

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

HEAD SPORT GMBH,
Petitioner

v.

VERMONT SAFETY DEVELOPMENTS LLC,
Patent Owner

Case IPR2024-01099
Patent No. 7,523,953

**DECLARATION OF MAURY HULL, PH.D., IN SUPPORT OF
PETITIONER'S PETITION FOR *INTER PARTES* REVIEW OF U.S.
PATENT NO. 7,523,953**

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LIST OF EXHIBITS

<u>Exhibit</u>	<u>Description</u>
Ex-1001	U.S. Patent No. 7,523,953 to Ettlinger et al. (“’953 patent”)
Ex-1002	RESERVED
Ex-1003	Switzerland Patent No. 679213 A5 to Freudiger and Certified English Translation (“ <i>Freudiger-1</i> ”)
Ex-1004	European Patent Application Publication No. 1190746 A2 to Freudiger and Certified English Translation (“ <i>Freudiger-2</i> ”)
Ex-1005	United States Patent Application Publication No. 2002/0101063 A1 to Dodge (“ <i>Dodge</i> ”)
Ex-1006	German Patent Application Publication No. 2340420 A1 to Sittmann and Certified English Translation (“ <i>Sittmann</i> ”)
Ex-1007	United States Patent Application Publication No. 2004/0173994 A1 to Howell (“ <i>Howell</i> ”)
Ex-1008	David W. Gulick & C. D. Mote, <i>Design of a Learning Binding for Alpine Skiing</i> , in 13 SKIING TRAUMA AND SAFETY: THIRTEENTH VOLUME, ASTM STP 1397, 30-49 (Robert J. Johnson et al. eds., 2000) (“ <i>Gulick</i> ”)
Ex-1009	Prosecution History of the ’953 patent
Ex-1010	Patent Owner’s Proposed Claim Constructions served on April 23, 2024, in <i>Vermont Safety Developments LLC v. Head Sport GmbH</i> , No. 2:23-cv-00089 (D. Vt. May 11, 2023)
Ex-1011	ASTM Int’l, Standard F939-05, <i>Standard Practice for Selection of Release Torque Values for Alpine Ski Bindings</i> 1 (2005)
Ex-1012	Revised Stipulated Discovery Schedule/Order (Dkt. 32) in <i>Vermont Safety Developments LLC v. Head Sport GmbH</i> , No. 2:23-cv-00089 (D. Vt. May 11, 2023)

<u>Exhibit</u>	<u>Description</u>
Ex-1013	Complaint in <i>Vermont Safety Developments LLC v. Head Sport GmbH</i> , No. 2:23-cv-00089 (D. Vt. May 11, 2023)
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Ex-1015	CV of Maury Hull, Ph.D.
Ex-1016	Declaration of Kelley M. Hayes Greenhill Regarding Ex-1008
Ex-1017	U.S. Patent No. 6,007,086 to Hopkins
Ex-1018	ASTM Int'l, Standard F504-05, <i>Standard Test Method for Measuring the Quasi-Static Release Moments of Alpine Ski Bindings</i> 1 (2005)

1. My name is Maury Hull, Ph.D. I have been retained by counsel for Head Sport GmbH (“Head”) as an independent expert in this proceeding before the United States Patent and Trademark Office. I understand that this proceeding involves U.S. Patent No. 7,523,953 (“the ’953 patent”). I have been asked to provide my opinions as to the patentability or unpatentability of certain claims of the ’953 patent.

2. This declaration sets forth my opinions, which I have formed in this proceeding based on my study of the evidence; my understanding as an expert in this industry; and my education, training, research, knowledge, and personal and professional experience.

3. I am being compensated for my time at a rate of \$350 per hour. This compensation is in no way contingent upon the nature of my findings, the presentation of my findings in testimony, or the outcome of this proceeding.

I. QUALIFICATIONS AND BACKGROUND

4. I believe that I am well qualified to serve as a technical expert in this matter based upon my educational and work experience.

5. I understand that my curriculum vitae (“CV”) is being filed in this proceeding as Exhibit 1015.

6. I am currently a Distinguished Professor Emeritus at the University of California Davis where I direct the Orthopaedic Biomechanics Laboratory in the

Department of Orthopaedic Surgery at the UC Davis Medical Center in Sacramento.

I hold appointments in the Department of Biomedical Engineering, the Department of Mechanical Engineering, and the Department of Orthopaedic Surgery.

7. I received a BS degree in mechanical engineering from Carnegie-Mellon University in 1969 and MS and PhD degrees also in mechanical engineering from the University of California Berkeley in 1970 and 1975. My PhD dissertation is titled “Skiing Injuries: Field Loading and Analysis” and involves design of an instrumentation system to measure the six load components at both the toe piece and heel piece of releasable bindings for Alpine skiing and the use of this system to measure boot-binding reaction loads in different types of Alpine skiing turns.

8. I became a faculty member in the Department of Mechanical Engineering at the University of California Davis in 1976. From 1993 until 2000, I served as Chair of the Biomedical Engineering Graduate Program and played a leadership role in creating a new Department of Biomedical Engineering launched in 2001. This department now has 35 full-time employees, 400 undergraduate students, 100 graduate students, and annual research expenditures in excess of \$17 million.

9. I was active in the Bioengineering Division of the American Society of Mechanical Engineers in various leadership positions for 15 years, including Chair of the Division in 2003. As Division Chair, I led the formation of the annual

Summer Bioengineering Conference (now the SB³C conference) typically attended by 800 participants, including a large cohort of students.

10. My research activities encompass orthopaedic biomechanics with emphasis on the human knee, musculoskeletal system modeling and simulation of movement, and sports biomechanics and equipment design. My research in sports biomechanics and equipment design has led to design innovations in releasable bindings for Alpine skiing and off-road cycling, which improved the safety of these sports. In addition, I hold three patents on releasable bindings for Alpine skiing.

11. I was also a pioneer in development of whole-body musculoskeletal models to simulate human movement. These models are now used by hundreds of researchers internationally in applications including analysis of walking dynamics, studies of sports performance, simulations of surgical procedures, analysis of joint loads, design of medical devices, and animation of human and animal movement. In orthopaedic biomechanics, I developed new surgical procedures to more effectively treat knee injury and disease. Surgical procedures include anterior cruciate ligament (ACL) reconstruction, meniscal transplantation, and total knee replacement. These advances in surgical techniques have led to improved patient outcomes which are well-documented in the literature. To describe the results of my research, I have published more than 285 papers in scientific journals, with my 90 graduate advisees and orthopaedic residents being lead authors on most papers.

12. In recognition of my research achievements, I have received a number of major awards including the Giovanni Borelli Award from the American Society of Biomechanics in 1989 (highest honor of the society); Life Fellow of ASME in 1993; the H. R. Lissner Medal from the Bioengineering Division of the American Society of Mechanical Engineers (ASME) in 2007 (highest honor of the division); a special award from *Bicycling Magazine* for Excellence in Applied Science Research in 2008; Paolo Aglietti Award from the International Society of Arthroscopy, Knee Surgery, and Orthopaedic Sports Medicine recognizing outstanding research contributing to the understanding of knee arthroplasty in 2019; honorary membership in the Personalized Arthroplasty Society in 2020; and the Robert M. Nerem Education and Mentorship Medal from the Bioengineering Division of ASME in 2021. Additionally, in 2012 I became the first person to be promoted to the position of Distinguished Professor in the 50-year history of the Department of Mechanical Engineering at the University of California Davis; this is the highest level of advancement in the University of California system.

13. I serve on the editorial board of the *Journal of Biomechanics* and have served multiple terms as Associate Editor of the *Journal of Biomechanical Engineering*. I have been honored as an educator when I received the UC Davis Engineering Alumni Distinguished Teaching Award in 2002.

14. Throughout my career, I have been a member of several professional associations. Some of these associations include, but are not limited to, The American Society of Mechanical Engineers (ASME), Biomedical Engineering Society (BMES), Orthopedic Research Society (ORS), International ACL Study Group, American Society of Biomechanics (ISB), American Society for Testing and Materials (ASTM), and the International Society for Skiing Safety (ISSS).

15. While an active member of the ASTM, I regularly attended meetings and have co-authored papers for the American Society for Testing and Materials (“ASTM”) STP series on *Ski Trauma and Safety* since 1979. Many of my papers reported on novel designs of Alpine ski bindings including both mechanical and electromechanical (i.e. electronic) bindings.

16. In addition to my membership in these professional associations, I have personally been involved in alpine skiing since 1966 and skied for approximately the next 35 years.

17. Additional details on my qualifications are provided in my CV. Ex-1015.

II. SUMMARY OF OPINIONS

18. I have been asked to provide my opinion on whether the claims of the '953 patent are unpatentable over certain prior art references. It is my opinion that each of claims 30, 31, 34-38, 53-56, and 58-60 of the '953 patent is unpatentable

because each would have been obvious to a person of ordinary skill in view of the prior art.

19. In forming the opinions provided in this Declaration, I have considered and relied on the documents listed above, my experience and knowledge in the relevant art, and the viewpoint of a person of ordinary skill in the art (“POSITA”). I have considered the documents, my experience and knowledge, and the viewpoint of a POSITA as of August 8, 2006.

20. Specifically, it is my opinion for the reasons below that *Freudiger-1* renders obvious claims 30, 31, 34, 35, 37, 53, 55, 58, and 59 of the ’953 patent; that *Freudiger-1* and *Gulick* render obvious claims 36, 38, 54, 56, and 60; that *Dodge* and *Howell* render obvious claims 30, 31, 34, 35, 37, 53, 55, 58, and 59; that *Dodge*, *Howell*, and *Gulick* render obvious claims 36, 38, 54, 56, and 60; *Sittmann* renders obvious claims 58 and 59; and *Sittmann* and *Gulick* render obvious claim 60.

III. LEGAL STANDARD

21. In forming my opinions and considering the subject matter of the ’953 patent and its claims in light of the prior art, I am relying on certain legal principles that counsel in this case has explained to me. My understanding of these concepts is summarized below.

22. I understand that the claims define the invention. I also understand that an unpatentability analysis is a two-step process. First, the claims of the patent are

construed to determine their meaning and scope. Second, once the claims have been construed, the content of the prior art is compared to the construed claims.

23. For purposes of this declaration, I have been asked to opine only on issues regarding the technology at issue, the level of ordinary skill in the art, claim construction, and obviousness. I have also been informed of the following legal standards, which I have applied in forming my opinions.

24. I have been informed that a claim may be unpatentable as obvious under 35 U.S.C. § 103 if the differences between the subject matter patented and the prior art are such that the subject matter as a whole would have been obvious to a person of ordinary skill in the art at the time the invention was made. I have also been advised that several factual inquiries underlie a determination of obviousness. These inquiries include (1) the scope and content of the prior art; (2) the level of ordinary skill in the art; (3) the differences between the claimed invention and the prior art; and (4) any objective evidence of non-obviousness.

25. I understand that the objective evidence of non-obviousness can be important evidence regarding whether a patent is obvious or non-obvious, if it has an appropriate nexus to the claimed invention, i.e., is a result of the merits of a claimed invention (rather than the result of design needs or market-pressure advertising or similar activities). Such objective evidence include: commercial success of products covered by the patent claims; a long-felt need for the invention;

failed attempts by others to make the invention; copying of the invention by others in the field; unexpected results achieved by the invention as compared to the closest prior art; praise of the invention by the infringer or others in the field; the taking of licenses under the patent by others; expressions of surprise by experts and those skilled in the art at the making of the invention; and the patentee proceeded contrary to the accepted wisdom of the prior art.

26. In analyzing the relevance of the differences between the claimed invention and the prior art, I have been informed that I must consider the impact, if any, of such differences on the obviousness or non-obviousness of the invention as a whole, not merely some portion of it.

27. I have been informed that a precise teaching in the prior art directed to the subject matter of the claimed invention is not needed. I have been informed that one may take into account the inferences and creative steps that a person of ordinary skill in the art would have employed in reviewing the prior art at the time of the invention. For example, if the claimed invention combined elements known in the prior art and the combination yielded results that were predictable to a person of ordinary skill in the art at the time of the invention, then this evidence would make it more likely that the claim was obvious. On the other hand, if the combination of known elements yielded unexpected or unpredictable results, or if the prior art teaches away from combining the known elements, then this evidence would make

it more likely that the claim that successfully combined those elements was not obvious.

28. I have been informed and understand that there are recognized, exemplary, rationales for combining or modifying references to show obviousness of claimed subject matter. Some of the rationales include the following: combining prior art elements according to known methods to yield predictable results; simple substitution of one known element for another to yield predictable results; use of a known technique to improve a similar device (method or product) in the same way; applying a known technique to a known device (method or product) ready for improvement to yield predictable results; choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success; known work in one field of endeavor may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces if the variations are predictable to one of ordinary skill in the art; and some teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill to modify the prior art reference or to combine prior art teachings to arrive at the claimed invention.

29. I am also informed that when there is some recognized reason to solve a problem, and there are a finite number of identified, predictable and known solutions, a person of ordinary skill in the art has good reason to pursue the known

options within his or her technical grasp. If such an approach leads to the expected success, it is likely not the product of innovation but of ordinary skill and common sense. In such a circumstance, when a patent simply arranges old elements with each performing its known function and yields no more than what one would expect from such an arrangement, the combination is obvious.

IV. PERSON OF ORDINARY SKILL IN THE ART

30. As explained above, I have been informed that unpatentability must be analyzed from the perspective of a POSITA in the same field as the patent-in-suit at the time of the invention. I understand that this POSITA is a hypothetical person who is presumed to be aware of all pertinent prior art. I have also been informed that several factors are considered in assessing the level of ordinary skill in the art, including the (1) types of problems encountered in the prior art; (2) prior-art solutions to those problems; (3) rapidity with which innovations are made; (4) sophistication of the technology; and (5) educational level of active workers in the field.

31. I am familiar with the technology at issue here and the state of the art at the time the application leading to the '953 patent was filed. For purposes of this Declaration, I believe that a person of ordinary skill in the art would have been someone with an advanced degree in mechanical engineering and five years of experience in either ski binding design, manufacture, or testing; research

concerning ski bindings and related equipment; or the development of standards concerning ski bindings or related equipment. This level of skill is approximate, and more experience would compensate for less formal education, and vice versa. For example, an individual having a BS degree in mechanical engineering, but ten years of ski binding design, manufacture, or testing experience would qualify as a POSITA.

32. I consider myself to have such “level of ordinary skill in the art” with respect to the subject matter of the ’953 patent at the time of the application. Thus, I am able to opine on how the person of ordinary skill would have understood the disclosure and claims of the ’953 patent, the disclosures of the prior art, the motivations to combine the prior art, and what combinations would or would not have been obvious to one of ordinary skill in the art.

V. THE ’953 PATENT

A. The ’953 Patent and Specification

33. The ’953 patent, entitled “Alpine Ski Binding System Having Release Logic for Inhibiting Anterior Cruciate Ligament Injury,” was filed on August 6, 2007, and issued on April 28, 2009. Ex-1001, 1:1-10. As I understand, the ’953 patent claims priority to U.S. Provisional Patent Application No. 60/836,454, filed on August 8, 2006. It is my understanding that Patent Owner claims that the effective filing date of the claims of the ’953 patent is August 8, 2006. I, therefore,

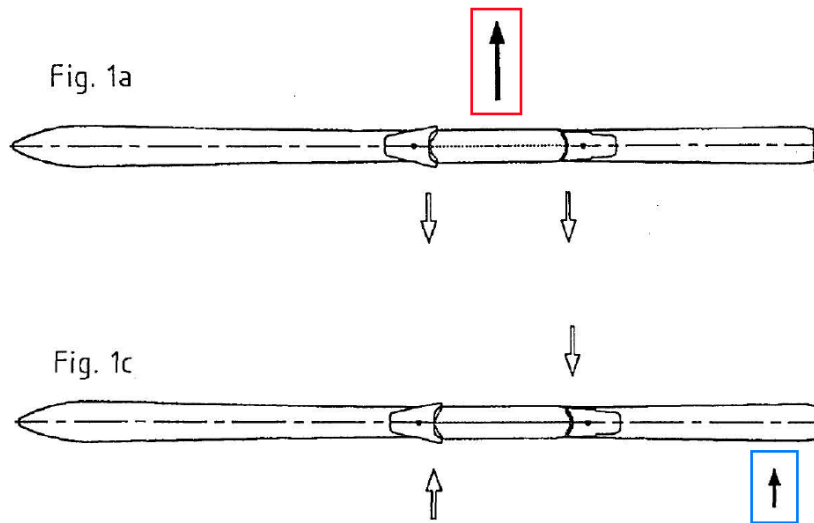
conduct my analysis based on Patent Owner's alleged priority date of August 8, 2006.

34. The '953 patent is directed to a lateral release alpine ski binding unit that releases a ski boot from a binding in response to certain external loads, such as those occurring that may cause anterior cruciate ligament (ACL) injury. *Id.*, 1:14-17. Specifically, the '953 patent explains that certain external loads experienced along the ski, when transferred to the skier's leg, can cause ACL injuries. *Id.*, 4:27-31. Thus, the '953 patent is directed to an alpine ski binding system having release logic configured to release a ski boot when a dangerous torsional load on the skier's lower leg is experienced. *Id.*, 4:50-54.

35. Yet, long before the '953 patent's priority date, people in the industry had already developed laterally releasable bindings intended to prevent knee injuries, such as ACL tears.

36. The '953 patent was not the first documented attempt to prevent knee injuries during ski falls by laterally releasing the ski boot from the ski binding. Well before the patent's priority date, several manufacturers and inventors in the industry made lateral release bindings to prevent ACL tears. *See, e.g., Ex-1003-Freudiger-1; Ex-1004-Freudiger-2; Ex-1007-Howell; Ex-1008-Gulick; Ex-1005-Dodge; and Ex-1006-Sittmann.*

37. For instance, European Patent Application No. 1190746 A2 to Freudiger (“*Freudiger-2*”), published on March 27, 2002, explains that many prior ski bindings are configured to laterally release a ski binding to prevent skier injury. *Freudiger-2* noticed that these prior bindings are unable to accurately distinguish between forces caused by active skiing (such as the **lateral force** depicted below in Figure 1a) and forces caused by falls that may cause “ligament injuries to the knee joint,” such as when a **force** is exerted “on the rear part of the ski,” (depicted below in Figure 1c). Ex-1004-*Freudiger-2*, ¶¶ [0002], [0005].



Ex-1004-*Freudiger-2*, FIGs. 1a & 1c (annotated, labels repositioned)

38. Thus, *Freudiger-2* opined that the prior bindings suffer from “premature opening,” causing skiers to have their safety bindings “set to higher release values than would be permissible for protection” and thereby causing

“ligament injuries to the knee joint,” such as ACL tears. *See Ex-1004-Freudiger-2*, ¶ [0003].

39. Another publication predating the purported invention of the '953 patent is U.S. Patent Application No. 10/780,455, published on Sept. 9, 2004, as U.S. Publication No. 2004/0173994 A1 to Howell (“*Howell*”). *Howell* explained that ACL injuries continue to be a problem in alpine skiing. *Ex-1007-Howell*, ¶ [0011]. *Howell* understood that “ACL strain intensifies when lateral forces are applied to the ski immediately under or near the projected tibial axis (coaxial with the tibia), generally known as phantom-foot fall kinematics. *Id.* *Howell*’s invention thus related to an alpine ski binding heel unit with lateral release capabilities to “quickly and efficiently” release the ski boot from the ski when “ACL injury producing loads” are experienced. *Id.*, ¶ [0057].

40. Thus, in my opinion, the techniques and designs described in the '953 patent were well known before the patent’s purported priority date. The claims of the '953 patent recite only standard well-known components and simple engineering principles.

41. As the '953 patent claims, an external load applied to the ski, creates internal loads (a first and second loading) within the ski system. *Ex-1001*, 21:10-16. These internal loadings are assessed relative to a first and second axis. *Id.*, 21:10-16. The '953 patent’s components perform a logical operation in response to

the internal forces to determine whether the binding needs to release the boot. *Id.*, 9:5-8, 9:28-31.

42. More specifically, Independent Claim 30, directed to an apparatus for releasably securing a ski boot to a ski binding, is provided below as a representative claim:

Claim 30. An apparatus for securing a ski boot to a ski so as to from [sic] a ski system, the apparatus comprising:

a ski binding assembly configured to be attached to the ski and to releasably secure the ski boot to the ski during use, said ski binding assembly having a first release, said ski binding assembly including release logic that causes the ski binding assembly to release the ski boot at said first release in response to a release condition, said ski binding assembly configured to:

assess, relative to a first axis, a first loading internal to the ski system caused by an external loading applied to the ski system; and assess, relative to a second axis spaced from said first axis and substantially parallel to said first axis, a second loading internal to the ski system caused by the external loading;

wherein said release logic is configured to:

determine whether or not the release condition is occurring as a function of both of the first loading and the second loading; and

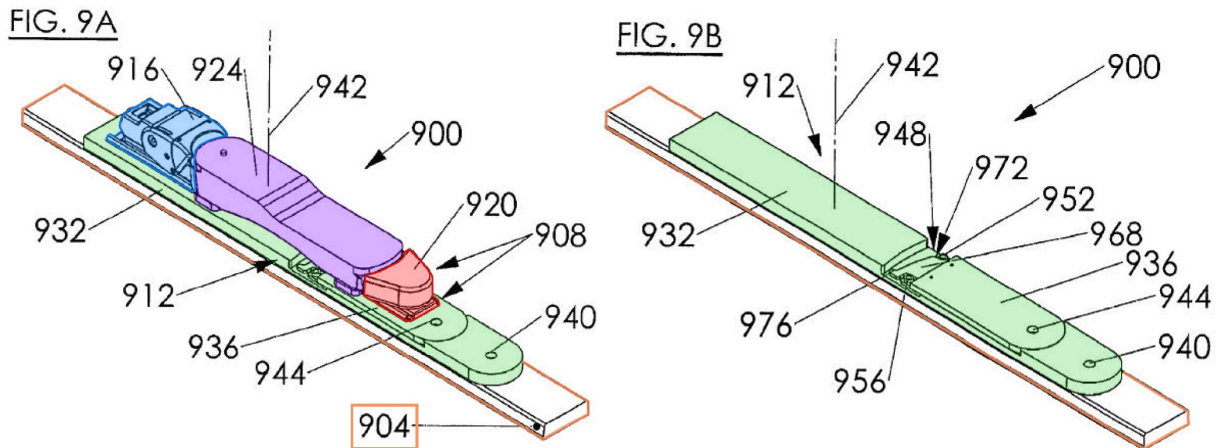
cause said ski binding assembly to provide said first release if the release logic determines that the release condition is occurring;

wherein said ski binding assembly is configured to determine a force-couple at a third axis from said first loading and said second loading, and said release logic is configured to determine whether or not the release condition is occurring as a function of the force-couple.

Id., 21:1-28.

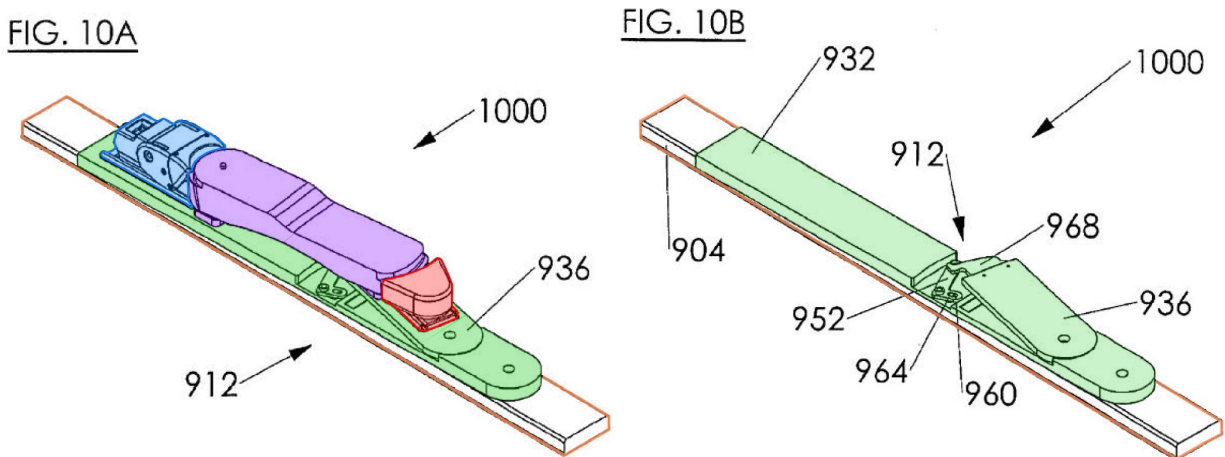
43. The '953 patent explains that certain external forces experienced on the inside tail edge of the ski, when transferred to the skier's leg can cause ACL injuries. *Id.*, 4:27-31. The claimed system therefore provides for an alpine ski binding system having release logic configured to release a ski boot when a dangerous torsional load on the skier's lower leg is experienced. *Id.*, 4:50-54. As the patent claims, the external force applied at the inside tail edge of the ski, creates internal loads (a first and second loading) within the ski system. *Id.*, 21:10-16. These internal loadings are relative to a first and second axis, corresponding to pivot points within the binding system at which the loads can be assessed. *Id.*, 21:10-16, 9:39-67. The '953 patent's components can perform a logical operation in response to the internal loads to determine whether the binding needs to release the boot. *Id.*, 9:5-8, 9:28-31.

44. Figures 9A and 9B of the '953 patent, reproduced below, provide an overview of an alpine ski system 900 made in accordance with the purported invention. *Id.*, 9:9-10. System 900 includes a ski 904 and a binding system 908 having a release-logic mechanism 912 and heel and toe pieces 916 and 920, respectively, for clamping a ski-boot 924 into binding system 908. *Id.*, 9:9-16, 9:26-28.



Ex-1001, FIGs. 9A & 9B (annotated)

45. Release logic mechanism 912 is configured to “provide[] an attenuated release” of the boot from binding system 908 in response to a certain load condition. *Id.*, 4:13-18, 9:5-10; *see also id.*, FIG. 1. Figures 10A and 10B, reproduced below, provide a view of the ski system with release logic mechanism 912 in a released state. *Id.*, 10:37-43.



Ex-1001, FIGs. 10A & 10B (annotated)

46. As shown in Figures 10A and 10B, in response to the application of a lateral force on the tail of the ski that overcomes a release threshold, release logic mechanism 912 triggers a release, allowing the ski boot to be displaced laterally relative to the ski. *Id.*, 10:37-46.

B. The '953 Patent's Prosecution History

47. The application that issued as the '953 patent was filed on August 6, 2007. Ex-1009, 74. The application initially included 55 claims directed to a “ski binding,” a “ski binding system,” and a “method of releasing a ski boot from an alpine ski binding system.” *Id.*, 49-56. In a Restriction Requirement dated August 1, 2008, the examiner required an election of species from among four embodiments shown in the figures. *Id.*, 114-116. In a response dated September 2, 2008, the applicant elected “Species I,” corresponding to the embodiment of Figures 9A-11. *Id.*, 132-133; *see also id.*, 114-116. At the same time, the applicant cancelled original claims 30-55 and presented new claims 56-81, directed to an “apparatus for securing a ski boot to a ski so as to form a ski system.” *Id.*, 122-131. These new claims 56-81 included the two claims that eventually issued as independent claims 30 and 53. *Id.*, 193.

48. During prosecution, the Examiner issued one, non-final obviousness rejection based on *Hopkins* (US 6,007,086). Ex-1009, 146-154; *see* Ex-1017-*Howell*. The Examiner found that *Hopkins* rendered obvious several pending claims

but found the rest of the pending claims to contain allowable subject matter. Ex-1009, 147-151. Specifically, the Examiner noted that the allowable subject matter included that the ski binding assembly is configured to “determine a force-couple at a third axis from said first loading and said second loading,” the release logic is configured to “determine whether or not the release condition is occurring as a function of the force-couple,” and “the ski binding assembly has a second release, said first release being an attenuated release relative to said second release.” Ex-1009, 149-152.

49. In response, Patent Owner amended the pending claims to include the language that the Examiner found to contain allowable subject matter. Ex-1009, 169, 177–79. The Examiner issued a notice of allowance. Ex-1009, 185. But, as discussed below, prior art not applied by the Examiner, e.g., *Freudiger-I*, *Gulick*, *Dodge*, *Howell*, and *Sittmann* disclose these allegedly allowable features.

50. In my opinion, as set forth below, the prior art not applied by the Examiner, e.g., *Freudiger-I*, *Gulick*, *Dodge*, *Howell*, and *Sittmann*, disclose this and the other features of the issued claims.

VI. CLAIM INTERPRETATION

51. It is my understanding that in order to properly evaluate the '953 patent, the terms of the claims must first be interpreted. It is my understanding that for the purposes of this *inter partes* review, the claims are to be construed under the

so-called *Phillips* standard, under which claim terms are given their ordinary and customary meaning as would be understood by one of ordinary skill in the art in light of the specification and prosecution history, unless Patent Owner has set forth a specific meaning for a term.

52. I have also been informed and understand that, in the related District Court litigation, Petitioner and Patent Owner may dispute the construction of the claim terms set forth in the Challenged Claims. I have also been informed and understand, however, that in the related litigation, Patent Owner has submitted proposed claim constructions for certain terms and has submitted infringement contentions purportedly applying the same constructions.

53. I understand that the same claim construction should apply for purposes of an infringement analysis and a validity analysis. Thus, I understand that I should analyze the patentability of the '953 patent under the same interpretation that Patent Owner contends applies in the parallel district court proceeding. Applying that approach, I believe that the Challenged Claims are unpatentable in view of the prior art relied on.

54. I further understand that Petitioner and Patent Owner may dispute the construction of the claim terms set forth in the Challenged Claims. Specifically, I have been informed that indefiniteness is not an unpatentability ground that can be asserted in an *inter partes* review petition. Therefore, I do not concede that any term

in the Challenged Claims meet the statutory requirements of 35 U.S.C. § 112, but I do not draw those conclusions herein.

VII. THE CHALLENGED CLAIMS ARE UNPATENTABLE OVER *FREUDIGER-1* ALONE OR IN COMBINATION WITH *GULICK*

A. *Freudiger-1* Renders Obvious Claims 30, 31, 34, 35, 37, 53, 55, 58, and 59

55. I believe claims 30, 31, 34, 35, 37, 53, 55, 58, and 59 are rendered obvious by *Freudiger-1* for the specific reasons I have provided below.

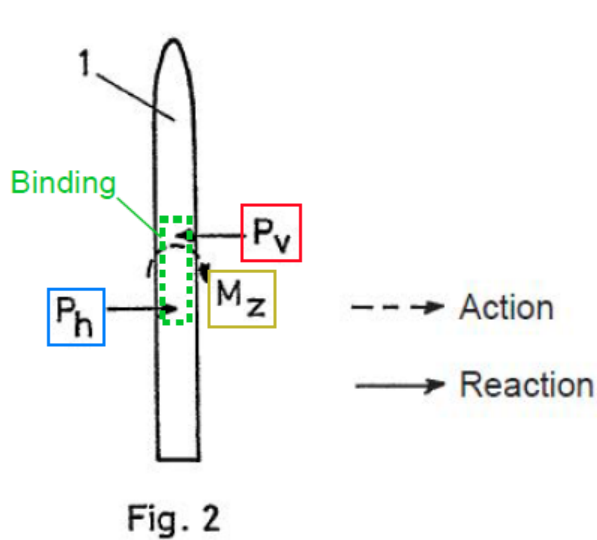
1. Overview of *Freudiger-1*

56. Swiss Patent No. 679213 to Freudiger (“*Freudiger-1*”) issued on January 15, 1992, more than 20 years before the priority date of the ’953 patent. I have therefore been informed that *Freudiger-1* is prior art under pre-AIA 35 U.S.C. §§ 102(a) and/or 102(b).

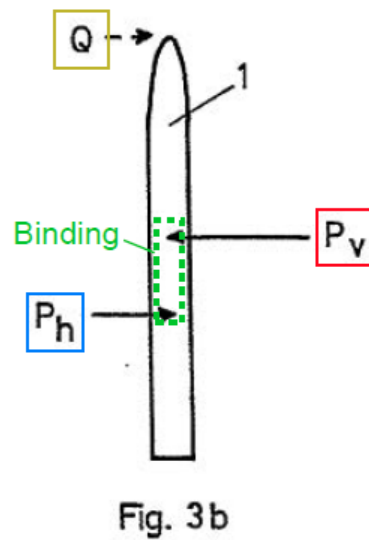
57. *Freudiger-1* concerns “a safety ski binding with automatic release force control.” Ex-1003-*Freudiger-1*, 1:3-5; *see also id.*, FIG. 1. *Freudiger-1* explains that prior ski bindings can automatically release the boot from the ski when the skier falls or crashes. *See id.*, 1:8-30. But *Freudiger-1* explained that the problem with these existing ski bindings was that they are poor at distinguishing between resulting forces experienced during active skiing (in which case the binding should remain closed) and those experienced when the skier is falling (in which case the binding should open to release the boot). *Id.*, 1:30-35. Specifically,

Freudiger-1 discussed that these prior bindings are unable to “distinguish whether the force on a ski binding comes from the ski boot,” such as during active skiing, “or [from] the ski,” such as when the skier falls. *Id.*, 1:36-38; *see also id.*, 1:39-43.

58. *Freudiger-1* explained in the context of its invention that “the stresses on a ski binding as they can be generated by the skier (active) can be distinguished from the stresses on a ski binding as they occur in a fall (passive).” *Id.*, 1:39-43. In active skiing, the skier’s leg exerts a torsional moment M_z on the binding; *Freudiger-1* refers to this force pattern as “pure torsional loading.” *Id.*, 2:31-34; *see id.*, FIG. 2, 2:1-5, 2:40-43. In pure torsional loading, moment M_z exerted by the skier results in a front reaction force P_v and rear reaction force P_h exerted on the binding’s toe jaw and heel jaw, respectively, with forces P_v and P_h being equal in magnitude. *Id.*, FIG. 2, 2:1-5, 2:40-43. On the other hand, *Freudiger-1* also describes that when the skier falls, an external lateral force Q acts on a section of the ski either in front of or behind the binding. *See id.*, FIGs. 3a-3b, 2:1-5, 2:34-46. In this force pattern, called “lateral force torsion,” the reaction forces P_v and P_h on the jaws are unequal in magnitude. *See id.*, FIGs. 3a-3b, 2:1-5, 2:34-46.

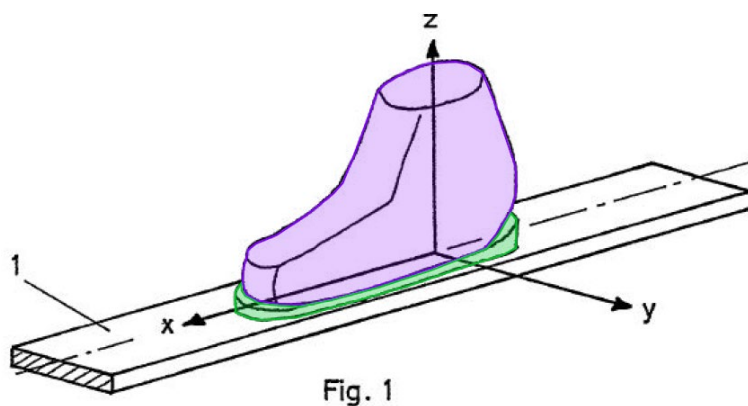


Ex-1003-Freudiger-1, FIG. 2
(modified, annotated)
(depicting pure torsional loading)



Ex-1003-Freudiger-1, FIG. 3b
(annotated)
(depicting lateral force torsion)

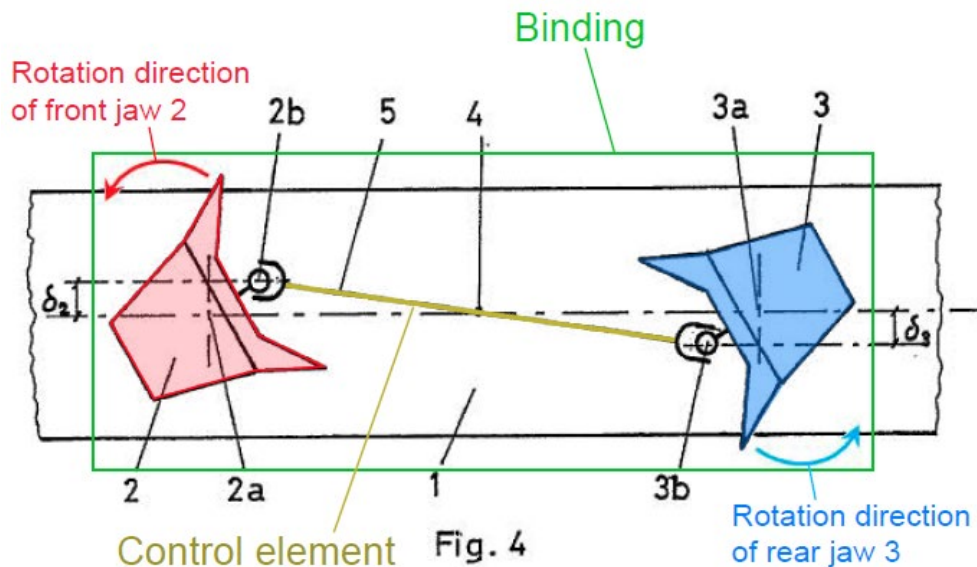
59. *Freudiger-1* discloses a **binding** for a ski that “distinguish[es] pure torsional loading around the z-axis (active driving load) from lateral force torsion along the y-axis or in order to the z-axis (passive fall stress).” *Id.*, 2:1-5; *see id.*, FIG. 1 (below).



Ex-1003-Freudiger-1, FIG. 1 (annotated)

60. *Freudiger-1* achieves this result by providing a “control element [that] can determine at any time whether a particular load case represents pure torsion or lateral force torsion and can control the release force accordingly.” *Id.*, 2:8-12; see *id.*, FIG. 1 (above).

61. The binding of *Freudiger-1* includes a front jaw 2 and rear jaw 3 for holding the toe end and heel end of the skier’s boot, respectively. *Id.*, 3:31-39. Front jaw 2 and rear jaw 3 are both configured to be “pivoted” about “an axis perpendicular to the ski plane” in response to an applied lateral force or moment. *Id.*, 2:46-50, 3:31-39. Front jaw 2 and rear jaw 3 are connected by control element 5. *Id.*, FIGs. 4 and 5, 3:31-39.



Ex-1003-*Freudiger-1*, FIG. 4 (annotated)

62. During pure torsion (i.e., active skiing), front jaw 2 and rear jaw 3 hold the boot until lateral forces exerted on the jaws exceed a threshold release force. See

id., FIG. 4, 2:46-54, 3:31-39. When this occurs, front jaw 2 and rear jaw 3 are pivoted away from each other until the boot is released from the binding. *See id.*, FIG. 4, 2:46-54, 3:31-39. But, when lateral force torsion (a fall) occurs, control element 5 causes “the release force [to] be[] reduced” so that at least one of front jaw 2 and rear jaw 3 is pivoted in response to a smaller applied force, thus releasing the boot more promptly. *Id.*, 3:51-55; *see id.*, FIG. 5, 2:54-58.

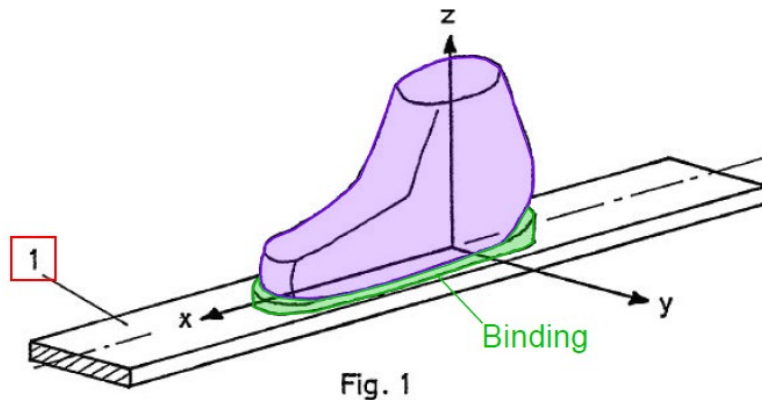
63. In my opinion, *Freudiger-1* is analogous art to the '953 patent because it is related to the same technical field of boot releases for ski bindings and describes a ski binding releasing laterally under certain loading conditions. Thus, *Freudiger-1* is reasonably pertinent to one of the particular problems dealt with by Patent Owner, such as providing a safer ski binding through programmed logic to decrease the release level in response to lateral force torsion.

2. Independent Claim 30

64. I believe *Freudiger-1* renders obvious independent claim 30 because *Freudiger-1* discloses or at least renders obvious each element of claim 30.

- a. **[30(Preamble)]: “An apparatus for securing a ski boot to a ski so as to from [sic] a ski system, the apparatus comprising:”**

65. *Freudiger-1* discloses an apparatus for securing a ski boot to a ski so as to form¹ a ski system. Ex-1003-*Freudiger-1*, FIG. 1, 1:3-5. In fact, *Freudiger-1* describes a **binding** for securing a **ski boot** to a **ski 1**, thus creating a ski system. *Id.*, FIG. 1, 1:3-5.



Ex-1003-*Freudiger-1*, FIG. 1 (annotated)

66. Specifically, the object of the invention of *Freudiger-1* is for the ski binding to attach to a ski and retain the ski boot when in normal use and release the boot when the skier falls and generates forces on the ski boot that require release. *Id.*, 1:3-43. As I explain further below, the *Freudiger-1* ski binding includes a front

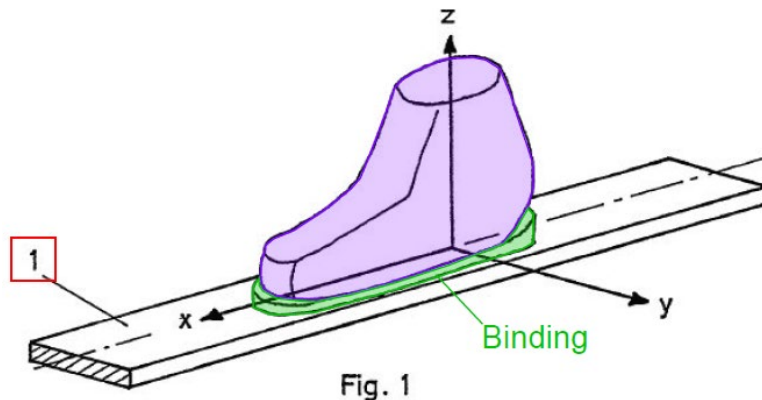
¹ I understand that “from” in the preamble of the claim is a typographical error, and, in context, I am interpreting that Patent Owner meant “form.”

jaw 2 and a rear jaw 3 configured to hold the ski boot onto the ski by the toe end of the ski boot and the heel end of the ski boot respectively. *Id.*, 3:31-39.

- b. ***[30(a)]: “a ski binding assembly configured to be attached to the ski and to releasably secure the ski boot to the ski during use, said ski binding assembly having a first release,”***

67. *Freudiger-1* discloses or at least renders obvious [30(a)] because *Freudiger-1*’s binding is a “ski binding” configured to be attached to a ski 1, secure a ski boot during use, and release the ski boot when a force applied to the binding exceeds a threshold release force, thereby separating the ski boot from the ski. *Id.*, 2:6-12, 3:51-55.

68. *Freudiger-1* discloses “a ski binding assembly configured to be attached to the ski and to releasably secure the ski boot to the ski during use.” *Freudiger-1* discloses a ski binding configured to be attached to a ski 1 and to secure a ski boot during use. *Id.*, 2:6-12,3:51-55, FIGs. 1 and 7. Specifically, the binding includes a “safety jaw (2, 3) at the front and at the rear of the ski boot” for securing the boot to ski 1. *Id.*, 3:31-39.

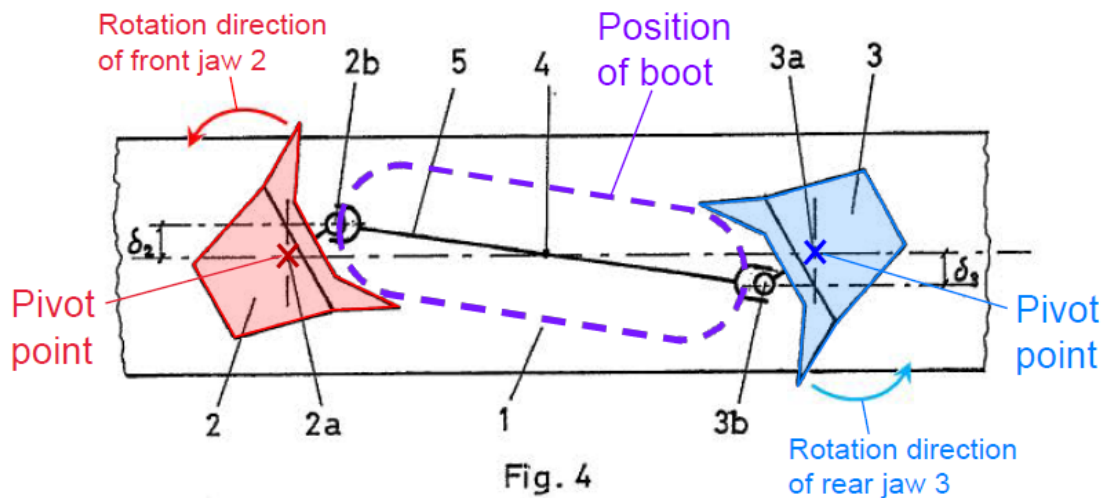


Ex-1003-Freudiger-1, FIG. 1 (annotated)
(front jaw 2 and rear jaw 3 not shown)

69. *Freudiger-1* also discloses “said ski binding assembly having a first release” because *Freudiger-1*’s **binding** is configured to release the **boot** from the ski in response to an applied force. *See, e.g., id.*, 1:3-5, 2:6-12, 3:34-39, 3:51-55. As *Freudiger-1* explains, “[t]he present invention relates to a **safety ski binding** with automatic *release force control*.” *Id.*, 1:3-5 (emphasis added).

70. I understand that Patent Owner contends that a first release is “[a] mechanism within the ski binding assembly that allows separation of the ski boot from the ski automatically and without skier intervention in response to a predetermined external loading of the ski correlated to an estimated tibial axis load level selected to lessen the likelihood of ACL injury.” *See* Ex-1010-Patent Owner’s Proposed Constructions. In my opinion, without agreeing with Patent Owner’s proposed construction, *Freudiger-1*’ discloses, or at least renders obvious, the claimed “first release.”.

71. For example, *Freudiger-1* discloses that **front jaw 2** is configured to rotate about a “pivot point (2a)” when it experiences an applied load exceeding “the release force of the jaw” (i.e., a threshold release force). *Ex-1003-Freudiger-1*, 2:46-48, 3:34-39. **Rear jaw 3** similarly rotates about “pivot point (3a)” in response to an applied load exceeding the threshold release force. *Id.*, 2:48-50, 3:34-39. This “[s]imultaneous deflection of the **front** and **rear jaws**” causes a “twist between the **ski boot** and the ski” such that the **boot** is released from the **binding**. *Id.*, 3:7-13; see also *id.*, 3:31-34.



Ex-1003-Freudiger-1, FIG. 4 (annotated)
(jaw rotation in pure torsional loading)

72. Each of the front and rear jaws includes mechanisms for adjusting the threshold release force—the amount of force required to cause release. *Id.*, FIGs. 7 and 8, 2:59-3:6. These mechanisms include a **front spring 7a** and **rear spring 7b**, both of which are connected to a **spring plate 10**. *Id.*, FIGs. 7 and 8, 2:59-3:6. As

shown in Figure 8, each jaw also includes a **ball detent** connected to **rear spring 7b**, which enables the jaw to rotate relative to ski 1. *Id.*, FIG. 8; *see also id.*, 3:31-39, 3:51-55. To reduce the threshold release force, **spring plate 10** is moved away from **rear spring 7b** by a transmission element 6 (discussed below in ¶ 77) to reduce the tension on the spring. *Id.*, 2:59-3:6; *see also id.*, FIGs. 7 and 8. The reduced spring tension lowers the friction at the **ball detent** such that the jaw can rotate more easily. *Id.*, 2:59-3:6; *see also id.*, FIGs. 7 and 8.

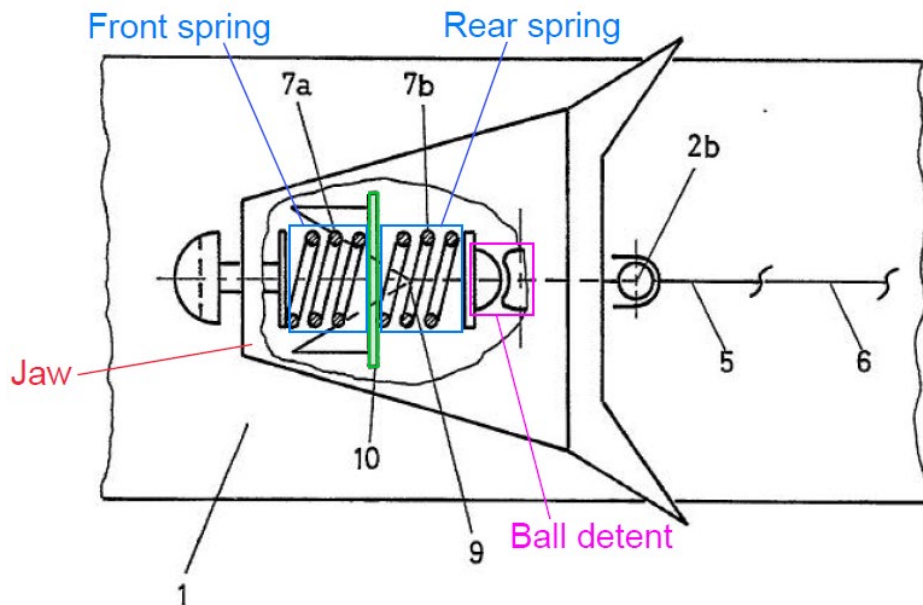
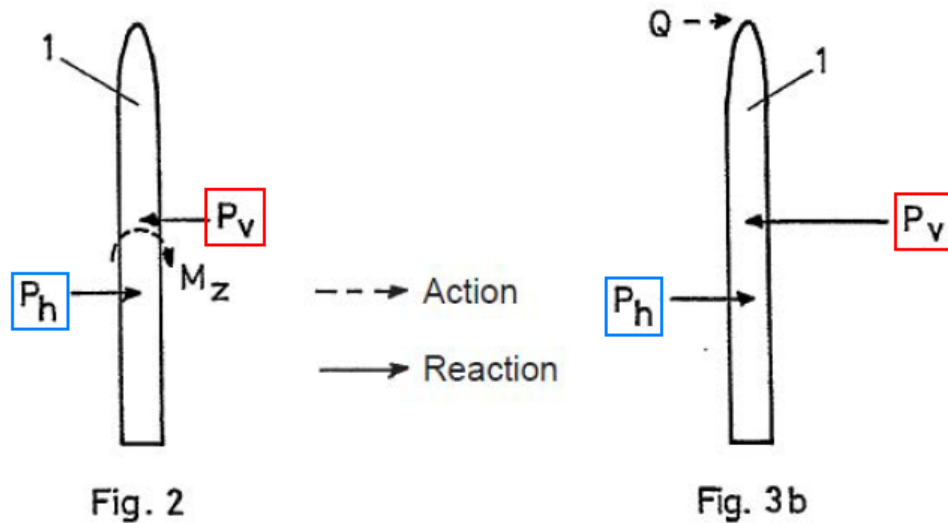


Fig. 8

Ex-1003-Freudiger-1, FIG. 8 (annotated)

73. *Freudiger-1* additionally discloses that one or both of **front jaw 2** and **rear jaw 3** is configured so that “the release force [is] reduced in the presence of a transverse force torsion,” such as when the skier falls. *Id.*, 3:51-55; *see also id.*, 1:49-57, 2:6-12, 3:31-41. This occurs because lateral (or transverse) force torsion

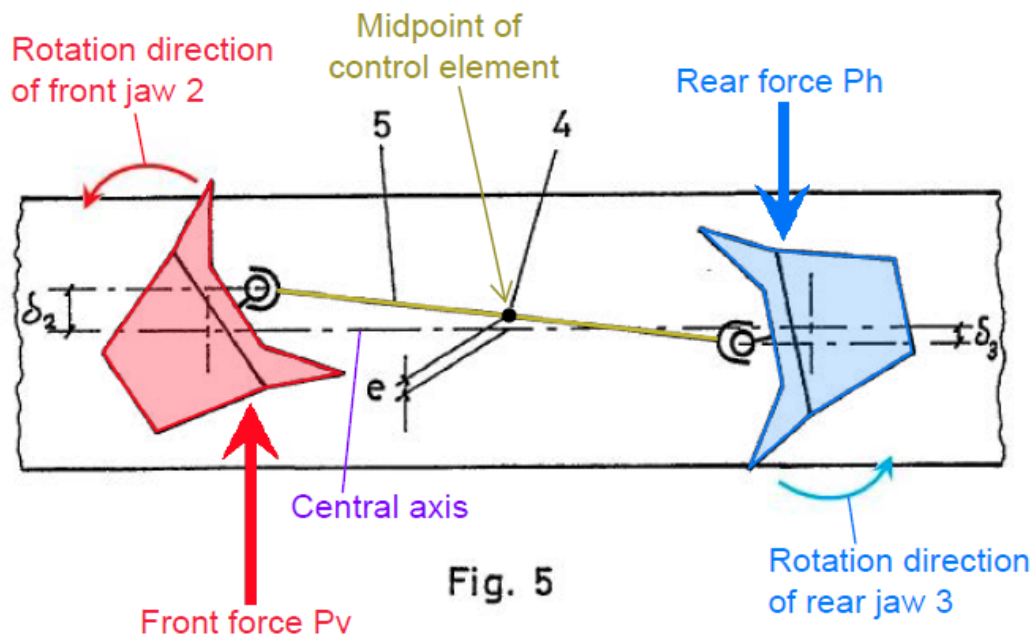
causes **front jaw 2** and **rear jaw 3** to experience unequal reaction forces **P_v** and **P_h**, respectively. *Id.*, 2:34-46, FIGs. 3a and 3b. To the contrary, and as explained above in Section VII.A.1 in a pure torsion example, **front jaw 2** and **rear jaw 3** experience equal reaction forces **P_v** and **P_h**, respectively, during normal skiing. Ex-1003-*Freudiger-1*, 2:40-43, FIG. 2. These different reaction forces are shown in *Freudiger-1*'s FIGs. 2 and 3B.



Ex-1003-*Freudiger-1*, FIG. 2
(annotated, modified)
(depicting pure torsional loading)

Ex-1003-*Freudiger-1*, FIG. 3b
(annotated)
(depicting lateral force torsion)

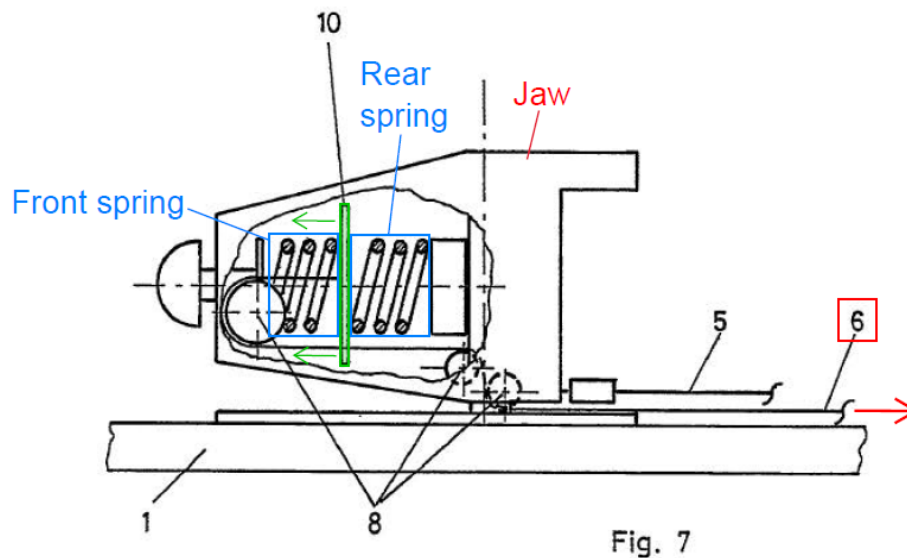
74. Because of the unequal reaction forces in lateral force torsion, one of **front jaw 2** and **rear jaw 3** rotates further than the other when a load is applied. *Id.*, 2:54-58. This causes the binding's **control element 5** (which is connected to both jaws) to be displaced from a **central axis** of the binding by a distance "e," as shown in Figure 5. *Id.*, 2:54-58.



Ex-1003-Freudiger-1, FIG. 5 (annotated)
(jaw rotation in lateral force torsion)

75. Displacement of **control element 5** causes “the release force [to] be[] reduced” in at least one of **front jaw 2** and/or **rear jaw 3**, *Id.*, 2:59-3:6, FIGs. 6-8, thus reducing the overall amount of force needed to drive rotation of the jaws to release the boot from the binding (i.e., the threshold release force of the entire binding). *Id.*, 3:51-55; *see also id.*, 2:59-3:6, 3:31-39.

76. Accordingly, the ski binding of *Freudiger-1* has a “first release,” as claimed, that occurs during lateral force torsion when an applied load exceeds the reduced threshold release force and causes the binding to release the boot. *See id.*, 1:49-57, 2:6-12, 2:54-3:10, 3:31-41.



Ex-1003-Freudiger-1, FIG. 7 (annotated) (the red and green arrows represent displacement of transmission element 6 and spring plate 10, respectively).

77. Transmission element 6, being pulled by control element 5, pulls spring plate 10 away from rear spring 7b. *Id.*, FIGs. 6-8, 2:59-3:6. This relaxes the tension of rear spring 7b, thus reducing the amount of force needed to drive rotation of the jaw to release the boot from the ski binding (i.e., the threshold release force). *Id.*, FIGs. 7 and 8, 2:59-3:6, 3:31-39, 3:51-55.

78. In summary, the ski binding assembly of *Freudiger-1* has a first release because, when lateral force torsion is experienced, the binding will open to release the boot when an applied lateral force exceeds a reduced threshold release force. *See id.* at 2:6-12, 2:54-3:10. Said differently, *Freudiger-1* discloses a “ski binding assembly having a first release,” as claimed, because the “first release” corresponds to the embodiment in which an applied lateral force exceeds the reduced threshold

release force during lateral force torsion, thus causing the binding to open and release the boot.

79. This is in contrast to the situation when the binding does not experience lateral force torsion (e.g., during pure torsional loading). In pure torsional loading, such as when the skier exerts a torsional moment on the ski binding (such as moment M_z depicted in Figure 2), front jaw 2 and rear jaw 3 do not release the boot until an applied lateral force exceeds the non-reduced (or unchanged) threshold release force. *See id.* at 2:6-12, 2:54-3:10.

80. Only when the force exceeds the threshold release force will **front jaw 2** and **rear jaw 3** rotate so far apart that the boot is released from both jaws. *See id.* at FIG. 4, 2:1-5, 2:40-46, 3:31-39. Thus, as explained further below, the binding of *Freudiger-1* also has a “second release” (as recited in claims 35-38, *see infra* Sections VII.A.7-8 and VII.B.3-4, with the “second release” corresponding to the embodiment in which the binding opens to release the boot in response to an applied force that exceeds the normal, non-reduced threshold release force during pure torsional loading (e.g., during active skiing). *See Ex-1003-Freudiger-1*, 2:6-12, 2:46-54, 3:31-39.

- c. ***[30(b)]: “said ski binding assembly including release logic that causes the ski binding assembly to release the ski boot at said first release in response to a release condition,”***

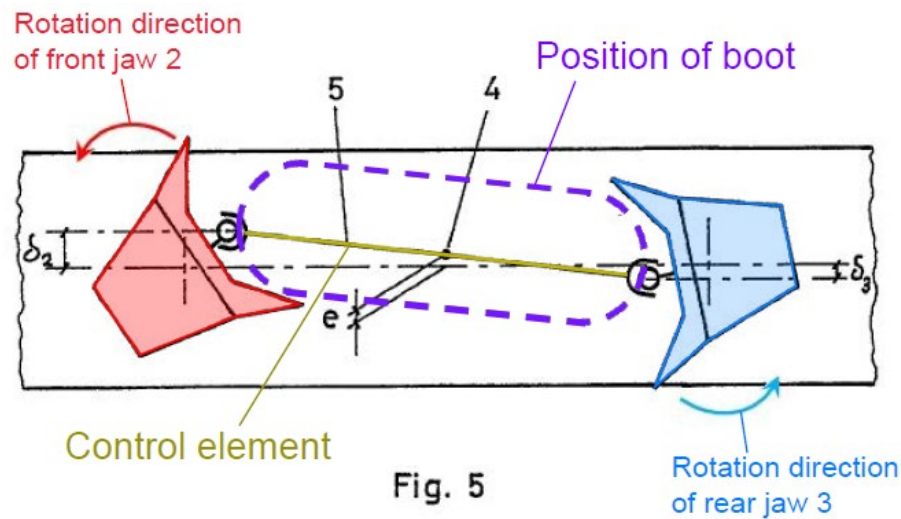
81. *Freudiger-1* discloses or at least renders obvious [30(b)] because it discloses a ski binding assembly including release logic that causes the ski binding assembly to release the ski boot at said first release in response to a release condition.

82. As *Freudiger-1* explains, its ski binding employs release logic that can “distinguish[] pure torsional loading” from “lateral force torsion” and cause a first release of the boot during lateral force torsion in response to a desired release condition. *See id.*, 2:1-12, 3:31-34. Here, the desired release condition occurs when “the release force [is] reduced in the presence of a transverse force torsion” and a load applied to the binding exceeds the reduced threshold release force. *Id.*, 1:49-57, 2:6-12, 3:31-39, 3:51-55.

83. I understand that Patent Owner contends that release logic is “a specific sequence of actions executed by components of the ski binding assembly, and the components that execute the sequence of actions, in response to externally applied loads on the ski that allow or disallow binding release (via the first release) to occur dependent upon whether predetermined loading conditions are met that would indicate risk of ACL injury (i.e., the release condition).” *See Ex-1010-Patent*

Owner's Proposed Constructions. In my opinion, without agreeing with this proposed construction, *Freudiger-1* discloses, or at least renders obvious, the claimed "release logic."

84. Components of the mechanical system of *Freudiger-1*, including **front jaw 2**, **rear jaw 3**, and **control member 5** (described above in [30(a)]), amount to a "release logic" because together they form the mechanism that performs a logical operation ("determin[ing] at any time whether a particular load case represents pure torsion or lateral force torsion") and changes the release threshold in response to different types of forces. Ex-1003-*Freudiger-1*, 2:6-12; *see id.*, 2:38-3:11, 3:31-39, 3:51-55; *see, e.g.*, Ex-1001, 9:26-31. Additionally, **front jaw 2** and **rear jaw 3** are the components in *Freudiger-1* that retain the **boot** until the desired release condition occurs, at which point the jaws release the **boot**. Ex-1003-*Freudiger-1*, 3:31-34; *see also id.*, 3:7-15. Specifically, *Freudiger-1* explains that "the front and rear jaws of the ski binding are connected to a control element in such a way that the control element can determine at any time whether a particular load case represents pure torsion or lateral force torsion and can control the release force accordingly." *Id.*, 2:6-12.



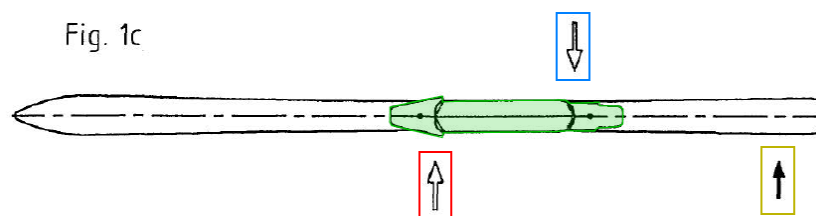
Ex-1003-Freudiger-1, FIG. 5 (annotated)
(depicting boot release in lateral force torsion)

85. Thus, the release logic of *Freudiger-1* causes the binding to release the boot at the “first release” (i.e., during lateral force torsion) in response to a particular release condition: when a load applied to the ski binding during lateral force torsion exceeds the reduced threshold release force. *See id.*, 1:49-57, 2:6-12, 3:31-39, 3:51-55.

86. I understand that Patent Owner contends that release condition is “[a] predetermined external loading of the ski correlated to an estimated skier tibial axis load level selected to lessen the likelihood of ACL injury.” *See* Ex-1010-Patent Owner’s Proposed Constructions. In my opinion, without agreeing with this proposed construction, *Freudiger-1* discloses, or at least renders obvious, the claimed “release condition.”

87. In my opinion, *Freudiger-1* at least teaches this element because *Freudiger-1* explains that lateral force torsion occurs when the “forces act in the y-direction far enough away from the ski boot.” Ex-1003-*Freudiger-1*, 1:54-56 and FIG. 3b. A POSITA would have understood *Freudiger-1*’s lateral force torsion to qualify as a release condition, as recited in claim 1, because it involves an external loading on the ski that correlates to a load on the skier’s leg and can cause injury. *See id.*, Figs. 3a and 3b.

88. Even if the claims were limited to a force applied to the medial inside edge of the ski, as Patent Owner may improperly argue, it is still my opinion that *Freudiger-1* discloses, or at least suggests, that the external lateral force may be applied to the inside tail edge of the ski. *Id.*, 1:54-56. This is because a POSITA would have both understood and found it obvious that *Freudiger-1*’s lateral force torsion also occurs for forces applied to the inside tail edge of the ski. For example, a POSITA would have also been familiar with *Freudiger-2*, showing the similar **front reaction force** and **rear reaction force** caused by an **external force** applied to the inside tail edge of the ski, as shown in Figure 1c below.



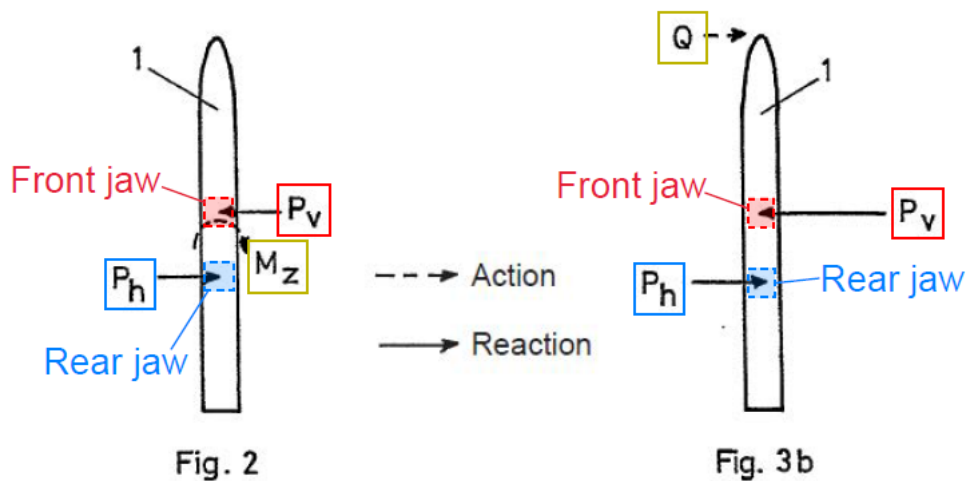
Ex-1004-Freudiger-2, FIG. 1c (annotated, label repositioned)

- d. *[30(c)]: “said ski binding assembly configured to: assess, relative to a first axis, a first loading internal to the ski system caused by an external loading applied to the ski system; and assess, relative to a second axis spaced from said first axis and substantially parallel to said first axis, a second loading internal to the ski system caused by the external loading;”*

89. *Freudiger-1* discloses or at least renders obvious [30(c)] because it discloses said ski binding assembly configured to: assess, relative to a first axis, a first loading internal to the ski system caused by an external loading applied to the ski system; and assess, relative to a second axis spaced from said first axis and substantially parallel to said first axis, a second loading internal to the ski system caused by the external loading.

90. *Freudiger-1* explains that an external load (e.g., lateral force “Q” in lateral force torsion and moment “Mz” in pure torsional loading) causes “reaction forces acting on the front (Pv) and rear (Ph) jaws.” *Id.*, 2:34-45, FIG. 2, FIGs. 3a-3b. *Freudiger-1*’s ski binding assesses a first internal loading (front reaction force Pv) about a first axis (the rotational axis of front jaw 2) and a second internal loading (rear reaction force Ph) about a second axis (the rotational axis of rear jaw 3), which is substantially parallel to and spaced from the front jaw rotational axis. *Id.*, 2:1-5, 2:20-22, 2:31-46.

91. Annotated Figures 2 and 3b below depict the loads experienced by the ski binding of *Freudiger-1* during pure torsional loading and lateral force torsion, respectively. *Id.*, 2:1-5, 2:20-22, 2:31-46. In pure torsional loading (Figure 2), the skier exerts a **torsional moment M_z** on the ski binding with his or her leg via the ski boot. *Id.*, 2:31-34. And in lateral force torsion (Figure 3b), such as when a skier falls, an **external lateral force Q** acts on ski 1 either in front of or behind the ski binding (e.g., Figure 3b depicts **force Q** exerted near the front tip of ski 1). *Id.*, 2:34-37. In both cases, reaction forces **P_v** and **P_h** are exerted on **front jaw 2** and **rear jaw 3**, respectively, in response to the **external load**. *See id.*, 2:31-46.

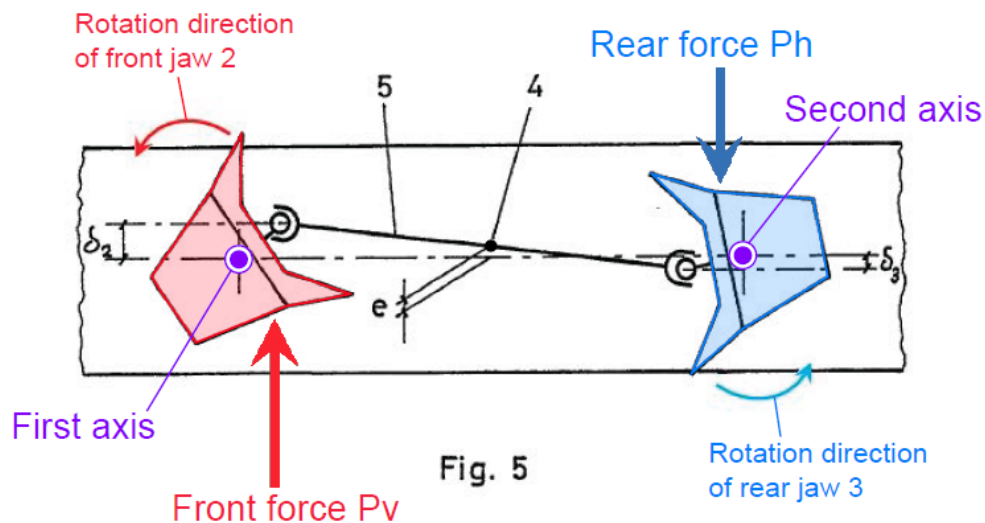


EX-1003-Freudiger-1, FIG. 2
(modified, annotated)
(depicting pure torsion)

EX-1003-Freudiger-1, FIG. 3b
(annotated)
(depicting lateral force torsion)

92. Here, **front force P_v** and **rear force P_h** disclosed by *Freudiger-1* correspond to the claimed “**first loading**” and “**second loading**,” respectively, since

both forces are internal to *Freudiger-1*'s ski system and occur in reaction to an external loading applied to the ski binding (either torsional moment M_z applied by the skier or external force Q acting on the ski). *Id.*, 2:20-22, 2:34-46. *Freudiger-1*'s binding is configured to "assess" reaction forces P_v and P_h by enabling rotation of front jaw 2 and rear jaw 3 in response to forces P_v and P_h , respectively. *Id.*, 2:37-40, 3:31-34; see also *id.*, 3:7-15. Front force P_v is assessed about a "first axis," which is "an axis perpendicular to the ski plane" at the pivot point 2a of front jaw 2. *Id.*, 2:46-50, 3:31-34. Similarly, rear force P_h is assessed about a "second axis," which is "an axis perpendicular to the ski plane" at pivot point 3a of rear jaw 3. *Id.*, 2:46-50, 3:31-34.



Ex-1003-*Freudiger-1*, FIG. 5 (annotated)
(reaction forces in lateral force torsion)

93. As shown in annotated Figure 5 above, the **second axis**, which is perpendicular to the ski at pivot point 3a, is spaced from and substantially parallel to the **first axis**, which is perpendicular to the ski at pivot point 2a. *Id.*, 3:31-34.

94. I understand that Patent Owner contends that a first axis is “[a]n axis of rotation substantially perpendicular to the plane of the ski at a specific point on the ski relative to the tibial axis.” *See* Ex-1010-Patent Owner’s Proposed Constructions. Indeed, Patent Owner appears to equate the first axis to the location at which the first loading is assessed as a trigger for enabling the first release. *See id.*

95. I also understand that Patent Owner contends that a second axis is “[a]n axis of rotation parallel to and spaced from the “first axis,” and substantially perpendicular to the plane of the ski at a different specific point on the ski relative to the tibial axis.” *See id.* Indeed, Patent Owner appears to equate the second axis to the location at which the second loading is assessed as a trigger for enabling the first release. *See id.*

96. I further understand that Patent Owner contends that a first loading is “[a] torque, moment or force resolvable at the first axis in response to an externally applied load on the ski,” and a second loading is “[a] torque, moment or force resolvable at the second axis in response to an externally applied load on the ski.” *See id.*

97. I also understand that Patent Owner contends that “internal to the ski system caused by an external loading applied to the ski system” refers to “loads acting on and between parts of the ski binding assembly as a result of a load applied externally to the ski system such as by impact of a ski edge on the snow.” *See id.*

98. Thus, I understand that Patent Owner contends that “assess, relative to a first axis, a first loading internal to the ski system caused by an external loading applied to the ski system” means “the first loading at the first axis by permitting or causing movement of one or more mechanical components or creating an electronic signal when an external load, such as an impact on the snow, is applied to the ski,” and “assess, relative to a second axis spaced from the first axis and substantially parallel to the first axis, a second a loading internal to the ski system caused by the external loading” means “provide an indication of or a response to a magnitude and direction of the second loading at the second axis by permitting or causing movement of one or more mechanical components or creating an electronic signal when an external load, such as an impact on the snow, is applied to the ski.” *See id.*

99. In my opinion, without agreeing with these proposed constructions, *Freudiger-1* discloses, or at least renders obvious, these claim elements.

- e. ***[30(d)]: “wherein said release logic is configured to: determine whether or not the release condition is occurring as a function of both of the first loading and the second loading; and cause said ski binding assembly to provide said first release if the release logic determines that the release condition is occurring;”***

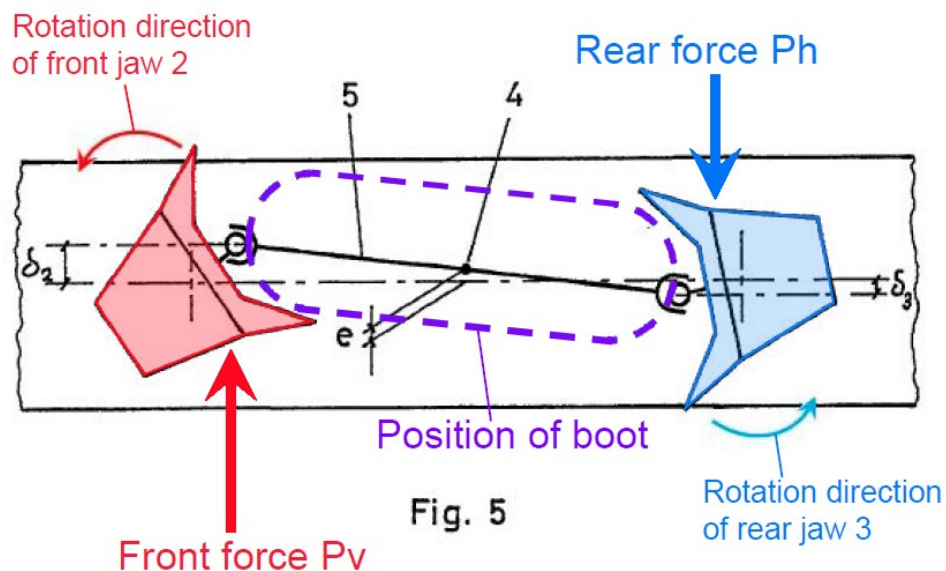
100. *Freudiger-1* discloses, or at least renders obvious, [30(d)] because it discloses wherein said release logic is configured to: determine whether or not the release condition is occurring as a function of both of the first loading and the second loading; and cause said ski binding assembly to provide said first release if the release logic determines that the release condition is occurring.

101. *Freudiger-1* explains that the release logic (described above in [30(b)]) is configured to determine whether the release condition (also described above in [30(b)]) is occurring based on reaction forces **P_v** (first loading) and **P_h** (second loading) and to cause a first release of the boot during lateral force torsion when an applied load exceeds the reduced force threshold. *See* Ex-1003-*Freudiger-1*, 2:38-3:11; 3:31-39.

102. *Freudiger-1* explains that the binding “can determine at any time whether a particular load case represents pure torsion or lateral force torsion and can control the release force accordingly.” *Id.*, 2:6-12. This determination is made as a function of the **front reaction force P_v** (the “first loading”) and the **rear reaction force P_h** (the “second loading”) because the ski binding detects lateral force torsion

when forces P_v and P_h are unequal in magnitude, and causes “the release force [to] be[] reduced” in response. *Id.*, 3:51-55; *see id.*, 2:54-58. That is, front jaw 2 and rear jaw 3 set the force release threshold to either the normal threshold or the reduced threshold based on whether the reaction forces P_v and P_h are equal or unequal in magnitude. *See id.*, 2:6-12, 2:37-40, 3:51-55. For instance, in lateral force torsion, the amount of deflection of the front and rear jaws is “no longer equal ($\delta_3 \neq \delta_2$) due to unequal forces,” P_v and P_h , thus the release force is reduced. *Id.*, 2:57-62, 3:53-6:3.

103. The release logic of *Freudiger-1* then causes the binding to release the boot when the “release condition” is satisfied (i.e., when a load on the binding exceeds the reduced threshold release force) by rotating so far that the boot is freed from front jaw 2 and/or rear jaw 3. *See id.*, 2:6-12, 2:48-58, 3:31-39.



Ex-1003-Freudiger-1, FIG. 5 (annotated)

104. I understand that Patent Owner contends that “determine whether or not the release condition is occurring as a function of both of the first loading and the second loading” means “the ski binding assembly release logic indicating occurrence or nonoccurrence of the release condition dependent upon the assessments of the first loading and second loading.” *See* Ex-1010-Patent Owner’s Proposed Constructions.

105. In my opinion, without agreeing with this proposed construction, *Freudiger-1* discloses, or at least renders obvious, this claim element.

106. Thus, in my opinion, *Freudiger-1* alone discloses, or at least suggests, this claim element. A POSITA would have both understood and found it obvious that *Freudiger-1*’s release logic is configured to determine the forces at the front and rear jaws and cause the necessary release force threshold to remain “unchanged” if $P_v = P_h$ but reduce the necessary release force threshold if $P_v \neq P_h$. Ex-1003-*Freudiger-1*, 3:17-28. A POSITA would have understood that, at a minimum, the release logic’s reduction of the necessary release threshold is a function of the forces at the front and rear jaws.

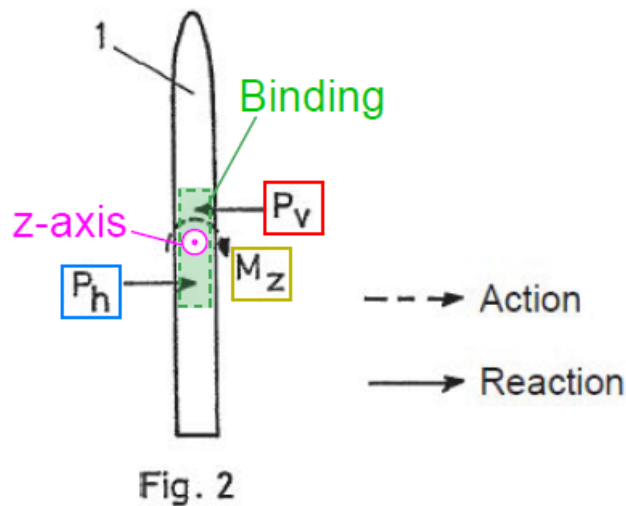
- f. *[30(e)]: “wherein said ski binding assembly is configured to determine a force-couple at a third axis from said first loading and said second loading, and said release logic is configured to determine whether or not the release condition is occurring as a function of the force-couple.”*

107. *Freudiger-1* discloses, or at least renders obvious, [30(e)] because it discloses wherein said ski binding assembly is configured to determine a force-couple at a third axis from said first loading and said second loading, and said release logic is configured to determine whether or not the release condition is occurring as a function of the force-couple.

108. *Freudiger-1*'s ski binding is configured to determine a force-couple formed from front force P_v (first loading) and rear force P_h (second loading) at a third axis, and *Freudiger-1*'s release logic (described above in [30(b)]) is configured to determine whether a load on the binding exceeds the threshold release force as a function of the force-couple. *See* Ex-1003-*Freudiger-1*, 2:27-34, 2:40-43, 3:31-39, FIGs. 1-2.

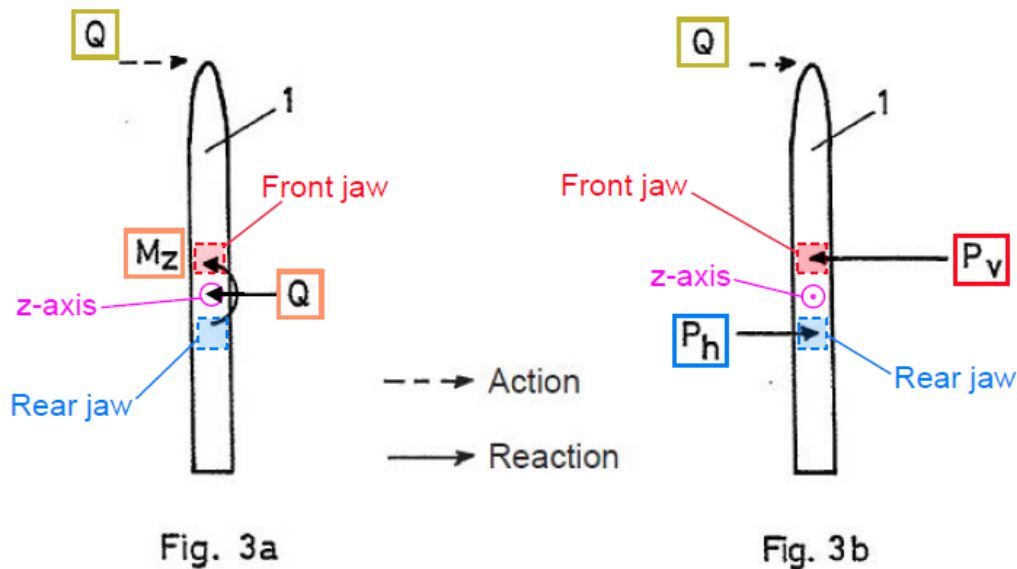
109. Figure 2 of *Freudiger-1* shows the “typical reactions at the location of a front (P_v) and rear (P_h) jaw of a safety binding when a torsional moment M_z is applied by the skier.” *Id.*, 2:31-34. In this pure torsion example, the reaction forces P_v and P_h form a force-couple because they are a pair of opposite forces which

result in a net moment that is equal and opposite to **torsional moment M_z** (action force in Figure 2). *See id.*, FIGs. 1 and 2, 2:27-34, 2:40-43, 3:31-39.



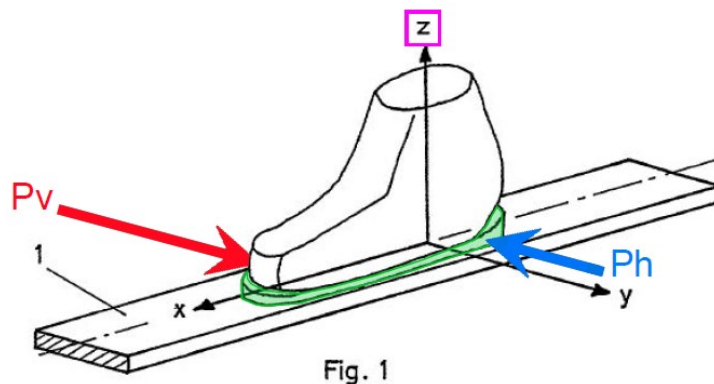
**Ex-1003-Freudiger-1, FIG. 2 (annotated)
(pure torsional loading)**

110. In Figures 3a-3b, *Freudiger-1* shows an **external force Q** acting on the ski during lateral force torsion. *Id.*, 2:34-37. In response, the binding experiences a **reactive moment M_z** and **reactive force Q** , which can be “divided into the reaction forces acting on the **front (P_v)** and **rear (P_h)** jaws.” *Id.*, FIGs. 3a and 3b, 2:34-40.



**Ex-1003-Freudiger-1, FIGs. 3a & 3b (annotated, with legend from FIG. 2)
(depicting lateral force torsion)**

111. The **reactive moment M_z** (see Figure 3a) is applied by the skier's leg to the **binding** around the vertical **z-axis**, which is depicted in annotated Figure 1 below. *See id.*, 2:1-5, 2:27-31, 2:33-34. Thus, the force-couple formed from **front force P_v** and **rear force P_h** is also applied to the **binding** around the **z-axis**. *See id.*, 2:1-5, 2:27-31.



**Ex-1003-Freudiger-1, FIG. 1 (annotated)
(front jaw 2 and rear jaw 3 not shown)**

112. Further, the **ski binding** of *Freudiger-1* is configured to “determine whether or not the release condition is occurring as a function of the force-couple” formed from **front force Pv** and **rear force Ph**. *See id.*, 2:6-12, 2:40-46, 3:51-55. As explained above for [30(d)], the release logic is configured to set the **binding’s** force release threshold based on whether forces **Pv** and **Ph** are equal or unequal in magnitude. *See id.*, 2:6-12, 2:40-46, 3:51-55 (explaining that *Freudiger-1*’s release logic “can control the release force” threshold based on its “determin[ation] at any time whether a particular load case represents pure torsion or lateral force torsion”); *supra* Section VII.A.2.e. Thus, the *Freudiger-1* release logic determines whether the release condition is occurring (i.e., whether an applied load exceeds the reduced force threshold) as a function of the force-couple, since the force threshold is selected based on the relative magnitudes of forces **Pv** and **Ph** and the torsional moment **Mz** (which form the force-couple).

113. *Freudiger-1* alone discloses, or at least suggests, that a force-couple is determined at a third axis from said first loading and said second loading. Because *Freudiger-1* is a safety ski device that provides lateral release capabilities when a skier falls, a POSITA would have both understood and found it obvious that the reaction forces, **Pv** and **Ph**, create a force-couple around a third axis, which is of interest. Indeed, a POSITA would have known “[i]njuries to the lower leg and knee persist in alpine skiing” (Ex-1008-*Gulick* at 31), and that “achiev[ing] a release at

small moments around the tibia and large lateral forces” will avoid “ligament injuries to the knee joint.” Ex-1004-*Freudiger-2*, ¶¶ [0002]-[0003].

3. Independent Claim 53

114. *Freudiger-1* discloses, or at least renders obvious, each element of independent claim 53.

- a. ***[53(Preamble)]: “An apparatus for securing a ski boot to a ski so as to form a ski system, the apparatus comprising:”***

115. This element is substantially identical to [30(Preamble)]. Accordingly, for the reasons discussed in Section VII.A.2.a, *Freudiger-1* discloses, or at least renders obvious, this element.

- b. ***[53(a)]: “a ski binding assembly configured to be attached to the ski and to releasably secure the ski boot to the ski during use, said ski binding assembly having a first release,”***

116. This element is identical to [30(a)]. Accordingly, for the reasons discussed in Section VII.A.2.b, *Freudiger-1* discloses, or at least renders obvious, this element.

- c. ***[53(b)]: “said ski binding assembly including release logic that causes the ski binding assembly to release the ski boot at said first release in response to a release condition,”***

117. This element is identical to [30(b)]. Accordingly, for the reasons discussed in Section VII.A.2.c, *Freudiger-1* discloses, or at least renders obvious, this element.

- d. ***[53(c)]: “said ski binding assembly configured to: assess, relative to a first axis, a first loading internal to the ski system caused by an external loading applied to the ski system; and assess, relative to a second axis spaced from said first axis and substantially parallel to said first axis, a second loading internal to the ski system caused by the external loading;”***

118. This element is identical to [30(c)]. Accordingly, for the reasons discussed in Section VII.A.2.d, *Freudiger-1* discloses, or at least renders obvious, this element.

- e. ***[53(d)]: “wherein said release logic is configured to: determine whether or not the release condition is occurring as a function of both of the first loading and the second loading; and cause said ski binding assembly to provide said first release if the release logic determines that the release condition is occurring;”***

119. This element is identical to [30(d)]. Accordingly, for the reasons discussed in Section VII.A.2.e, *Freudiger-1* discloses, or at least renders obvious, this element.

- f. ***[53(e)]: “wherein said ski binding assembly has a second release, said first release being an attenuated release relative to said second release.”***

120. *Freudiger-1* discloses, or at least renders obvious, [53(e)] because it discloses wherein said ski binding assembly has a second release, said first release being an attenuated release relative to said second release.

121. As discussed above for [30(b)], *Freudiger-1* discloses, or at least renders obvious, a “first release” of the boot, which occurs during lateral force torsion in response to a load on the binding exceeding the reduced threshold release force. Ex-1003-*Freudiger-1*, 2:1-12, 2:48-54, 3:31-39, 3:51-55. *Freudiger-1* further explains that it performs a “second release” of the boot during pure torsional loading, when the jaws deflect evenly ($\delta_3 = \delta_2$) and release the boot in response to a force exceeding the normal threshold release force. *See id.*, 2:6-12, 3:7-10, 3:22-27, 3:34-39.

122. As described above for [30(a)], **front jaw 2** and **rear jaw 3** experience equal reaction forces **P_v** and **P_h**, respectively, during pure torsional loading (such as when the skier exerts **torsional moment M_z** on the binding). *See id.*, 2:31-34, 2:40-43.

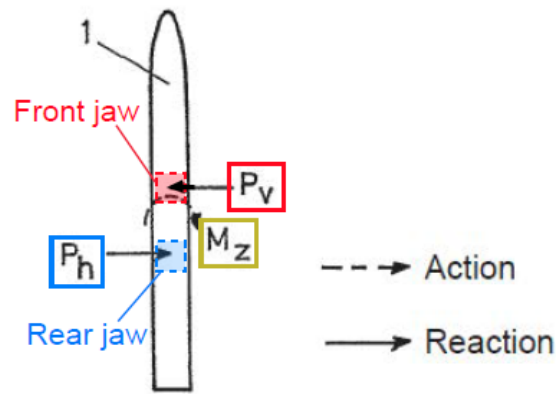
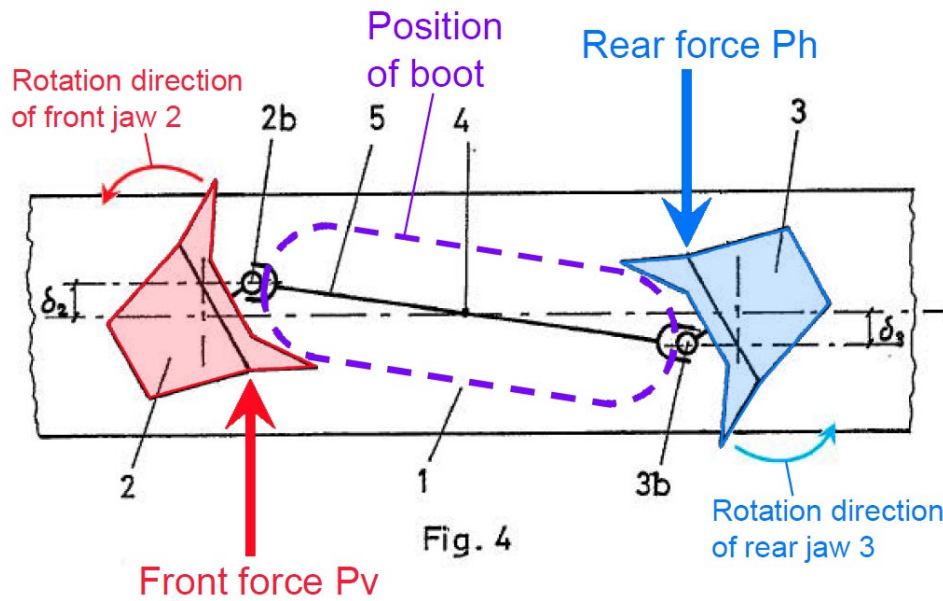


Fig. 2

**Ex-1003-Freudiger-1, FIG. 2 (annotated, condensed)
(depicting pure torsional loading)**

123. When forces P_v and P_h exceed the normal (i.e., non-reduced) threshold release force, front jaw 2 and rear jaw 3 pivot the same distance relative to the binding. *Id.*, 2:40-43, 2:50-54; see also *id.*, 3:31-34. This “[s]imultaneous deflection of the front and rear jaws” increases “the total angle of twist between the ski boot and the ski,” thus achieving a “second release” of the boot. *Id.*, 3:11-13; see also *id.*, 2:50-54, 3:31-36.



Ex-1003-Freudiger-1, FIG. 4 (annotated)
(depicting boot release during pure torsion)

124. *Freudiger-1* also discloses, or at least suggests, that the “first release” is “an attenuated release” relative to the “second release,” as claimed, because the release threshold in lateral force torsion (the first release) is “reduced” compared to the release threshold in pure torsional loading (the second release). *See id.*, 3:51-4:3 (explaining that “the release force [is] reduced in the presence of a transverse force torsion”).

125. I understand that Patent Owner contends that a second release is “[a] mechanism of the ski binding assembly that allows separation of the ski boot from the ski automatically and without skier intervention (i.e., releases) in response to a predetermined external loading of the ski correlated to an estimated maximum tibial axis load level selected to lessen the likelihood of tibial shaft injuries such as tibial

spiral fractures.” *See* Ex-1010-Patent Owner’s Proposed Constructions. Indeed, Patent Owner appears to equate the second release to “the standard release mode in a typical prior art conventional alpine binding.” *See id.*

126. I also understand that Patent Owner contends that an attenuated release is “[a] release of the ski binding assembly that occurs at a lower tibial axis loading relative to another release.” *See id.*

127. In my opinion, without agreeing with these proposed constructions, *Freudiger-1* discloses, or at least renders obvious, these claim elements.

4. Independent Claim 58

128. *Freudiger-1* discloses, or at least renders obvious, each element of independent claim 58.

- a. ***[58(Preamble)]: “An apparatus for securing a ski boot to a ski so as to form a ski system, the apparatus comprising:”***

129. This element is substantially identical to [30(Preamble)] and [53(Preamble)] above. Accordingly, for the reasons discussed in Section VII.A.2.a, *Freudiger-1* discloses this element.

- b. ***[58(a)]: “a ski binding assembly configured to be attached to the ski and to releasably secure the ski boot to the ski during use, said ski binding assembly having a first release,”***

130. This element is substantially identical to [30(a)] and [53(a)] above.

Accordingly, for the reasons discussed in Section VII.A.2.b, *Freudiger-1* discloses, or at least renders obvious, this element.

- c. ***[58(b)]: “said ski binding assembly including release logic that causes the ski binding assembly to release the ski boot at said first release,”***

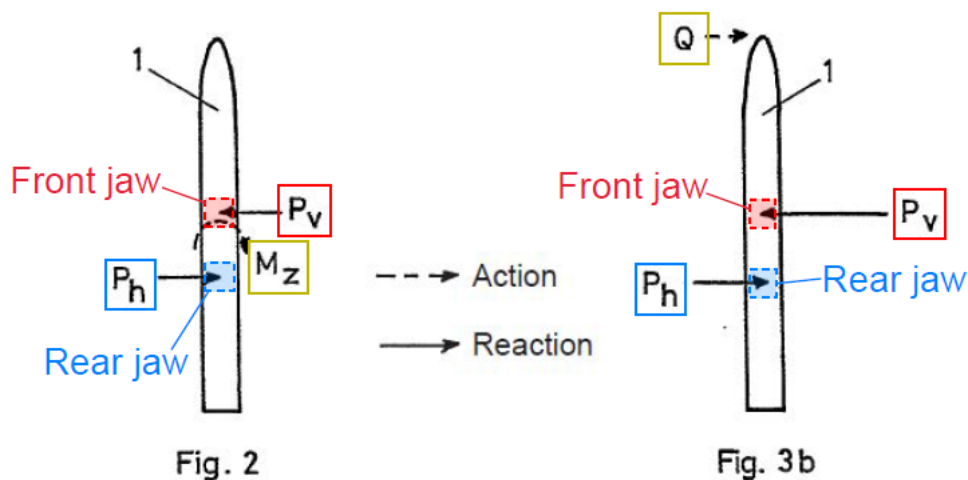
131. This element is substantially identical to [30(b)] and [53(b)] above.

Accordingly, for the reasons discussed in Section VII.A.2.c, *Freudiger-1* discloses, or at least renders obvious, this element.

- d. ***[58(c)]: “said release logic set to activate said first release substantially only when: a first loading, internal to the ski system along or about a first axis and caused by an external loading applied to the ski system, exceeds a first defined level and has a first defined sense; and a second loading, internal to the ski system along or about a second axis and caused by the external loading, exceeds a second defined level and has a second defined sense;”***

132. *Freudiger-1* discloses, or at least renders obvious, [58(c)] because its binding’s release logic is specifically designed so that a first release occurs substantially only in response to first and second loadings which exceed certain thresholds and are applied in certain directions, as more fully described below.

133. *Freudiger-1* explains that an external load (specifically, lateral force “Q” in lateral force torsion and moment “Mz” in pure torsional loading) causes “reaction forces acting on the front (Pv) and rear (Ph) jaws.” Ex-1003-*Freudiger-1*, 2:34-45, FIG. 2, FIGs. 3a-3b. Annotated Figures 2 and 3b below depict the loads experienced by the ski binding of *Freudiger-1* during pure torsional loading and lateral force torsion, respectively. *Id.*, 2:1-5, 2:20-22, 2:31-46. In pure torsional loading (Figure 2), the skier exerts a torsional moment Mz on the ski binding with his or her leg via the ski boot. *Id.*, 2:31-34. And in lateral force torsion (Figure 3b), such as when a skier falls, an external lateral force Q acts on ski 1 either in front of or behind the ski binding (e.g., Figure 3b depicts force Q exerted near the front tip of ski 1). *Id.*, 2:34-37. In both cases, reaction forces Pv and Ph are exerted on front jaw 2 and rear jaw 3, respectively, in response to the external load. *See id.*, 2:31-46.



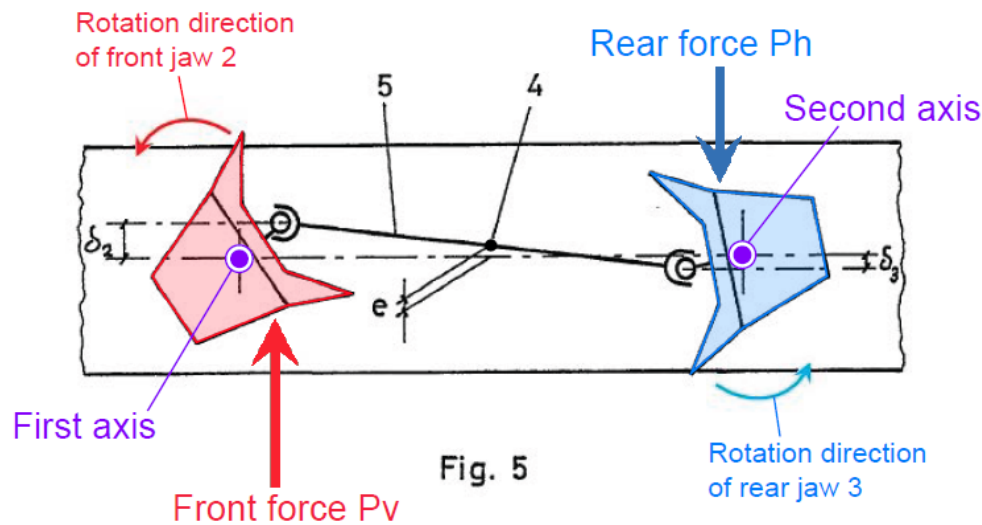
EX-1003-*Freudiger-1*, FIG. 2
(modified, annotated)

EX-1003-*Freudiger-1*, FIG. 3b
(annotated)

(depicting pure torsion)

(depicting lateral force torsion)

134. *Freudiger-1*'s ski binding thus experiences a first loading (**front reaction force Pv**) and a second loading (**rear reaction force Ph**). *Id.*, 2:1-5, 2:20-22, 2:31-46. Here, **front force Pv** and **rear force Ph** correspond to the claimed “**first loading**” and “**second loading**,” respectively, since both forces are internal to *Freudiger-1*'s ski system and occur in reaction to an **external loading** applied to the ski binding (either **torsional moment Mz** applied by the skier or **external force Q** acting on the ski). *Id.*, 2:20-22, 2:34-46. *Freudiger-1*'s binding enables rotation of **front jaw 2** in response to **front force Pv**, thus the first loading is experienced internal to the ski system and along or about a **first axis**, corresponding to the rotational axis of **front jaw 2**. *Id.*, 2:46-50, 3:31-34. This first axis is “perpendicular to the ski plane” at the pivot point 2a of **front jaw 2**. *Id.*, 2:46-50, 3:31-34. Similarly, *Freudiger-1*'s binding enables rotation of **rear jaw 3** in response to **rear force Ph**, thus the second loading is experienced internal to the ski system and along or about a **second axis**, corresponding to the rotational axis of **rear jaw 3**. *Id.*, 2:46-50, 3:31-34. This is shown below in annotated Figure 5: This second axis is “perpendicular to the ski plane” at pivot point 3a of **rear jaw 3**. *Id.*, 2:46-50, 3:31-34.

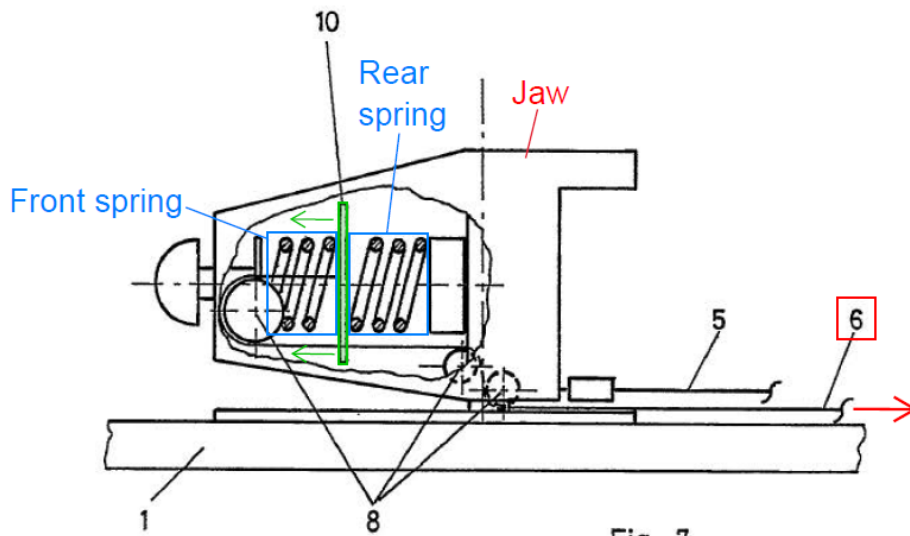


Ex-1003-Freudiger-1, FIG. 5 (annotated)
(showing lateral force torsion)

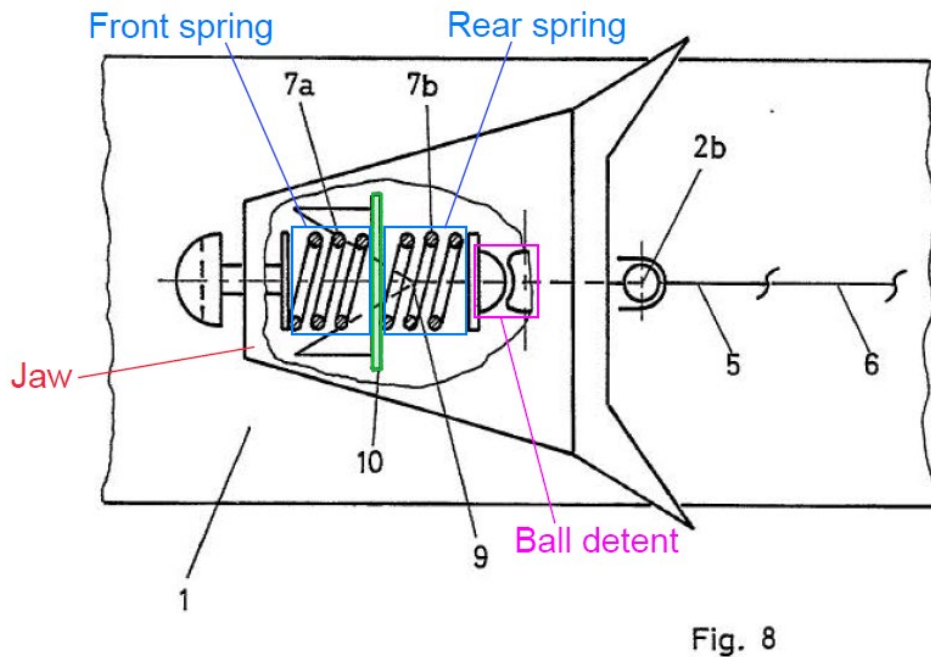
135. *Freudiger-1* explains that **front jaw 2** and **rear jaw 3** “can be pivoted for release” of the ski boot from the ski binding. *Id.*, at 3:33-35. Only once the first loading and second loading deflect the **front** and **rear** jaws far enough apart is the ski boot freed from the binding. *Id.*, 3:8-11 (“A certain amount of deflection is required” for release, “both at the **front** and **rear** jaws”).

136. Under lateral force torsion, the external force (and thus the internal loadings) required to achieve the necessary deflection between the front jaw and rear jaw is reduced. As *Freudiger-1* explains, each of the front and rear jaws include mechanisms for adjusting the level of force required to rotate the jaws and cause release. *Id.*, FIGs. 7 and 8, 2:59-3:6, 3:31-39, 3:51-55. These mechanisms include a **spring plate 10**, attached to a **front spring 7a** and **rear spring 7b**, and a **ball detent**,

connected to rear spring 7b, which enables the jaw to rotate relative to ski 1. *Id.* at FIG. 8; see also *id.* at 3:31-39, 3:51-55.



Ex-1003-Freudiger-1, FIG. 7 (annotated) (the red and green arrows represent displacement of transmission element 6 and spring plate 10, respectively).



Ex-1003-Freudiger-1, FIG. 8 (annotated)

137. The **spring plate 10** within the front and rear jaws adjusts the rotational resistance of the jaw. For instance, to reduce the rotational resistance, **spring plate 10** is moved away from **rear spring 7b**, reducing the tension on the spring and causing the jaw to rotate more easily. *Id.* at 2:59-3:6; *see also id.* at FIGs. 7 and 8. This occurs under lateral force torsion where **transmission element 6** is pulled by **control element 5** and thereby pulls **spring plate 10** away from **rear spring 7b**. *Id.*, 1:49-57, 2:6-12, 3:31-41.

138. Thus, under lateral force torsion, the internal jaw mechanisms reduce the amount of force needed to drive rotation of the jaws. *Id.*, FIGs. 7 and 8, 2:59-3:6, 3:31-39, 3:51-55. Therefore, *Freudiger-1*'s binding sets a first defined level, being the amount of force required to rotate **front jaw 2** to an open position with respect to **rear jaw 3**, and a second defined level, being the amount of force required to rotate **rear jaw 3** to an open position with respect to **front jaw 2**.

139. Accordingly, *Freudiger-1*'s release logic (explained above in connection with [30(b)]) activates the first release (under lateral force torsion) substantially only when a first loading exceeds a first defined level and a second loading exceeds a second defined level. This is because substantially only once (i) a first loading is applied to **front jaw 2** exceeding the magnitude necessary to rotate **front jaw 2** far enough from **rear jaw 3**, and (ii) a second loading is applied to **rear jaw 3** exceeding the magnitude necessary to rotate **rear jaw 3** far enough from **front**

jaw 2 will the release logic activate the first release and release the boot from the binding.

140. I understand that Patent Owner contends that “said release logic set to activate said first release substantially only when” means “[t]he release logic enables the first release when both of the loading conditions set forth thereafter in the claim are satisfied.” *See* Ex-1010-Patent Owner’s Proposed Constructions. Patent Owner further states that “‘substantially only’ addresses the fact that no ski binding system is 100% accurate and as such an expected small amount of false releases may occur but the occurrence of such false releases does not cause a ski binding that otherwise meets the requirements of the claim to fall outside the claim.” *See id.*

141. In my opinion, without agreeing with this proposed construction, *Freudiger-1* discloses, or at least renders obvious, this claim element.

142. Additionally, the *Freudiger-1* release logic is set to activate the first release substantially only when a first loading has a first defined sense, and a second loading has a second defined sense.

143. I understand that Patent Owner contends that “exceeds” means “greater than (plain meaning),” that “first defined level” means “a magnitude of the first loading corresponding to a release setting of the binding at the defined release condition” and that a “first defined sense” is “the direction of the first loading

corresponding to a release setting of the binding at the defined release condition.”

See id.

144. I also understand that Patent Owner contends that “second defined level” means “a magnitude of the second loading corresponding to a release setting of the binding at the defined release condition” and that a “second defined sense” is “the direction of the second loading corresponding to a release setting of the binding at the defined release condition.” *See id.* Thus, it appears Patent Owner contends that the first and second defined senses refer to the directions that the first and second loadings are applied, respectively.

145. In my opinion, without agreeing with these proposed constructions, *Freudiger-1* discloses, or at least renders obvious, this claim element.

146. For instance, *Freudiger-1* explains that under either lateral force torsion or pure torsion, **front jaw 2** and **rear jaw 3** experience reaction forces **Pv** and **Ph** in opposite directions. Thus, to achieve release of the boot, the **front load Pv** has a first defined sense in one direction (e.g., in the positive y-direction) and the **rear load Ph** has a second defined sense in another direction (e.g., in the negative y-direction). *See Ex-1003-Freudiger-1*, FIGs. 1-3.

147. At a minimum, *Freudiger-1* at least suggests that the release logic is set to activate the first release substantially only when a first loading exceeds a first defined level and has a first defined sense, and a second loading exceeds a second

defined level and has a second defined sense. Because *Freudiger-I* explains that an external force will create reaction forces at the **front** and **rear jaw**, a POSITA would have both understood and found it obvious that for a release to occur under lateral force torsion, a force, **Ph**, needs to have a certain magnitude and be applied in a certain direction and the boot will be released if a second force, **Pv**, exceeds a certain magnitude and is applied in a substantially opposite direction. Thus, a POSITA would have understood that *Freudiger-I* discloses, or at least teaches, this claim element.

- e. ***[58(d)]: “wherein said ski binding assembly has a second release, said first release being an attenuated release relative to said second release.”***

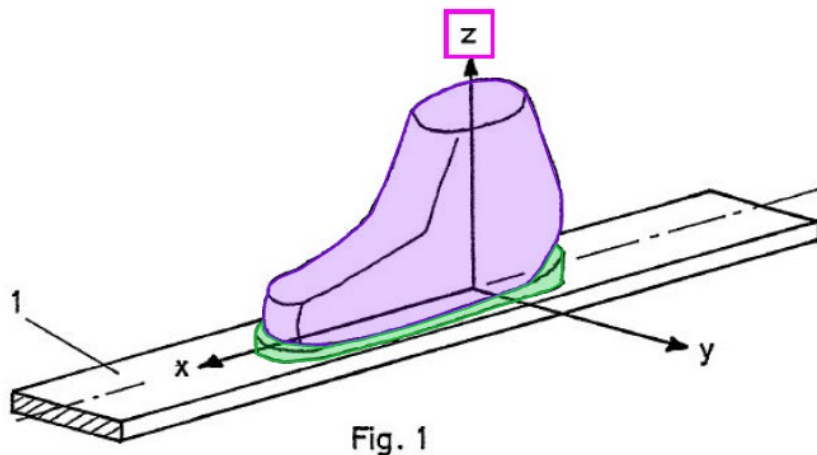
148. This element is substantially identical to claim 35 and to element [53(e)], discussed above. Accordingly, for the reasons discussed in Section VII.A.3.f, *Freudiger-I* discloses or at least renders obvious this element.

5. Claim 31

“wherein said third axis is substantially coincident with a tibial axis of a user when the user is wearing the ski boot and the ski boot is releasably engaged in the binding assembly.”

149. In addition to all the elements of the claim from which this claim depends, *Freudiger-I* discloses, or at least renders obvious, this additional element.

150. *Freudiger-1* discloses that the binding has a z-axis (i.e., a “third axis”) that is substantially coincident with the skier’s tibial axis. Ex-1003-*Freudiger-1*, FIGs. 1-2, 2:27-34, 2:40-43, 3:31-39.



Ex-1003-*Freudiger-1*, FIG. 1 (annotated)

151. As depicted in Figure 1 (reproduced and annotated above), the **binding’s z-axis** closely corresponds with the position of the skier’s lower leg when the skier is wearing the **boot** and when the **boot** is secured within the **binding**. See *id.*, 1:44-46, 2:27-34. Accordingly, the **z-axis** (i.e., the “third axis”) in the coordinate system of *Freudiger-1* is “substantially coincident” with an axis defined by the lower leg of the skier (i.e., a tibial axis of the skier) in a case in which the skier “is wearing the **ski boot** and the **ski boot** is releasably engaged in the **binding assembly**.”

152. *Freudiger-1* discloses, or at least suggests, that the third axis is substantially coincident with a tibial axis of a user because a POSITA would have

both understood and found it obvious that *Freudiger-1*'s z-axis refers the tibial axis. See Ex-1007-Howell, ¶ [0011], Ex-1004-Freudiger-2, ¶ [0003].

6. Claim 34

“wherein said first loading is a first moment on said first axis and said second loading is a second moment on said second axis, and said ski binding assembly is configured to determine the force-couple from the first moment and the second moment.”

153. In addition to all the elements of the claim from which this claim depends, *Freudiger-1* discloses, or at least renders obvious, this additional claim element.

154. As discussed above for element [30(c)], the claimed “first loading” and “second loading” correspond to front force P_v and rear force P_h exerted on front jaw 2 and rear jaw 3 of the ski binding, respectively. See Ex-1003-Freudiger-1, 2:31-40. Front force P_v creates a first moment about the pivotable axis (2a) of front jaw 2 (i.e., at the “first axis”). See *id.*, FIGs. 3a and 3b, 1:44-46, 2:31-34. Similarly, rear force P_h creates a second moment about the pivotable axis (3a) of rear jaw 3 (i.e., at the “second axis”). See *id.*, FIGs. 3a and 3b, 1:44-46, 2:31-34.

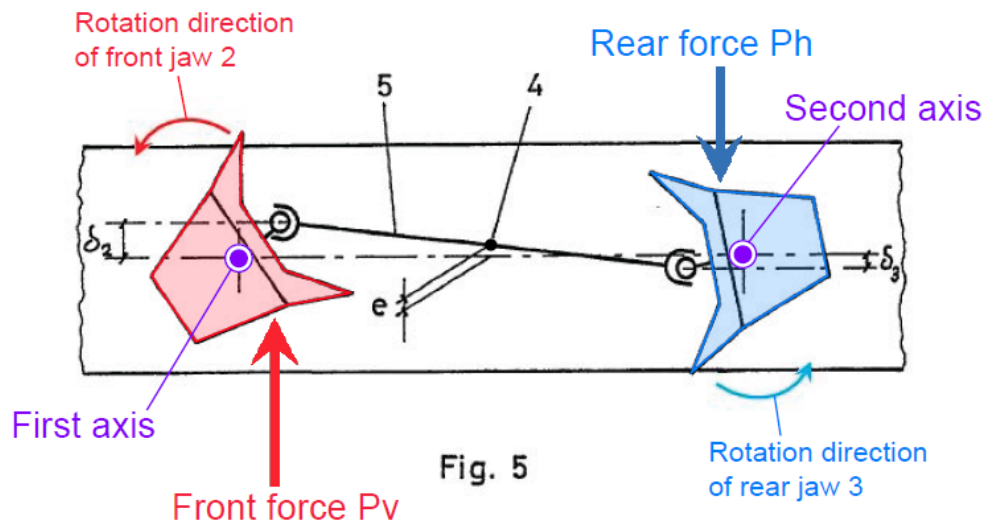


Fig. 5

Ex-1003-Freudiger-1, FIG. 5 (annotated)

155. Further, the ski binding assembly of *Freudiger-1* is configured to “determine the force-couple from the first moment and the second moment,” as claimed, by subjecting **front jaw 2** and **rear jaw 3** to the moments of **front force P_v** and **rear force P_h**, respectively, and enabling each jaw to pivot only if the applied moment overcomes the jaw’s threshold release force. *See id.*, FIGs. 3a and 3b, 2:46-3:1, 3:7-10, 3:31-39, 3:51-55.

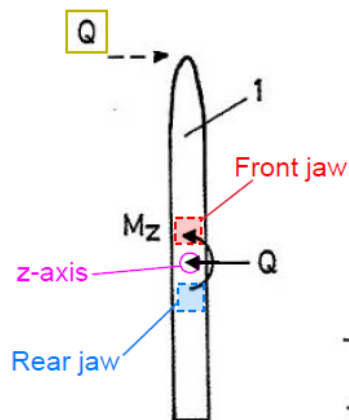


Fig. 3a

---> Action
--> Reaction

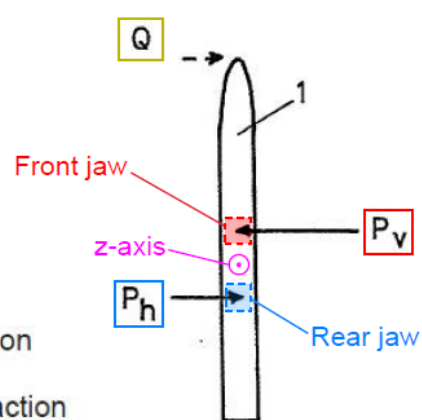


Fig. 3b

Ex-1003-Freudiger-1, FIGs. 3a & 3b (annotated, with legend from FIG. 2)

156. Further, a POSITA would have at least found this element obvious in view of *Freudiger-1*, considering the POSITA would have understood that a release at small moments around the tibia and large lateral forces is desirable. Ex-1004-*Freudiger-2*, ¶¶ [0002]-[0003].

7. Claim 35

“wherein said ski binding assembly has a second release, said first release being an attenuated release relative to said second release.”

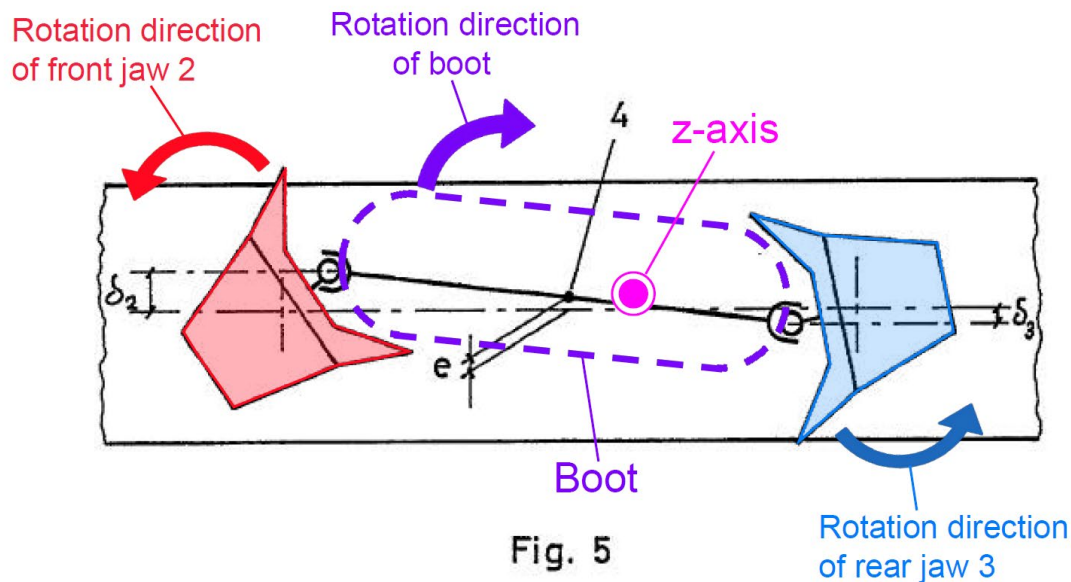
157. This limitation is identical to claim [53(e)]. Accordingly, for the reasons discussed above in Section VII.A.3.f, *Freudiger-1* discloses or at least renders obvious this element.

8. Claims 37, 55, and 59

“wherein said first release is a first release torque about a tibial axis of a skier when the skier is wearing the ski boot and the ski boot is secured to the ski by said ski binding assembly and said second release is a second release torque about a tibial axis of a skier when the skier is wearing the ski boot and the ski boot is secured to the ski by said ski binding assembly.”

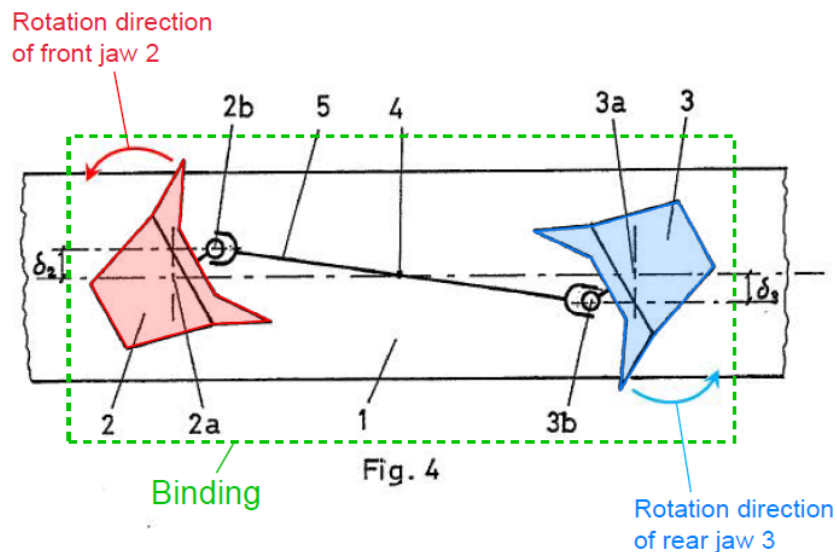
158. In addition to all the elements of the claim from which this claim depends, *Freudiger-1* discloses, or at least renders obvious, these additional claim elements.

159. As discussed above, the claimed “first release” of *Freudiger-1* occurs when a force exceeding the reduced threshold release force is exerted on the **binding** during lateral force torsion. See *supra* Section VII.A.2.b; Ex-1003-*Freudiger-1*, 2:6-12, 3:31-39, 3:51-55. This loading creates a first torque on the binding about the **z-axis**, which as explained above for claim 31 substantially coincides with the skier’s tibial axis. See Ex-1003-*Freudiger-1*, 2:6-12, 3:31-39, 3:51-55, FIG. 1; *supra* Section VII.A.5. This torque causes “[s]imultaneous deflection of the **front** and **rear jaws**” so that “the total angle of twist between the **ski boot** and the ski is increased,” thus releasing the **boot** from the binding. Ex-1003-*Freudiger-1*, 3:11-15; see also *id.*, 3:31-39. This is shown in Figure 5 below.



Ex-1003-*Freudiger-1*, FIG. 5 (annotated)

160. Similarly, the claimed “second release” of *Freudiger-1* occurs when a force exceeding the non-reduced threshold release force is exerted on the binding during pure torsional loading (e.g., during active skiing). *See id.*, 2:6-12, 3:31-39, 3:51-55. *Freudiger-1* explains that in a pure torsion situation, the forces acting at **front jaw 2 (Pv)** and at **rear jaw 3 (Ph)** will be of the same magnitude. *Id.*, 2:32-34, 41-45. This application of force exerts a second torque on the binding about the z-axis, which again corresponds with the skier’s tibial axis while the skier is using the binding to ski. *See id.*, 2:32-34, 41-45. This torque causes **front jaw 2** and **rear jaw 3** to pivot until the boot is released. *See id.*, 3:11-15, 3:31-39. The second torque is larger in magnitude than the first torque because the second torque has to exceed the larger release force to cause the boot to be released, while the first torque only has to exceed the reduced release force. This example is shown in Figure 4 below.



Ex-1003-*Freudiger-1*, FIG. 4 (annotated)

161. At a minimum, *Freudiger-1* suggests that the first release is a first release torque about the tibial axis and a second release is a second release torque about the tibial axis because a POSITA would have both understood and found it obvious that the reaction forces on the jaws create torques on the skier's tibia. *See* Ex-1007-*Howell*, ¶ [0011]; Ex-1008-*Gulick*, 31; Ex-1004-*Freudiger-2*, ¶¶ [0002]-[0003] (explaining that it is desirable to release the ski boot from the binding under small torque about the tibial axis).

162. I understand that Patent Owner contends that “wherein said first release is a first release torque about a tibial axis of a skier . . . and said second release is a second release torque about a tibial axis” refers to “[t]he torque experienced at the tibial axis at binding release settings of the first release is the first release torque and the torque experienced at the tibial axis is at binding release settings of the second release is the second release torque.” *See* Ex-1010-Patent Owner's Proposed Constructions.

163. In my opinion, without agreeing with this proposed construction, *Freudiger-1* discloses, or at least renders obvious, this claim element.

B. *Freudiger-1* and *Gulick* Render Claims 36, 38, 54, and 56 Obvious

1. Overview of *Gulick*

164. David W. Gulick & C. D. Mote, *Design of a Learning Binding for Alpine Skiing*, in 13 SKIING TRAUMA AND SAFETY: THIRTEENTH VOLUME, ASTM

STP 1397, 30-49 (Robert J. Johnson et al. eds., 2000) (“*Gulick*”) published in December 2000, and constitutes prior art under pre-AIA 35 U.S.C. §§ 102(a) and/or 102(b).

165. Several years before the purported priority date of the ’953 patent, *Gulick* recognized that “[r]educing the risks of injury during downhill skiing remains a critical research issue.” Ex-1008-*Gulick*, 31. More specifically, *Gulick* identified that existing ski bindings were commonly associated with lower leg and knee injuries in skiers because the release settings of these bindings did not account for “the maximum forces during skiing” or for “changes in snow conditions, skiing style, and other unmeasurable variables.” *Id.*, 30-31.

166. Therefore, *Gulick* developed a “learning binding,” which is a model of an alpine skiing binding with variable release settings that adapt to real-time changes in forces experienced during skiing. *See id.*, 31-32. *Gulick*’s learning binding was designed with three “release modes”: a lateral release due to an external twisting force, a lateral release due to an internal twisting force, and a forward lean release due to an upward force at the heel. *Id.*, 32, 35-36. *Gulick* developed two “learning binding algorithms” that use force and moment data collected during skiing to continuously adjust the binding’s release settings to “accommodate changes in skiing style, snow conditions, and other parameters.” *Id.*, 36-37, 47. The algorithms were designed to keep the release settings as low as possible, “thereby

reducing the likelihood of a failure to release in a dangerous situation,” while also only releasing the boot when necessary (e.g., during dangerous falls). *Id.*, 32, 34-38.

167. *Gulick* compared the performance of the conceptual learning binding to an experimental ski binding used by test subjects during several skiing runs. *Id.*, 32-34. The experimental binding (see annotated Figure 1 below) included **force sensors** at the **toe and heel portions** that collected measurements of the forces and moments exerted by the skier at the toe and heel, respectively, while skiing. *Id.*, 32-34. The experimental binding was set using the ASTM recommended release settings for each skier. *Id.*, 33, Table 1.

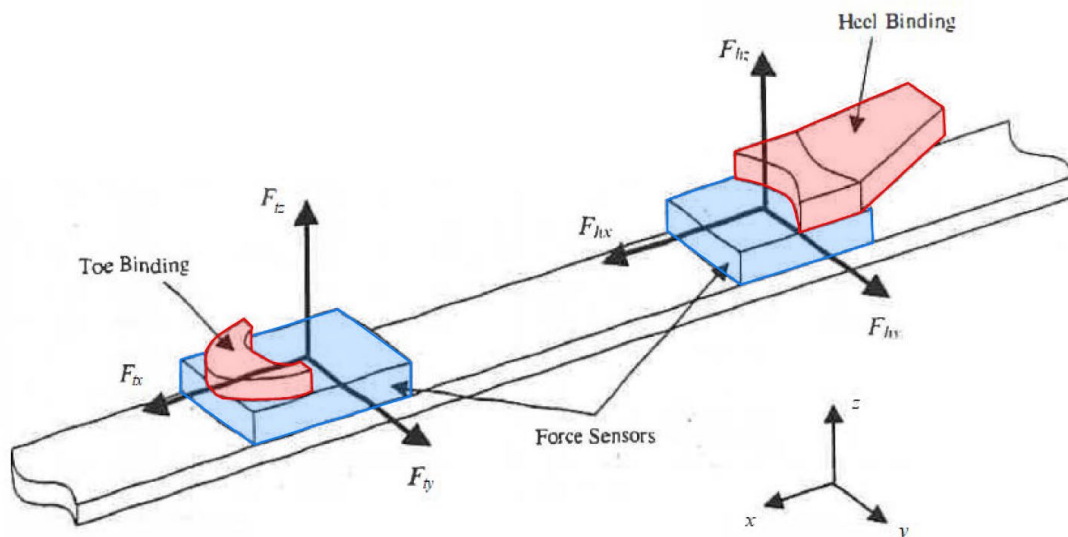


FIG. 1—Instrumented ski and force components.

Ex-1008-Gulick, FIG. 1 (annotated)

168. *Gulick* found that the ASTM standard settings “substantially exceed[ed] the maximum forces generated by a great majority of skiers during normal downhill skiing.” *Id.*, 47; *see also id.*, 43-46. This finding suggests that the ASTM standard settings are higher than is necessary for meeting the retention requirement (i.e., avoiding inadvertent release). *See Ex-1004-Freudiger-2*, ¶ [0003].

169. Additionally, *Gulick* found that the learning binding’s release settings were “on average at least 22% less than the corresponding ASTM recommended settings in each of the three directions.” *Ex-1008-Gulick*, 47. As a result, *Gulick*’s learning binding effectuated earlier releases in dangerous falling scenarios without causing inadvertent releases in active skiing, suggesting that “a learning binding can significantly improve the safety of alpine skiing” without hindering performance. *Id.*, 30, 32, 47.

170. In my opinion, *Gulick* is analogous art to the ’953 patent because it is related to the same technical field and describes ski binding releases designed to reduce knee injuries. Thus, *Gulick* is reasonably pertinent to one of the particular problems dealt with by Patent Owner, such as providing a safer ski binding.

2. Rationale for Combining *Freudiger-1* and *Gulick*

171. For the reasons set forth below, a POSITA would have been motivated to combine the teachings of *Freudiger-1* and *Gulick*. In particular, before the

priority date of the '953 patent, it would have been obvious, beneficial, and predictable to utilize *Gulick*'s teaching regarding reduced release threshold from the ASTM recommended release setting. A POSITA would have been specifically motivated to incorporate *Gulick*'s teachings because doing so would have addressed the goals of *Freudiger-1*.

172. As discussed above for claims 30 and 35, *Freudiger-1* discloses an attenuated "first release" (reduced threshold in response to uneven deflection/forces) compared to a "second release" (regular threshold in response to even deflection/forces). *Supra* Sections VII.A.2.b, VII.A.3.f. A POSITA would have known that the second release is set, or would have found it obvious to set, the second release to the release setting recommended by the ASTM Standard F939-05 for ski binding release settings because this was the industry standard practice at the time of the purported invention. Ex-1011; *see also* Ex-1005-*Dodge*, ¶¶ [0009], [0012]; Ex-1008-*Gulick*, 30, 32, Table 1; Ex-1011, Intro. A POSITA would have wanted to follow the industry standard because it was established by leading experts in the field of alpine skiing safety. A POSITA further would have understood that the ASTM standard for release settings exceeds the maximum forces generated by most skiers. Ex-1008-*Gulick*, 47; *see also* Ex-1007-*Howell*, ¶ [0008].

173. As a result, *Gulick* explains that ski bindings set in accordance with the ASTM standard may fail to release during falls with a likelihood of injury. Ex-

1008-*Gulick*, 32; *see supra* Section VII.B.1. *Freudiger-I* confirms this by explaining the need to distinguish between pure torsional loading from lateral force torsion and decrease the release threshold when lateral force torsion occurs. Ex-1003-*Freudiger-I*, 2:1-12, 3:53-6:3. Therefore, as disclosed in both *Freudiger-I* and *Gulick*, a POSITA would have been motivated to release the boot more easily under lateral force torsion as compared to pure torsion. Ex-1008-*Gulick*, 30, 32, 47; *see* Ex-1003-*Freudiger-I*, 1:39-43; 1:49-54, 2:1-12.

174. While *Freudiger-I* describes a lower release threshold when lateral force torsion is experienced, *Freudiger-I* does not quantify the reduction of the release threshold. Thus, a POSITA would have looked to *Gulick* for further instruction on how much to reduce the threshold. As discussed above, *Gulick* compared the performance of their “learning binding” with an experimental ski binding using the ASTM standard settings. *Supra* Section VII.B.1; *see* Ex-1008-*Gulick*, 32-34.

175. *Gulick* found, among other things, that the learning algorithm’s release settings were “on average at least 22% less than the corresponding ASTM recommended setting.” Ex-1008-*Gulick*, 47. As a result, the learning binding “yield[ed] earlier releases in several falling scenarios” compared to the bindings with ASTM settings, suggesting that a learning binding with lowered release

thresholds “can significantly improve the safety of alpine skiing.” *Id.*, 30; *see also id.*, 47.

176. A POSITA would have been motivated to implement *Gulick*’s at least 22% retention reduction to have the advantages of improved safety as disclosed in *Gulick* and *Freudiger-I*, namely lowering release threshold for lateral force torsion loads to improve safety and prevent knee injuries.

177. Further, any modification of *Freudiger-I*’s teaching, including adjusting the internal components, such as the springs and spring plates, to accommodate the teaching of *Gulick*, would have been well within the level of ordinary skill in the art. *Freudiger-I* understood that a POSITA would have known how to adjust the *Freudiger-I* components to achieve the desired result. *Gulick* explains the quantity by which a POSITA would reduce the first release threshold as compared to the second release threshold.

178. Accordingly, a POSITA would have found it obvious to apply *Gulick*’s teachings to *Freudiger-I* because the combination merely amounts to applying a known technique to a device ready for improvement.

3. Claims 36 and 54

“wherein said first release is at least 20% less than said second release.”

179. A POSITA would have been motivated to, or found it obvious to, set *Freudiger-1*'s reduced release threshold (first release) to “at least 22% less than” the ASTM setting (second release due to a pure torsional load). A POSITA would have wanted to reduce the setting by this amount at least because doing so would have (1) created a safer ski binding, (2) implemented a release sooner without causing inadvertent releases, and (3) brought the ski binding release more closely to the maximum forces generated by most skiers.

180. In my opinion, a POSITA would have wanted to reduce the setting by at least 22% because doing so would have brought the ski binding release closer to the maximum forces generated by most skiers. It would have also implemented release sooner without inadvertently releasing the boot. *See Ex-1008-Gulick*, 47. Thus, a POSITA would have been motivated by these factors because they contribute to the safety of the ski binding and prevent injuries during skiing. *Id.*

181. A POSITA would have recognized that *Freudiger-1*'s release settings could be easily adjusted by changing the distance or amount that spring 7b actuates (or can actuate) in response to the certain deflection of the jaws. Moreover, adjusting a ski binding release threshold was a common practice before the critical

date of the '953 patent. *See* Ex-1004-*Freudiger-2*, ¶ [0006] (explaining that “the safety ski binding releases according to its setting number,” which can be adjusted); *see also* Ex-1007-*Howell*, ¶ [0008] (explaining that “skiers [can] manually increase the release level biasing of the ski bindings which increases the retention of the ski to the boot in the binding”). Thus, a POSITA would have known how to use *Gulick*’s teaching to reduce the release threshold of *Freudiger-1* by at least 20%.

182. Although *Gulick*’s teaching of at least a 22% reduced release settings is implemented electronically in *Gulick*, as discussed above, a POSITA would have known how to translate this teaching to *Freudiger-1*’s mechanical binding. Indeed, setting *Freudiger-1*’s reduction to at least 22% would have required nothing more than the application of ordinary skill and basic knowledge of the hardware of the *Freudiger-1* ski binding.

183. Thus, this combination would have involved “the mere application of a known technique”—reducing the ski binding threshold at least 22% as *Gulick* teaches—“to a piece of prior art”—*Freudiger-1*’s ski binding—“ready for the improvement.” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 417 (2007). And the result would have been a “predictable variation,” as *Gulick*’s reduced threshold would merely have “improve[d] similar devices”—*Freudiger-1*’s ski binding—“in the same way.” *Id.* Moreover, a POSITA would have had a reasonable expectation of success for this combination because the references disclose similar ski bindings

and adjusting the amount of force required to cause release (e.g., adjusting the threshold) would have been a routine combination before the earliest priority date of the '953 patent. Indeed, the references each discuss similar ski conditions where release may be required (e.g., in response to a fall). [cite]. And, as noted above, both references are analogous art to the '953 patent.

184. Moreover, it would have been obvious to a POSITA to adjust *Freudiger-I*'s release reduction to come to the claimed invention. As noted above, it was within the skill of the art to adjust the release of a ski binding threshold. And because it was known that reducing the release threshold "at least 22%" or even "50%" as *Gulick* instructs creates safer ski bindings, a POSITA would have had a working range to experiment within. *E.I. DuPont de Nemours & Company v. Synvina C.V.*, 904 F.3d at 1006 ("where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation.") (citation omitted); *In re Peterson*, 315 F.3d 1325, 1329 (Fed. Cir. 2003) ("In cases involving overlapping ranges, we and our predecessor court have consistently held that even a slight overlap in range establishes a prima facie case of obviousness."). That is, a POSITA would have been motivated to adjust *Freudiger-I*'s first release by at least 20% as taught in *Gulick*.

185. Thus, the combination of *Freudiger-1* in view of *Gulick* renders obvious claims 36 and 54.

186. I understand that Patent Owner contends that “said first release is at least 20% less than said second release” refers to “[t]he tibial axis torque at the first release is at least 20% less than the tibial axis torque at the second release.” *See* Ex-1010-Patent Owner’s Proposed Constructions.

187. In my opinion, without agreeing with this proposed construction, the *Freudiger-1* and *Gulick* combination discloses, or at least renders obvious, this claim element.

4. Claims 38, 56, and 60

“wherein said first release torque is at least 20% less than said second release torque.”

188. For the same reasons above, the combination of *Freudiger-1* in view of *Gulick* renders obvious claims 38, 56, and 60 because a POSITA would have understood that the first release being at least 20% less than the second release is substantially equivalent to the first release torque being at least 20% less than the second release torque.

189. I understand that Patent Owner contends that “wherein said first release torque is at least 20% less than said second release torque” refers to “[t]he the first release torque (as defined above) is lower than the second release torque

(as defined above) by 20% or more.” *See* Ex-1010-Patent Owner’s Proposed Constructions.

190. In my opinion, without agreeing with this proposed construction, the *Freudiger-1* and *Gulick* combination discloses, or at least renders obvious, this claim element.

VIII. THE CHALLENGED CLAIMS ARE UNPATENTABLE OVER *DODGE* ALONE OR IN COMBINATION WITH *HOWELL* AND/OR *GULICK*

A. *Dodge* and *Howell* Render Obvious Claims 30, 31, 34, 35, 37, 53, 55, 58, and 59

1. Overview of *Dodge*

191. United States Application No. 09/774,351, published as United States Patent Application Publication No. US 2002/0101063 A1 on August 1, 2002. It therefore constitutes prior art under pre-AIA 35 U.S.C. §§ 102(a) and/or 102(b).

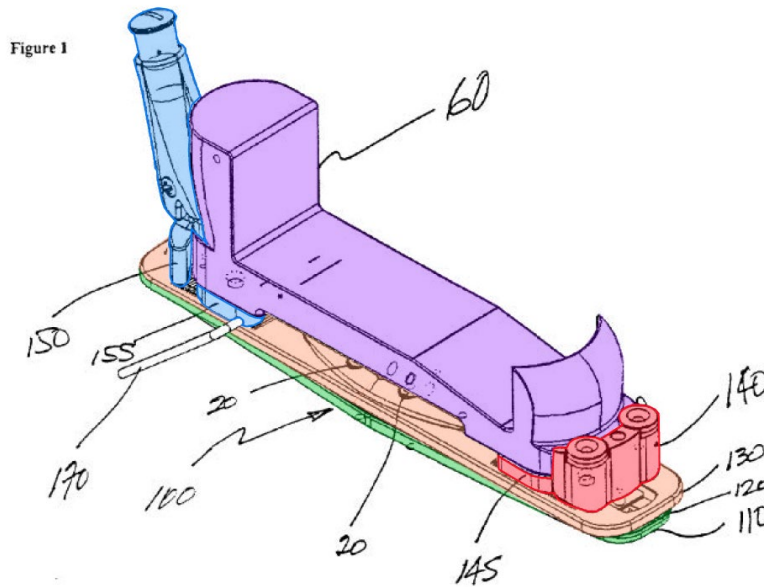
192. *Dodge* discloses a “safety ski binding for interfacing a ski boot to a ski” that is designed to enhance skier safety and reduce “Anterior Cruciate Ligament (ACL) injuries to the knee” by providing lateral release functionality for a ski boot. Ex-1005-*Dodge*, ¶¶ [0017]-[0018]. *Dodge* recognized that ACL injuries “are most often caused by a load to the medial (inside) edge of the tail of the ski.” *Id.*, ¶ [0017]. However, conventional bindings are unable to identify the loads most likely to cause ACL injury because they “cannot differentiate between loads at the

tip of the ski and loads at the tail of the ski that produce the same torque about the tibial axis.” *Id.*, ¶ [0017].

193. *Dodge* saw this as a problem because a force applied to the outside edge of the tip of the ski does not cause the same threats to a skier’s knee as if the same force is applied at the inside edge of the tail of the ski. *Id.*, ¶ [0017] (noting that “Anterior Cruciate Ligament (ACL) injuries to the knee are most often caused by a load to the medial (inside) edge of the tail of the ski”).

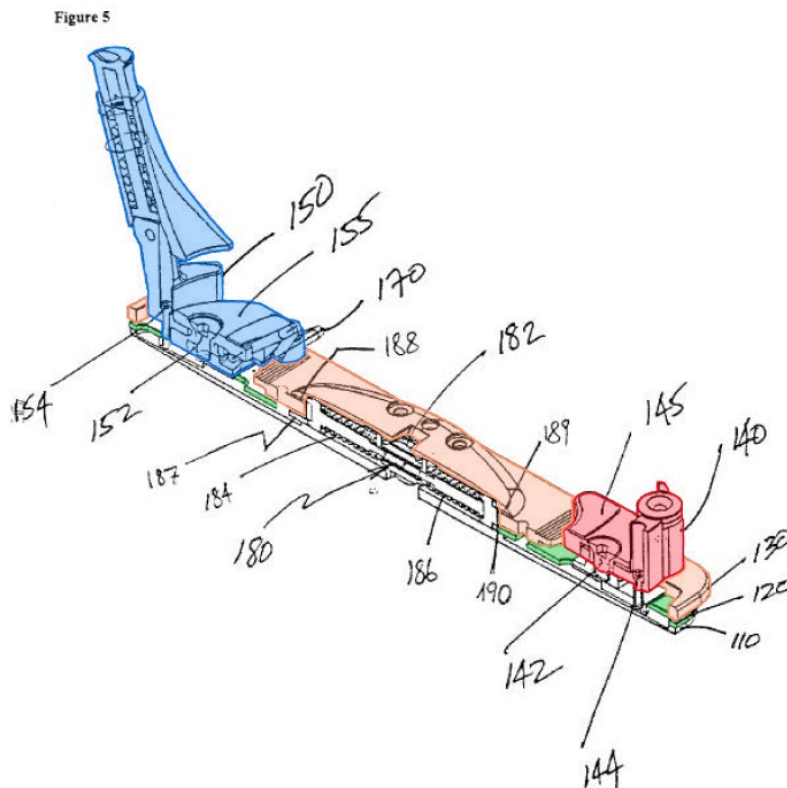
194. Accordingly, *Dodge* explains that it is an object of the invention to “differentiate between loads applied at” different parts of the ski because recognizing when an “inward twisting load[] [is] applied at the medial side of the ski tail” may “afford skiers significant additional protection against ACL injuries.” *Id.*, ¶¶ [0017]-[0018]. To achieve this result, *Dodge* explains that “[b]y properly designing [its components] it is possible to obtain a ski binding in which the ski boot will be released more easily if a load is applied to the medial (inside) edge of the tail of the ski than if a similar load is applied to the lateral (outside) edge of the front of the ski.” *Id.*, ¶ [0046].

195. *Dodge* discloses a ski binding 100 having a toe cup 140 and heel cup 150 that “hold a boot... to the binding” to secure the boot to a ski. *Id.*, ¶ [0041].



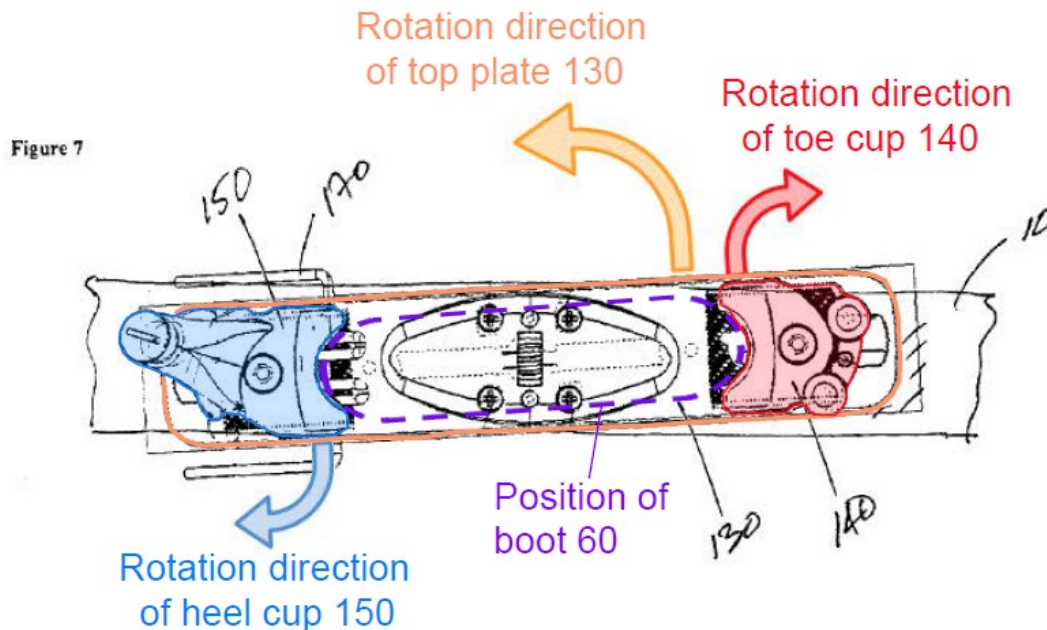
Ex-1005-Dodge, FIG. 1 (annotated, condensed)

196. The safety ski binding of *Dodge* includes a **base plate 120** mounted to the ski and a pivoting **top plate 130** mounted to **base plate 120**. *Id.*, ¶ [0041]. **Toe cup 140** and **heel cup 150** are, in turn, pivotably attached to **top plate 130**. *Id.*, ¶ [0041]. **Top plate 130** can pivot laterally with respect to the ski but is biased into alignment with the ski. *Id.*, ¶ [0041].



Ex-1005-*Dodge*, FIG. 5 (annotated)

197. As *Dodge* explains, when a dangerous force is applied at the tip or tail of the ski, the resulting “torque on the boot is transferred through these pads [i.e., the toe and heel cups] to the top plate.” *Id.*, ¶¶ [0019], [0045]. If the transferred torque “is sufficient to overcome the bias on the top plate then it pivots, and the boot is released.” *Id.*, ¶¶ [0019], [0045].



**Ex-1005-Dodge, FIG. 7 (annotated, some labels removed)
(top view of top plate 130)**

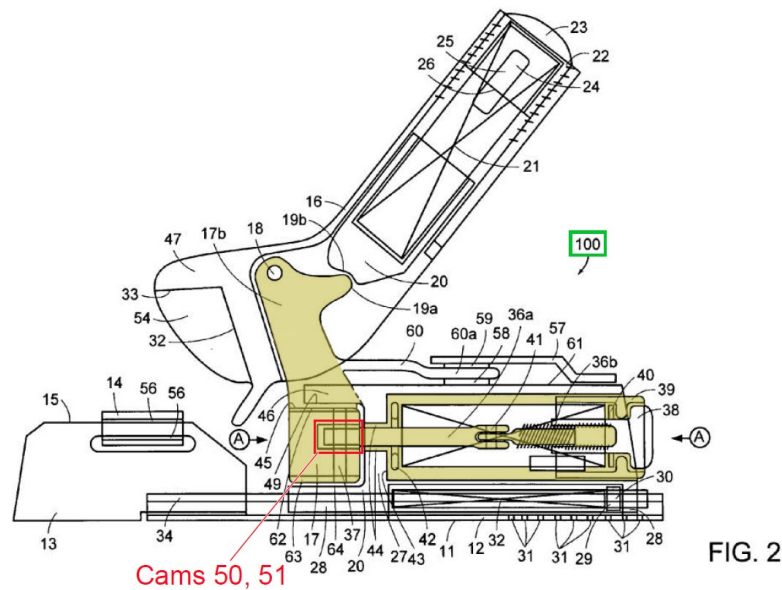
198. Thus, in situations where an applied load exceeds the bias on the top plate, the top plate will pivot, prompting the release of the ski boot from the binding and thereby avoiding a potentially hazardous knee injury. *Id.*, ¶ [0047].

199. In my opinion, *Dodge* is analogous art to the '953 patent because it is related to the same technical field and describes ski binding releases designed to release a boot laterally under certain loading conditions to reduce knee injuries. Thus, *Dodge* is reasonably pertinent to one of the particular problems dealt with by Patent Owner, such as providing a safer ski binding particularly to better protect against ACL injuries due to the 'phantom foot' mechanism wherein a lateral force is applied to the medial edge of the tail of the ski with the knee in deep flexion.

2. Overview of *Howell*

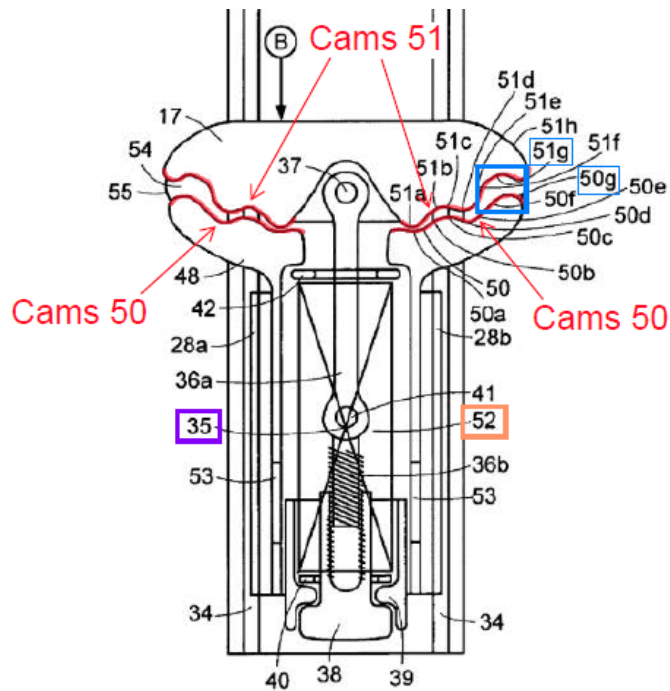
200. United States Application No. 10/780,455, published as United States Patent Application Publication No. US 2004/0173994 A1 to Howell (“*Howell*”) on September 9, 2004. It therefore constitutes prior art under pre-AIA 35 U.S.C. §§ 102(a) and/or 102(b).

201. *Howell* discloses a ski binding heel unit 100 with a lateral release assembly to provide lateral release of a heel of a ski boot when a force is applied to the side of the ski immediately under or near the heel piece. Ex-1007-*Howell*, Abstract, ¶¶ [0002]-[0011], [0054]-[0059]. As *Howell* recognized, “alpine ski bindings provide lateral toe release to release the ski from the boot when a transverse-longitudinal (side of the ski) force is applied to the ski at all points along the ski, except where a lateral force is applied to the ski immediately under or near a non lateral releasing heel.” *Id.*, ¶ [0005]. Under these forces (under or near the heel piece), ACL strain or rupture is common. *Id.*, ¶¶ [0005]-[0011].



Ex-1007-Howell, FIG. 2 (annotated)

202. Thus, in developing a laterally-releasing heel binding to solve this problem, *Howell* explains that a lateral force applied to heel unit 100 will cause the lateral release assembly to progressively pivot about consecutive cams 50a-g, 51a-g, producing an incrementally increasing force opposing the lateral force, and will laterally release the ski boot once the lateral release assembly rotates beyond a predetermined cam axis. *Id.*, ¶¶ [0055]-[0059], claims 1, 13. More specifically, *Howell* discloses that the lateral boot release occurs only if the lateral force is strong enough to overcome the bias of a spring 35 and draw the outer-most cam surfaces (e.g., 51g and 50g) into contact. *Id.*, ¶¶ [0054], [0059].



Ex-1007-Howell, FIG. 4 (annotated, cropped)
(top view of lateral release assembly)

203. If the lateral force does not exceed the necessary magnitude to cause a lateral release, **spring biasing means 52** biases the binding to its original “at-rest position.” *Id.*, ¶ [0057].

204. In my opinion, *Howell* is analogous art to the '953 patent because it is related to the same technical field and describes a ski binding designed to release the ski boot laterally under certain loading conditions to reduce knee injuries. Thus, *Howell* is reasonably pertinent to one of the particular problems dealt with by Patent Owner, such as providing a safer ski binding to prevent ACL injury due to “phantom-foot” fall kinematics. *Id.*, ¶ [0011].

3. Rationale for Combining *Dodge* and *Howell*

205. For the reasons set forth below, a POSITA would have been motivated to combine the teachings of *Dodge* and *Howell*. In particular, before the priority date of the '953 patent, it would have been obvious, beneficial, and predictable to use *Howell*'s teaching regarding a laterally releasable heel binding. As *Howell* explains "[a] heel that releases in the vertical direction only which relies on a lateral releasing toe can be dangerous to the knee in the event of lateral forces being applied to the ski immediately under a heel" piece. *Id.*, ¶¶ [0003]-[0005].

206. Thus, a POSITA would have been specifically motivated to incorporate *Howell*'s binding because doing so would further address the goals of each of *Dodge* and *Howell*, namely to prevent strain or rupture to the ACL under external lateral forces applied to the ski which cause phantom-foot fall kinematics characterized by combined internal axial and valgus moments transmitted by the knee in deep flexion. Ex-1005-*Dodge*, ¶¶ [0017], [0046]; Ex-1007-*Howell*, ¶¶ [0005], [0011].

207. Any modification of *Dodge*'s teaching, including implementing the heel binding components of *Howell*, would have been well within the level of ordinary skill in the art. Indeed, as *Dodge* explains "[b]y properly designing the cam surfaces 187, 188, 189, and 190 it is possible to obtain a ski binding in which the ski boot will be released more easily if a load is applied to the medial (inside) edge

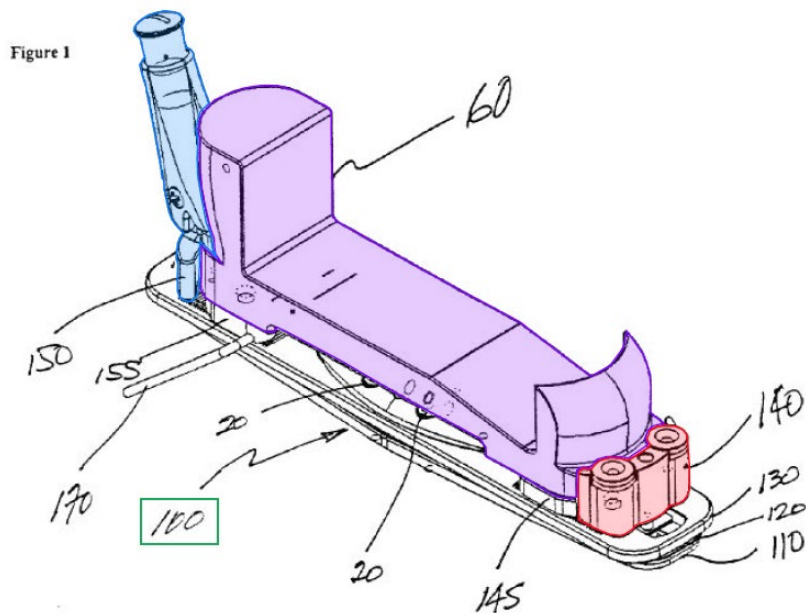
of the tail of the ski than if a similar load is applied to the lateral (outside) edge of the front of the ski.” Ex-1005-*Dodge*, ¶ [0047]. *Dodge* understood that a POSITA would have known how to design the cam surfaces to achieve the desired result, and *Howell* provides a disclosure of cam surfaces, achieving a lateral release under dangerous loads applied to the side of the ski. *See generally*, Ex-1007-*Howell*.

208. Accordingly, a POSITA would have found it obvious to apply *Howell*’s teaching to *Dodge* because the combination merely amounts to applying a known technique to a device ready for improvement.

4. Independent Claim 30

- a. *[30(Preamble)]*: “*An apparatus for securing a ski boot to a ski so as to from [sic] a ski system, the apparatus comprising:*”

209. *Dodge* satisfies this element because it discloses “a safety binding for interfacing a ski boot to a ski or skiboard.” Ex-1005-*Dodge*, ¶ [0018]. As shown in Figure 1 below, “binding 100 is mounted on a ski 10” and includes a toe cup 140 and heel cup 150, which “work to hold a boot (shown schematically as 60) to the binding.” *Id.*, ¶ [0041].



Ex-1005-Dodge, FIG. 1 (annotated, condensed)

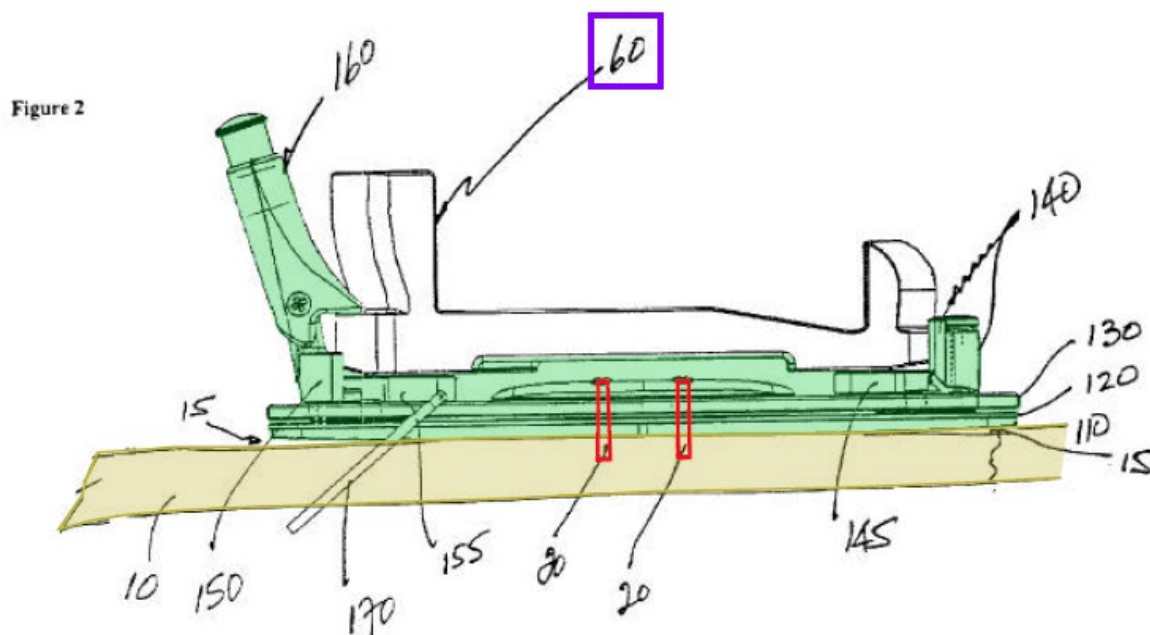
210. Therefore, *Dodge* discloses this element.

211. *Howell* similarly discloses an “alpine ski binding” with a laterally-releasable heel unit. Ex-1007-*Howell*, ¶¶ [0002], [0003] (explaining that the “[s]ki binding heel units have a jaw that is adapted to hold a boot and move between a boot retention position and a release position”).

- b. ***[30(a)]: “a ski binding assembly configured to be attached to the ski and to releasably secure the ski boot to the ski during use, said ski binding assembly having a first release,”***

212. *Dodge* discloses element [30(a)] because it discloses a ski binding assembly configured to be attached to the ski and to releasably secure the ski boot to the ski during use and also discloses that its ski binding assembly has a first release.

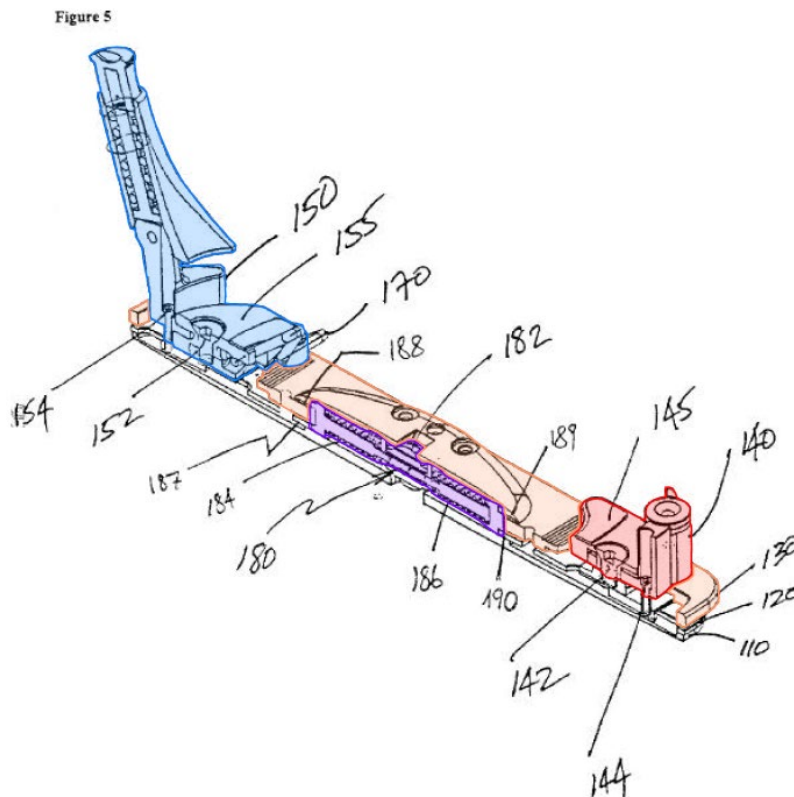
213. *Dodge* discloses, or at least renders obvious, [30(a)]. *Dodge* discloses that “binding 100 is fastened to the ski 10 by screws 20 in a central location.” Ex-1005-*Dodge*, ¶ [0042]. Further, *Dodge* discloses that binding 100 includes “the heel holding cup 150 and the toe holding cup 140” that “work to hold a boot... to the binding.” *Id.*, ¶ [0041].



Ex-1005-*Dodge*, FIG. 2 (annotated, condensed)

214. Additionally, *Dodge* discloses that **binding 100** is configured to release the **boot** when a load exerted on the binding overcomes a “predetermined bias.” *Id.*, ¶¶ [0045]-[0046]; see *id.*, ¶ [0023]. For example, *Dodge* discloses that **binding 100** includes a **top plate 130**, upon which the **heel holding cup 150** and **toe holding cup 140** are mounted. *Id.*, ¶ [0041]. **Top plate 130** is “pivotable in a lateral direction” relative to a base plate 110, *Id.*, ¶¶ [0019], [0041], but is also “biased towards being

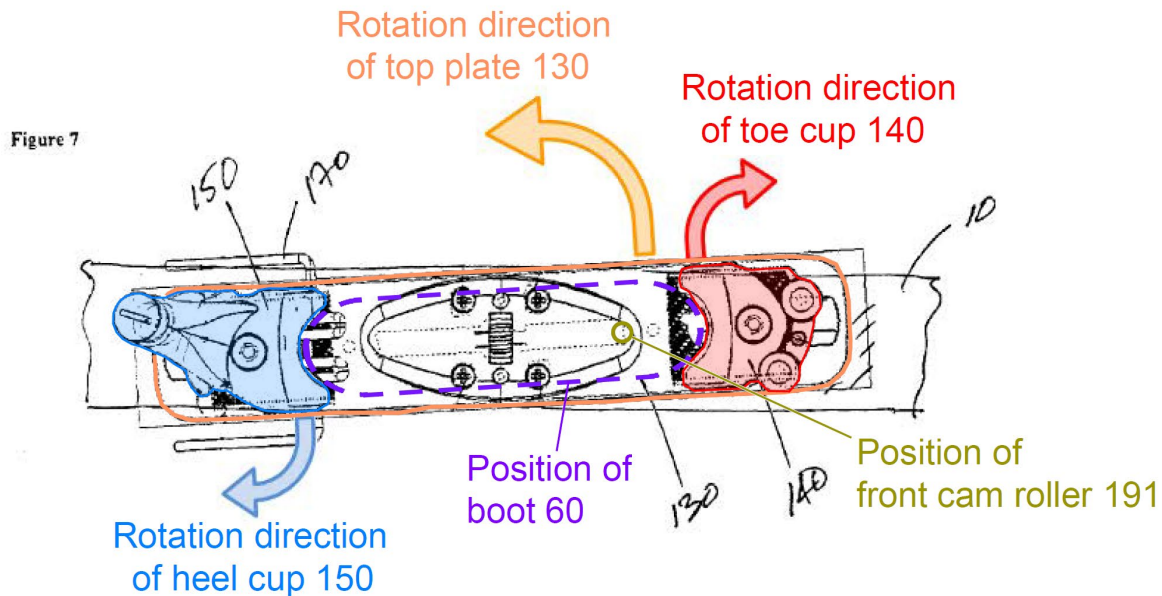
aligned with the ski” by a **biasing means 180**. *Id.*, ¶¶ [0043], [0045]. This configuration is depicted by *Dodge* in Figure 5.



Ex-1005-Dodge, FIG. 5 (annotated)

215. *Dodge* additionally discloses that a “twisting load [] applied to the tail of the ski” causes a “torsional force on the boot” that is “transferred to the top plate 130.” *Id.*, ¶¶ [0045], [0047]. If the force overcomes the bias on **top plate 130**, the top plate pivots about **front cam roller 191** relative to the ski. *Id.*, ¶¶ [0023], [0047]. This pivoting of **top plate 130**, in turn, causes “the **toe cup 140** and the **heel cup 150** [to] pivot[]... about connecting means 142 and 152, thereby releasing the **boot**.” *Id.*,

¶ [0047]; *see also id.*, ¶ [0023]. This “first release” of the boot by binding 100 is shown in Figure 7.



Ex-1005-Dodge, FIG. 7 (annotated, some labels removed)

216. Therefore, *Dodge* discloses this element.

217. *Howell* similarly discloses this element. *Howell*, ¶¶ [0002], [0003]. To the extent Patent Owner improperly argues that the first release is limited to a heel release, *Howell* discloses a lateral heel release. *As Howell* explains, a heel unit of a ski binding “that releases in the vertical direction only . . . can be dangerous to the knee in the event of [certain] lateral forces.” Ex-1007-*Howell*, ¶ [0005]. Thus, to prevent “ACL strain” under “phantom-foot fall kinematics,” *Howell* discloses a binding with a first release that will laterally release a boot when a lateral force applied to the boot’s heel overcomes a threshold which may strain or rupture the

ACL. *Id.*, claim 13 (specifically, “a lateral force applied to the heel portion of the ski boot in a direction perpendicular to the longitudinal and vertical plane of the ski causes the lateral release assembly to progressively pivot about consecutive cams, producing an incrementally increasing force opposing the lateral force applied to the heel portion of the ski boot, until the lateral release assembly rotates beyond a predetermined cam axis and releases the ski boot”). Thus, *Howell* likewise discloses this element.

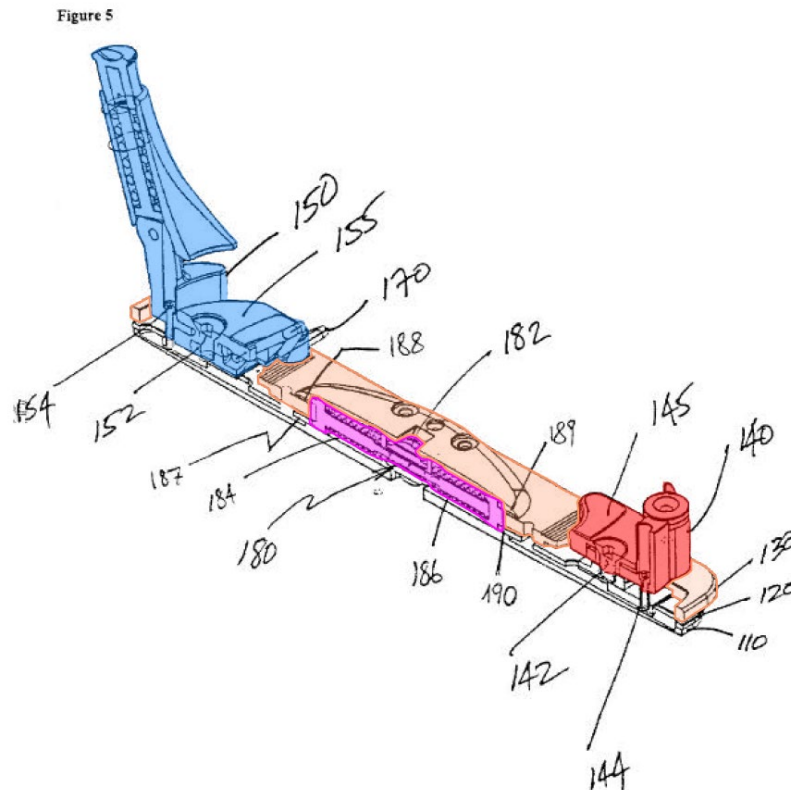
218. I understand that Patent Owner contends that a first release is “[a] mechanism within the ski binding assembly that allows separation of the ski boot from the ski automatically and without skier intervention in response to a predetermined external loading of the ski correlated to an estimated tibial axis load level selected to lessen the likelihood of ACL injury.” *See* Ex-1010-Patent Owner’s Proposed Constructions. In my opinion, without agreeing with this proposed construction, both *Dodge* and *Howell* disclose, or at least render obvious, this claim element.

- c. ***[30(b)]: “said ski binding assembly including release logic that causes the ski binding assembly to release the ski boot at said first release in response to a release condition,”***

219. *Dodge* discloses, or at least renders obvious, [30(b)] because it discloses a ski binding assembly including release logic that causes the ski binding

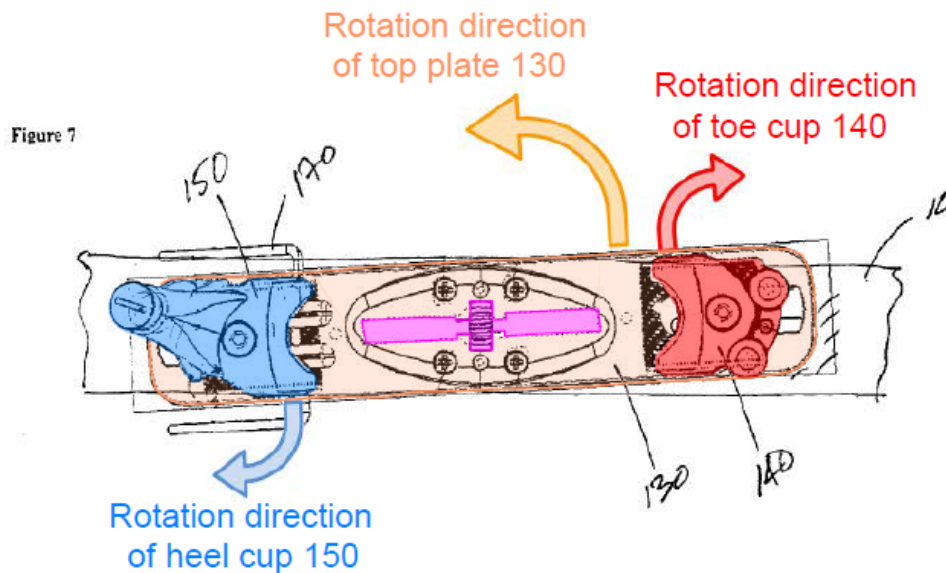
assembly to release the ski boot at said first release in response to a release condition.

220. *Dodge* discloses, or at least renders obvious, [30(b)] because *Dodge* employs release logic configured to release a ski boot when a “rotational moment applied to the boot...overcomes the biased alignment of the pivotable plate.” Ex-1005-*Dodge*, ¶ [0023]; *see id.*, ¶¶ [0045]-[0047]. To do this *Dodge* discloses a ski binding 100 with a pivotable top plate 130 connected to a “heel holding cup 150 and [] toe holding cup 140” that “work to hold a boot... to the binding.” *Id.*, ¶ [0041]. Binding 100 also includes “biasing means 180 (shown in Figures 5 and 6), which hold top plate 130 in its normal position” (i.e., in a position where top plate 130 is “aligned with the longitudinal axis of the ski”). *Id.*, ¶¶ [0021], [0041]; *see id.*, FIG. 2.



Ex-1005-*Dodge*, FIG. 5 (annotated)

221. *Dodge* further discloses that a “rotational moment applied to the boot” that “overcomes the biased alignment of the **pivotable plate**” causes “**top plate 130** [to] pivot[]... about the front cam roller 191.” *Id.*, ¶¶ [0023], [0047]. “[T]oe cup **140** and the **heel cup 150** are pivoted” due to the rotation of **top plate 130**, “thereby releasing the boot.” *Id.*, ¶ [0047]. In contrast, if an applied force or torque does not exceed the threshold, **biasing means 180** biases the **top plate 130** back into its “normal” position, aligned longitudinally with the ski, so that the boot remains locked in the binding. *Id.*, ¶ [0044].



Ex-1005-Dodge, FIG. 7 (annotated, modified)
(front cam roller 191 not shown)

222. Here, the **biasing means 180**, **top plate 130**, **toe cup 140**, and **heel cup 150** together form a “release logic” because they are the mechanisms that perform a logical operation to “release the ski boot at said first release in response to a release condition,” as claimed. Further, the “release condition” corresponds to an embodiment in which a “twisting load on the forebody [or tail] of the ski” causes a rotational moment on the boot that “overcomes the biased alignment of the **pivotal plate**,” and thus causes the binding 100 to release the boot. *Id.*, ¶¶ [0023], [0047].

223. Thus, the release logic of *Dodge* causes the binding to release the boot at the first release in response to a particular release condition: when a twisting load

on the forebody or tail of the ski affects **top plate 130** and overcomes the biased alignment of the **pivotable plate**. *Id.*, ¶¶ [0023], [0047].

224. At the least, *Dodge* discloses or suggests this limitation. *Dodge* explains that using its design “it is possible to obtain a ski binding in which the ski boot will be released more easily if a load is applied to the medial (inside) edge of the tail of the ski than if a similar load is applied to the lateral (outside) edge of the front of the ski.” *Id.*, ¶ [0046]. A person of skill would have understood *Dodge*’s release for a load applied to the medial edge of the tail of the ski to qualify as a release condition, as recited in claim 1. Even if the claims were limited to a force applied to the medial inside edge of the ski, as Patent Owner may improperly argue, *Dodge* discloses or at least suggests that the external force may be applied to the ski’s inside tail edge. *Id.*, ¶ [0046]. Thus, a POSITA would have both understood and found it obvious that *Dodge* discloses, or at the very least suggests, this claim element.

225. *Howell* similarly discloses or renders obvious this element. As explained above, *Howell* discloses a binding with a first release that will laterally release a boot when a lateral force applied to the boot’s heel overcomes a threshold which may strain or rupture the ACL. *See, e.g., Ex-1007-Howell*, claim 13.

226. I understand that Patent Owner contends that release logic is “a specific sequence of actions executed by components of the ski binding assembly,

and the components that execute the sequence of actions, in response to externally applied loads on the ski that allow or disallow binding release (via the first release) to occur dependent upon whether predetermined loading conditions are met that would indicate risk of ACL injury (i.e., the release condition).” *See* Ex-1010-Patent Owner’s Proposed Constructions. In my opinion, without agreeing with this proposed construction, both *Dodge* and *Howell* disclose, or at least render obvious, this claim element.

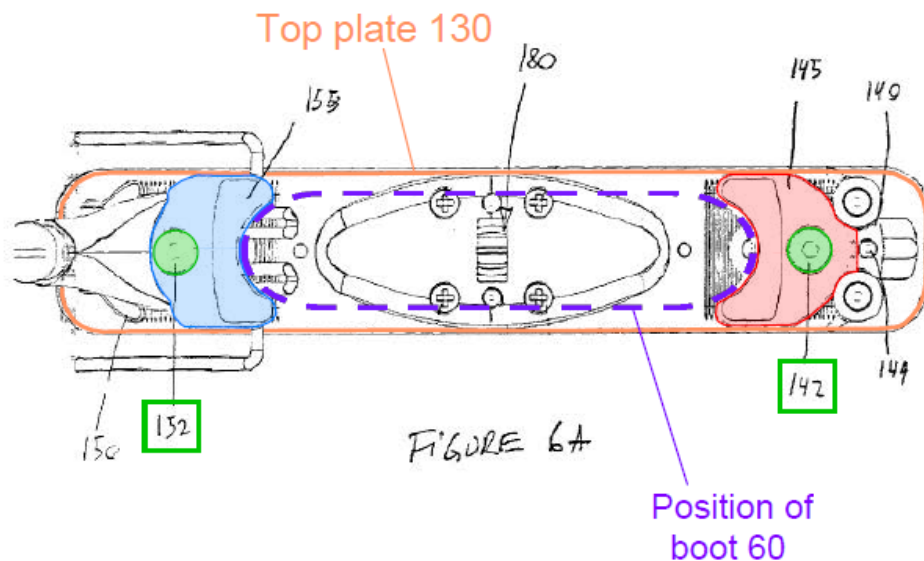
227. I also understand that Patent Owner contends that release condition is “[a] predetermined external loading of the ski correlated to an estimated skier tibial axis load level selected to lessen the likelihood of ACL injury.” *See id.* In my opinion, without agreeing with this proposed construction, both *Dodge* and *Howell* disclose, or at least render obvious, this claim term.

- d. ***[30(c)]: “said ski binding assembly configured to: assess, relative to a first axis, a first loading internal to the ski system caused by an external loading applied to the ski system; and assess, relative to a second axis spaced from said first axis and substantially parallel to said first axis, a second loading internal to the ski system caused by the external loading;”***

228. *Dodge* discloses, or at least renders obvious, [30(c)] because it discloses a ski binding assembly configured to assess, relative to a first axis, a first loading internal to the ski system caused by an external loading applied to the ski system. *Dodge* also discloses a ski binding assembly configured to assess, relative

to a second axis spaced from said first axis and substantially parallel to said first axis, a second loading internal to the ski system caused by the external loading.

229. *Dodge* explains that in binding 100, top plate 130 is mounted on static base plate 120 and “can pivot laterally around the biasing means 180.” Ex-1005-*Dodge*, ¶ [0041]. Binding 100 also includes a heel pad 155 and toe pad 145, which are “integrally formed” with heel cup 150 and toe cup 140, respectively, and are configured for boot 60 to rest on top of them. *Id.*, ¶¶ [0041], [0043]. As *Dodge* explains, heel pad 155 and toe pad 145 are connected to top plate 130 by “fastening means 142 and 152.” *Id.*, ¶ [0045]. As a result, “any torque applied to the boot 60 is transmitted to the top plate 130” via heel pad 155, toe pad 145, and fastening means 142, 152. *Id.*, ¶ [0041].

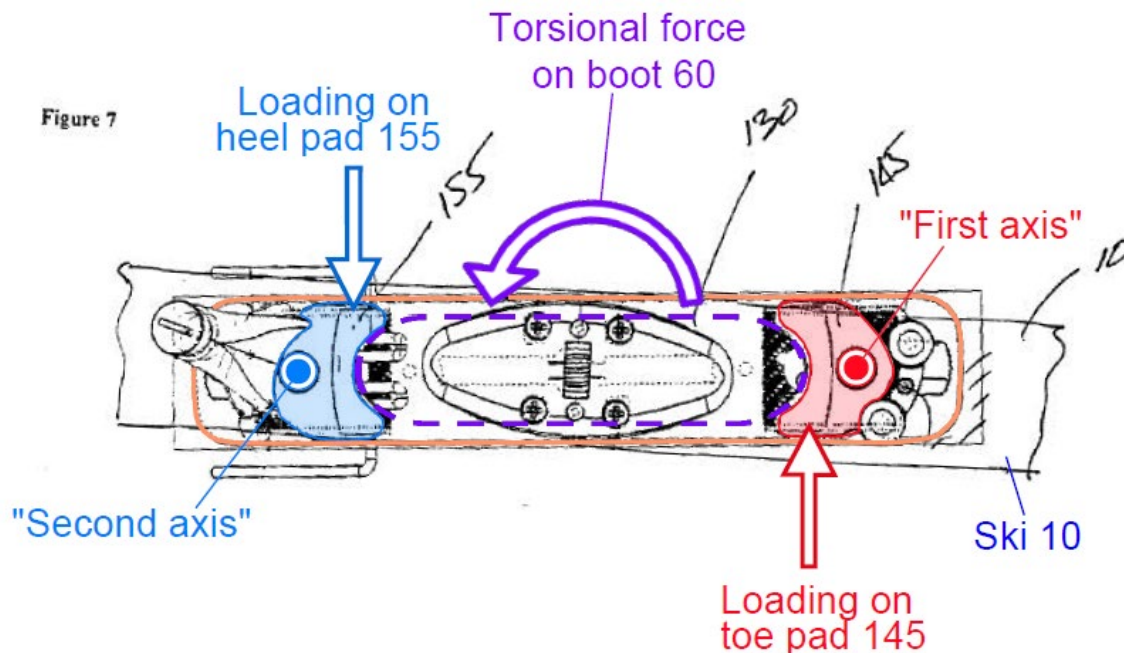


Ex-1005-*Dodge*, FIG. 6A (annotated, some labels removed)

230. Thus, based on an external force applied to the ski, which results in a torsional moment on the boot, the binding of *Dodge* is configured to assess a “first loading” at toe pad 145 and a “second loading” at heel pad 155. *Id.*, ¶ [0045]; see also *id.*, ¶¶ [0019], [0023]. For example, when an external load on the ski results in “torsional forces (about a vertical axis) on the boot,” the binding of *Dodge* is configured so that “frictional and/or imping[e]ment forces [are] applied by the boot to the toe pad [] and to the heel pad.” *Id.*, ¶ [0043]; see also *id.*, ¶¶ [0019], [0045]. Thus, the external force on the ski causes a “first loading” of toe pad 145 “internal to the ski system” and a “second loading” of heel pad 155 “internal to the ski system,” as claimed. *Id.*, ¶¶ [0019], [0045].

231. *Dodge* discloses that the forces applied by the boot to the toe and heel pads are “transferred to the top plate 130” by “fastening means 142 and 152.” *Id.*, ¶ [0045]. Thus, the binding of *Dodge* is configured to assess the “first loading” at toe pad 145 and “second loading” at heel pad 155 because if the forces transferred from the pads to top plate 130 are “sufficient to overcome the bias on the top plate then it pivots, and the boot is released.” *Id.*, ¶ [0019]; see also *id.*, ¶ [0045]. Further, the binding of *Dodge* assesses the first loading at toe pad 145 relative to a first vertical axis through fastening means 142 and assesses the second loading at heel pad 155 relative to a second vertical axis through fastening means 152. *Id.*, ¶ [0045]. Since the “first axis” through fastening means 142 and the “second axis” through

fastening means 152 are both vertical and spaced apart from one another, these two axes are “substantially parallel,” as claimed.



Ex-1005-Dodge, FIG. 7 (annotated, rotated, some labels removed)

232. Therefore, *Dodge* discloses this claim element.

233. *Howell* similarly discloses or renders obvious this claim element.

Howell's lateral release assembly includes **cam surfaces (50a-g, 51a-g)** having cam axes “defined by a contact point of one of the **first plurality of cams [50a-g]** and one of the **second plurality of cams [51a-g]**,” meaning that the cam axes are the contact points where pairs of cams collide under an external load. Ex-1007-*Howell*, [0057]-[0059], claim 13. *Howell* explains that a lateral external force will create, at least, a first and second reaction force around their corresponding cam axes. *Id.*, claim 13.

For instance, the lateral release assembly includes a plurality of cams, wherein the external load will create a first internal reaction load relative to the first cam axis, and if the external “load continues to persist in magnitude and duration,” the external load will create at least a second internal reaction load relative to a second cam axis. *Id.*, ¶¶ [0057]-[0059], claim 13.

234. Because *Howell* explains that the cam axes are the contact points where the corresponding cams collide under a lateral force, *id.*, claim 13, the axes are substantially parallel and spaced from one another. It is only once “the lateral release assembly rotates beyond a predetermined cam axis” of the **outer-most cam pair** that the ski boot is laterally released. *Id.*, claim 13. Thus, *Howell* likewise discloses, or at least renders obvious, this claim element.

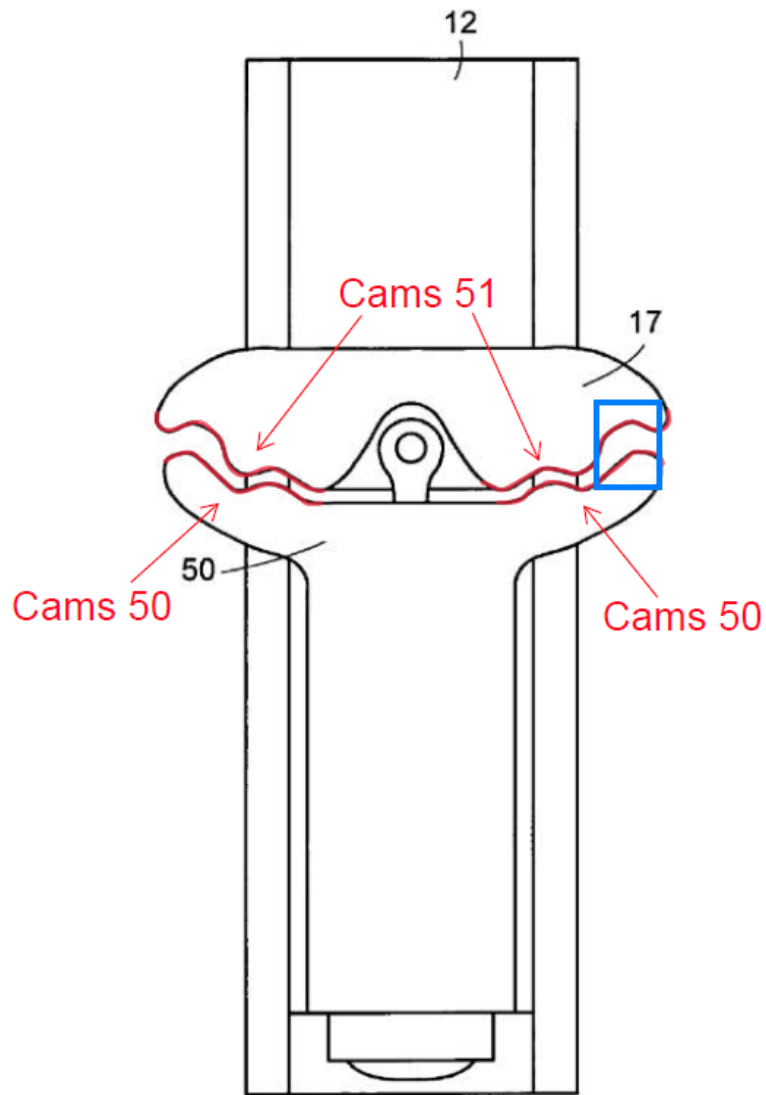


FIG. 3

Ex-1007-Howell, FIG. 3 (annotated)

235. I understand that Patent Owner contends that a first axis is “[a]n axis of rotation substantially perpendicular to the plane of the ski at a specific point on the ski relative to the tibial axis.” *See* Ex-1010-Patent Owner’s Proposed Constructions. Indeed, Patent Owner appears to equate the first axis to the location

at which the first loading is assessed as a trigger for enabling the first release. *See id.*

236. I also understand that Patent Owner contends that a second axis is “[a]n axis of rotation parallel to and spaced from the “first axis,” and substantially perpendicular to the plane of the ski at a different specific point on the ski relative to the tibial axis.” *See id.* Indeed, Patent Owner appears to equate the second axis to the location at which the second loading is assessed as a trigger for enabling the first release. *See id.*

237. I further understand that Patent Owner contends that a first loading is “[a] torque, moment or force resolvable at the first axis in response to an externally applied load on the ski,” and a second loading is “[a] torque, moment or force resolvable at the second axis in response to an externally applied load on the ski.” *See id.*

238. I also understand that Patent Owner contends that “internal to the ski system caused by an external loading applied to the ski system” refers to “loads acting on and between parts of the ski binding assembly as a result of a load applied externally to the ski system such as by impact of a ski edge on the snow.” *See id.*

239. Thus, I understand that Patent Owner contends that “assess, relative to a first axis, a first loading internal to the ski system caused by an external loading applied to the ski system” means “the first loading at the first axis by permitting or

causing movement of one or more mechanical components or creating an electronic signal when an external load, such as an impact on the snow, is applied to the ski,” and “assess, relative to a second axis spaced from the first axis and substantially parallel to the first axis, a second a loading internal to the ski system caused by the external loading” means “provide an indication of or a response to a magnitude and direction of the second loading at the second axis by permitting or causing movement of one or more mechanical components or creating an electronic signal when an external load, such as an impact on the snow, is applied to the ski.” *See id.*

240. In my opinion, without agreeing with these proposed constructions, both *Dodge* and *Howell* disclose, or at least render obvious, these claim elements.

- e. ***[30(d)]: “wherein said release logic is configured to: determine whether or not the release condition is occurring as a function of both of the first loading and the second loading; and cause said ski binding assembly to provide said first release if the release logic determines that the release condition is occurring;”***

241. *Dodge* discloses, or at least renders obvious, [30(d)] because it discloses wherein said release logic is configured to determine whether or not the release condition is occurring as a function of both of the first loading and the second loading and cause said ski binding assembly to provide said first release if the release logic determines that the release condition is occurring.

242. As described above for element [30(c)], binding 100 of *Dodge* includes “fastening means 142 and 152 by which the [toe] pad 145 and the [heel] pad 155 are connected to the top plate 130,” respectively. Ex-1005-*Dodge*, ¶ [0045]; *supra* Section VIII.A.4.d. Fastening means 142 and 152 transfer the first and second loading (which are applied by boot 60 on toe pad 145 and on heel pad 155, respectively) to top plate 130. *Id.*, ¶ [0045]. *Dodge* additionally discloses:

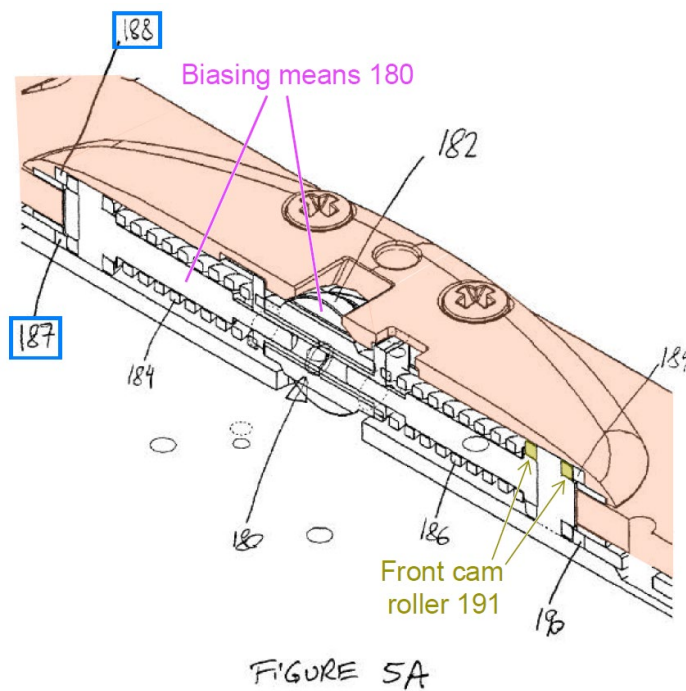
Any rotational moment applied to the boot and transmitted to the toe and heel cups that overcomes the biased alignment of the pivotable plate and causes the pivotable plate to move relative to the base plate will cause the toe and/or heel cup(s) to rotate or translate in such a way that the boot is free to release from the binding.

Id. at ¶ [0023].

243. Therefore, binding 100 is configured to “determine whether or not the release condition is occurring” when the loads transferred to top plate 130 by fastening means 142, 152 are sufficient to overcome the bias and rotate top plate 130 about front cam roller 191. *Id.*, ¶¶ [0023], [0045]-[0047].

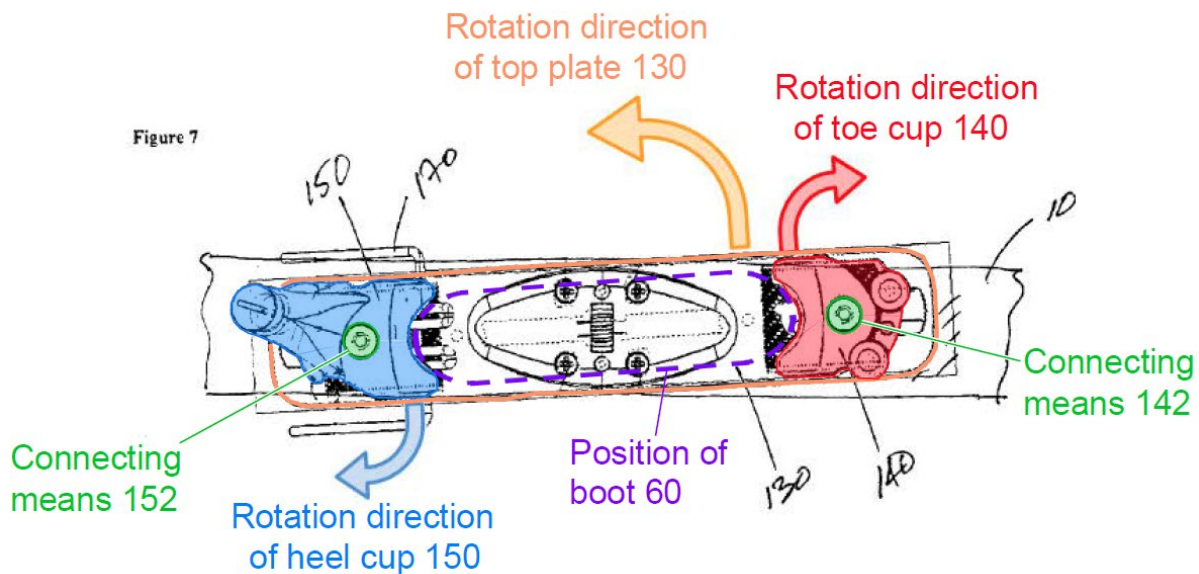
This exploded perspective view shows the internal components of the device. Key parts include a battery pack (110) at the rear, a printed circuit board (120) with various electronic components (130, 140, 142, 145, 146), a speaker (150) and microphone (152) assembly, a display unit (154), and a hinge mechanism (155). The device is shown in an open position, revealing the internal layout and the connection points for the various modules.

Ex-1005-Dodge, FIG. 5 (annotated, cropped)



Ex-1005-*Dodge*, FIG. 5A (annotated) (close-up of FIG. 5)

244. Further, discloses that when top plate 130 pivots, “toe cup 140 and the heel cup 150 are pivoted... about connecting means 142 and 152, thereby releasing the boot.” *Id.*, ¶ [0047]. This configuration is shown in Figure 7.



**Ex-1005-Dodge, FIG. 7 (annotated, modified)
(connecting means 142, 152 not shown)**

245. Therefore, *Dodge* discloses, or at least suggests, this claim element because a POSITA would have both understood and found it obvious that *Dodge*’s cam surfaces (e.g., cam surfaces 187, 188 depicted in Figure 5A above) can be designed such that its release logic is configured to determine the internal forces and cause “the ski boot [to] be released more easily if a load is applied to the medial (inside) edge of the tail of the ski.” *Id.*, ¶ [0046]. This would have been well within the level of ordinary skill in the art.

246. As explained above, *Howell* similarly discloses or renders obvious this element because, only when the external lateral force creates incrementally increasing reaction forces and exceed a predetermined threshold will the *Howell* release logic determine that a release is necessary to prevent knee injury. Ex-1007-*Howell*, claim 13.

247. I understand that Patent Owner contends that “determine whether or not the release condition is occurring as a function of both of the first loading and the second loading” means “the ski binding assembly release logic indicating occurrence or nonoccurrence of the release condition dependent upon the assessments of the first loading and second loading.” *See* Ex-1010-Patent Owner’s Proposed Constructions.

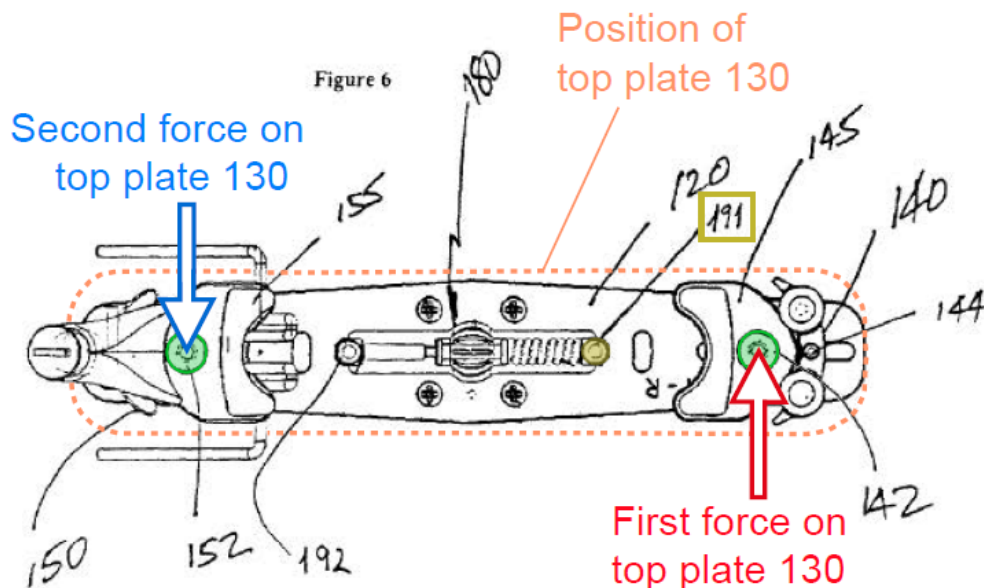
248. In my opinion, without agreeing with this proposed construction, both *Dodge* and *Howell* disclose, or at least render obvious, this claim element.

- f. ***[30(e)]: “wherein said ski binding assembly is configured to determine a force-couple at a third axis from said first loading and said second loading, and said release logic is configured to determine whether or not the release condition is occurring as a function of the force-couple.”***

249. *Dodge* discloses, or at least renders obvious, [30(e)] because it discloses wherein said ski binding assembly is configured to sense a force-couple at a third axis from said first loading and said second loading. *Dodge* also discloses

wherein said release logic is configured to determine whether or not the release condition is occurring as a function of the force-couple.

250. As discussed above for [30(c)], *Dodge* discloses that boot 60 applies a torsional force to toe pad 145 and heel pad 155. Ex-1005-*Dodge*, ¶¶ [0043], [0045]. “These pads are connected to the **top plate**” via **fastening means 142 and 152** “such that any torque on the boot is transferred through these pads to the **top plate**.” *Id.*, ¶¶ [0019], [0045]. Therefore, as discussed above for [30(c)], the torsional load on the boot, creating a first internal loading and a second internal loading, are exerted on the top plate by fastening means 142 and 152. *See id.*, ¶¶ [0045], [0047]. Therefore, binding 100 is configured to sense a force-couple consisting of the forces exerted on the **top plate 130** by **fastening means 142 and 152**, respectively. *See id.*, ¶¶ [0045], [0047].



Ex-1005-Dodge, FIG. 6 (annotated, modified)

251. Further, *Dodge* also discloses that the release logic of binding 100 is configured to determine whether a release condition is occurring as a function of the force-couple on **top plate 130**. As discussed above for [30(b)], the “release condition” corresponds to an embodiment in which a rotational moment on the boot “overcomes the biased alignment of the **pivotable plate**,” thus causing the binding 100 to release the boot. *Id.*, ¶¶ [0023], [0047]; *supra* Section VIII.A.4.c. Thus, the binding 100 of *Dodge* determines that the release condition is occurring “as a function of the force-couple,” as claimed, since the two forces of the force-couple (i.e., the **first force** and **second force** depicted in annotated Figure 6 above) cause **top plate 130** to rotate to release the boot. *See* Ex-1005-Dodge, ¶¶ [0023], [0047].

252. *Dodge* alone discloses, or at least suggests, that a force-couple is sensed at a third axis from said first loading and said second loading. Because *Dodge* is “a safety binding for interfacing a ski boot to a ski,” and is concerned with differentiating between loads applied to different parts of the ski to prevent ACL injuries to the knee, which “are often caused by a load to the medial (inside) edge of the tail of the ski” (*Id.*, ¶¶ [0002], [0017], [0046], a POSITA would have both understood and found it obvious that the reaction forces experienced by the binding create a force-couple around a third axis, coinciding with the skier’s tibial axis. Indeed, a person of skill would have known “[i]njuries to the lower leg and knee

persist in alpine skiing” (Ex-1008-*Gulick*, 31), and that “achiev[ing] a release at small moments around the tibia and large lateral forces” and will avoid “ligament injuries to the knee joint.” Ex-1004-*Freudiger-2*, ¶¶ [0002]-[0003]. More specifically, a POSITA would have both understood and found it obvious that *Dodge* is configured to release the boot when the reaction forces, formed by an external load, create an ACL-threatening force-couple around a third axis, coinciding with the skier’s lower leg (i.e., the tibial axis) because *Dodge* is concerned with differentiating forces to protect the skier’s ACL and lower leg. Ex-1005-*Dodge*, [0017], [0046]-[0047].

253. Thus, *Dodge* discloses, or at least renders obvious, this claim element.

254. *Howell* similarly discloses, or renders obvious, this claim element because, as explained above, *Howell* describes a lateral heel release binding that prevents ACL strain or ruptures, specifically when a lateral force applied to the ski causes high strain on the “tibial axis,” generally known as phantom-foot fall kinematics. Ex-1007-*Howell*, ¶¶ [0005], [0011].

5. Independent Claim 53

- a. ***[53(Preamble)]: “An apparatus for securing a ski boot to a ski so as to form a ski system, the apparatus comprising:”***

255. This element is substantially identical to 30(Preamble). For the reasons discussed above for element 30(Preamble), *Dodge* discloses, or at least renders obvious, this element.

- a. ***[53(a)]: “a ski binding assembly configured to be attached to the ski and to releasably secure the ski boot to the ski during use, said ski binding assembly having a first release,”***

256. This element is identical to [30(a)]. Accordingly, for the reasons discussed above for [30(a)], *Dodge* discloses, or at least renders obvious, this element.

- b. ***[53(b)]: “said ski binding assembly including release logic that causes the ski binding assembly to release the ski boot at said first release in response to a release condition,”***

257. This element is identical to [30(b)]. Accordingly, for the reasons discussed above for [30(b)], *Dodge* discloses, or at least renders obvious, this element.

- c. ***[53(c)]: “said ski binding assembly configured to: assess, relative to a first axis, a first loading internal to the ski system caused by an external loading applied to the ski system; and assess, relative to a second axis spaced from said first axis and substantially parallel to said first axis, a second loading internal to the ski system caused by the external loading;”***

258. This element is identical to [30(c)]. Accordingly, for the reasons discussed above for [30(c)], *Dodge* discloses, or at least renders obvious, this element.

- d. ***[53(d)]: “wherein said release logic is configured to: determine whether or not the release condition is occurring as a function of both of the first loading and the second loading; and cause said ski binding assembly to provide said first release if the release logic determines that the release condition is occurring;”***

259. This element is identical to [30(d)]. Accordingly, for the reasons discussed above for [30(d)], *Dodge* discloses, or at least renders obvious, this claim element.

- e. ***[53(e)]: “wherein said ski binding assembly has a second release, said first release being an attenuated release relative to said second release.”***

260. *Dodge* discloses, or at least renders obvious, this additional claim element. *Dodge* discloses that binding 100 is configured so that “the ski boot will be released more easily if a load is applied to the medial (inside) edge of the tail of the ski than if a similar load is applied to the lateral (outside) edge of the front of the ski.” Ex-1005-*Dodge*, ¶ [0046]. *Dodge* achieves this by designing rear cam

surfaces 187, 188 of binding 100 to release biasing means 180 more easily (i.e., in response to a smaller applied load) than front cam surfaces 189, 190. *Id.*, ¶ [0046]. Thus, *Dodge* discloses a “first release” occurring when “the ski boot [is] released more easily if a load is applied to the medial (inside) edge of the tail of the ski.” *Id.*, ¶ [0046]. *Dodge* also discloses a “second release” occurring when a load “is applied to the lateral (outside) edge of the front of the ski,” in which case a larger applied load is required to release the boot. *Id.*, ¶ [0046].

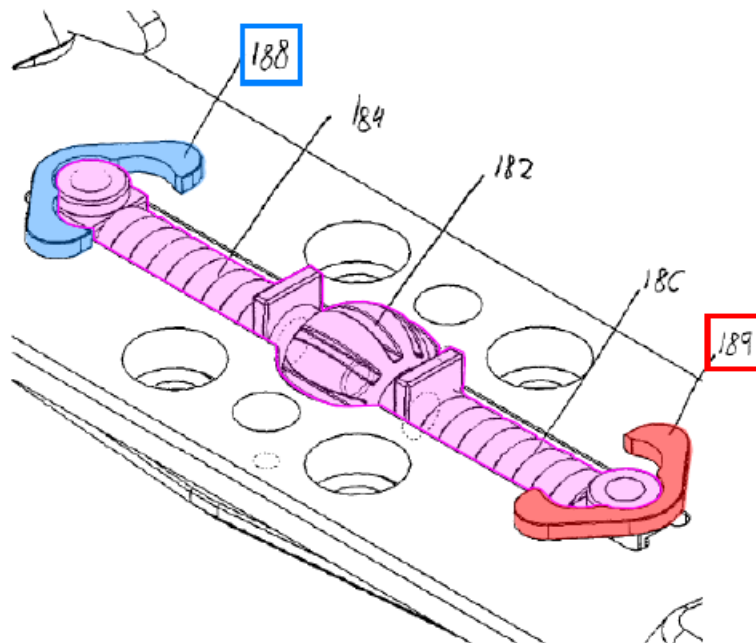


FIGURE 5B

**Ex-1005-Dodge, FIG. 5B (annotated)
(cam surfaces 187 and 190 not shown)**

261. *Howell* similarly discloses or renders obvious this element. *Howell* explains that “ACL strain intensified when lateral forces are applied to the ski

immediately under or near the projected tibial axis.” Ex-1007-*Howell*, ¶¶ [0003], [0005], [0011]. Thus, *Howell*’s binding provides a first lateral release at the heel piece to prevent strain or rupture to the ACL. *Howell* further explains that “[a]ll alpine ski bindings provide a lateral toe release to release the ski from the boot when a transverse-longitudinal (side of the ski) force is applied to the ski at all [other] points along the ski.” *Id.*, ¶ [0005]. Thus, to the extent Patent Owner argues improperly that the first release should be limited to a heel piece and a second release should be limited to a toe piece, *Howell* discloses or renders obvious this element.

262. I understand that Patent Owner contends that a second release is “[a] mechanism of the ski binding assembly that allows separation of the ski boot from the ski automatically and without skier intervention (i.e., releases) in response to a predetermined external loading of the ski correlated to an estimated maximum tibial axis load level selected to lessen the likelihood of tibial shaft injuries such as tibial spiral fractures.” *See* Ex-1010-Patent Owner’s Proposed Constructions. Indeed, Patent Owner appears to equate the second release to “the standard release mode in a typical prior art conventional alpine binding.” *See id.*

263. I also understand that Patent Owner contends that an attenuated release is “[a] release of the ski binding assembly that occurs at a lower tibial axis loading relative to another release.” *See id.*

264. In my opinion, without agreeing with these proposed constructions, both *Dodge* and *Howell* disclose, or at least render obvious, this claim element.

6. Independent Claim 58

- a. ***[58(Preamble)]: “An apparatus for securing a ski boot to a ski so as to form a ski system, the apparatus comprising:”***

265. This element is substantially identical to [30(Preamble)] and [53(Preamble)] above. Accordingly, for the reasons discussed in Section VIII.A.4.a, *Dodge* discloses or at least renders obvious this claim element.

- b. ***[53(a)]: “a ski binding assembly configured to be attached to the ski and to releasably secure the ski boot to the ski during use, said ski binding assembly having a first release,”***

266. This element is substantially identical to [30(a)] and [53(a)] above. Accordingly, for the reasons discussed in Section VIII.A.4.b, *Dodge* discloses or at least renders obvious this claim element.

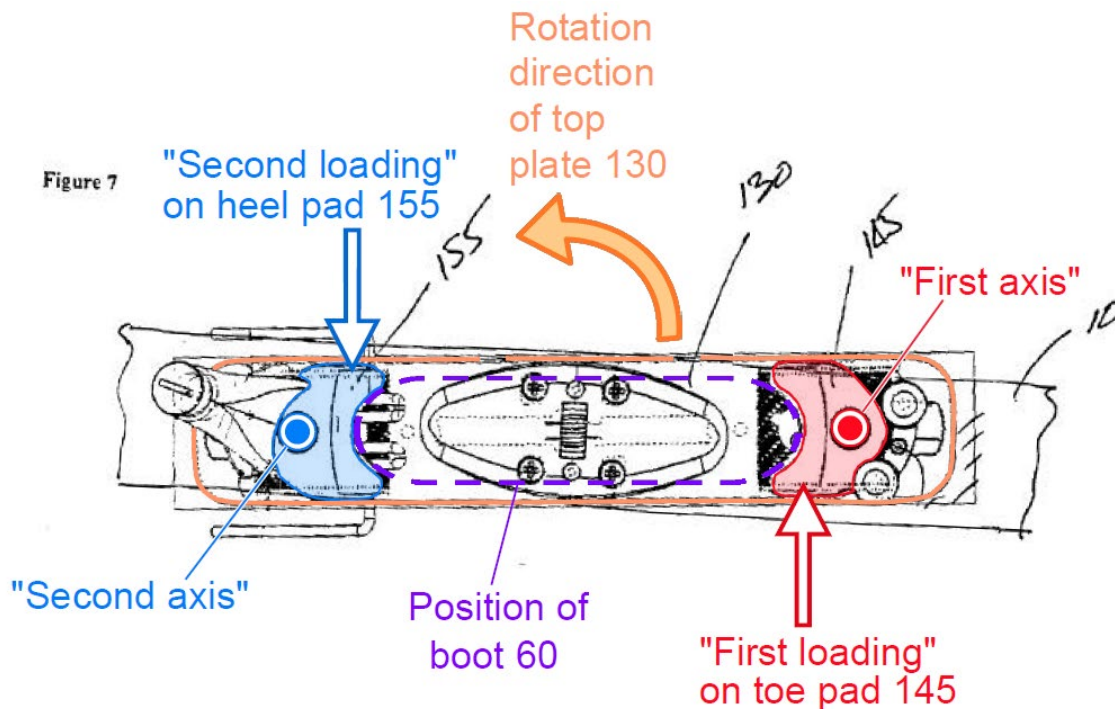
- c. ***[53(b)]: “said ski binding assembly including release logic that causes the ski binding assembly to release the ski boot at said first release,”***

267. This element includes substantially identical elements to [30(b)] and [53(b)] above. Accordingly, for the reasons discussed in Section VIII.A.4.c, *Dodge* discloses or at least renders obvious this claim element.

- d. ***[58(c)]: “said release logic set to activate said first release substantially only when: a first loading, internal to the ski system along or about a first axis and caused by an external loading applied to the ski system, exceeds a first defined level and has a first defined sense; and a second loading, internal to the ski system along or about a second axis and caused by the external loading, exceeds a second defined level and has a second defined sense;”***

268. *Dodge* discloses or at least renders obvious [58(c)] because *Dodge*’s binding’s release logic is specifically designed so that a first release occurs substantially only in response to first and second loadings which exceed certain thresholds, overcoming a “predetermined bias,” and are applied in certain directions, as more fully described below.

269. *Dodge* explains a “twisting load [] applied to the tail of the ski” causes a “torsional force on the boot” that is “transferred to the top plate 130.” Ex-1005-*Dodge*, ¶¶ [0045], [0047]. If the force overcomes the bias on top plate 130, the top plate pivots relative to the ski, releasing the boot, as shown in Figure 7 below. *Id.*, ¶¶ [0023], [0047].



Ex-1005-Dodge, FIG. 7 (annotated, some labels removed)

270. As *Dodge* explains, when an external load on the ski results in “torsional forces (about a vertical axis) on the boot,” the binding of *Dodge* is configured so that “frictional and/or imping[e]ment forces [are] applied by the boot to the toe pad [] and to the heel pad.” *Id.*, ¶ [0043]; see also *id.*, ¶¶ [0019], [0045]. Thus, the external force on the ski causes a “first loading” of toe pad 145 “internal to the ski system” along or around a first vertical axis through fastening means 142 and a “second loading” of heel pad 155 “internal to the ski system” along or around a second vertical axis through fastening means 152, as claimed. *Id.*, ¶¶ [0019], [0045].

271. If these internal forces, which are transferred from the pads to **top plate 130**, are “sufficient to overcome the bias on the **top plate** then it pivots, and the **boot** is released.” *Id.*, ¶ [0019]; *see also id.*, ¶ [0045]. Thus, each of the first loading and second loading need to exceed a defined level before the top plate is pivoted for release of the ski boot from the ski binding. As *Dodge* explains, the level of force required to overcome the bias can be adjusted through the design of the cam surfaces 187, 188, 189, and 190. *Id.*, ¶ [0046]. Therefore, *Dodge*’s binding sets a first defined level, being the magnitude of force required at the toe pad, and a second defined level, being the magnitude of force required at the heel pad, to overcome the predetermined bias and rotate the top plate.

272. I understand that Patent Owner contends that “said release logic set to activate said first release substantially only when” means “[t]he release logic enables the first release when both of the loading conditions set forth thereafter in the claim are satisfied.” *See* Ex-1010-Patent Owner’s Proposed Constructions. Patent Owner further states that “‘substantially only’ addresses the fact that no ski binding system is 100% accurate and as such an expected small amount of false releases may occur but the occurrence of such false releases does not cause a ski binding that otherwise meets the requirements of the claim to fall outside the claim.” *See id.*

273. In my opinion, without agreeing with this proposed construction, *Dodge* discloses, or at least renders obvious, this claim element.

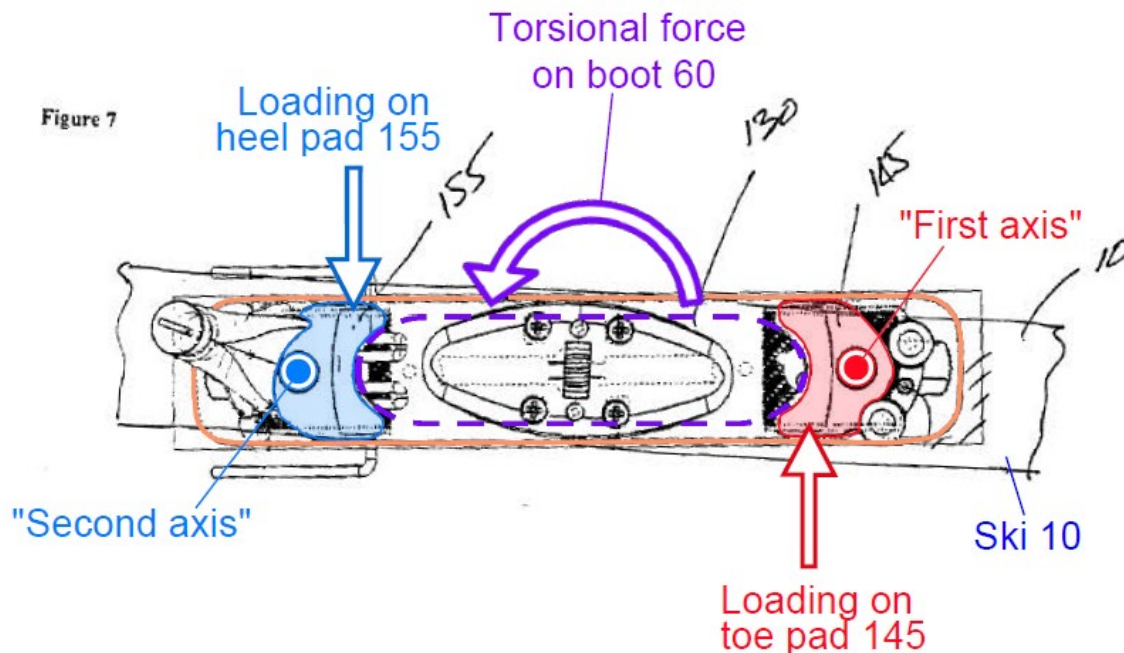
274. Additionally, the *Dodge* release logic is set to activate the first release substantially only when a first loading has a first defined sense, and a second loading has a second defined sense.

275. I understand that Patent Owner contends that “exceeds” means “greater than (plain meaning),” that “first defined level” means “a magnitude of the first loading corresponding to a release setting of the binding at the defined release condition” and that a “first defined sense” is “the direction of the first loading corresponding to a release setting of the binding at the defined release condition.” *See* Ex-1010-Patent Owner’s Proposed Constructions.

276. I also understand that Patent Owner contends that “second defined level” means “a magnitude of the second loading corresponding to a release setting of the binding at the defined release condition” and that a “second defined sense” is “the direction of the second loading corresponding to a release setting of the binding at the defined release condition.” *See id.* Thus, it appears Patent Owner contends that the first and second defined senses refer to the directions that the first and second loadings are applied, respectively.

277. In my opinion, without agreeing with these proposed constructions, *Dodge* discloses, or at least renders obvious, these claim elements.

278. *Dodge* explains, and shows in annotated Figure 7 below, that the toe pad and heel pad experience reaction loads in opposite directions.



Ex-1005-Dodge, FIG. 7 (annotated, rotated, some labels removed)

279. Thus, to achieve release of the boot, the front loading has a first defined sense in one direction and the rear loading has a second defined sense in another direction. See Ex-1005-Dodge, FIGs. 7.

280. At a minimum, *Dodge* at least suggests that the release logic is set to activate the first release substantially only when a first loading exceeds a first defined level and has a first defined sense, and a second loading exceeds a second defined level and has a second defined sense. Because *Dodge* explains that “injuries to the knee are often caused by a load to the medial (inside) edge of the tail of the

ski” and that the cam surfaces can be designed to more easily release the ski boot under these dangerous forces, a POSITA would have both understood and found it obvious to design the cam surfaces to effectuate a release when a force acting on one surface reaches a certain magnitude and is applied in a certain direction and a force acting on a different cam surface reaches a certain magnitude and is applied in a certain direction. Thus, a POSITA would have understood that *Dodge* discloses, or at least teaches, this claim element.

281. *Howell* similarly discloses or renders obvious this element because, as explained above, an external force will create internal reaction forces relative to the corresponding cam axes. Ex-1007-*Howell*, claim 13. It is only when the external force persists that the release assembly will create additional reaction forces that “progressively pivot about consecutive cams, producing an incrementally increasing force opposing the lateral force.” Thus, to the extent Patent Owner attempts to improperly limit this limitation to a sequential (rather than parallel) operation, *Howell* discloses or renders obvious this limitation because the forces are being applied in sequence to one another, and it is only when “the lateral release assembly rotates beyond a predetermined cam axis” that a lateral release is achieved. *Id.*, claim 13.

282. In my opinion, *Howell*’s disclosure is consistent with Patent Owner’s proposed terms above, and thus, under Patent Owner’s proposed terms, *Howell*

discloses, or at least renders obvious, this claim element. Therefore, *Dodge* discloses this claim element alone or in combination with *Howell*.

- e. ***[58(d)]: “wherein said ski binding assembly has a second release, said first release being an attenuated release relative to said second release.”***

283. This element is substantially identical to claim 35 (discussed below) and to element [53(e)] (discussed above). Accordingly, for the reasons discussed Section VIII.A.5.e, *Dodge* discloses this element alone or in combination with *Howell*.

7. Claim 31

“wherein said third axis is substantially coincident with a tibial axis of a user when the user is wearing the ski boot and the ski boot is releasably engaged in the binding assembly.”

284. In addition to all the elements of the claim from which this claim depends, *Dodge* discloses this additional element because it discloses wherein said third axis is substantially coincident with a tibial axis of a user when the user is wearing the ski boot and the ski boot is releasably engaged in the binding assembly.

285. As discussed above for element [30(e)], *Dodge* discloses that **binding 100** has a “third axis” coinciding with the skier’s tibial axis. *Supra* Section VIII.A.4.f; see Ex-1005-*Dodge*, ¶ [0046]. *Dodge* is concerned with “afford[ing] skiers significant additional protections against ACL injuries.” Ex-1005-*Dodge*,

[0017]. A POSITA would have understood that ACL injuries occur from loads experienced around the skier's tibial axis and lower leg. *Id.*, [0017], [0046]-[0047]; Ex-1007-*Howell*, [0003]-[0005]. Thus, a POSITA would have understood that *Dodge* was concerned with the loading about the skier's tibia while the skier wears the boot 60, i.e., the third axis, so that it could release the boot before the load about the skier's tibia caused ACL injuries. *See* Ex-1005-*Dodge*, FIGs. 1 and 6, ¶ [0033].

286. Therefore, *Dodge* discloses this claim element.

287. As explained above for [30(e)] *Howell* similarly discloses or renders obvious this element. Ex-1007-*Howell*, ¶¶ [0005], [0011].

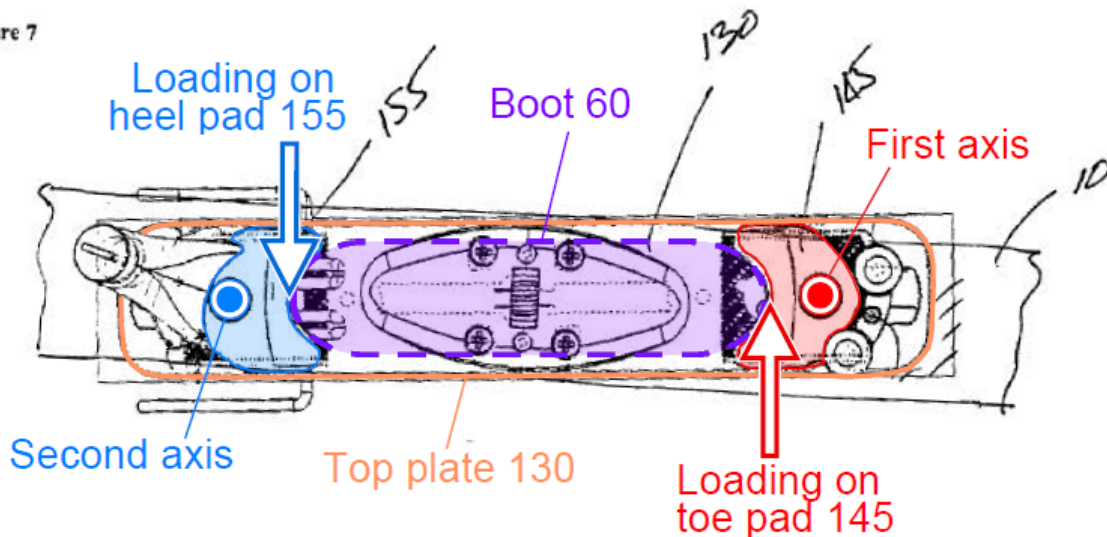
8. Claim 34

“wherein said first loading is a first moment on said first axis and said second loading is a second moment on said second axis, and said ski binding assembly is configured to determine the force-couple from the first moment and the second moment.”

288. In addition to all the elements of the claim from which this claim depends, *Dodge* discloses this additional element because it discloses wherein said first loading is a first moment on said first axis and said second loading is a second moment on said second axis. *Dodge* also discloses that the ski binding assembly is configured to determine the force-couple from the first moment and the second moment.

289. As explained above for [30(c)], *Dodge* discloses that a torsional force on boot 60 causes a first loading at toe pad 145 and a second loading at heel pad 155. Ex-1005-*Dodge*, ¶¶ [0043], [0045]; see also *id.*, ¶ [0019]. The first loading at toe pad 145 is created about the vertical “first axis” defined by fastening means 142, thus creating a first moment on this first axis. *Id.*, ¶¶ [0043], [0045]; see also *id.*, ¶ [0019]. Similarly, the second loading at heel pad 155 is created about the vertical “second axis” defined by fastening means 152, thus creating a second moment on this second axis. *Id.*, ¶¶ [0043], [0045]; see also *id.*, ¶ [0019].

Figure 7



Ex-1005-*Dodge*, FIG. 7 (annotated, some labels removed)

290. Moreover, *Dodge* discloses that “fastening means 142 and 152” enable “the torsional force on the boot [to be] transferred to the top plate 130.” *Id.*, ¶ [0045]. Therefore, binding 100 of *Dodge* is configured to determine the force-couple on top plate 130 (as discussed above in Section VIII.A.4.f for [30(e)]) from

the first moment and second moment since the moments are transferred to the top plate by fastening means 142 and 152 to form the force-couple. Ex-1005-*Dodge*, ¶¶ [0043], [0045]; *see also id.*, ¶ [0019].

9. Claim 35

“wherein said ski binding assembly has a second release, said first release being an attenuated release relative to said second release.”

291. This element is identical to claim [53(e)]. Accordingly, for the reasons discussed above in Section VIII.A.5.e, *Dodge* and *Howell* disclose or at least render obvious this claim element.

10. Claim 37, 55, and 59

“wherein said first release is a first release torque about a tibial axis of a skier when the skier is wearing the ski boot and the ski boot is secured to the ski by said ski binding assembly and said second release is a second release torque about a tibial axis of a skier when the skier is wearing the ski boot and the ski boot is secured to the ski by said ski binding assembly.”

292. In addition to all the elements of the claim from which these claims depend, *Dodge* discloses this additional element because it discloses wherein said first release is a first release torque about a tibial axis of a skier when the skier is wearing the ski boot and the ski boot is secured to the ski by said ski binding assembly and said second release is a second release torque about a tibial axis of a

skier when the skier is wearing the ski boot and the ski boot is secured to the ski by said ski binding assembly.

293. As discussed above for element [30(a)] and for [53(a)], *Dodge* discloses a first release occurring “if [a] twisting load is applied to the tail of the ski,” in which case “the top plate pivots about the front cam roller 191” to release the boot. Ex-1005-*Dodge*, ¶ [0047]. *Dodge* discloses a second release occurring in response to “a twisting load on the forebody of the ski.” *Id.*, ¶ [0047]. This twisting load causes “top plate 130 [to] pivot[] in a counterclockwise direction about the rear cam roller 192” such that “the toe cup 140 and the heel cup 150 are pivoted in a clockwise direction about connecting means 142 and 152, thereby releasing the boot.” *Id.*, ¶ [0047].

294. Under each of these load situations, a POSITA would have understood that the loading conditions create a torque about the skier’s tibial axis. As *Dodge* explains, it is concerned with “afford[ing] skiers significant additional protection against ACL injuries.” *Id.*, [0017]. Thus, *Dodge* was differentiating the torque experienced on the skier’s lower leg and tibia under loads applied at the tip versus loads applied at the tail of the ski. *Id.*, [0017], [0046]-[0047]. A POSITA would have therefore both understood and found obvious that *Dodge* disclosed a first release, when a first release torque is experienced about the skier’s tibial axis, and

a second release, when a second release torque is experienced about the skier's tibial axis.

295. Therefore, *Dodge* discloses, or at least renders obvious, this claim element.

296. Additionally, as explained above for [53(e)], *Howell* similarly discloses or renders obvious this element because a POSITA would have understood and found it obvious that a lateral force “can act over the entire length of the lower leg to generate a moment about the femur,” substantially coinciding with the tibial axis. Ex-1007-*Howell*, ¶ [0005]. Thus, a POSITA would have known that the moment or torque around the tibial axis is different for a force applied to the ski immediately under or near the tibial axis compared to a similar force applied to a different point along the ski. *Id.*, ¶¶ [0005], [0011].

297. I understand that Patent Owner contends that “wherein said first release is a first release torque about a tibial axis of a skier . . . and said second release is a second release torque about a tibial axis” refers to “[t]he torque experienced at the tibial axis at binding release settings of the first release is the first release torque and the torque experienced at the tibial axis is at binding release settings of the second release is the second release torque.” See Ex-1010-Patent Owner's Proposed Constructions.

298. In my opinion, without agreeing with this proposed construction, *Dodge* discloses, or at least renders obvious, this claim element alone or in combination with *Howell*.

B. *Dodge, Howell, and Gulick* Render Claims 36, 38, 54, and 56 Obvious

1. Rationale for Combining *Dodge, Howell, and Gulick*

299. For the reasons set forth below, a POSITA would have been motivated to combine the teachings of *Dodge, Howell, and Gulick*. Before the priority date of the '953 patent, it would have been obvious, beneficial, and predictable to utilize *Gulick's* teaching regarding reduced release threshold from the ASTM recommended release setting. One of ordinary skill in the art would have been specifically motivated to incorporate *Gulick's* teachings because doing so would have addressed the goals of *Dodge* and *Howell*.

300. As discussed above for claims 30, 35, 53 and 58, *Dodge* and *Howell* each disclose an attenuated “first release” (a lower boot-release threshold in response to “a load [] applied to the medial (inside) edge of the tail of the ski”) compared to a “second release” (a higher boot-release threshold in response to “a similar load [] applied to the lateral (outside) edge of the front of the ski”). *Supra* Sections VIII.A.4.b, VIII.A.5.e. A POSITA would have known that *Dodge's* second release is set, or would have found it obvious to set, the second release to the release

setting recommended by the ASTM Standard F939-05 for ski binding release settings because this was the industry standard practice at the time of the purported invention. Ex-1011; *see also* Ex-1005-*Dodge*, ¶¶ [0009], [0012]; Ex-1008-*Gulick*, 30, 32, Table 1; Ex-1011, Intro. A POSITA would have wanted to follow the industry standard because it was established by leading experts in the field of alpine skiing safety. A POSITA further would have understood that the release settings recommended by the ASTM standard exceed the maximum forces generated by most skiers. Ex-1008-*Gulick*, 47. As a result, *Gulick* explains that ski bindings that are set in accordance with the ASTM standard may fail to release during falls with a likelihood of injury. *Id.*, 32; *see supra* Section VII.B.1.

301. Further, *Dodge* explains that “[i]t is believed by many knowledgeable in the art of ski binding design and ski injury analysis that Anterior Cruciate Ligament (ACL) injuries to the knee are often caused by a load to the medial (inside) edge of the tail of the ski.” Ex-1005-*Dodge*, ¶ [0017]. Therefore, as disclosed in both *Dodge* and *Gulick*, a POSITA would have been motivated to release the boot more easily under loads applied to the inside edge of the tail of the ski to create a safer binding with a reduced risk of ACL injury due to the phantom-foot mechanism. *See id.*, ¶¶ [0017], [0018], [0046]; Ex-1008-*Gulick*, 30, 32, 43, 46-47.

302. While *Dodge* contemplates a lower release threshold for loads applied at the medial side of the ski tail, and *Howell* contemplates a lower release threshold for “lateral forces applied to the ski immediately under or near the projected tibial axis,” neither *Dodge* nor *Howell* quantifies the reduction of the release threshold. Thus, a POSITA would have looked to *Gulick* for further instruction on how much to reduce the release threshold.

303. As discussed above, *Gulick* compared the performance of their “learning binding” with an experimental ski binding using the ASTM standard settings. *Supra* Section VII.B.1; see Ex-1008-*Gulick*, 32-34. *Gulick* found, among other things, that the learning algorithm’s release settings were “on average at least 22% less than the corresponding ASTM recommended setting.” Ex-1008-*Gulick*, 47. As a result, the learning binding “yield[ed] earlier releases in several falling scenarios” compared to the bindings with ASTM settings, suggesting that a learning binding with lowered release thresholds “can significantly improve the safety of alpine skiing.” *Id.*, 30; see also *id.*, 47.

304. A POSITA would have been motivated to implement *Gulick*’s at least 22% retention reduction to have the advantages of improved safety as disclosed in *Gulick*, *Howell*, and *Dodge*, namely that a lower release threshold for certain forces would improve safety by preventing knee injuries.

305. Further, any modification of *Dodge*'s and *Howell*'s teachings, including adjusting the design of the internal components, such as the cams, to accommodate the teaching of *Gulick*, would have been well within the level of ordinary skill in the art. Indeed, as *Dodge* explains "[b]y properly designing the cam surfaces 187, 188, 189, and 190 it is possible to obtain a ski binding in which the ski boot will be released more easily if a load is applied to the medial (inside) edge of the tail of the ski than it a similar load is applied to the lateral (outside) edge of the front of the ski." Ex-1005-*Dodge*, ¶ [0047]. *Dodge* understood that a POSITA would have known how to design the cam surfaces to achieve the desired result. *Gulick* explains the quantity by which a POSITA would have reduced the first release threshold as compared to the second release threshold.

306. Accordingly, a POSITA would have found it obvious to apply *Gulick*'s teachings to *Dodge* and *Howell* because the combination merely amounts to applying a known technique to a device ready for improvement.

2. Claims 36 and 54

“wherein said first release is at least 20% less than said second release.”

307. A POSITA would have been motivated to, or found it obvious to, set the threshold of *Dodge*'s first release (occurring when “a load is applied to the medial (inside) edge of the tail of the ski”) to be “at least 22% less than” the

threshold recommended under the ASTM standard (i.e., *Dodge's* second release occurring when a "load is applied to the lateral (outside) edge of the front of the ski"). *Id.*, ¶ [0046]. A POSITA would have wanted to reduce the first release setting by this amount at least because doing so would have 1) brought the ski binding release settings closer to the maximum forces generated by most skiers, 2) resulted in a faster release of the boot, 3) reduced the likelihood of a failure to release, and 4) created a safer ski binding.

308. In my opinion, a POSITA would have wanted to reduce the setting by at least 22% because doing so would have brought the ski binding release closer to the maximum forces generated by most skiers. It would have also implemented release sooner. *See Ex-1008-Gulick*, 47. Thus, a POSITA would have been motivated by these factors because they contribute to the safety of the ski binding and prevent injuries during skiing. *Id.*

309. Although *Gulick's* teaching of at least a 22% reduced release setting is implemented electronically in *Gulick*, a POSITA would have known how to translate this teaching to *Dodge's* mechanical binding. Setting *Dodge's* reduction to at least 22% would have been as accomplished by adjusting the cam surfaces 187, 188, 189, and 190 as *Dodge* suggests. *Ex-1005-Dodge*, ¶ [0046] ("By properly designing the cam surfaces 187, 188, 189, and 190 it is possible to obtain a ski binding in which the ski boot will be released more easily if a load is applied to the

medial (inside) edge of the tail of the ski than if a similar load is applied to the lateral (outside) edge of the front of the ski.”). Adjusting a ski binding release threshold was a common practice before the critical date of the ’953 patent.

310. In other words, this combination would have involved “the mere application of a known technique”—reducing the ski binding threshold at least 22% as *Gulick* teaches—“to a piece of prior art”—*Dodge*’s ski binding—“ready for the improvement.” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 417 (2007). And the result would have been a “predictable variation,” as *Gulicks*’s reduced threshold would merely have “improve[d] similar devices”—*Dodge*’s ski binding—“in the same way.” *Id.* Moreover, a POSITA would have had a reasonable expectation of success for this combination because the references disclose similar alpine ski release bindings and adjusting the amount of force required to cause release (e.g., adjusting the threshold) would have been a routine combination before the earliest priority date of the ’953 patent. Indeed, the references each discuss similar ski conditions where release may be required (e.g., in response to a fall). And, as noted above, each reference is analogous art to the ’953 patent.

311. Moreover, it would have been obvious to a POSITA to adjust *Dodge*’s release reduction to come to the claimed invention. As noted above, it was within the skill of the art to adjust the release of a ski binding threshold. And because it was known that reducing the release threshold “at least 22%” or even “50%” as

Gulick instructs creates safer ski bindings, a POSITA would have had a working range to routinely experiment within. *E.I. DuPont de Nemours & Company v. Synvina C.V.*, 904 F.3d at 1006 (“where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation.”) (citation omitted); *In re Peterson*, 315 F.3d 1325, 1329 (Fed. Cir. 2003) (“In cases involving overlapping ranges, we and our predecessor court have consistently held that even a slight overlap in range establishes a prima facie case of obviousness.”). Petitioner contends that the ’953 patent presents no evidence of criticality of the “at least 20%” limitation to refute the obviousness of this limitation.

312. I understand that Patent Owner contends that “said first release is at least 20% less than said second release” refers to “[t]he tibial axis torque at the first release is at least 20% less than the tibial axis torque at the second release.” *See* Ex-1010-Patent Owner’s Proposed Constructions.

313. In my opinion, without agreeing with this proposed construction, the *Dodge*, *Howell*, and *Gulick* combination discloses, or at least renders obvious, this claim element. Therefore, the combination of *Dodge*, *Howell*, and *Gulick* renders obvious claims 36 and 54.

3. Claims 38, 56, and 60

“wherein said first release torque is at least 20% less than said second release torque.”

314. For the same reasons above, the combination of *Dodge*, *Howell*, and *Gulick* renders obvious claims 38, 56, and 60 because a POSITA would understand the first release being at least 20% less than the second release is substantially equivalent to the first release torque being at least 20% less than the second release torque.

315. I understand that Patent Owner contends that “wherein said first release torque is at least 20% less than said second release torque” refers to “[t]he first release torque (as defined above) is lower than the second release torque (as defined above) by 20% or more.” *See* Ex-1010-Patent Owner’s Proposed Constructions.

316. In my opinion, without agreeing with this proposed construction, the *Dodge*, *Howell*, and *Gulick* combination discloses, or at least renders obvious, this claim element.

IX. THE CHALLENGED CLAIMS ARE UNPATENTABLE OVER *SITTMANN* ALONE OR IN COMBINATION WITH *GULICK*

A. *Sittmann* Renders Obvious Claims 58 and 59

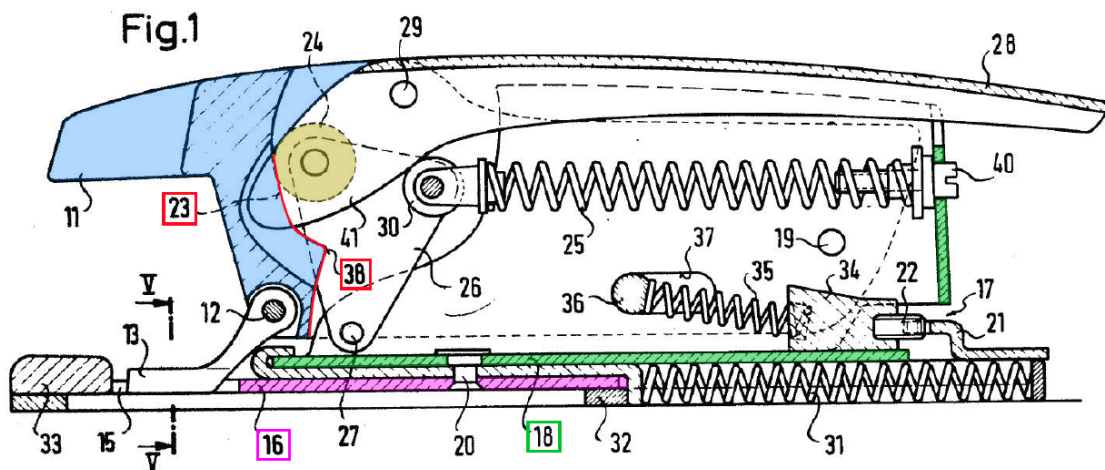
1. Overview of *Sittmann*

317. German Patent Application Publication No. 2340420 A1 to Sittmann (“*Sittmann*”) was published on February 20, 1975, and constitutes prior art under pre-AIA 35 U.S.C. §§ 102(a) and/or 102(b).

318. *Sittmann* concerns “safety ski bindings that are triggered by excessive vertical, diagonal or lateral forces, thereby releasing the skier’s boot.” Ex-1006-*Sittmann*, 1:6-8. *Sittmann* notes that many existing safety ski bindings have a “complicated” design, resulting in “considerable expense for their manufacture” and “susceptibility to faults.” *Id.*, 1:8-13. *Sittmann* therefore aims to “create a safety ski binding” with a simplified design that provides “an increase in operational safety” and which is “less costly to manufacture.” *Id.*, 2:6-11.

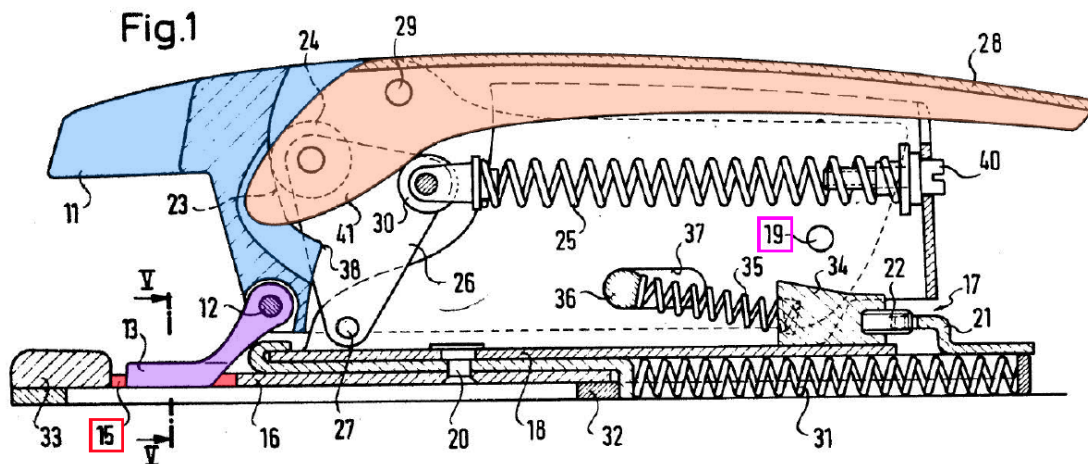
319. *Sittmann* discloses a “safety ski binding” for releasably securing a ski boot to a ski. *See id.*, 1:1-4. In some embodiments, the safety ski binding is configured as a “heel binding, which interacts with a toe binding” to secure the boot to a ski. *Id.*, 3:12-14. In most circumstances, “the toe binding takes over the side release” of the boot. *Id.*, 3:15. Additionally, *Sittmann*’s heel binding is configured for both vertical and lateral releases of the boot when certain loading patterns are applied on the ski. *See id.*, 9:8-11, 11:6-23.

320. The heel binding of *Sittmann's* ski binding assembly (referred to hereafter as the “heel piece”) includes a **bottom plate 16** that is connected to a ski via base plate 32 and a “**housing 18** that [is] mounted on the **bottom plate 16**” and which can swivel “around a vertical axis 20.” *Id.*, 7:25-27, 8:1-3. *Sittmann's* heel piece also includes a “**boot holder 11** [] fitted to **housing 18**” for releasably holding the heel end of the ski boot. *Id.*, 8:5-6; *see id.*, 3:12-14, 10:16-17. As shown in annotated Figure 1 below, a portion of **boot holder 11** is shaped as a “**detent curve 23**” which “rises linearly in the upper area and then has a **crest 38**,” below which “the **detent curve 23** drops again.” *Id.*, 8:24-27, FIGs. 1 and 2. **Housing 18** also contains a spring-mounted “**detent member 24** in the form of a roller,” which engages with **detent curve 23**. *Id.*, 8:31-34, 9:1-4.



EX-1006-Sittmann, FIG. 1 (annotated, condensed)
(side view of the heel piece of the safety ski binding in a closed state)

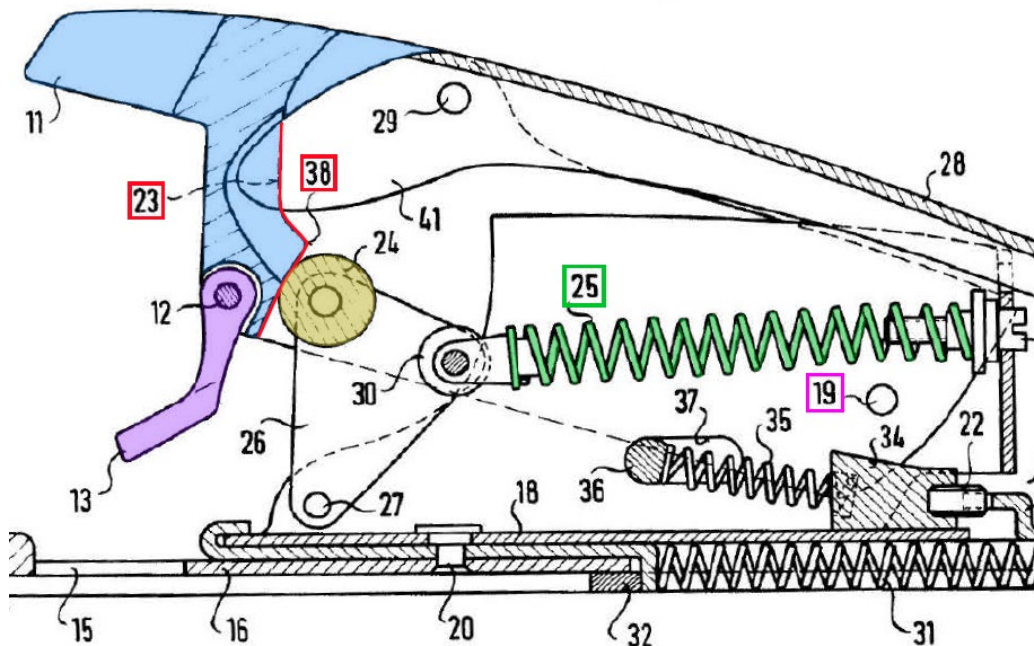
321. Additionally, *Sittmann* discloses that **boot holder 11** is attached to a **hand lever 28** which can be “swung upwards” by the user for a “manual release” of the ski boot from the binding. *Id.*, 9:13-18, 10:19-30. *Sittmann*’s heel piece also includes a **tread spur 13** “in the area of the boot heel.” *Id.*, 10:1-3. The heel piece is closed by “placing the heel of the boot on the **tread spur 13**” and pressing **tread spur 13** down until it is received within a **slot 15** in bottom plate 16, thus securing the ski boot within the binding. *Id.*, 10:1-6, 10:32-11:4.



EX-1006-*Sittmann*, FIG. 1 (annotated, condensed)

322. *Sittmann*’s heel piece is configured for an “automatic vertical release” of the boot, such as when the skier falls forward. *Id.*, 11:6-7; *see also id.*, 3:16-19. When this occurs, “a lifting moment is exerted on the **boot holder 11**” about a **transverse axis 19** due to forces exerted by the skier, which pushes **detent roller 24** along **detent curve 23** to compress a **spring 25**. *Id.*, 8:5-8, 10:22-26, 11:6-7. **Detent roller 24** travels along **detent curve 23** “until the **detent roller 24** has passed the **top**

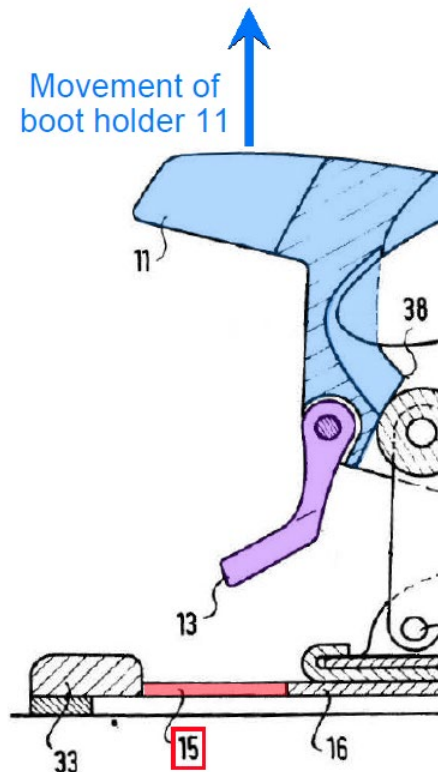
38” of the curve. *Id.* Beyond this point, “spring 25, in conjunction with the descending detent curve 23, takes over the further opening” of the heel piece about transverse axis 19 until the heel piece reaches the open state of Figure 3. *Id.*, 7:11-12, 8:5-8, 10:26-30.



Ex-1006-Sittmann, FIG. 3 (annotated, cropped)
(side view of the heel piece in an open state)

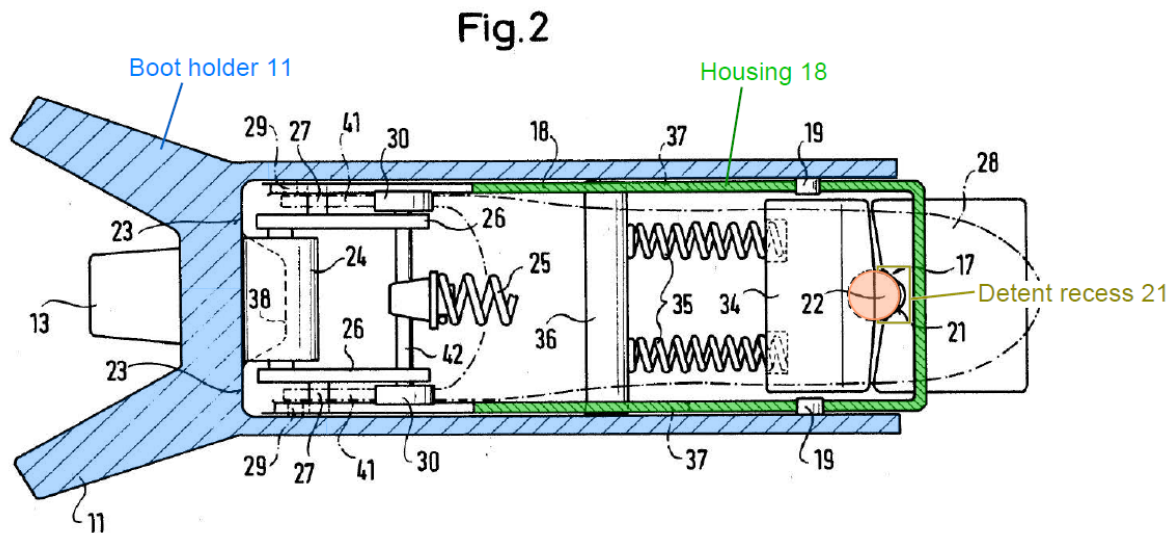
323. Additionally, *Sittmann* discloses that the heel piece can also laterally release the boot, but only when the skier experiences a forward, twisting fall. *See id.*, 3:1-23 (describing a “lateral release” by the heel piece “when a lateral load is applied” while “the skier falls in a frontal direction”), 11:15-20. Initially, “[t]he lateral release [of the heel piece] is blocked” because the “tread spur 13 is held in the slot 15 by the boot heel standing on it”; in this case, the toe piece performs the

lateral boot release. *Id.*, 3:15, 11:15-16. The heel piece's lateral release becomes unlocked when the skier falls forward, in which case the toe piece is blocked from lateral release. *See id.*, 3:15-22. During a forward, twisting fall, "the sole of the boot [] lift[s] the boot holder to such an extent that the tread spur can swing completely out of the slot" when a "lateral load is applied." *Id.*, 3:9-12; *see also id.*, 11:15-20. That is, once boot holder 11 is lifted high enough so that the boot heel no longer holds tread spur 13 within slot 15, tread spur 13 ceases to block the heel piece from laterally releasing the boot. *See id.*, 3:7-12, 11:15-20.



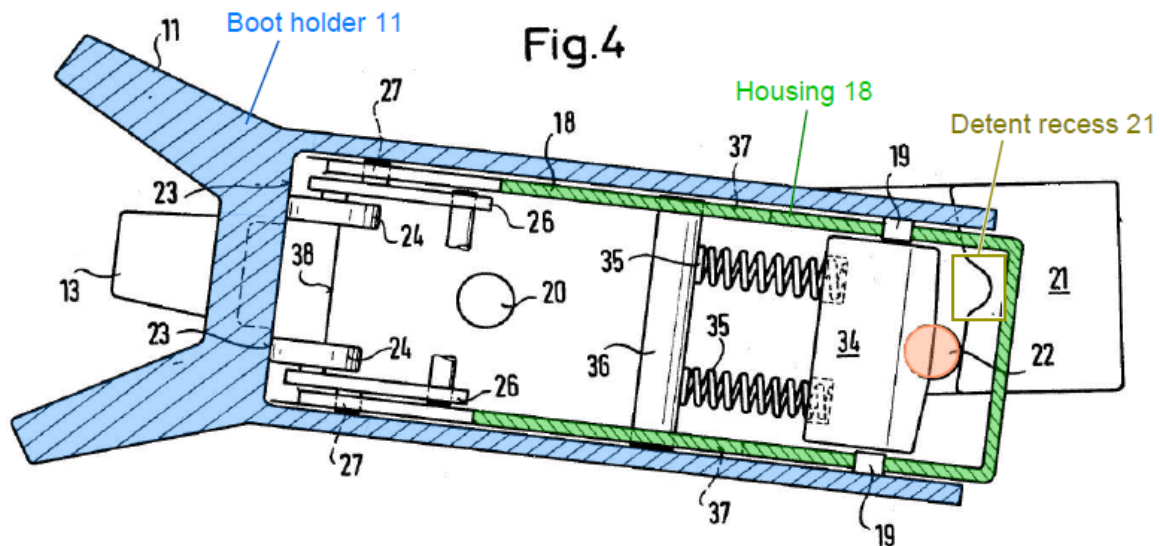
Ex-1006-Sittmann, FIG. 3 (annotated, cropped)

324. Once the lateral release is unlocked by freeing tread spur 13 from slot 15, a side release device 17 enables the heel piece to laterally release the boot when the heel piece experiences a lateral force of sufficient magnitude. *See id.*, 11:20-23. Side release device 17 includes a “detent 21 designed as a detent recess” connected to the heel piece’s bottom plate 16. *Id.*, 8:10-12. Side release device 17 also includes a “counter detent 22 designed as a roller,” which is connected to housing 18 and “pretensioned towards the detent 21 by helical compression springs 35.” *Id.*, 8:10-15. *Sittmann* further discloses that “the release force can be adjusted in a lateral direction” by adjusting the tension of springs 35 with a “screwing device.” *Id.*, 8:18-22.



Ex-1006-Sittmann, FIG. 2 (annotated)
(top view of the heel piece in a closed state)

325. When the heel piece experiences a lateral force, side release device 17 permits the lateral boot release if “the lateral force is sufficiently large so that the **detent roller 22** of the side release device 17 can emerge from the **detent recess 21**.” *Id.*, 11:20-23. This displacement of **detent roller 22** pivots **housing 18** and **boot holder 11** laterally relative to bottom plate 16, thus freeing the boot from the binding. *See id.*, 1:1-4, 4:19-21, 8:1-3, 14:6-10. As *Sittmann* explains, if the lateral force is not strong enough to displace **detent roller 22** from **detent recess 21**, the boot remains locked within the binding. *See id.*, 11:20-23.



EX-1006-Sittmann, FIG. 4 (annotated, condensed)
(top view of the heel piece in an open state)

326. In my opinion, *Sittmann* is analogous art to the '953 patent because it is related to the same technical field and describes an alpine ski release binding with the heel piece releasing laterally under certain loading conditions. As such, the

alpine ski release binding system allows for an attenuated first release by means of the heel piece and a non-attenuated second release by means of the toe piece. *Id.*, 3. Thus, *Sittmann* is directly relevant in concept to the binding described by Patent Owner in the '953 patent since the attenuated first release is aimed at providing a safer ski binding.

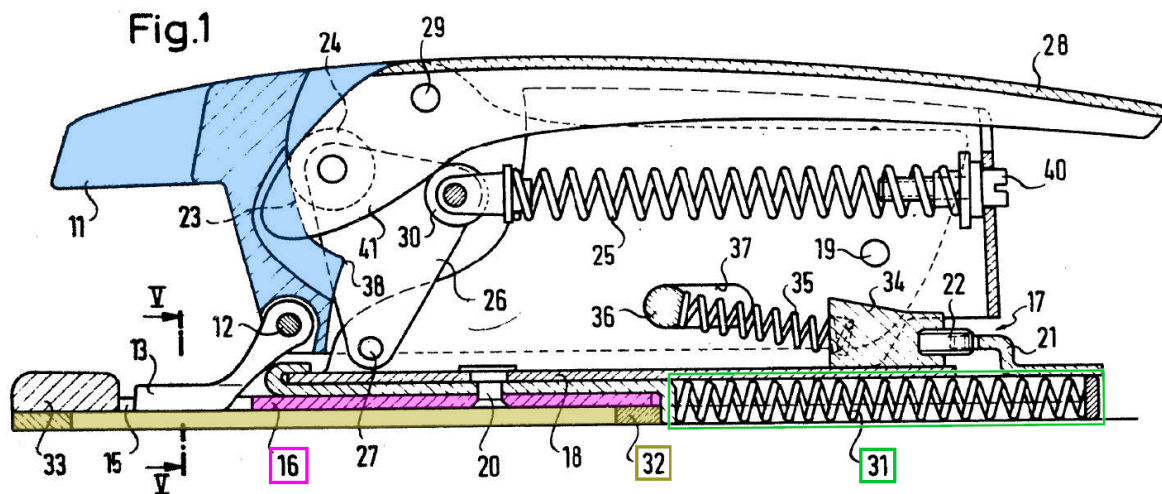
2. Independent Claim 58

- a. ***[58(Preamble)]: “An apparatus for securing a ski boot to a ski so as to form a ski system, the apparatus comprising:”***

327. *Sittmann* discloses a “safety ski binding with a boot holder” for securing the boot to a ski. Ex-1006-*Sittmann*, 1:1-2; *see also id.*, 7:25-35, 8:5-8.

- b. ***[58(a)]: “a ski binding assembly configured to be attached to the ski and to releasably secure the ski boot to the ski during use, said ski binding assembly having a first release,”***

328. *Sittmann* discloses, or at least renders obvious, [58(a)]. *Sittmann*'s heel piece includes a “bottom plate 16 [that] is mounted on a base plate 32 that is fixed to the ski...” *Id.*, 7:25-26. The rest of the heel piece is, in turn, mounted on bottom plate 16. *Id.*, 8:1-8. Thus, the heel piece is attached to the ski via base plate 32 and bottom plate 16.

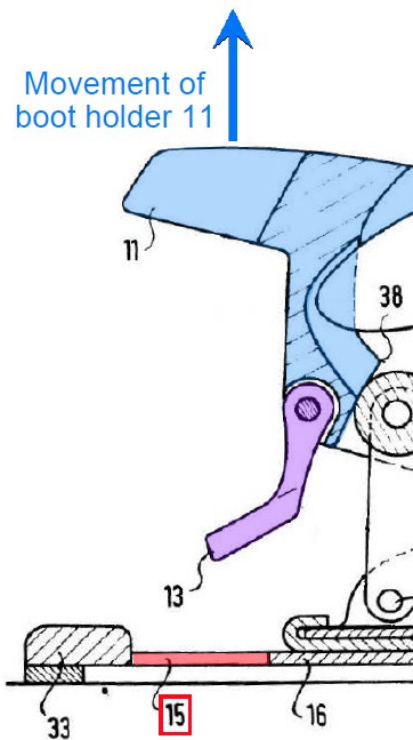


Ex-1006-*Sittmann*, FIG. 1 (annotated, condensed)

329. Additionally, *Sittmann*’s heel piece includes a [boot holder 11](#) for holding the heel end of the ski boot. *See id.*, 10:1-3, 10:32-11:4; *see also id.*, 3:12-14 (“This design version is particularly useful with a heel binding, which interacts with a toe binding...”). The boot is secured within the heel piece by “[helical compression springs 31](#)” that “generate the so-called push, i.e.[,] a force in the longitudinal direction on the clamped ski boot.” *Id.*, 7:27-35. Thus, due to the clamping force of [springs 31](#), the boot is held within the binding and secured to the ski during use. *See id.*, 3:12-14, 7:27-35.

330. Further, and as discussed above in Section IX.A.1, *Sittmann's* heel piece is configured to cause a lateral release of the boot. *See* Ex-1006-*Sittmann*, 11:15-23. As a prerequisite, the lateral release is first unlocked by “lift[ing] the boot

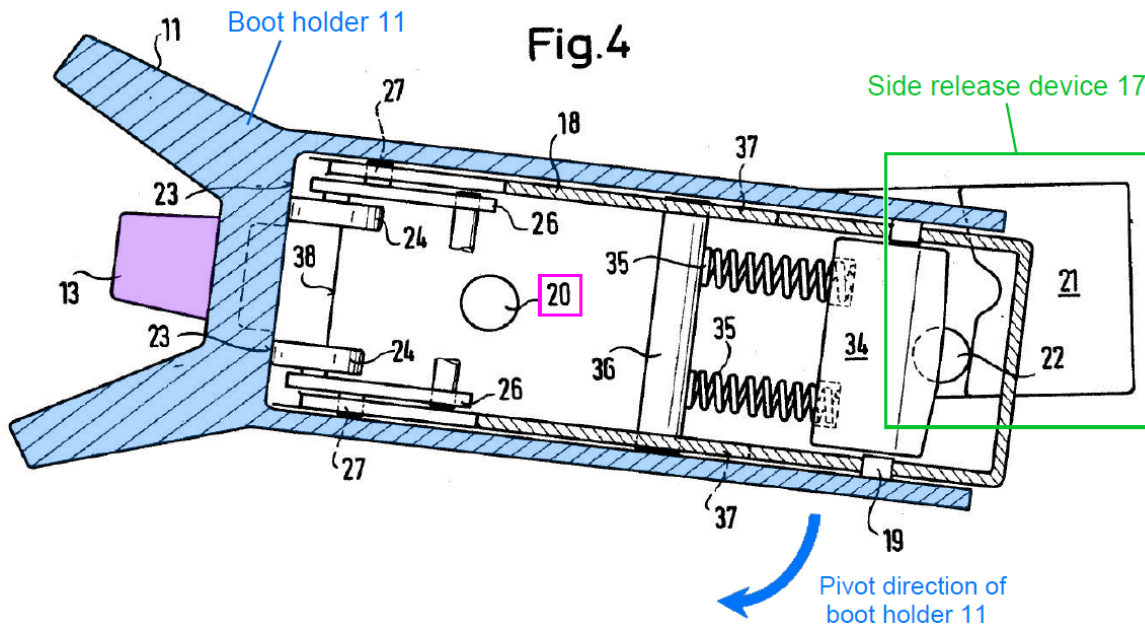
holder” with the boot heel “to such an extent that the tread spur can swing completely out of the slot” when a “lateral load is applied.” *Id.*, 3:9-11; *see supra* Section IX.A.1.



Ex-1006-Sittmann, FIG. 3 (annotated, cropped)

331. Once the lateral release is unlocked, side release device 17 enables boot holder 11 to pivot laterally about a vertical axis 20 in response to a “lateral force [that] is sufficiently large so that the detent roller 22 of the side release device 17 can emerge from the detent recess 21.” Ex-1006-Sittmann, 8:1-3, 11:20-23; *see supra* Section IX.A.1. Boot holder 11 is able to pivot laterally because tread spur 13, having been freed from slot 15, ceases to block the lateral movement of boot

holder 11. See *id.*, 3:7-9, 11:15-20. This lateral pivot of boot holder 11 releases the boot from the binding. *Id.*, 1:1-4, 13:1-4.



Ex-1006-Sittmann, FIG. 4 (annotated, labels moved for clarity)

332. The lateral boot release performed by *Sittmann*'s heel piece corresponds to the claimed "first release." Therefore, *Sittmann* discloses, or at least renders obvious, this element.

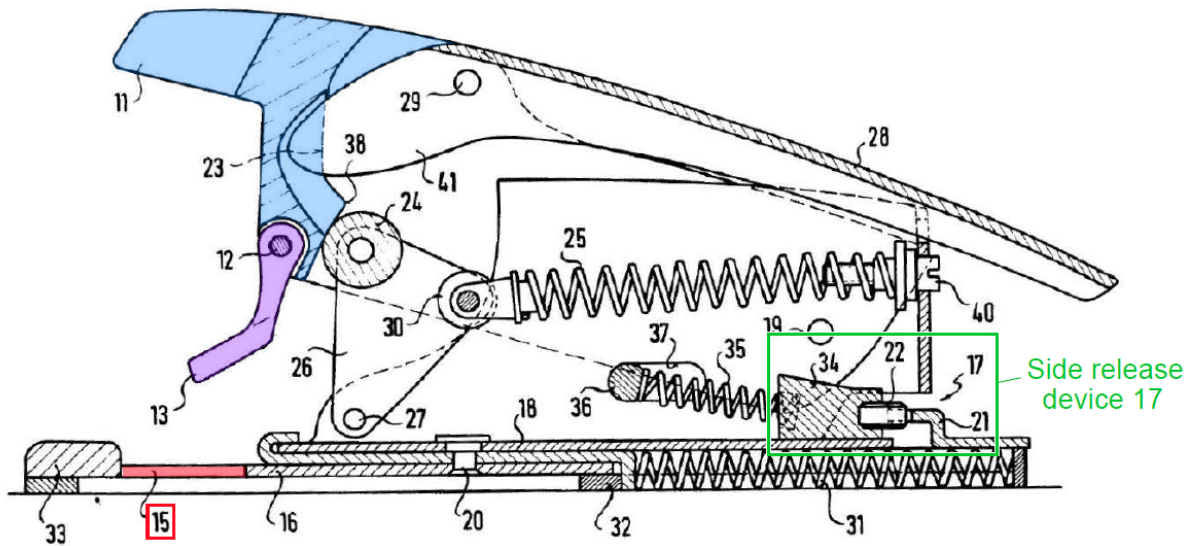
333. I understand that Patent Owner contends that a first release is "[a] mechanism within the ski binding assembly that allows separation of the ski boot from the ski automatically and without skier intervention in response to a predetermined external loading of the ski correlated to an estimated tibial axis load level selected to lessen the likelihood of ACL injury." See Ex-1010-Patent Owner's

Proposed Constructions. In my opinion, without agreeing with this proposed construction, *Sittmann* discloses, or at least renders obvious, this claim element.

- c. ***[58(b)]: “said ski binding assembly including release logic that causes the ski binding assembly to release the ski boot at said first release,”***

334. *Sittmann* discloses [58(b)]. As discussed above for [58(a)], *Sittmann*’s heel piece causes a lateral release of the ski boot during toward twisting falls (i.e., a “first release”). *See supra* Section IX.A.2.b. First, the lateral release is unlocked by lifting **boot holder 11** upward with the boot heel to free **tread spur 13** from **slot 15**. Ex-1006-*Sittmann*, 11:15-20. Then, **side release device 17** permits **boot holder 11** to pivot laterally when the binding experiences a lateral force of sufficient magnitude. *Id.*, 11:20-23. This lateral pivot of **boot holder 11** releases the boot from the binding. *Id.*, 1:1-4, 13:1-4. Thus, the claimed “release logic” corresponds to the combination of **boot holder 11**, **tread spur 13**, **slot 15**, and **side release device 17**, which together cause the “first release” of the boot. *See supra* Section IX.A.2.b.

Fig.3



Ex-1006-Sittmann, FIG. 3 (annotated)

335. Thus, in my opinion, *Sittmann* discloses, or at least renders obvious, this element.

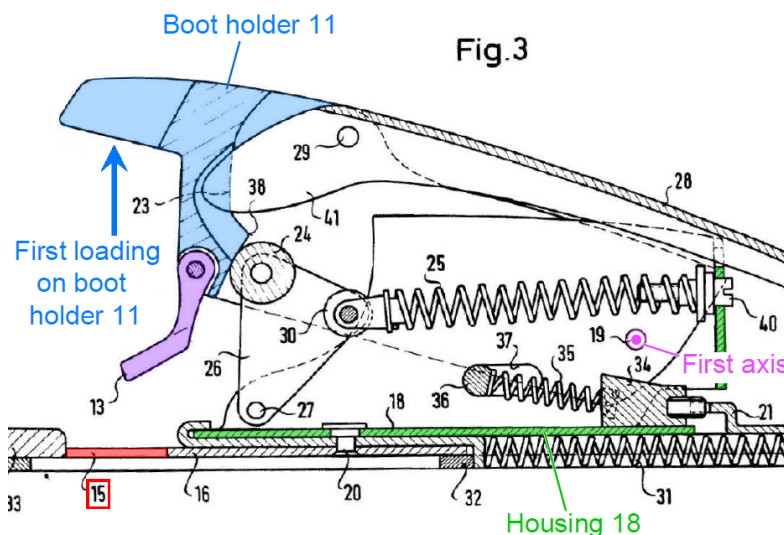
336. I understand that Patent Owner contends that release logic is “a specific sequence of actions executed by components of the ski binding assembly, and the components that execute the sequence of actions, in response to externally applied loads on the ski that allow or disallow binding release (via the first release) to occur dependent upon whether predetermined loading conditions are met that would indicate risk of ACL injury (i.e., the release condition).” See Ex-1010-Patent Owner’s Proposed Constructions. In my opinion, without agreeing with this proposed construction, *Sittmann* discloses, or at least renders obvious, this claim element.

- d. *[58(c)]: “said release logic set to activate said first release substantially only when: a first loading, internal to the ski system along or about a first axis and caused by an external loading applied to the ski system, exceeds a first defined level and has a first defined sense; and a second loading, internal to the ski system along or about a second axis and caused by the external loading, exceeds a second defined level and has a second defined sense;”*

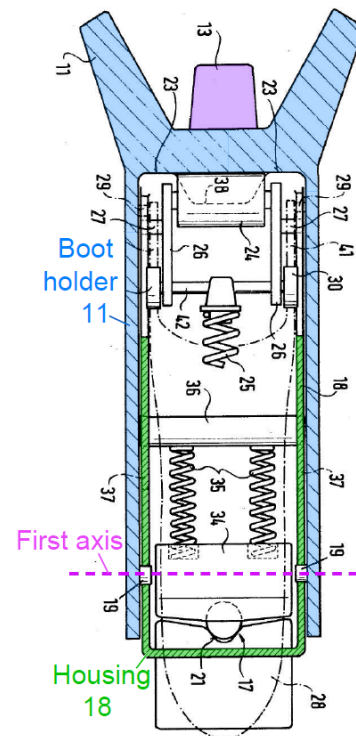
337. *Sittmann* discloses, or at least renders obvious, [58(c)]. Here, the claimed “first loading” corresponds to the loads experienced by the safety ski binding when the mechanism that allows lateral heel release is unlocked, as discussed above for [58(a)]. *See supra* Section IX.A.2.b. Further, the claimed “second loading” corresponds to the loads experienced by the heel piece when lateral heel release occurs. *See id.* The first loading and second loading on *Sittmann*’s heel piece are caused by the external forces exerted on the ski system when the skier experiences a forward, rotational fall necessitating a lateral release of the boot. *See Ex-1006-Sittmann*, 3:1-22.

338. The claimed “first loading” corresponds to the upward lifting force exerted by the boot heel on boot holder 11 to free tread spur 13 from slot 15. *See id.*, 3:9-12, 11:15-20. This lifting force causes boot holder 11 to “pivot around a transverse axis 19” relative to housing 18. *Id.*, 8:5-8, 14:6-10. Thus, transverse axis 19 corresponds to the claimed “first axis.” Further, the first loading exceeds a “first defined level” and has a “first defined sense,” as claimed, when boot holder 11 is

lifted so high that “the tread spur 13 can be forced out of the slot 15 in the event of a lateral force.” *Id.*, 11:16-20; *see also id.*, 3:7-12. That is, the “first defined level” and “first defined sense” correspond to the amount of force and direction of force required to lift boot holder 11 to the point of freeing tread spur 13 from slot 15. *See id.*, 11:16-20.



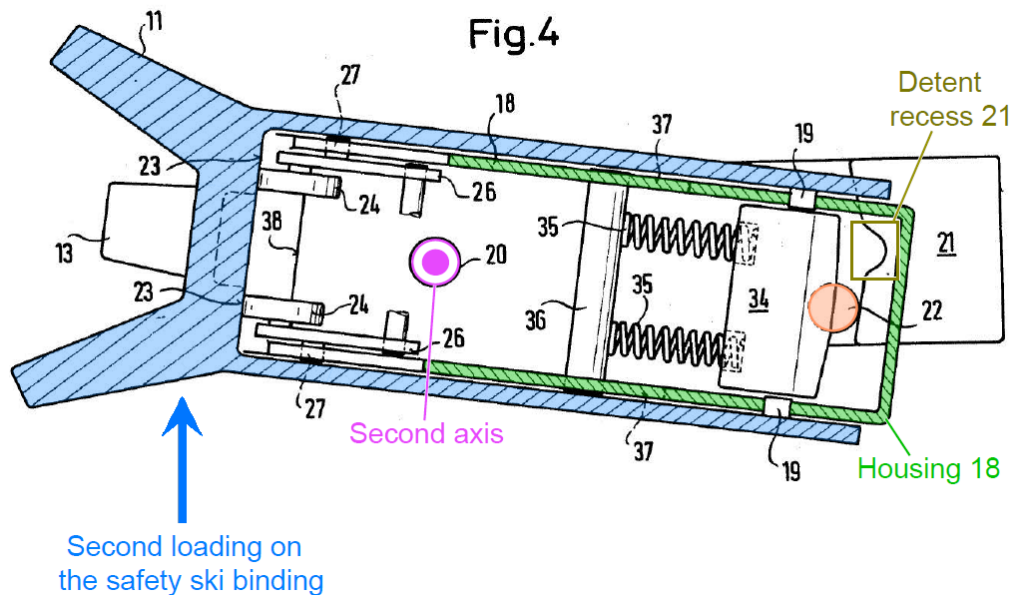
Ex-1006-Sittmann, FIG. 3
(cropped, labels removed)



Ex-1006-Sittmann, FIG. 2
(rotated)

339. Similarly, the claimed “second loading” corresponds to the lateral force experienced by the binding from the external lateral force generated during a forward rotational fall. The internal lateral force experienced by the heel piece causes boot holder 11 to pivot laterally to release the boot (after the lateral release

is unlocked). *See supra* Section IX.A.1. Specifically, the second loading corresponds to the “lateral force [that] is sufficiently large so that the **detent roller 22** of the side release device 17 can emerge from the **detent recess 21**.” Ex-1006-Sittmann, 11:20-23. The lateral force causes **housing 18** and **boot holder 11** to swivel around a **vertical axis 20** relative to bottom plate 16. *See id.*, 8:1-8. Thus, **vertical axis 20** corresponds to the claimed “**second axis**.” Further, the second loading exceeds a “second defined level” and has a “second defined sense,” as claimed, when the lateral force has sufficient magnitude to push **detent roller 22** out of **detent recess 21**. *Id.*, 11:20-23.



Ex-1006-Sittmann, FIG. 4 (annotated) (bottom plate 16 not shown)

340. Moreover, *Sittmann*’s release logic (as described above for [58(b)]) is “set to activate said first release substantially only when” the first loading “exceeds

a first defined level and has a first defined sense” and the second loading “exceeds a second defined level and has a second defined sense,” as recited in claim 58. This is because *Sittmann*’s heel piece only performs the lateral boot release if (1) boot holder 11 is lifted high enough to free tread spur 13 from slot 15, and (2) the lateral force experienced by the heel piece is strong enough to push detent roller 22 out of detent recess 21. *See id.*, 11:16-23. If either condition is not met, then the release logic is blocked from laterally releasing the boot. *See id.*, 3:1-7 11:15-16, 11:20-23. Therefore, *Sittmann* discloses this limitation.

341. At the least, *Sittmann* discloses or suggests this limitation because a person of skill would have understood and found it obvious that *Sittmann*’s internal components are set to activate a lateral heel release only once a first loading applied in the vertical direction lifts the heel of the boot far enough for a second loading applied in the horizontal direction to cause the boot to laterally release. To the extent Patent Owner attempts to improperly limit the claims to a sequential operation, a POSITA would have understood that *Sittmann*’s heel piece requires the first loading to exceed a first defined level and have a first defined sense before the second loading can exceed a second defined level and have a second defined sense, as claimed.

342. I disagree with Patent Owner’s contention that a first axis and a second axis are “substantially perpendicular to the plane of the ski” in claim 58. Claim 53

requires that the first and second axes are substantially parallel and spaced apart. To read into claim 58 a requirement to have the axes be perpendicular to the plane of the ski would render meaningless the requirement in claim 53 to have the axes be substantially parallel. The Patent Owner chose not to include any requirements for the orientation or relationship between the axes in claim 58. Thus, it is my opinion that claim 58 does not require the first and second axes to be substantially parallel nor does it require the axes to each be perpendicular to the plane of the ski.

343. I further understand that Patent Owner contends that a first loading is “[a] torque, moment or force resolvable at the first axis in response to an externally applied load on the ski,” and a second loading is “[a] torque, moment or force resolvable at the second axis in response to an externally applied load on the ski.” *See Ex-1010-Patent Owner’s Proposed Constructions.*

344. I also understand that Patent Owner contends that “internal to the ski system” and “caused by an external loading applied to the ski system” refers to “loads acting on and between parts of the ski binding assembly as a result of a load applied externally to the ski system such as by impact of a ski edge on the snow.” *See id.*

345. I further understand that Patent Owner contends that “said release logic set to activate said first release substantially only when” means “[t]he release logic enables the first release when both of the loading conditions set forth thereafter in

the claim are satisfied.” *See id.* Patent Owner further states that “‘substantially only’ addresses the fact that no ski binding system is 100% accurate and as such an expected small amount of false releases may occur but the occurrence of such false releases does not cause a ski binding that otherwise meets the requirements of the claim to fall outside the claim.” *See id.*

346. I also understand that Patent Owner contends that “exceeds” means “greater than (plain meaning),” that “first defined level” means “a magnitude of the first loading corresponding to a release setting of the binding at the defined release condition” and that a “first defined sense” is “the direction of the first loading corresponding to a release setting of the binding at the defined release condition.” *See id.*

347. I also understand that Patent Owner contends that “second defined level” means “a magnitude of the second loading corresponding to a release setting of the binding at the defined release condition” and that a “second defined sense” is “the direction of the second loading corresponding to a release setting of the binding at the defined release condition.” *See id.* Thus, it appears Patent Owner contends that the first and second defined senses refer to the directions that the first and second loadings are applied, respectively.

348. In my opinion, without agreeing with Patent Owner’s proposed constructions, *Sittmann* discloses, or at least renders obvious, these claim elements.

- e. ***[58(d)]: “wherein said ski binding assembly has a second release, said first release being an attenuated release relative to said second release;”***

349. *Sittmann* discloses, or at least renders obvious, [58(d)]. As discussed above for [58(a)], the claimed “first release” corresponds to the lateral boot release by side release device 17. *See supra* Section IX.A.2.b. Additionally, *Sittmann* discloses a “second release” corresponding to a lateral boot release by the toe piece. *See Ex-1006-Sittmann*, 3:12-15.

350. Specifically, *Sittmann* suggests that the disclosed ski binding assembly is “particularly useful with a heel binding, which interacts with a toe binding that also allows lateral release.” *Id.*, 3:12-14. *Sittmann* additionally discloses that “[n]ormally, the toe binding takes over the side release,” but that “the heel binding [] takes over the side release” when the toe binding experiences too much friction to release laterally (i.e., “when a lateral load is applied” while “the skier falls in a frontal direction”). *Id.*, 3:9-22. Here, the “first release” corresponds to a lateral release by the heel piece of the binding (as discussed above for [58(a)]), while the “second release” corresponds to a lateral release by the toe piece of the binding. *See id.*

351. A POSITA would have understood that a toe piece that allows lateral release is conventional and well known in alpine ski bindings at the purported time of the invention. As evidenced in *Howell*, “[h]eels that release only in the vertical

direction rely on mating ski binding toe units to provide lateral release in response to lateral stresses.” Ex-1007-*Howell*, [0003]. The Patent Owner likewise concedes that lateral release toe bindings were conventional. For example, the ’953 patent explains that “conventional toe release type ski bindings” exist (Ex-1001, 6:36-37), and compares the release envelope of a conventional lateral toe release binding to the release envelope of a ski system made in accordance with the purported invention of the ’953 patent. *Id.*, 7:1-16.

352. A POSITA would have thus understood that *Sittmann*’s toe piece would have been configured to perform the “second release” in response to large lateral loads on the ski assembly, including lateral loads caused by falls. At the time of the invention, conventional toe units with side-release capabilities were designed to release the boot in response to laterally-directed loads exceeding the release threshold setting. *See, e.g.*, Ex-1007-*Howell*, ¶ [0003] (“toe units release in response to lateral stresses”); Ex-1003-*Freudiger-1*, 2:34-40, 3:33-36. Therefore, a POSITA would have understood that *Sittmann*’s toe piece would have similar release capabilities in cases of large lateral loads.

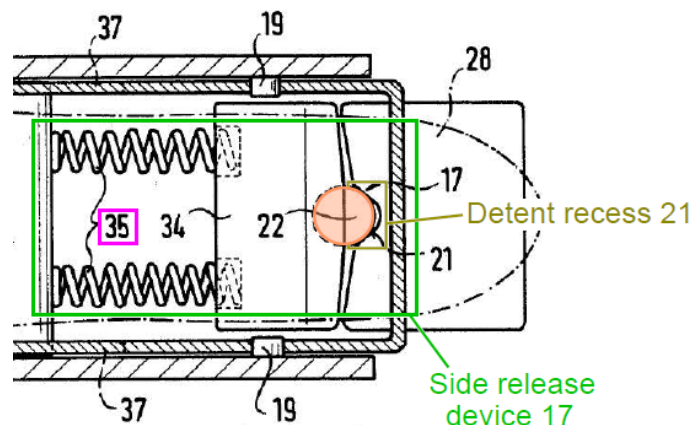
353. Further, the first release (i.e., lateral *heel* release) is “attenuated” relative to the second release (i.e., lateral *toe* release), as claimed. A POSITA would have understood that the first lateral release at the heel of *Sittmann*’s ski binding assembly is “attenuated” with respect to the second lateral release at the toe because

conventional lateral toe releases were well known (*see, e.g., Ex-1007-Howell*, ¶ [0003]; *Ex-1003-Freudiger-1*, 2:45-47, 3:33-36) and *Sittmann* disclosed a heel piece configured to laterally release the boot when the toe piece was unable to do so. *See Ex-1006-Sittmann*, 3:15-22. Thus, a POSITA would understand that the heel piece's lateral release threshold would be lower than the toe piece's lateral release threshold because a POSITA would understand that *Sittmann*'s toe piece would be set at conventional release levels while the heel piece would be set at a lower level, since the *Sittmann* heel piece was designed to release during dangerous falls in which a prompt release can minimize risk of injury.

354. Additionally, a POSITA would have understood, as evidenced by *Howell*, that “[a] heel that releases in the vertical direction only which relies on a lateral releasing toe can be dangerous to the knee” because certain loads can “act over the entire length of the lower leg” and produce “high strain across the anterior cruciate ligament of the knee.” *Ex-1007-Howell*, ¶ [0004]. Thus, a POSITA would have understood that to better protect the knee and to provide a safer alpine ski binding, the first lateral release at the heel would need to be attenuated with respect to the second lateral release at the toe.

355. Further, a POSITA would have known how to set the first release (i.e., lateral heel release) to be “attenuated” relative to the second release (i.e., lateral toe release), as claimed, because **side release device 17** is configured to set the lateral

release threshold of the heel piece to be lower than the lateral release threshold of the toe piece. See Ex-1006-Sittmann, 8:10-22. Sittmann discloses that side release device 17 of the heel piece includes a detent roller 22 that is “pretensioned towards the detent [recess] 21 by helical compression springs 35.” *Id.*, 8:12-15. Sittmann further discloses that the “release force can be adjusted in a lateral direction” by changing the pretension of springs 35 “by a screwing device, not shown for the sake of simplicity.” *Id.*, 8:18-22. That is, the amount of force required to laterally release the boot at the heel piece can be adjusted by changing the tension of springs 35. Accordingly, a POSITA would have understood that Sittmann’s ski binding assembly is configured to have an “attenuated” first release by adjusting the tension of springs 35 to set the heel piece’s lateral release threshold to be lower than the toe piece’s lateral release threshold.



Ex-1006-Sittmann, FIG. 2 (annotated, cropped)

356. I understand that Patent Owner contends that a second release is “[a] mechanism of the ski binding assembly that allows separation of the ski boot from the ski automatically and without skier intervention (i.e., releases) in response to a predetermined external loading of the ski correlated to an estimated maximum tibial axis load level selected to lessen the likelihood of tibial shaft injuries such as tibial spiral fractures.” *See* Ex-1010-Patent Owner’s Proposed Constructions. Indeed, Patent Owner appears to equate the second release to “the standard release mode in a typical prior art conventional alpine binding.” *See id.*

357. I also understand that Patent Owner contends that an attenuated release is “[a] release of the ski binding assembly that occurs at a lower tibial axis loading relative to another release.” *See id.*

358. In my opinion, without agreeing with these proposed constructions, *Sittmann* discloses, or at least renders obvious, this claim element.

359. At the least, *Sittmann* discloses or suggests this claim element because a POSITA would have understood that *Sittmann*’s heel piece, like most bindings, can be manually adjusted to decrease the level biasing of the heel piece, thereby lowering retention and requiring a smaller force to prompt a lateral release. *See e.g.*, Ex-1007-*Howell*, ¶ [0008]. Thus, a POSITA would have both understood and found it obvious that *Sittmann*’s heel piece can be adjusted to have a lower retention than

the toe piece, thereby providing for a lateral heel release (“first release”) that is attenuated relative to the lateral toe release (“second release”).

3. Claim 59

“wherein said first release is a first release torque about a tibial axis of a skier when the skier is wearing the ski boot and the ski boot is secured to the ski by said ski binding assembly and said second release is a second release torque about a tibial axis of a skier when the skier is wearing the ski boot and the ski boot is secured to the ski by said ski binding assembly.”

360. *Sittmann* discloses or at least renders obvious this element. As discussed above for [58(d)], *Sittmann* teaches a “first release” corresponding to a lateral release by the *heel* piece and a “second release” corresponding to a lateral release by the *toe* piece. See Ex-1006-*Sittmann*, 3:9-22, 11:16-23; see also *supra* Section IX.A.2.e. The toe piece performs the lateral boot release in most circumstances; however, “the heel binding [] takes over the side release” during forward, twisting falls, during which the toe piece is unable to laterally release due to increased friction. Ex-1006-*Sittmann*, 3:15-22.

361. As explained above for claim 58, a POSITA would have understood that *Sittmann*’s toe piece would have been configured to perform the “second release” in response to large lateral loads on the ski assembly, including lateral loads caused by falls. At the time of the invention, conventional toe pieces with side-release capabilities were designed to release the boot in response to laterally-

directed loads exceeding the release threshold setting. *See, e.g., Ex-1007-Howell*, ¶ [0003] (“toe units release in response to lateral stresses”); *Ex-1003-Freudiger-1*, 2:34-40, 3:33-36. Thus, a POSITA would have understood that *Sittmann*’s toe piece would have similar release capabilities in cases of large lateral loads.

362. Further, a POSITA also would have understood that the external loads triggering *Sittmann*’s “first release” and “second release” would have caused certain reaction forces on the binding assembly. *See generally, Ex-1003-Freudiger-1*; *Ex-1005-Dodge*; *Ex-1004-Freudiger-2*; *see also Ex-1007-Howell*, ¶¶ [0005]-[0011], claim 3. For instance, as evidenced by *Freudiger-1*, when a lateral falling load acts on a ski system, the skier’s boot exerts “reaction forces acting on the front (P_v) and rear (P_h) jaws” of the heel piece. *Ex-1003-Freudiger-1*, 2:34-40, FIG. 3b. And as *Freudiger-1* shows in Figure 3b (reproduced and annotated below), reaction forces P_v and P_h each create a torque about the skier’s tibial axis, which is the center of rotation of the skier’s boot. *See also id.*, 2:34-40. Thus, within *Sittmann*’s ski system, the lateral loads that trigger the first and second releases each create a torque about the tibial axis that causes lateral reaction forces acting on *Sittmann*’s toe and heel pieces.

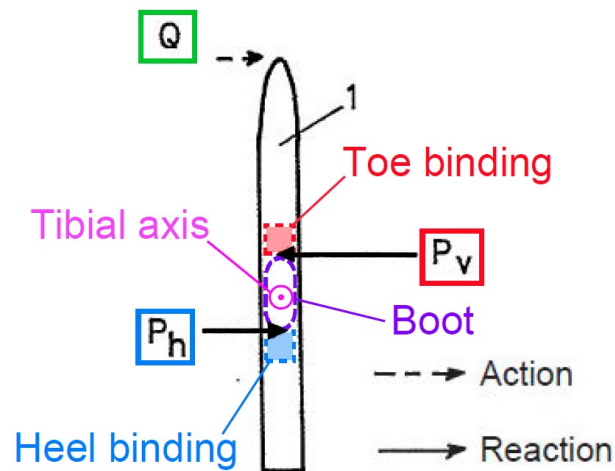


Fig. 3b

Ex-1003-Freudiger-1, FIG. 3b (annotated, with labels from FIG. 2)

363. Moreover, the torque acting on *Sittmann*'s heel piece during a forward twisting fall causes the heel piece to laterally release the boot if the torque surpasses the heel piece's release force threshold (i.e., if the torque "is sufficiently large so that the detent roller 22 of the side release device 17 can emerge from the detent recess 21"). Ex-1006-*Sittmann*, 11:20-23. Thus, the claimed "first release torque about a tibial axis of a skier" corresponds to the amount of torque required to cause the "first release" by side release device 17 of the heel piece. *See id.*, 11:20-23. Similarly, a POSITA would have understood that *Sittmann*'s toe piece would have been configured to perform the "second release" of the boot when the torque about the tibial axis surpassed the toe piece's release force threshold. *See, e.g.*, Ex-1011, §§ 3.1.3, 5.1 (providing "twist release torque values" for the "toe piece" of an alpine ski binding). Accordingly, the claimed "second release torque about a tibial axis of

a skier” corresponds to the amount of torque required to cause the “second release” by *Sittmann*’s toe piece. For these reasons, *Sittmann* discloses, or at least renders obvious, claim 59.

364. I understand that Patent Owner contends that “wherein said first release is a first release torque about a tibial axis of a skier . . . and said second release is a second release torque about a tibial axis” refers to “[t]he torque experienced at the tibial axis at binding release settings of the first release is the first release torque and the torque experienced at the tibial axis is at binding release settings of the second release is the second release torque.” *See* Ex-1010-Patent Owner’s Proposed Constructions.

365. In my opinion, without agreeing with this proposed construction, *Sittmann* discloses, or at least renders obvious, this claim.

B. *Sittmann* and *Gulick* Render Obvious Claim 60

1. Rationale for Combining *Sittmann* and *Gulick*

366. For the reasons set forth below, a POSITA would have been motivated to combine the teachings of *Sittmann* and *Gulick*. Before the priority date of the ’953 patent, it would have been obvious, beneficial, and predictable to utilize *Gulick*’s teachings regarding ski bindings with release thresholds below the ASTM-recommended settings. One of ordinary skill in the art would have been specifically

motivated to incorporate *Gulick*'s teachings because doing so would have addressed the goals of *Sittmann*.

367. As discussed above for [58(d)], *Sittmann* discloses an attenuated “first release” by the *heel* piece of a ski binding assembly, and a “second release” by the *toe* piece of a ski binding assembly. See Ex-1006-*Sittmann*, 3:9-22, 11:16-23; see also *supra* Section IX.A.2.e. A POSITA would have known that *Sittmann*'s toe piece is set (or would have found it obvious to set *Sittmann*'s toe piece) to have a release force threshold for the “second release” that complies with the ASTM Standard F939-05 because this was the industry standard practice for calibrating laterally-releasing toe pieces at the time of the purported invention. See Ex-1011, Intro, § 1; Ex-1005-*Dodge*, ¶¶ [0009], [0012]; Ex-1008-*Gulick*, 30, 32, Table 1. A POSITA would have wanted to follow the industry standard because it was established by leading experts in the field of alpine skiing safety. A POSITA further would have understood, in light of *Gulick*, that the release settings recommended by the ASTM standard exceed the maximum forces generated by most skiers. Ex-1008-*Gulick*, 47; see also Ex-1007-*Howell*, ¶ [0008].

368. As also discussed above for [58(d)], a POSITA would have understood and found it obvious that *Sittmann*'s heel piece – which has the “first release” – would have been adjusted to have a lower retention (that is, a lower release force threshold) than the toe piece, especially since the heel piece only releases laterally

during forward twisting falls, when a prompt boot release helps to reduce the risk of injury. *See supra* Section IX.A.2.e; *see also* Ex-1006-Sittmann, 3:9-22, 11:16-23. However, *Sittmann* does not quantify the reduction of the release force threshold for the heel piece (i.e., for the “first release”) relative to the toe piece. Thus, a POSITA would have looked to *Gulick* for further instruction on how much to reduce the release force threshold.

369. As discussed above, *Gulick* developed a computational “learning binding” that “use[d] measurements of the lateral force at the toe and the vertical force at the heel [of an alpine ski binding] as inputs to predict the release settings” for the learning binding. *Supra* Section VII.B.1; *see* Ex-1008-*Gulick*, 32-34, 47. *Gulick* found that the predicted release settings were “on average at least 22% less than the corresponding ASTM recommended setting.” Ex-1008-*Gulick*, 47. As a result, the learning binding “yield[ed] earlier releases in several falling scenarios” compared to bindings with ASTM settings, suggesting that a binding with lowered release thresholds “can significantly improve the safety of alpine skiing.” *Id.*, 30; *see also id.*, 47. Notably, *Gulick* also found that the “reduced settings result[ed] in no inadvertent releases predicted for any test subjects,” suggesting that the learning binding achieved similar performance as ASTM-calibrated bindings, despite having lowered release settings. *Id.*, 38, 47.

370. A POSITA would have been motivated to implement *Gulick*'s teaching of a 22% retention reduction in adjusting the lateral release settings of *Sittmann*'s heel piece. A POSITA would have been motivated to do so in order to attain the advantages described by *Gulick*: earlier releases in dangerous falling scenarios to improve safety and prevent knee injuries, without experiencing inadvertent boot releases. *See* Ex-1008-*Gulick*, 47. These advantages are particularly beneficial for *Sittmann*'s heel piece, which performs the lateral boot release during forward twisting falls that a POSITA would have understood pose a risk of ACL injury. *See* Ex-1006-*Sittmann*, 3:1-22, 11:15-20; *see also supra* Section IX.A.1. A POSITA would have understood that by incorporating *Gulick*'s teaching, *Sittmann*'s heel piece would yield earlier releases during falls, thereby limiting exposure of the skier's leg to injury-causing loads. *See* Ex-1008-*Gulick*, 34-35.

371. Further, any modification of *Sittmann*'s heel piece to accommodate the teachings of *Gulick*, including adjusting the settings of side release device 17, would have been well within the level of ordinary skill in the art. Indeed, *Sittmann* explains that "the release force can be adjusted in a lateral direction" by "provid[ing] the spring 35 with a suitable pre-tension." Ex-1006-*Sittmann*, 8:18-22. *Sittmann* understood that a POSITA would have known how to set the tension of spring 35 to achieve the desired lateral release setting. *Gulick* explains the quantity by which

a POSITA would have reduced *Sittmann*'s lateral heel release threshold (i.e., first release) as compared to the lateral toe release threshold (i.e., second release).

372. Accordingly, a POSITA would have found it obvious to apply *Gulick*'s teachings to *Sittmann* because the combination merely amounts to applying a known technique to a device ready for improvement.

2. Claim 60

“wherein said first release torque is at least 20% less than said second release torque.”

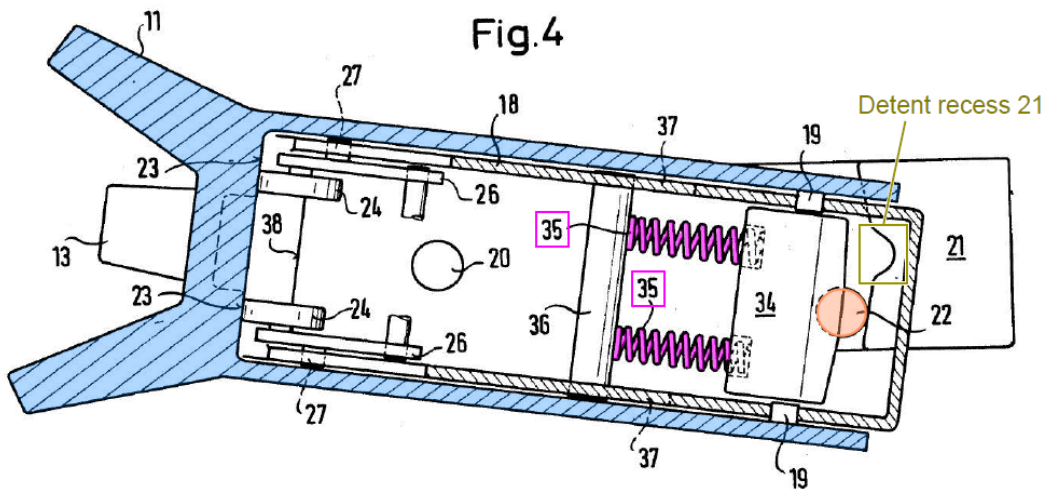
373. A POSITA would have been motivated to, or found it obvious to, set the threshold of *Sittmann*'s first release (by the heel piece) to be at least 22% less than the ASTM-recommended threshold of the second release (by the toe piece). *See Ex-1006-Sittmann*, 3:1-22.

374. This “at least 20%” element appears to be an arbitrary number. In my opinion, the '953 patent does not present evidence of why or how this number was selected or what benefit a reduction of at least 20% has over any other number. Thus, in my opinion, this number is not critical to the '953 patent's purported invention.

375. Regardless, a POSITA would have wanted to reduce the first release setting by this amount at least because doing so would have 1) brought the heel piece release settings closer to the maximum forces generated by most skiers, 2)

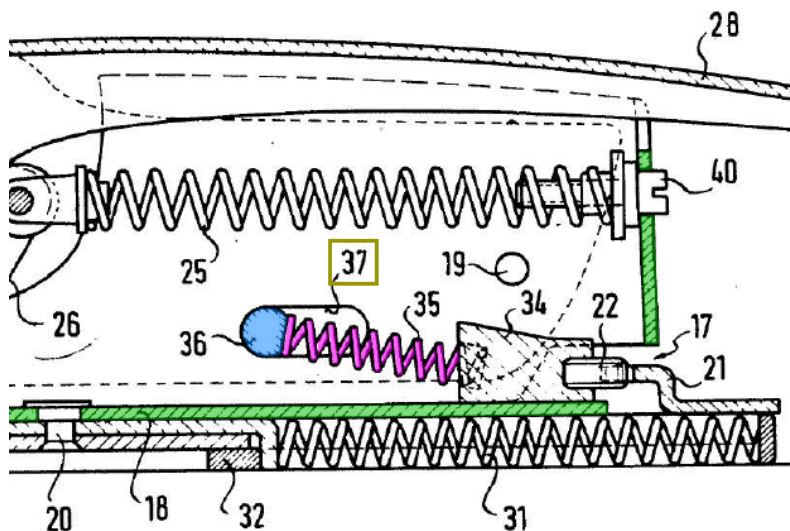
resulted in a faster release of the boot, 3) reduced the likelihood of a failure to release, and 4) created a safer ski binding. In my opinion, a POSITA would have been motivated by these factors because they contribute to the safety of the ski binding and prevent injuries during skiing.

376. Although *Gulick*'s teaching of at least a 22% reduced release setting is implemented electronically in *Gulick*, a POSITA would have known how to translate this teaching to *Sittmann*'s mechanical heel piece. Additionally, a POSITA would have expected success in modifying *Sittmann*'s heel piece to incorporate the reduced retention taught by *Gulick* because lateral release device 17 in *Sittmann*'s heel piece is well-equipped for such a modification. As explained by *Sittmann*, an at least 22% reduced release setting of the heel piece would have been accomplished by adjusting the compression of one or more **springs 35**, which control the amount of lateral force needed to push **detent roller 22** out of **detent recess 21**. See Ex-1006-*Sittmann*, 8:10-15, 11:20-23. This displacement of **detent roller 22** from **recess 21**, in turn, enables **boot holder 11** to rotate and release the boot. *Id.*, 11:20-23, 13:1-4.



Ex-1006-Sittmann, FIG. 4 (annotated)

377. *Sittmann* also discloses that the compression of **springs 35**, and thus the release torque setting for the heel piece, can be easily adjusted by displacing a **cross pin 36** (on which “**springs 35** are supported”) to “a desired position within the **elongated hole 37** [of **housing 18**] by a screwing device” until the desired tension of **springs 35** is achieved. *Id.*, 8:18-21.



Ex-1006-Sittmann, FIG. 1 (annotated, cropped) (screwing device not shown)

378. Given the simplicity of *Sittmann*'s release torque adjustment mechanism, it would have been well within the skill of the POSITA to identify a position of cross pin 36 with a corresponding tension of springs 35 that yields the reduced release setting taught by *Gulick*. See *id.*, 8:10-22. In other words, this combination would have involved “the mere application of a known technique”—reducing a ski binding's release setting by at least 22%, as *Gulick* teaches—“to a piece of prior art”—*Sittmann*'s heel piece—“ready for the improvement.” *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 417 (2007). And the result would have been a “predictable variation,” as the reduced release setting taught by *Gulick* would merely have “improve[d] similar devices”—*Sittmann*'s heel piece—“in the same way.” *Id.*

379. Additionally, a POSITA would have had a reasonable expectation of success in modifying *Sittmann*'s heel piece to incorporate the teachings of *Gulick* because the two references disclose similar releasable alpine ski bindings and because adjusting the amount of force required to cause a lateral boot release (i.e., adjusting the release setting) would have been routine before the earliest priority date of the '953 patent. Indeed, *Sittmann* and *Gulick* each describe similar ski conditions where release may be required (e.g., in response to a fall). See Ex-1006-*Sittmann*, 3:9-19; Ex-1008-*Gulick*, 31, 34-35. And, as noted above, each reference is analogous art to the '953 patent.

380. Moreover, it would have been obvious to a POSITA to adjust the release settings of *Sittmann*'s heel piece to come to the claimed invention. As noted above, it was within the skill of a POSITA to adjust the release force threshold of a ski binding. *Supra* Section IX.B.1; *see* Ex-1004-*Freudiger-2*, ¶ [0006] (explaining that "the safety ski binding releases according to its setting number," which can be adjusted); *see also* Ex-1007-*Howell*, ¶ [0008] (explaining that "skiers [can] manually increase the release level biasing of the ski bindings which increases the retention of the ski to the boot in the binding"). And because it was known that reducing the release setting of a ski binding by "at least 22%" or even "50%" as *Gulick* instructs creates safer ski bindings, a POSITA would have had a working range within which to routinely experiment. *E.I. DuPont de Nemours & Company v. Synvina C.V.*, 904 F.3d at 1006 ("where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation.") (citation omitted); *In re Peterson*, 315 F.3d 1325, 1329 (Fed. Cir. 2003) ("In cases involving overlapping ranges, we and our predecessor court have consistently held that even a slight overlap in range establishes a prima facie case of obviousness."). Petitioner contends that the '953 patent presents no evidence of criticality of the "at least 20%" limitation of claim 60 to refute the obviousness of this limitation.

381. For at least these reasons, the combination of *Sittmann* in view of *Gulick* renders obvious claim 60.

382. Lastly, I understand that Patent Owner contends that “wherein said first release torque is at least 20% less than said second release torque” refers to “[t]he the first release torque (as defined above) is lower than the second release torque (as defined above) by 20% or more.” *See* Ex-1010-Patent Owner’s Proposed Constructions.

383. In my opinion, without agreeing with this proposed construction, the *Sittmann* and *Gulick* combination discloses, or at least renders obvious, this claim element.

X. CONCLUSION

384. I am aware that this declaration will be filed as evidence in an IPR proceeding before the PTAB. This declaration and my opinions herein are made to the best of my knowledge and understanding, and based on the material available to me, at the time of signing this declaration. I declare that all statements herein made of my own knowledge are true, and all statements made on information and belief are believed to be true. I also declare that these statements were made with the knowledge that making willfully false statements in my declaration are punishable by fine or imprisonment, or both (under 18 U.S.C. § 1001).

385. I declare under penalty of perjury that the foregoing is true and correct.

Date: June 27, 2024

Maury L. Hill
Dr. Maury Hill