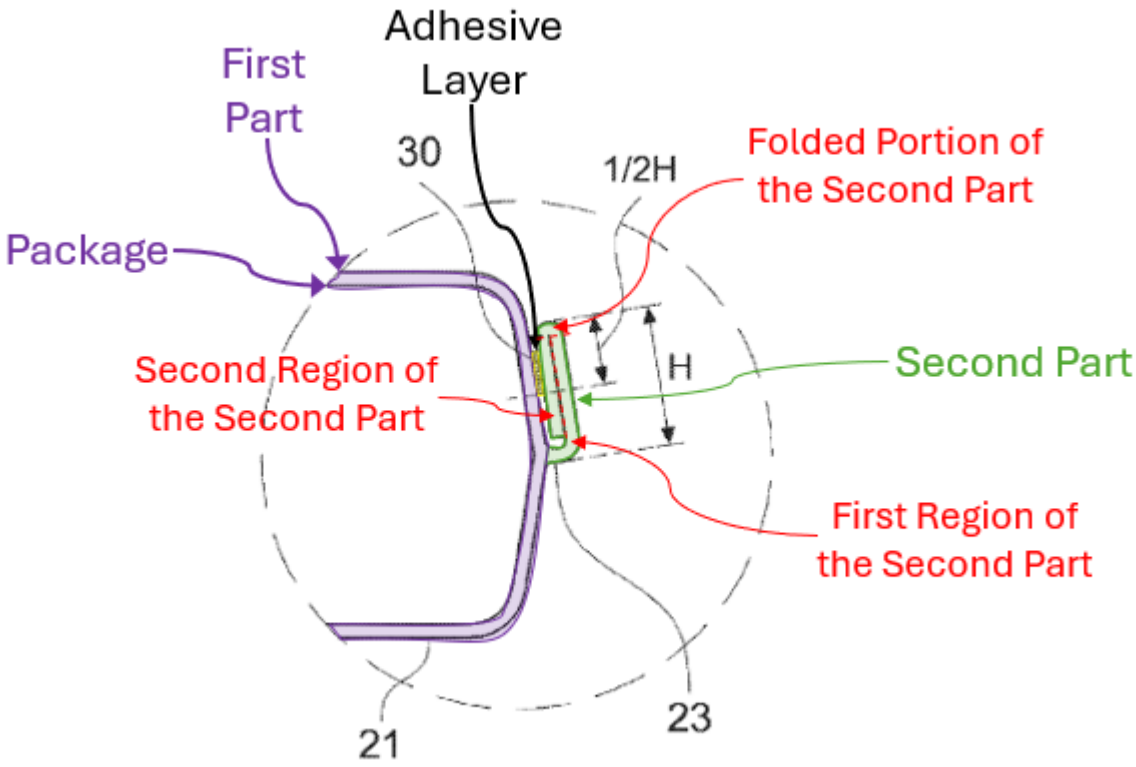
1. Kim-439/Ueda

222. As explained above in Section IX.K, the Kim-439/Ueda combination renders obvious applying the adhesive layer between the curved side face, the first region, and the second region in the width direction because a POSA would have understood that the height of Kim-439's second part (bonding portion) and the application of adhesive can be varied as a result-effective variable to control bonding strength and volume footprint. To the extent Patent Owner argues that the Kim-439/Ueda combination does not disclose the recited placement of adhesive, Kim-999 shows that modifying placement of adhesive relative to the location of the second part is well within the level of ordinary skill in the art.

2. Kim-999

223. As shown below, the end of the second region in Kim-999's folding part 23 is spatially separated from the folding part's first region. EX1007, FIG. 4. Kim-999 teaches that adhesive 30 "may be injected between the entire height of the folding part 23 and ½ or more of the entire height of the folding part 23." EX1007, ¶[0065]. A POSA would have understood that Kim-999's disclosed range of adhesive, specifically adhesive along the entire height of folding part 23,

includes applying adhesive between the curved side face, the first region, and the second region in the width direction. For adhesive applied along the entire height of folding part 23, intrusion of adhesive between the first and second region would be unavoidable.

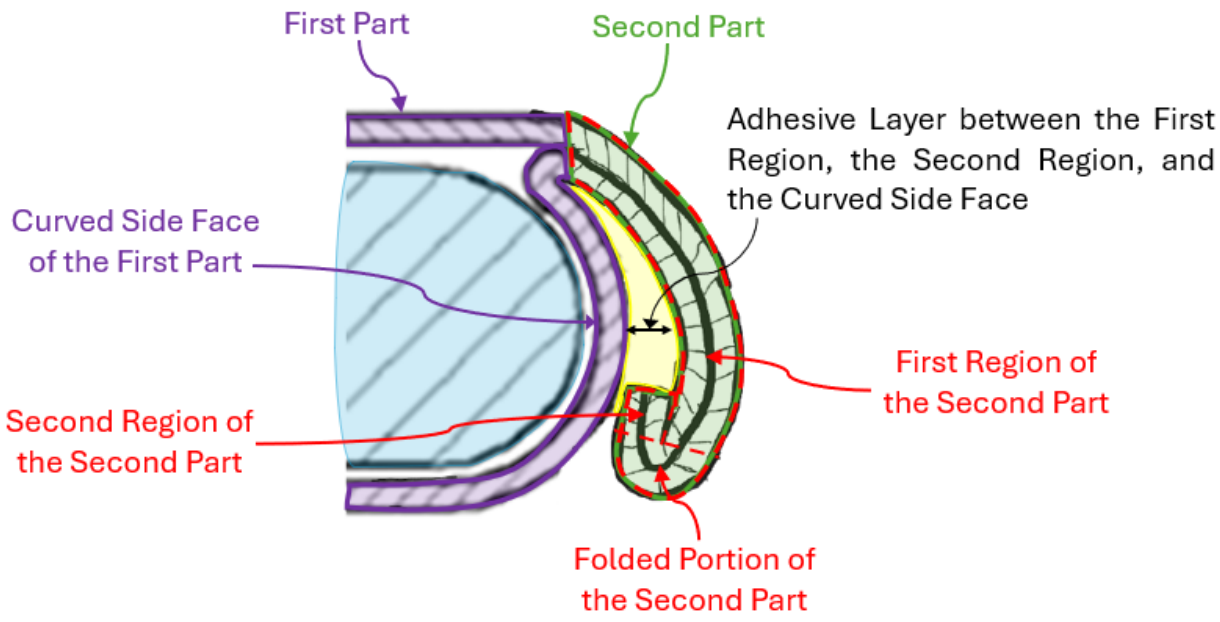


EX1007, FIG. 4 (annotated).

3. Kim-439/Ueda/Kim-999 Combination

224. For the reasons discussed in section X.D, it would have been obvious to modify the height of Kim-439's second part (bonding portion 240) and the height of adhesive in Kim-439/Ueda's battery such that adhesive is applied between Kim-439's curved side face, first region, and second region in the width

direction to improve bonding, reduce material usage, preserve compactness, and seal against the intrusion of air and moisture. And a POSA would have had a reasonable expectation of success in doing so because Kim-999's parameter-driven approach to adhesive application would have been directly applicable to Kim-439/Ueda's battery.



Rendering of Kim-439's Modified Battery.

H. Dependent Claim 26

225. Claim 26 depends from claim 1 and further recites "wherein a unit mass of the adhesive layer is 0.1 to 0.25 mg/mm in the thickness direction."

1. Kim-439/Ueda

226. The Kim-439/Ueda combination does not explicitly disclose wherein a unit mass of the adhesive layer is 0.1 to 0.25 mg/mm in the thickness direction. However, Kim-999 shows that modifying the amount of adhesive at the interface

between the second part and the side face of the package is well within the level of ordinary skill in the art.

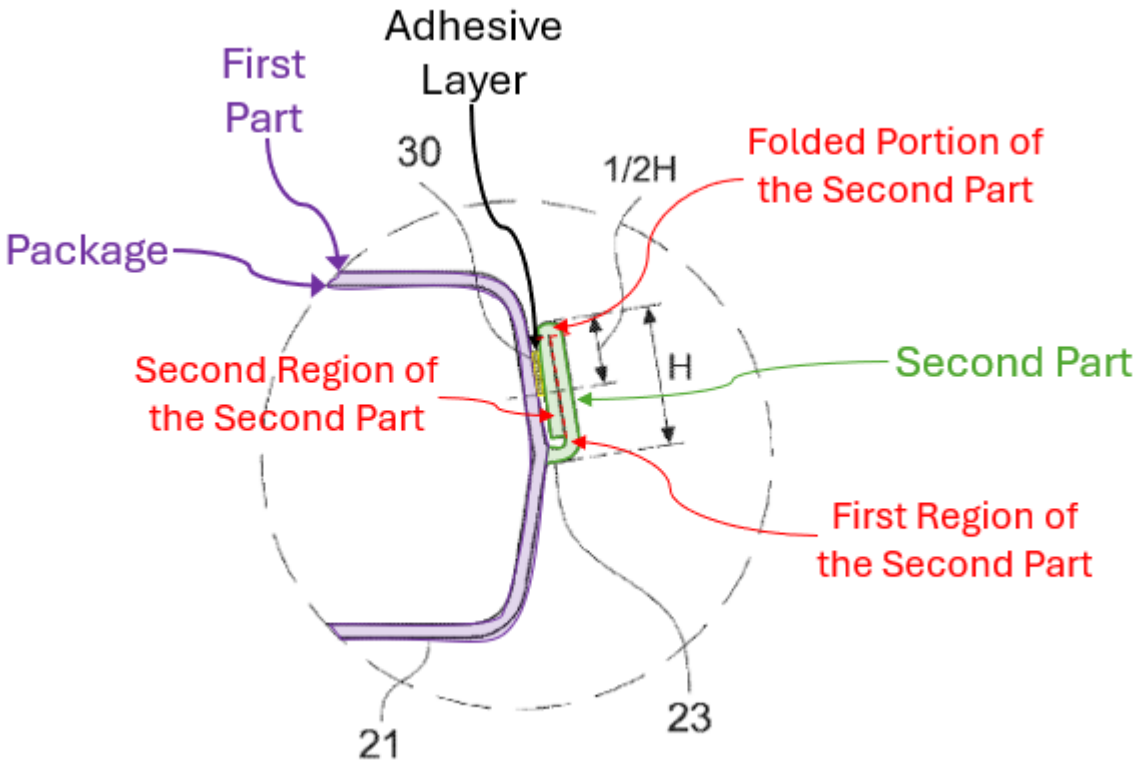
2. Kim-999

227. A POSA would have understood, in view of Kim-999, that the amount of adhesive applied per unit length (i.e., adhesive mass per mm) can be varied as a result-effective variable because Kim-999 expressly teaches adjusting both the placement and extent of adhesive to achieve adequate bonding while avoiding unnecessary bulk or separation between the folded portion and the case. EX1007, ¶[0065].

228. For example, Kim-999 teaches that adhesive 30 "may be injected between the entire height of the folding part 23 and ½ or more of the entire height of the folding part 23," thereby identifying a controllable range for how much adhesive is applied and where it is positioned. EX1007, ¶[0065]. This teaching signals to a POSA that the quantity of adhesive is not fixed, but instead is selected to ensure sufficient adhesion while minimizing excess material.

229. Kim-999 further emphasizes that adhesive is provided in an amount sufficient to secure the folded portion against "fluttering, bending, [and] twisting," but not so much as to increase spacing or impair compactness of the package. EX1007, ¶[0066]. From these teachings, a POSA would have understood that optimizing adhesive mass per unit length is necessary to balance structural

integrity against dimensional constraints. Thus, selecting an appropriate unit mass—such as within a narrow range that provides reliable bonding without increasing thickness—would have been a matter of routine optimization based on known engineering tradeoffs.



EX1007, FIG. 4 (annotated).

230. Furthermore, a POSA would have understood that the "adhesive amount per unit length" corresponds to the product of (i) adhesive density, and (ii) the cross-sectional area of the adhesive layer, e.g., the product of the adhesive layer thickness and the width of the adhesive bead. From basic engineering principles, a POSA would have recognized that this linear mass is determined by:

$$Adhesive\ Mass\ per\ Unit\ Length = \rho \times t \times w$$

where:

- ρ is the adhesive density (mass per unit volume),
- t is the thickness of the adhesive bead, and
- w is the width of the adhesive bead.

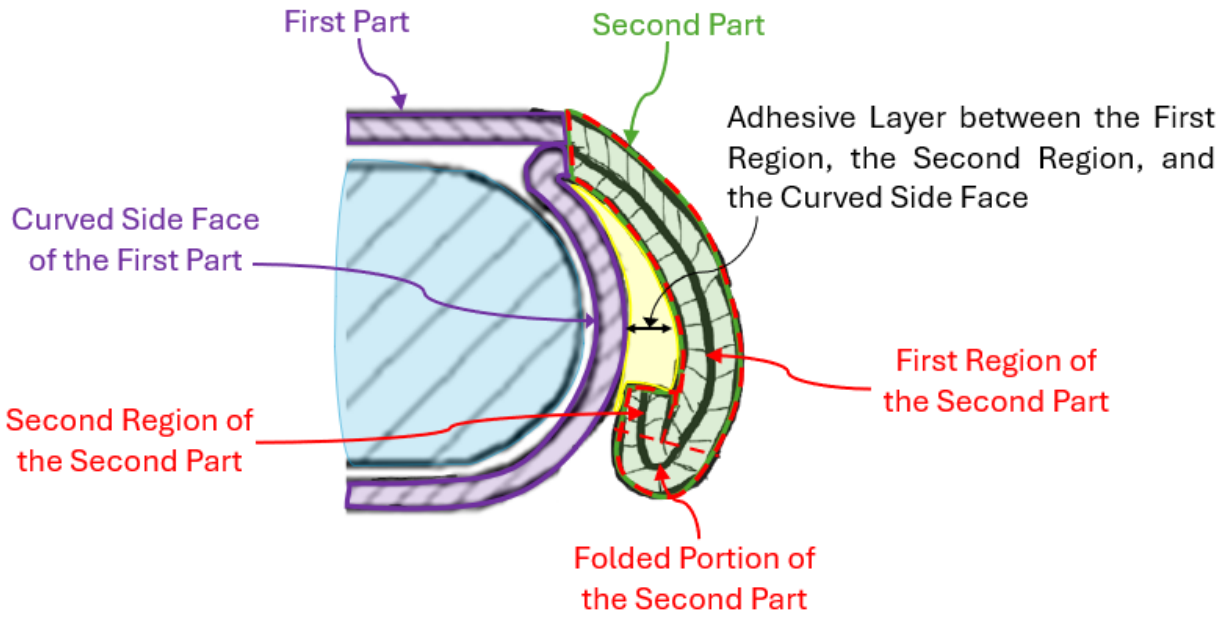
231. A POSA also would have been familiar with the material properties of common structural adhesives used in pouch-type lithium-ion batteries, including polyurethane adhesives. EX1007, ¶[0069]; *see also* EX1006, ¶[0010]. As reflected in the prior art, polyurethane adhesives were routinely employed in battery packaging due to their mechanical properties and stability. EX1007, ¶¶[0013], [0020]-[0023], [0069]. Such adhesives typically have densities on the order of approximately 1.0–1.3 g/cm³, which converts directly to approximately 1.0–1.3 mg/mm³. A POSA would have treated this density as a known and relatively fixed material property. In keeping with the goal of producing a compact package, a POSA would have been motivated to apply the adhesive into a thin layer, less than the thickness of the laminate packaging material (typically 0.1 mm). To avoid overflow of excess adhesive, a POSA would have been motivated to set the width of the adhesive bead to be substantially less than the overall thickness of the cell. Given that a typical cell thickness for use in smart phones is 5.0 mm, a reasonable-sized bead of glue would have been 2.5 mm wide (approximately half the thickness of a typical smartphone battery cell) by 0.05 mm thick (approximately half the

thickness of the laminate in a typical smartphone battery cell). Using these dimensions for a bead of polyurethane glue, the adhesive loading would have been 0.13 mg/mm (calculated by: $1.0\ {}^{mg}/_{mm^3} \times 2.5\ mm \times 0.05\ mm$) to 0.16 mg/mm (calculated by: $1.3\ {}^{mg}/_{mm^3} \times 2.5\ mm \times 0.05\ mm$), which is well within the claimed range. Accordingly, a POSA would have understood that applying a routine amount of polyurethane adhesive using conventional bead dimensions would have yielded an adhesive loading falling within the claimed range, consistent with known design tradeoffs between bonding strength and package compactness.

232. At the same time, the prior art, including Kim-999, expressly teaches varying the height and width of adhesive. EX1007, ¶¶[0063]-[0070]. Because (i) adhesive density is a known material property, and (ii) gap thickness and bonding height are expressly taught as adjustable parameters in the art, the resulting adhesive mass per unit length would have been understood by a POSA as a predictable and continuously variable outcome of routine design optimization. Selecting values that fall within a particular numerical range—such as 0.1 mg/mm to 0.25 mg/mm—would therefore have been a matter of ordinary engineering choice, guided by the well-understood tradeoff between bonding strength and dimensional compactness.

3. Kim-439/Ueda/Kim-999 Combination

233. For the reasons discussed in section X.D, it would have been obvious in view of Kim-999 to modify the application of adhesive in Kim-439/Ueda's battery to provide a unit mass of the adhesive layer in a range from 0.1 to 0.25 mg/mm in the thickness direction, thereby achieving adequate bonding strength and avoiding unnecessary bulk. And a POSA would have had a reasonable expectation of success in doing so because Kim-999's parameter-driven approach to adhesive application would have been directly applicable to Kim-439/Ueda's battery.



Rendering of Kim-439's Modified Battery.

XI. OBJECTIVE INDICIA DO NOT SUPPORT PATENTABILITY.

234. I understand that the obviousness analysis includes considering evidence of secondary indicia of nonobviousness (if available). I understand that

any secondary indicia of nonobviousness must have a nexus, or a close connection, to the novel aspects of the claimed invention. I understand that secondary indicia of nonobviousness include the following: commercial success, long-felt but unmet need, failure of others, copying, praise in the industry, and unexpectedly superior results as compared with the closest prior art.

235. Considering the information I have reviewed, my general knowledge of the field of lithium-ion battery manufacturing and/or design, and publications within that and related fields, I am not aware of any objective evidence that might support the patentability of the claims of the ’808 patent. Should any alleged secondary indicia of nonobviousness be presented, I reserve the right to provide an opinion thereon.

XII. CONCLUSION

I understand that this Declaration is to be filed as evidence in a contested IPR proceeding before the Patent Trial and Appeal Board. I acknowledge that I may be subject to cross-examination in the case and that cross-examination will take place within the United States. If cross-examination is required of me, I will appear for cross-examination within the United States during the time allotted for cross-examination.

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 could testify to the matters in this declaration competently if called upon to do so. 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.

Executed on this 27th day of July, 2026, in Sidney, BC. CANADA

Ulrich von Sacken, Ph.D.