Filed: April 11, 2017

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

MARKER VOLKL USA, INC.
Petitioner,
v.

KNEEBINDING, INC.
Patent Owner.

Patent No. 8,955,867
Issue Date: February 17, 2015
Title: "Alpine Ski Binding Heel Unit"

Inter Partes Review No.: Unassigned

DECLARATION OF JASPER SHEALY IN SUPPORT OF PETITIONER'S PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 8,955,867

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1. My name is Jasper Shealy. I have been retained by counsel for Marker Volkl USA, Inc. ("Marker"). I understand that Marker intends to petition for *inter partes* review of U.S. Patent No. 8,955,867 ("the '867 patent") [MARKERVOLKL-1001], which is assigned to KneeBinding, Inc. I also understand that Marker will request the United States Patent and Trademark Office cancel certain claims of the '867 patent as unpatentable in an *Inter Partes* Review petition. I submit this expert Declaration, which addresses and supports Marker's *Inter Partes* Review petition for the '867 patent.

I. QUALIFICATIONS AND BACKGROUND

A. Education and Experience; Prior Testimony

2. I have been involved in skiing in one way or another since 1963 when I first began to ski. I have been an active researcher in the area of ski equipment since 1970. I have been active in the promulgation of international standards relating to ski equipment since 1973. I have served as a consult to the ski industry since 1975.

3. My academic credentials include:

- Ph.D., Industrial Engineering (Human Factors Engineering), State University of New York at Buffalo. Dissertation title: "The Effect of Risk Taking on Skilled Task Performance,"

1974. The "skilled task" referenced in my dissertation title was alpine skiing.

- MS, Industrial Engineering (Human Factors Engineering), State University of New York at Buffalo. Thesis title: "Epidemiology of Ski Injuries in a Closed Population," 1973.
- BS, Applied Experimental Psychology, Georgia Institute of Technology, Atlanta, GA, 1963.

4. I have been a life-long skier since 1963. My career in alpine winter sports injury research began with my Master's and Doctoral research while in graduate school in the early 1970s and continues to the present. I have been an invited faculty member at several American Academy of Orthopaedic Surgeons ("AAOS") Winter Sports Trauma workshops as well as the Maine Society of Orthopedic Surgeons and the New England Medical Association. I have also frequently been an invited speaker at the National Ski Patrol ("NSP"), National Ski Areas Association ("NSAA"), Canadian Ski Association, Canada West and other snow sports related organizations.

5. I have been a member of the International Society for Skiing Safety ("ISSS") since 1981, and am currently a member of its Board of Directors. I have attended and presented one or more papers at the various ISSS International Congresses on Ski Trauma since 1981. I have been a co-editor for the American

Society for Testing and Materials ("ASTM") STP series on *Ski Trauma and Safety* since 1999.

6. I have been a member of the ASTM and the ISSS since the early 1970s. I served as F27 Vice-Chair from 1993 to 1999, Chair from 2000 to 2006 and Vice-Chair again from 2007 to 2014. I served as a technical delegate representing the U.S. at ISO ("International Standards Organization") meetings on matters relating to ski and snowboard equipment issues from 1990 to 2013. I am the chair of the Statistics subcommittee and past chair of the Ski Boot subcommittee.

7. I have been doing nationwide ski injury research since 1978. I was the principal investigator for the ASTM shop practices feasibility study that led to the current shop practice standards that are now been adopted worldwide. I am the author or co-author of numerous technical papers dealing with various aspects of ski injury research, including overall trends, comparisons between skiing, snowboarding, and cross-country skiing, fatalities, ski boot design, specific injury mechanisms, and others.

8. As a member of ASTM F27, and ISO from 1973 to the present, I have been actively engaged in the promulgation of national and international standards, relating to ski binding and ski boot design and function. I have also participated in the research that forms the basis for many of these standards. In my earliest

research (1972), I examined the functional properties of ski binding design, and evaluated the functionality of traditional two release mode bindings as well as multi-release mode bindings. I have served as a consultant to a variety of binding designers and manufacturers, to include: Cubco, Look, Geze, Marker, Salomon, and Tyrolia.

9. I testified extensively from the late 1970s through 2010. I have testified on behalf of both plaintiffs and defendants on matters relating to ski injury mechanisms, the role of ski equipment as it relates to ski injuries, to include skis, boots, bindings, anti-friction devices, ski poles, ski goggles, ski helmets, and padding. I have testified relating to ski shop operations and also the role of standards as relate to skiing as well as patents relating to ski boots.

10. Additional details are provided in my CV, attached as MARKERVOLKL-1007.

B. Bases for Opinions and Materials Considered

11. In preparing this Declaration, I have considered the relevant portions of the following documents.

MARKERVOLKL Exhibit No.	Exhibit Title
1001	U.S. Patent No. 8,955,867 ("the '867 patent")
1002	U.S. Patent No. 8,955,867 File History

1003	Listing of Patents and Patent Applications Related to the '867 Patent
1004	Certified Translation of German Patent Application Publication No. DE 23 64 298 ("DE '298")
1005	U.S. Patent No. 4,553,772 ("the '772 patent")
1008	German Patent Application Publication No. DE 23 64 298 ("DE '298")
1009	Plaintiff KneeBinding, Inc.'s Opening Claim Construction Brief, filed in *KneeBinding, Inc. v. Marker Volkl USA, Inc.*, D. Vt., Case No. 2:15-cv-121-wks
1010	Marker Volkl USA, Inc.'s Opening Claim Construction Brief, filed in *KneeBinding, Inc. v. Marker Volkl USA, Inc.*, D. Vt., Case No. 2:15-cv-121-wks
1011	Plaintiff KneeBinding, Inc.'s Response to Marker Volkl USA, Inc.'s Opening Claim Construction Brief, filed in *KneeBinding, Inc. v. Marker Volkl USA, Inc.*, D. Vt., Case No. 2:15-cv-121-wks
1012	Marker Volkl USA, Inc.'s Responsive Claim Construction Brief, filed in *KneeBinding, Inc. v. Marker Volkl USA, Inc.*, D. Vt., Case No. 2:15-cv-121-wks
1013	U.S. Patent No. 4,484,763 ("the '763 patent")
1014	Canadian Patent Publication No. CA 2 360 819 A1 ("CA '819")

1015	U.S. Patent No. 4,298,213 ("the '213 patent")
1016	European Patent Application Publication No. EP 1 027 908 A1 ("EP '908")
1017	Certified Translation of European Patent Application Publication No. EP 1 027 908 A1 ("EP '908")

12. In forming the opinions provided below, I have considered the documents listed above and relied upon my knowledge and experience in the field of composite structures. I have considered the relevant documents in light of the general knowledge in the art as of February 18, 2003. In formulating my opinions, I have relied upon my experience in the relevant art. I have also considered the viewpoint of a person of ordinary skill in the art ("POSA") in the field of composite structures, as of February 18, 2003.

C. Scope of Work

13. I have been retained by Marker as a technical expert in this matter to provide various opinions regarding the '867 patent. I am being compensated at the rate of $450 per hour for my efforts in this case. No part of my compensation is dependent upon my opinions given or the outcome of this case. I do not have any current or past affiliation with KneeBinding, Inc. or the named inventor on the '867 patent.

II. SUMMARY OF OPINIONS

14. I have been asked to provide my technical expertise, analysis, insights and opinions regarding the ’867 patent and relevant references raised in the Petition. As described in detail below, I offer the following opinions in this Declaration.

15. It is my opinion for the reasons below that claims 1 and 4–9 of the ’867 patent are anticipated by German Patent No. DE 23 64 298 (“DE ’298”) [MARKERVOLKL-1008; certified English translation MARKERVOLKL-1004]. It is also my opinion for the reasons below that claims 1 and 4–9 of the ’867 patent are rendered obvious by U.S. Patent No. 4,553,772 (“the ’772 patent”) [MARKERVOLKL-1005] in view of DE ’298.

16. The claims of the ’867 patent relate to a heel unit for a ski binding that separates and isolates two or more force vectors, having an upper and lower heel assembly wherein the upper heel assembly has a lateral release assembly and a linkage element fixedly attached thereto that, along with two other surfaces, limits the motion of the lateral release assembly within a predetermined region within a plane defined by the longitudinal and horizontal axes of the ski. In my opinion, the claims of the ’867 patent are directed to a combination of conventional components to perform conventional functions that were well known in the art of ski bindings, including the separation and isolation of force vectors to allow lateral

release of the ski boot from the ski binding. This was disclosed in DE ’298 and/or in the ’772 patent in combination with DE ’298.

17. It is my opinion on the basis of anticipation and/or obviousness that claim 1 and 4–9 of the ’867 patent are invalid.

III. LEGAL STANDARDS

18. I am not a lawyer and will not provide any legal opinions. In preparing and forming my opinions set forth in this Declaration, I have been informed regarding the relevant legal principles. I have used my understanding of those principles in forming my opinions. My understanding of those principles is summarized below.

19. I have been told that Marker bears the burden of proving unpatentability by a preponderance of the evidence. I am informed that this preponderance of the evidence standard means that Marker must show that unpatentability is more probable than not. I have taken these principles into account when forming my opinions in this case.

20. I have also been told that claims should be construed given their broadest reasonable interpretation in light of the specification from the perspective of a person of ordinary skill in the art.

21. I have been informed and understand that, to anticipate a claim under 35 U.S.C. § 102, a reference must teach every element of the claim either expressly or inherently to a person having ordinary skill in the relevant art.

22. Further, I am told that the concept of patent obviousness involves four factual inquiries: (1) the scope and content of the prior art; (2) the differences between the claimed invention and the prior art; (3) the level of ordinary skill in the art; and (4) secondary considerations of non-obviousness.

23. I have been informed and understand that a patent claim is not patentable under 35 U.S.C. § 103 if the differences between the patent claim and the prior art are such that the claimed subject matter as a whole would have been obvious at the time the claimed invention was made to a person having ordinary skill in the relevant art. Obviousness, as I have been informed and understand, is based on the scope and content of the prior art, the differences between the prior art and the claim, the level of ordinary skill in the art, and, to the extent that they exist, certain objective indicia of non-obviousness.

24. I understand that objective indicia can be important evidence regarding whether a patent is obvious or nonobvious, 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 indicia 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.

25. I have been informed that whether there are any relevant differences between the prior art and the claimed invention is to be analyzed from the view of a person of ordinary skill in the relevant art at the time of the invention. As such, my opinions below as to a person of ordinary skill in the art are as of the time of the invention, even if not expressly stated as such; for example, even if stated in the present tense.

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. The person of ordinary skill faced with a problem is able to apply his or her experience and ability to solve the problem and also look to any available prior art to help solve the problem.

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 above, I have been informed by counsel that the obviousness analysis is to be conducted from the perspective of a person of ordinary skill in the art (a "person of ordinary skill") at the time of the invention.

31. I have also been informed by counsel that in defining a person of ordinary skill in the art the following factors may be considered: (1) the educational level of the inventor; (2) the type of problems encountered in the art; (3) prior art solutions to those problems; (4) rapidity with which innovations are made; and (5) sophistication of the technology and educational level of active workers in the field.

32. It is my understanding that a POSA is a hypothetical person who is presumed to be aware of all pertinent prior art, thinks along conventional wisdom in the art, and is a person of ordinary creativity. With respect to the '867 patent, a POSA in the February 18, 2003 timeframe would be an individual with a Bachelor's degree in mechanical engineering or related technology and three to five years of experience in either the design, fabrication, or manufacture of ski bindings and related equipment, research concerning ski bindings and related equipment, or the development of standards concerning ski bindings or related equipment, in addition to ten years or more of personal experience using ski bindings.

V. THE '867 PATENT [MARKERVOLKL-1001]

A. SUMMARY OF THE '867 PATENT

33. The '867 patent, entitled "Alpine Ski Binding Heel Unit," was filed on January 4, 2011 and issued on February 17, 2015. It is my understanding that it

ultimately claims priority to a provisional application filed on February 18, 2003. The ’867 patent is directed to a multi-directional release alpine ski binding heel unit that releases in the vertical and lateral directions.

34. The ’867 patent acknowledges that prior art ski bindings existed that provided for multidirectional heel release. MARKERVOLKL-1001, 2:5–10. The specification of the ’867 patent identifies that these multidirectional heel units have “unsatisfactory lateral and vertical retention of the ski to the boot,” giving rise to “pre-release.” *Id.*at 2:11–17. According to the ’867 patent specification, this pre-release is due to “improper cross-linking” of the lateral and vertical release mechanisms. *Id.*, 3:7–23.

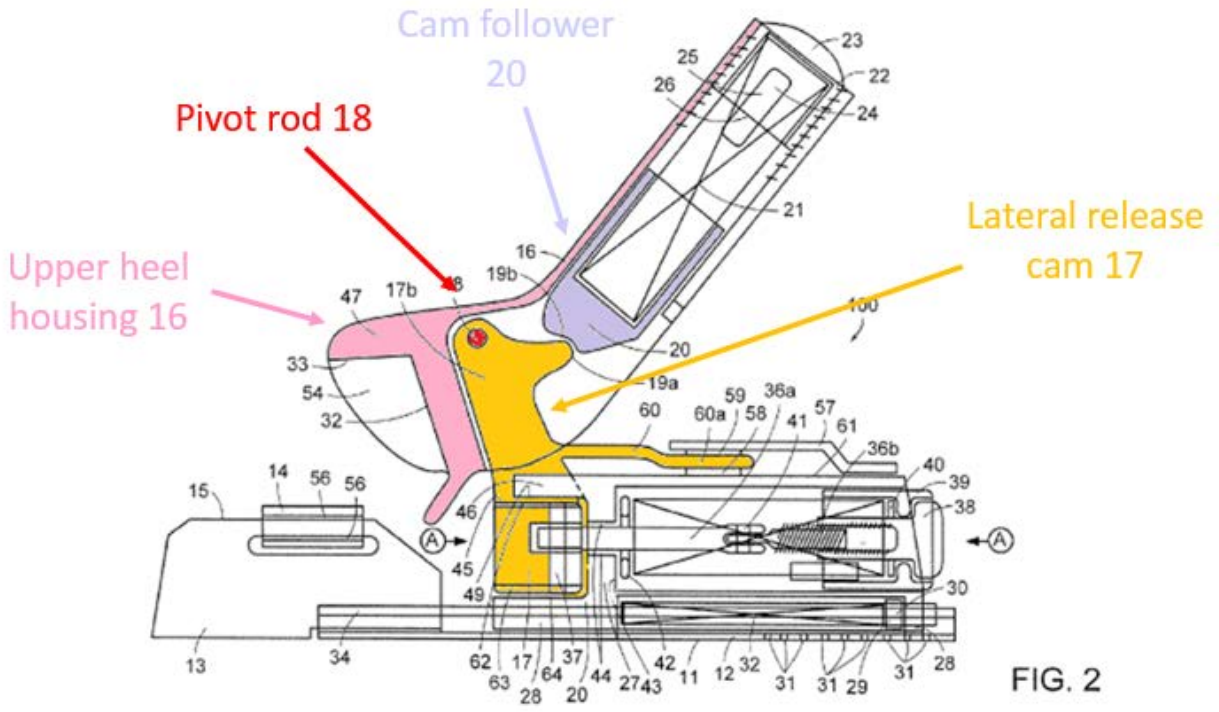
35. Specifically, the ’867 patent discloses a ski binding that resists against release of the ski boot in the upward direction and also resists against release of the ski boot in the lateral direction. *See id.*, 1:18–20. Independent Claim 1, directed to a “vector decoupling assembly” that separately resists against release of the ski boot in the upward and lateral directions, is provided below:

> 1. A vector decoupling assembly for separating and isolating two or more force vectors applied to a safety binding securing a heel portion of a ski boot to a ski, comprising:
>
> a lower heel assembly attached to the ski;
>
> an upper heel assembly coupled to the lower heel assembly and having a lateral release assembly for applying lateral securing pressure to the ski boot, the upper

> heel assembly comprising an upper heel housing that is configured to compress the heel portion of the ski boot downward;
>
> a linkage element fixedly attached to the lateral release assembly;
>
> wherein the linkage element, a first surface and a second surface cooperate to limit motion of the lateral release assembly to within a predetermined region within a plane defined by the longitudinal and horizontal axes of the ski.

Id., Claim 1.

36. FIG. 2, as I have annotated below, identifies the main components of the ski binding for resisting against release in the vertical direction, and FIG. 4, as annotated below, identifies the main components of the ski binding for resisting against release in the lateral direction. FIG. A illustrates the interaction of the disclosed ski binding with a ski boot.



Id., FIG. 2, p. 4 (annotations in color).

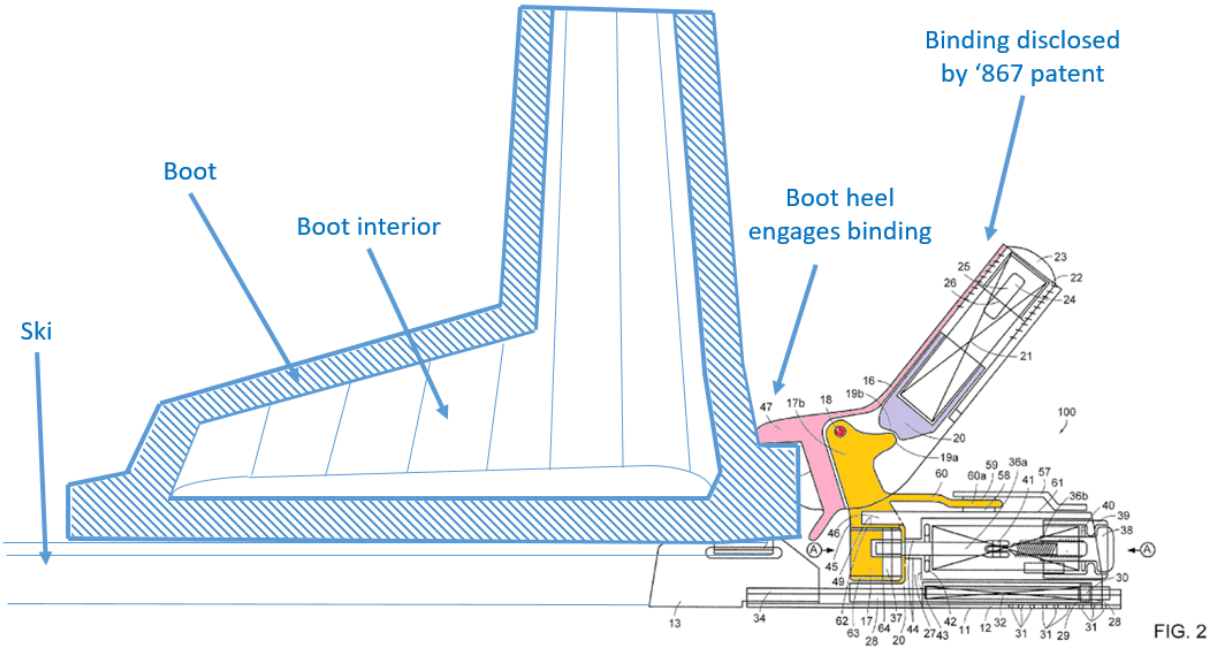


FIG. A. Ski binding of '867 patent and ski boot

37. With reference to FIG. 2 with respect to vertical forces, upper heel housing 16 (pink) connects to lateral release cam 17 (gold) by way of a pivot rod 18 (red). The vertical release spring 21 (shown by an "X") in the large internal pocket of the upper heel housing 16 pushes cam follower 20 (lavender). The upper heel housing 16 holds and compresses a ski boot heel downward to oppose the upward forces generated by the ski boot during skiing. *Id.*, 6:4–23.

38. In operation, in response to upward vertical forces being applied to region 33, cam follower 20 moves along the length of the pocket of the long axis of upper heel housing 16. The shape of cam surfaces 19a on lateral release cam 17 and 19b on cam follower 20 control the relationship of the forces and corresponding displacement of cam follower 20, as biased by spring 21, which allows for the rotational displacement about a horizontal axis 18 of upper heel housing 16 and the vertical displacement of the ski boot in concert with region 33. *Id.*, 6:30–39.

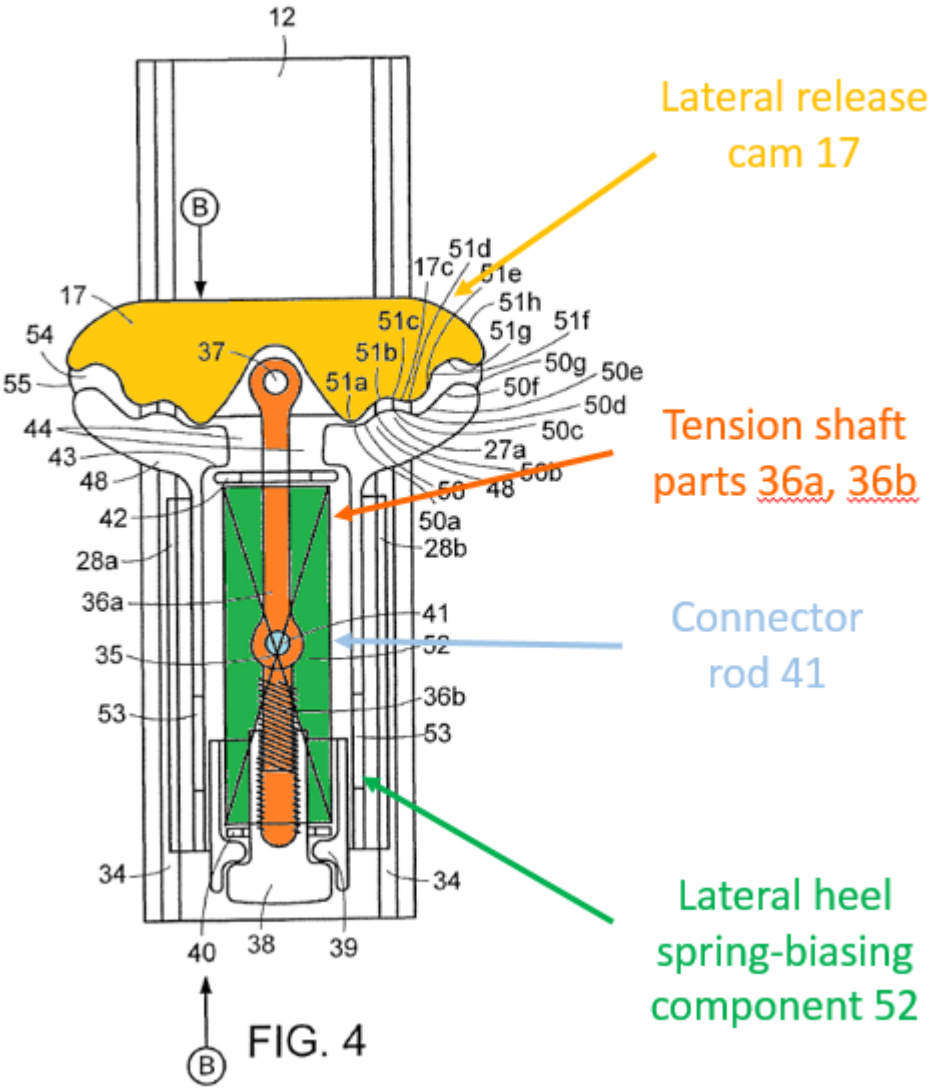


FIG. 4

Id., FIG. 4, p. 6 (annotations in color).

39. As shown in annotated FIG. 4, with respect to lateral forces the lateral heel release mechanism comprises lateral release cam surfaces 17c and lower heel housing lateral cam surfaces 27a, which are biased (*i.e.* forced together) by lateral heel spring-biasing component 52 (green). Lateral spring biasing component 52 includes lateral heel release spring 35 (shown by an "X") that is placed in

compression by the opposing force of the tension shaft parts, 36a and 36b (orange), and connector rod 41 (light blue). *Id.*, 9:7–13. The compression of lateral heel release spring 35 is adjustable by screw 38. *Id.*, 10:60–63.

40. In operation, in response to the application of a lateral force to lateral release cam 17, lateral heel release cam surfaces allow the lateral release cam 17 (gold) to both rotate and translate relative to the lower heel housing 27, so that the heel area of the ski boot can displace laterally relative to the longitudinal and horizontal axes of the ski, *i.e.* the plane parallel to the bottom surface of the ski as shown in the annotated FIG. B below. *Id.*, 5:65–67, 9:33–40. Boot displacement occurs when lateral loads are induced that overcome the compressive force of lateral heel release spring 35. Such lateral movement of the boot occurs across low-friction element 14 and heel pad top surface 15, as well as laterally against heel cup 47 boot-interface surfaces 32 and 33. *Id.*, 9:33–40.

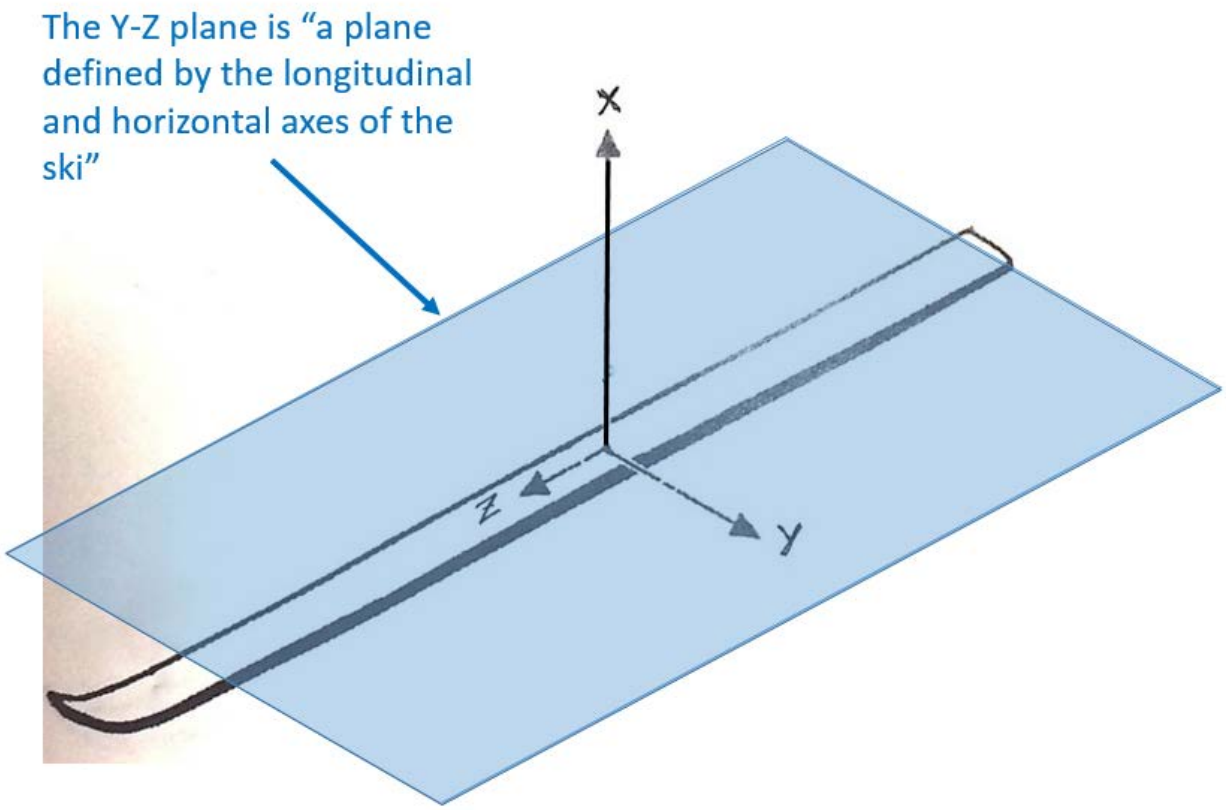


FIG. B. A plane defined by the longitudinal and horizontal axes of the ski.

B. PROSECUTION HISTORY OF THE '867 PATENT

41. The application as filed included one independent claim directed to a ski binding having a vector decoupling assembly. MARKERVOLKL-1002, 220. During prosecution dependent claims 2–9 were added and Claim 1 was amended in order to distinguish over the cited art. [1] *Id.*, 36, 141. In response to a rejection that

[1] Claim 1 was also amended during prosecution to address informalities under 35 U.S.C. § 112. MARKERVOLKL-1002, 141.

Claim 1 was anticipated by U.S. Patent 4,505,494 to Gertsch, applicant amended claim 1 as follows:

> **1.** (Currently Amended) A vector decoupling assembly for separating and isolating two or more force vectors applied to a safety binding securing a heel portion of a ski boot to a ski, comprising:
>
> a lower heel assembly attached to the ski;
>
> an upper heel assembly coupled to the lower heel assembly and having a lateral release assembly for applying lateral securing pressure to the ski boot, the upper heel assembly comprising an upper heel housing that is configured to compress the heel portion of the ski boot downward;
>
> a linkage element fixedly attached to the lateral release assembly; wherein the linkage element, a first surface and a second surface cooperate to limit motion of the lateral release assembly to within a predetermined region within a plane defined by the longitudinal and horizontal axes of the ski.

Id., 36.

42. Applicant also provided arguments that it had distinguished over Gertsch in its previous responses that Gerstch discloses "a base plate for a lateral release means associated with the *toe ball portion* of a ski boot." *Id.*, 38 (emphasis in original). The applicant further added that, to expedite prosecution, it amended the claim to make clear that, because "Gertsch discloses an assembly to hold down a *toe* portion of a ski boot", it did not disclose the new limitation to the upper heel

assembly for engaging with the heel portion of a ski boot. *Id.* (emphasis in original).

43. In response to the Applicant's claim amendment and arguments, the examiner allowed claims 1–9. *Id.*, 8–14.

C. CLAIM CONSTRUCTION

44. I have been informed and understand that, in the related District Court litigation, Petitioner and Patent Owner dispute the construction of the claim terms set forth in the Challenged Claims.[2] However, in my opinion specific construction of any claim term is not required for purposes of this Petition because the prior art relied on meets each of the claim limitations under any reasonable construction of the terms. In particular, I have been informed and understand that, in the related litigation, patent owner contends that the claim terms should be given their plain and ordinary meaning, and applying that approach, I believe that the Challenged Claims are unpatentable in view of the prior art relied on.

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[2] I have been informed and understand that Petitioner's claim construction briefing is attached as MARKERVOLKL-1010 and MARKERVOLKL-1012 and Patent Owner's claim construction briefing is attached at MARKERVOLKL-1009 and MARKERVOLKL-1011.

D. PRIORITY DATE

45. The ’867 patent was filed on January 4, 2011 and, as I understand it, claimed priority to U.S. Provisional Patent Application Ser. No. 60/448,645, filed on February 18, 2003. It my understanding that Patent Owner claims that the effective filing date of the claims of the ’867 patent is February 18, 2003. Therefore, I conduct my analysis based on this date.

VI. STATE OF THE ART

46. Alpine touring bindings have been in use for winter sports for as much as perhaps 4,000 years based on cave pictographs in Scandinavian countries. They have evolved from simple equipment that originally consisted of little more than wooden skis with simple leather straps that ordinary hiking boots could slip into.

FIG. C. Cave drawing of pre-historic skiing.

FIG. D. Late 1800s ski equipment with toe strap.

47. In the latter half of the 19th and the early 20th century, ski clubs became fashionable. At this time, about the only way to get to the top of the ski slope was by climbing, so most skis intended for downhill skiing still retained the ability to have a free heel for the uphill climb part of skiing. The equipment of the day usually was called a "cable" binding. By the 1930s mechanical uphill lift devices began to appear. With the advent of an uphill lift facility, the uphill climbing part of downhill skiing began to fade. At the same time, as downhill skiing evolved, the equipment became more and more specialized. The progression is shown below in pictures from my collection.

FIG. E. 1920s–1930s ski equipment with toe held in metal clamp with cable to control heel function.

FIG. F. Ski equipment from the 1940s, in the front, with the toe held in a clamp device and the 1950s, in the rear, having a ski-boot-binding combination.

FIG. G. Current ski-boot-binding combinations for downhill skiing, in the front, and alpine touring, in the rear.

48. English tourists on winter vacations in Switzerland in the late 19th century popularized what today is called "downhill" skiing. Once the "sport" of skiing down hills became a recreational activity, equipment began to evolve.

49. For downhill skiing it was important for the boot heel to be held in place in order to exert greater control over direction. As speeds increased, it became important to be able to exert control over direction. Toe bindings evolved that held the boot more securely to the ski as well, and ski boots became stiffer to allow for greater control. A distinction was made between skiing as a means of transportation, versus a recreational sport. This distinction led to different requirements and different equipment related solutions.

50. As downhill ski equipment evolved in the mid-20th century, it became commonplace for the ski-boot-binding system to have a release capability to make the sport safer. The development of downhill bindings included, among other things, the standardization of the ski boot sole at the toe and the heel, so the binding designer would know in advance the shape of the boot at the toe and heel, as the boot and binding work together in a cam-follower system.

51. The knowledge of, and desire for, release modes beyond just lateral at the toe and vertical at the heel was common in the 1960s and beyond. Numerous designers and manufacturers offered a rich variety of solutions to the multi-release issue.

52. In the 1960s and beyond there were numerous bindings that provided what was known as multi-release capabilities. Traditional bindings only provided two release modes, *i.e.* lateral at the toe and vertical at the heel. In addition to the traditional release modes, these innovative designs included additional release modes such as vertical at the toe, lateral at the heel, forward at the toe, roll about the lateral axis, and responses to combined loads.

53. For example, Alsop, Americana, Besser, Burt, Cubco, Eckl, Gertsch, Geze, Head, Look , and Moog among others, manufactured multi-release bindings. The images below are those taken by me from my collection of ski bindings.

FIG. H. Cubco design from 1955 for vertical release at the toe.

FIG. I. Burt design from the 1970s, allowing for release vertically and laterally at toe and heel.

FIG. J. Besser design from later 1970s, allowing for release vertically and laterally at toe and heel.

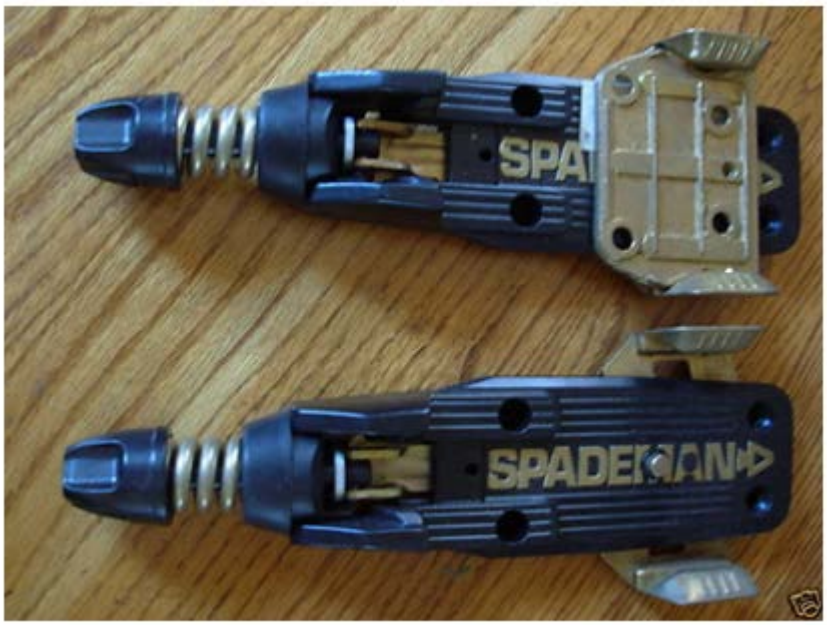


FIG. K. Spademan design from the 1980s, allowing for release vertically, laterally, and straight ahead.

FIG. L. Look design from the 1980s, allowing for vertical release at toe.

54. As shown above, in some prior art bindings, it was common for the toe binding to accommodate lateral forces, while the rear binding accommodated vertical forces. One proposed improvement to these prior art bindings was to concentrate the release features in the rear binding, which provides the benefit of a simpler and more economical retention system that eliminated the need for the front binding to contain a release mechanism. *See*, *e.g.*, MARKERVOLKL-1013 (U.S. Patent No. 4,484,763 ("the '763 patent")), MARKERVOLKL-1014 (Canadian Patent Publication No. CA 2 360 819 A1 ("CA '819")), MARKERVOLKL-1015 (U.S. Patent No. 4,298,213 ("the '213 patent")), MARKERVOLKL-1016 (European Patent Application Publication No. EP 1 027

908 A1 ("EP '908")), MARKERVOLKL-1017, p. 2 (Certified Translation of European Patent Application Publication No. EP 1 027 908 A1 ("EP '908")). For example, EP '908 discloses a jaw which is biased against vertical forces by springs 17 and 18, and biased against lateral forces by spring 42. EP '908 teaches that the separate biasing means can be independently adjusted. For example, springs 17 and 18 are adjusted by adjustment assembly 19, and spring 42 is adjusted by adjustment assembly 43. This arrangement provided for independent adjustment of the biasing means to allow an optimal adjustment of the release means for each skier.

55. The '763 patent also discloses an automatic heel-releasing mechanism that can open under an overload. In the '763 patent, an upwardly directed force causes the automatic heel-release mechanism to release by conventional safety opening movements. MARKERVOLKL-1013, 3:54–60. When the lateral load exceeds the initial compression of the springs, the detent roller 14 forces the piston 16 back against the force of the compression spring 17. The detent roller 14 then leaves detent aperture 18 and runs up surface 19. During a transverse movement the cam follower pin 32 of the locking level 30 performs a lateral movement in the cam groove 33. *Id.*, 3:65–4:14. This arrangement provides for separate vertical and lateral release.

56. Likewise, in CA ’819, lateral release devices that were once disclosed for use in a front jaw are applied to a rear sole holder, such that there may be downward projecting dog attachments on each side of a central pivot pin supporting the sole holder against lateral outward pivoting and a pressure piece mounted to the rear jaw that can be displaced in the lengthwise direction of the binding and loaded by a compression spring. CA ’819 also discloses the rear jaw as pivoting about a substantially vertical central pivot pin fixed on the rear jaw for lateral release. MARKERVOLKL-1014, 17–18, 21, 30, 33–34. Therefore, CA ’819 also discloses a separate lateral release mechanism independent of the vertical release at the heel.

57. The ’213 patent discloses an adjustable upward release mechanism that includes an adjustable upward release spring adapted to release the housing and sole clamp for upward pivotal movement about a transverse axis once the release setting on the spring is exceed. The ’213 patent also discloses a sideways release mechanism with an adjustable sideways release spring bearing against the housing and adapted to allow the sole clamp to be displaced sideways in either direction of the housing when the release setting of the spring is exceeded. MARKERVOLKL-1015, Abstract.

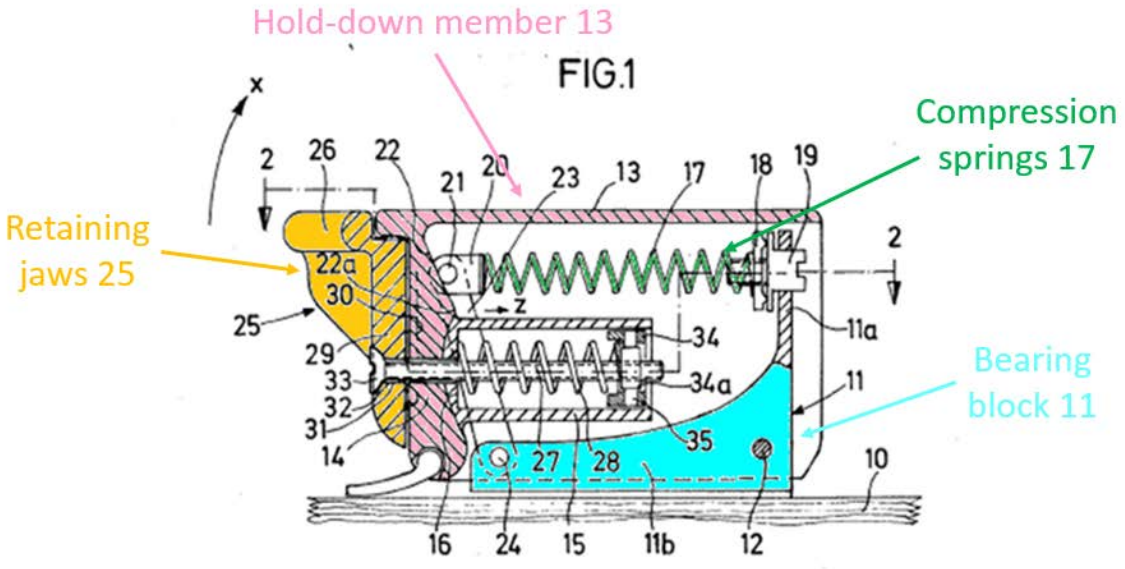
VII. UNPATENTABILITY OF THE CHALLENGED CLAIMS OF THE '867 PATENT

1. DE '298 [MARKERVOLKL-1008, certified translation at MARKERVOLKL-1004]

58. DE '298 relates to a safety ski binding with "a front or rear retention of the shoe on the ski . . . as well as for releasing the shoe both in the upward direction as well as also in the lateral direction against a release resistance in the event of excessively strong releasing forces." MARKERVOLKL-1004, 2. The object of the invention in DE '298 is "to achieve a reliable retention of the shoe in the normal mode as well as also maximum safety in the event of a fall, in particular, in the event of a forward or rearward fall and also a rotation fall." *Id.*, 3. In other words, the ski binding in DE '298 releases in both the vertical direction and the lateral direction. *Id.*, 4.

59. Specifically, DE '298 discloses a ski binding that resists against release of the ski boot in the upward direction and also resists against release of the ski boot in the lateral direction, wherein the resistance can be "dimensioned and adjusted independently of each other." *Id.* FIG. 1, as annotated below, identifies the main components of the ski binding for resisting against release in the vertical direction, and FIG. 2, as annotated below, identifies the main components of the ski binding for resisting against release in the lateral direction. I additionally provide annotated versions of FIG. 1 and FIG. 2, labeled FIG. M and FIG. N,

below, to illustrate the interaction of the ski binding disclosed by DE ’298 and a ski boot.



Id., FIG. 1, p. 16 (annotations in color).

60. With reference to FIG. 1 with respect to vertical forces, hold-down member 13 (pink) is pivotably attached at 12 to bearing block 11 (blue) to allow rotational movement of the hold down member 13 in the clockwise direction of x. Bearing block 11 is mounted to ski 10. A pair of compression springs 17 (green) interact with front cross wall 14 and are biased to oppose any upward movement of hold-down member 13. The compression force of springs 17 is adjustable by adjustable screw 19. *Id.*, 7. Retaining jaw 25 and its arms 26 (gold) engage with the heel of the ski boot as a heel holder and are attached to the front wall 14 (gold) of the hold-down member by rod-shaped tension member 27. *Id.,* 8.

61. In operation, in response to a strong upward-directed force, the hold-down member 13 and heel holder 25 are swiveled upwards together in the direction of arrow x. *Id.*, 9. In this way, if the upward-directed force is greater than the compressive force imparted by springs 17, the hold-down member 13, together with the heel-holder 25, will move upwards and release the heel of the ski boot from engagement with the ski.

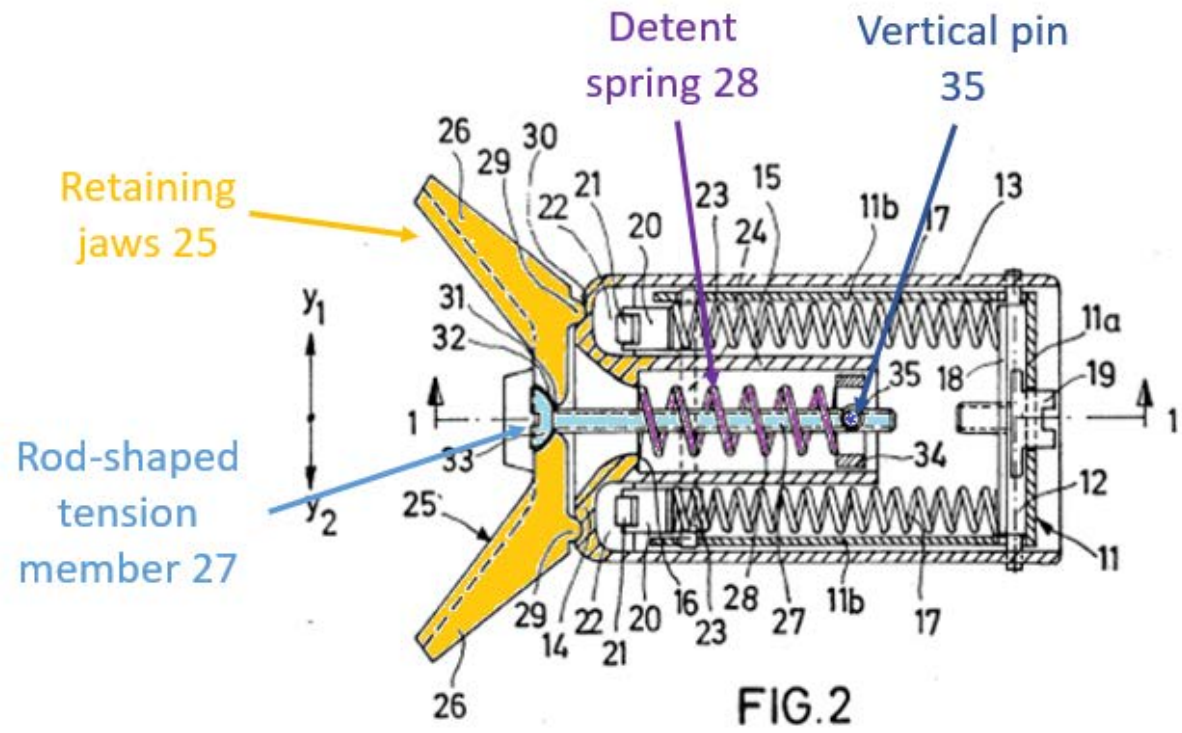


FIG.2

Id., FIG. 2, p. 16 (annotations in color).

62. With reference to FIG. 2 with respect to lateral forces, retaining jaw 25 (gold) is fixedly attached to hold-down member 13 by rod-shaped tension member 27 (light blue) and detent spring 28 (purple). Tension member 27 is

pivotably attached by vertical pin 35 (dark blue) to spring abutment 34, which allows for movement of the tension member 27 in the lateral direction. Detent spring 28 urges detent cams 29 of retaining jaw 25 to engage detent recesses 30 on the front face of hold-down member 13. The compression of detent spring 28 is adjustable by screw 33. *Id.*, 8.

63. In operation, in response to a strong lateral force in the direction of Y_1 or Y_2, heel holder 25 swivels in the corresponding transverse direction. As a result, the detent cams 29 are swiveled in their recesses 30 against the action of detent spring 28. Tension member 27 swivels in the lateral direction about pivot 35. In this way, if the lateral force in the direction of Y_1 or Y_2 is greater than the force imparted by detent spring 28, heel holder 25 swivels so far laterally as to release the heel of the ski boot from engagement with the ski. *Id.*, 9.

64. FIGS. M and N illustrate the interaction of the ski binding of DE '298 with a ski boot. Retaining jaws 25 engage and retain a heel portion of the ski boot.

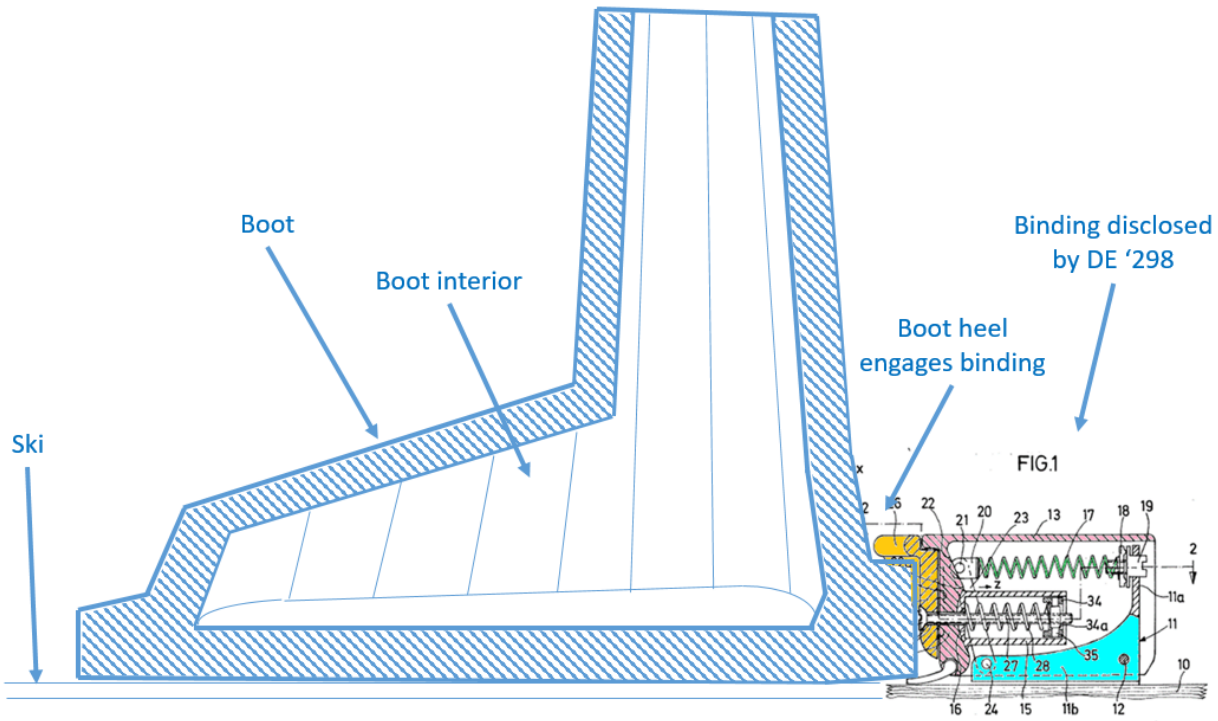


FIG. M. Side cutaway view of ski binding of DE '298 with ski boot.

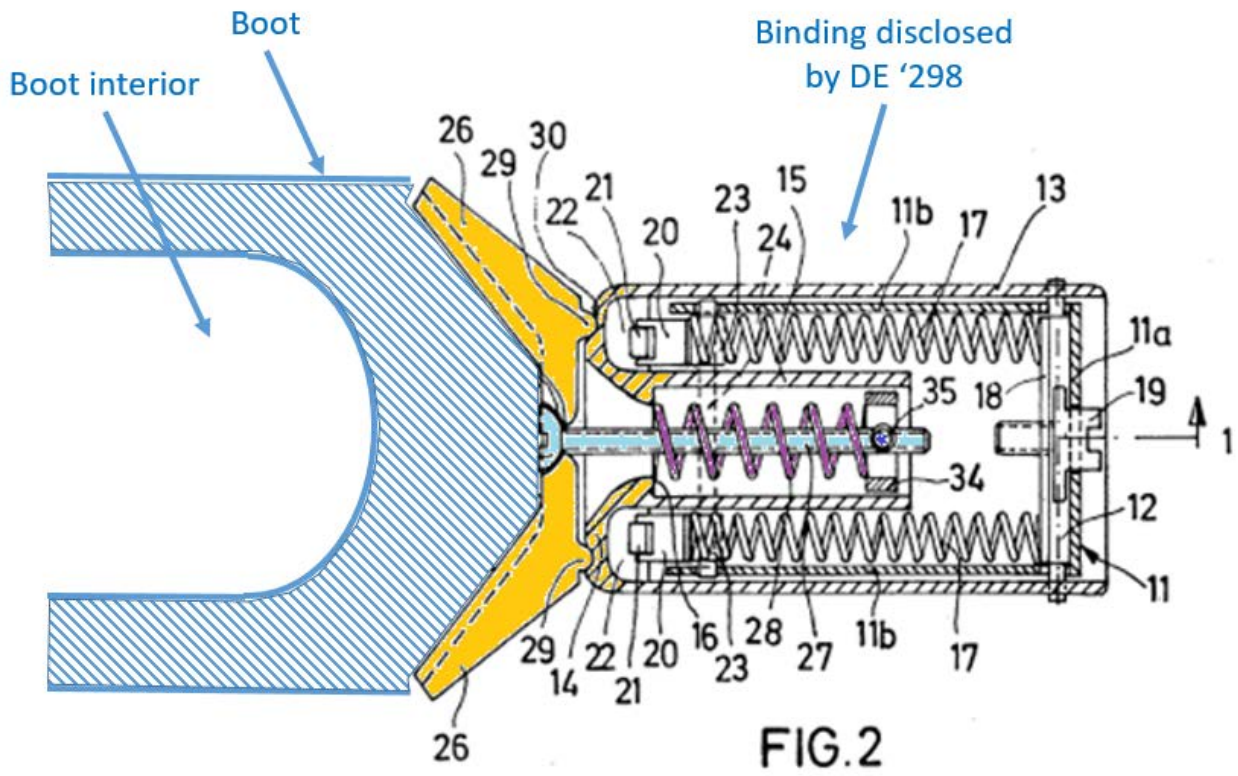


FIG. N. Top cutaway view of ski binding of DE '298 with ski boot.

65. The arrangement of the components allows the ski binding to accommodate both vertical and lateral forces independently. For example, in response to an upward directed force, hold-down member 13 is swiveled upwards thereby compressing springs 17. However, the vertical movement of hold-down member 13 and compression of springs 17 does not affect the force applied by detent spring 28 on retaining jaws 25. *Id.*, 9.

2. Claims 1 and 4–9 are Anticipated By DE '298

a. Claim 1

[1.0] A vector decoupling assembly for separating and isolating two or more force vectors applied to a safety binding securing a heel portion of a ski boot to a ski, comprising:

66. DE '298 discloses a vector decoupling assembly for separating and isolating two or more force vectors applied to a safety binding securing a heel portion of a ski boot to a ski, as claimed. MARKERVOLKL-1004, 2–4, 9, 11. Specifically, the object of the invention in DE '298 is for the safety ski binding to be able to retain the shoe when in normal use and to provide "maximum safety" when there is a forward, rearward, or rotational fall. *Id.*, 3. In other words, DE '298 relates to "a release/retaining device that is designed for safety ski bindings and that comprises means for front or rear retention of the shoe on the ski." *Id.*, 2, 11. It also relates to a safety ski binding that "releas[es] the shoe both in the

upward direction as well as also in the lateral direction against a release resistance in the event of excessively strong releasing forces." *Id.* The pictured embodiments in FIGS. 1 and 2 of DE '298 show that the retaining/release device is a rearward heel holding device. *See id.*, 6.

67. DE '298 allows for resistance against upward and lateral release "to be dimensioned and adjusted independently of each other." *Id.*, 4. In other words, the safety binding in DE '298 allows for two or more force vectors to be separated and isolated. This is accomplished as follows:

> Upon the occurrence of a strong upwards directed force, for example, in the case of a forward fall of the skier, the hold-down member 13 is swiveled upwards together with the heel holder 25 in the direction of the arrow X. . . At the same time the guide members 21 are held by the link arms 23 and, in so doing, are swiveled about the lower bearing joint 24 of the link arms in the direction of the arrow Z.
>
> If there is excessive lateral force in the direction of arrow Y1 or Y2, the heel holder 25 swivels in the corresponding transverse direction. . . .In this case the heel holder 25 swivels so far toward the rear until the shoe or more specifically the sole plate, which is connected to the shoe, or the like is released by the retaining device.

Id., 9. According to the disclosure of DE '298, the hold-down member 13 swivels about transverse axis 12 due to pivoting around pivot pin 24. *See id.*, 6. As shown below, the swiveling action in the X direction around the transverse axis means that the rotation occurs in one plane:

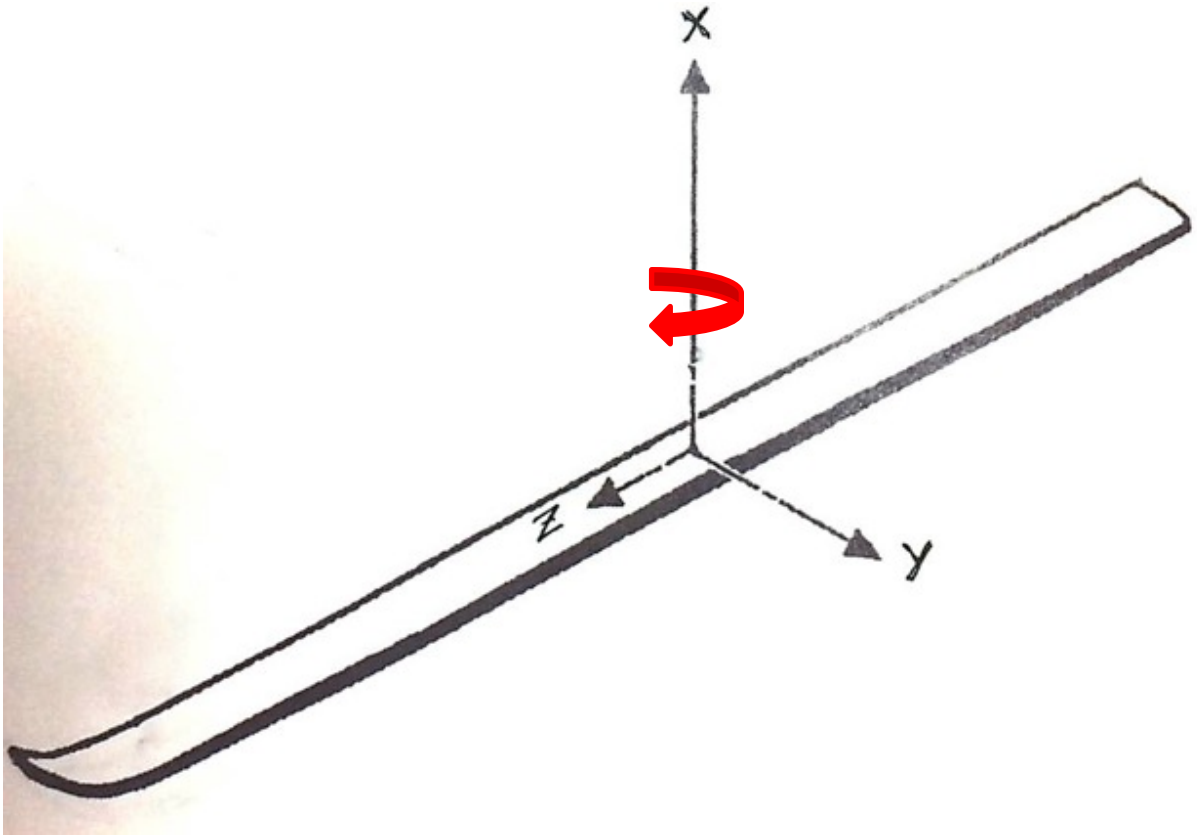


FIG. O. Axes of a ski annotated to show swiveling around x axis.

68. Therefore, in my opinion, DE ’298 discloses a vector decoupling assembly for separating and isolating two or more force vectors applied to a safety binding securing a heel portion of a ski boot to a ski, as claimed, and anticipates element [1.0] of claim 1 of the ’867 patent.

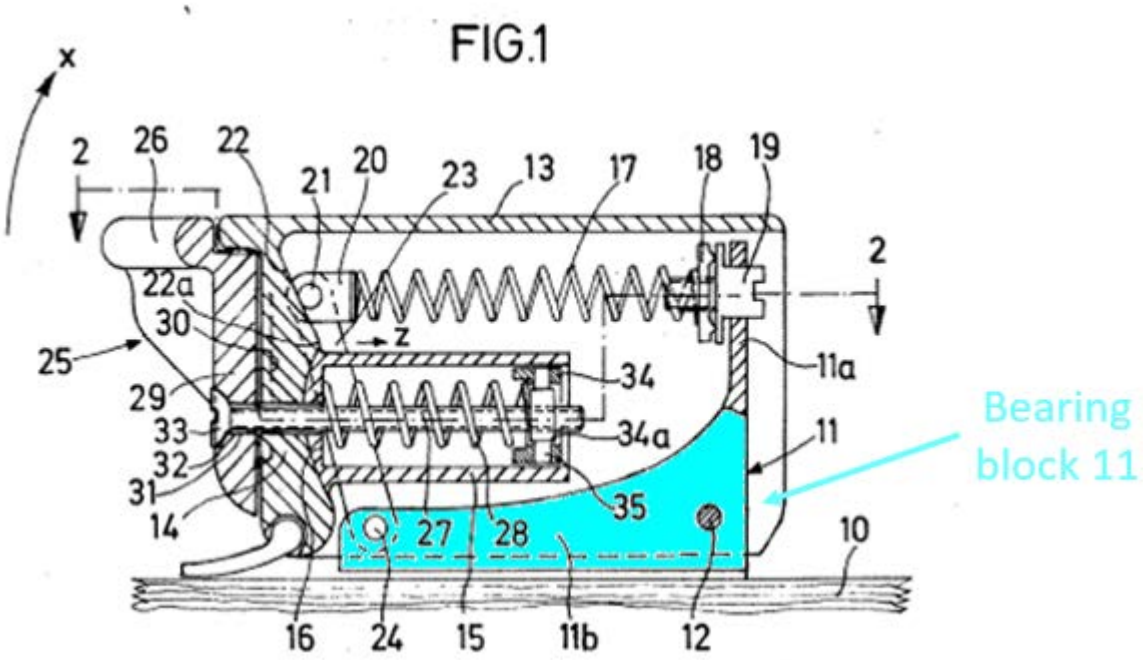
[1.1] a lower heel assembly attached to the ski;

69. In my opinion, DE ’298 discloses this limitation. The safety binding in DE ’298 contains:

> A bearing block 11 comprising a rear cross wall 11a (always according to a heel holding device) and side walls 11b is mounted (if desired, adjustable in the longitudinal

direction of the ski), for example, by means of screws, rivets or the like on the ski 10.

MARKERVOLKL-1004, 6. The bearing block is shown in blue in annotated FIG. 1 below.

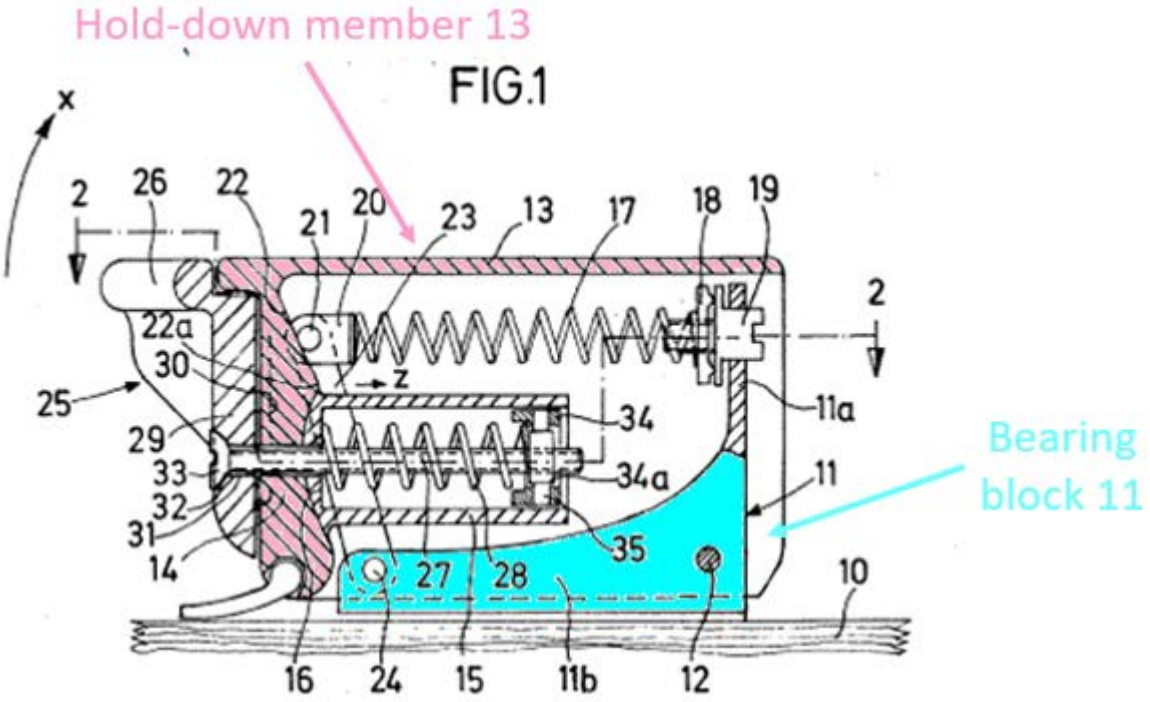


Id., FIG. 1, p. 16 (annotations in color).

[1.2] an upper heel assembly coupled to the lower heel assembly and

70. DE '298 discloses that "the housing-shaped hold-down member 13 is mounted in the bearing block 11 in such a way that said hold-down member can be swiveled upwards in the direction of the arrow x about a transverse axis 12." MARKERVOLKL-1004, 6–7. Therefore, the housing-shaped hold-down member 13 is an upper portion of a heel unit, or upper heel housing, (shown in pink in annotated FIG. 1 below) of a ski binding that is coupled to the lower heel assembly

described in [1.1] above (shown in blue) and, therefore, in my opinion discloses this limitation.



Id., FIG. 1, p. 16 (annotations in color).

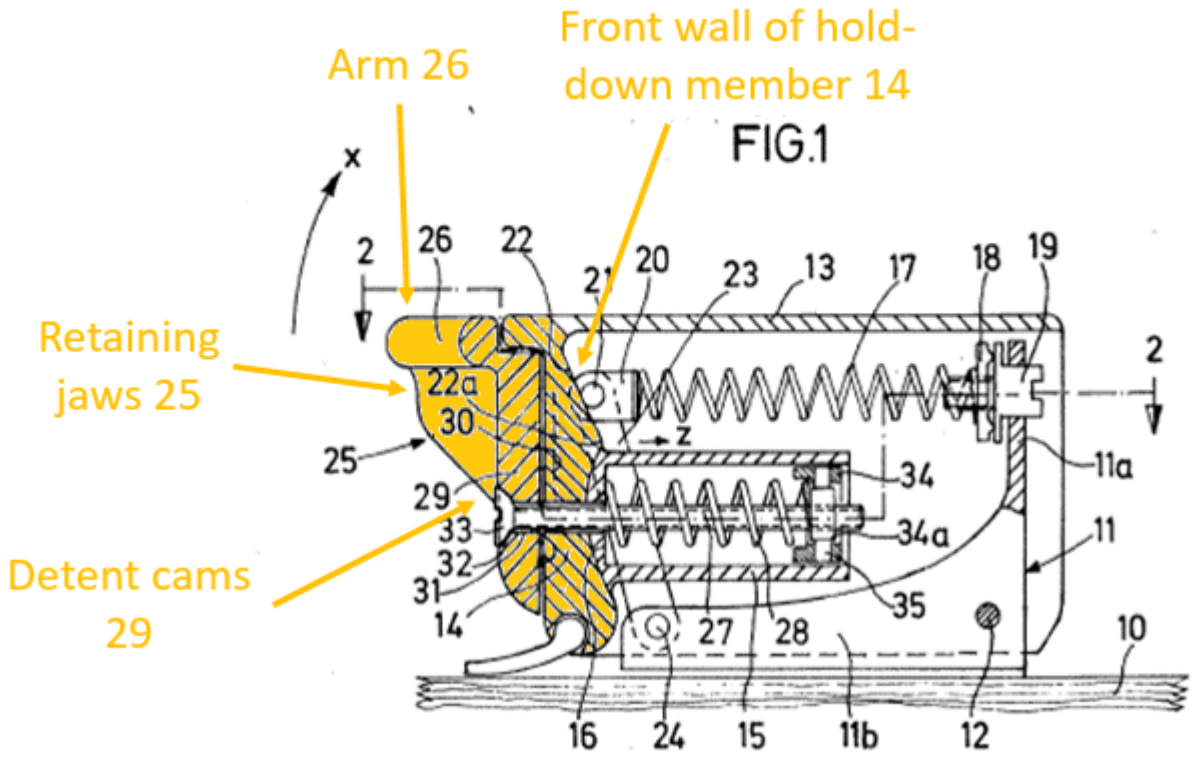
[1.3] having a lateral release assembly for applying lateral securing pressure to the ski boot,

71. DE ’298 describes a retaining jaw 25 with two side arms 26 that laterally retain the ski boot. *See* MARKERVOLKL-1004, 4, 11. More specifically:

> A retaining jaw 25 has two arms 26, which reach laterally over the shoe sole or the like, and is pressed against the front wall 14 of the hold-down member by a rod-shaped tension member 27 and by a detent spring 28, which is formed as a compression spring, by means of two detent

> cams 29, which extend in the vertical direction, in that in the central working position of the support device the cams engage with the detent recesses 30, which are spaced equidistant from the vertical central plane of the retaining device . . .

Id., 8. Therefore, in my opinion, the retaining jaw 25, the two arms 26, the two detent cams 29, and the front wall of the hold-down member 14 work together as a lateral release assembly (as shown in gold in annotated FIGS. 1 and 2 below) that applies lateral securing pressure to the ski boot as required by this claim limitation.



Id., FIG. 1, p. 16 (annotations in color).

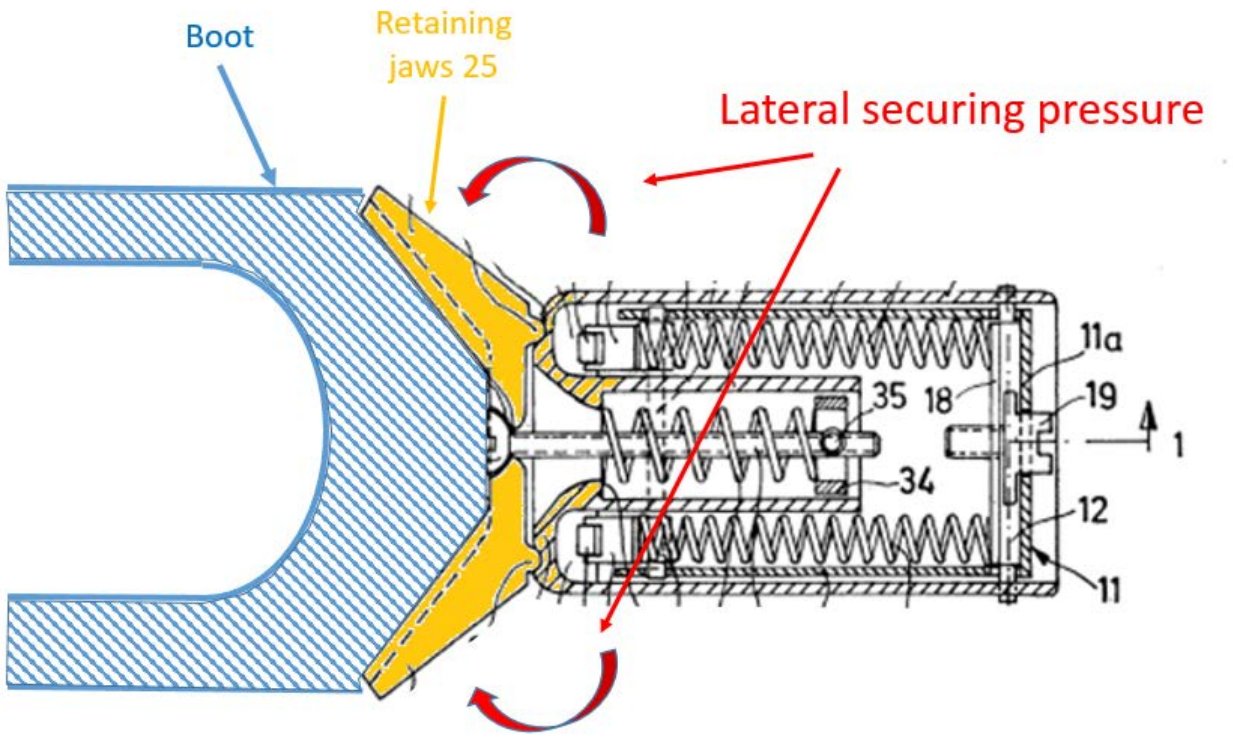


FIG. P. Top cutaway view of ski binding of DE ’298 with ski boot.

[1.4] the upper heel assembly comprising an upper heel housing that is configured to compress the heel portion of the ski boot downward;

72. As described in [1.2], it is my opinion that DE ’298 describes a hold-down member that is an upper heel assembly. As evidenced by the name of the elements themselves, the hold-down member 13 and heel holder 25 work cooperatively to hold down the ski boot, *i.e.* compress it downward. For instance, DE ’298 further discloses that the hold-down member 13 “serves to hold the shoe in the upward direction and which can be pivoted upwards about a rearward transverse axis, is held down against upwardly pivoting by one or more hold-down springs by means of guide members.” MARKERVOLKL-1004, 5. As pertains to

DE ’298, the “upward direction” is synonymous with “vertical direction”. For ski bindings, it is important to restrict slack in the coupling between the boot and the ski in order to improve control and thus safety. Specifically, for the binding disclosed in DE ’298, as shown in FIG. Q and annotated FIG. 2, the hold-down member 13 (pink) is urged downward by springs 17 (green) operating against the front cross wall 14 (gold) of the hold-down member 13 through rollers 21 (lavender) in engagement with detent tracks 22 (orange). MARKERVOLKL-1004, 6–7. Therefore, it is my opinion that the hold-down member 13 and the heel holder 25 compress the heel portion of the ski boot downward as required by this limitation of claim 1 of the ’867 patent, independent of any lateral movement.

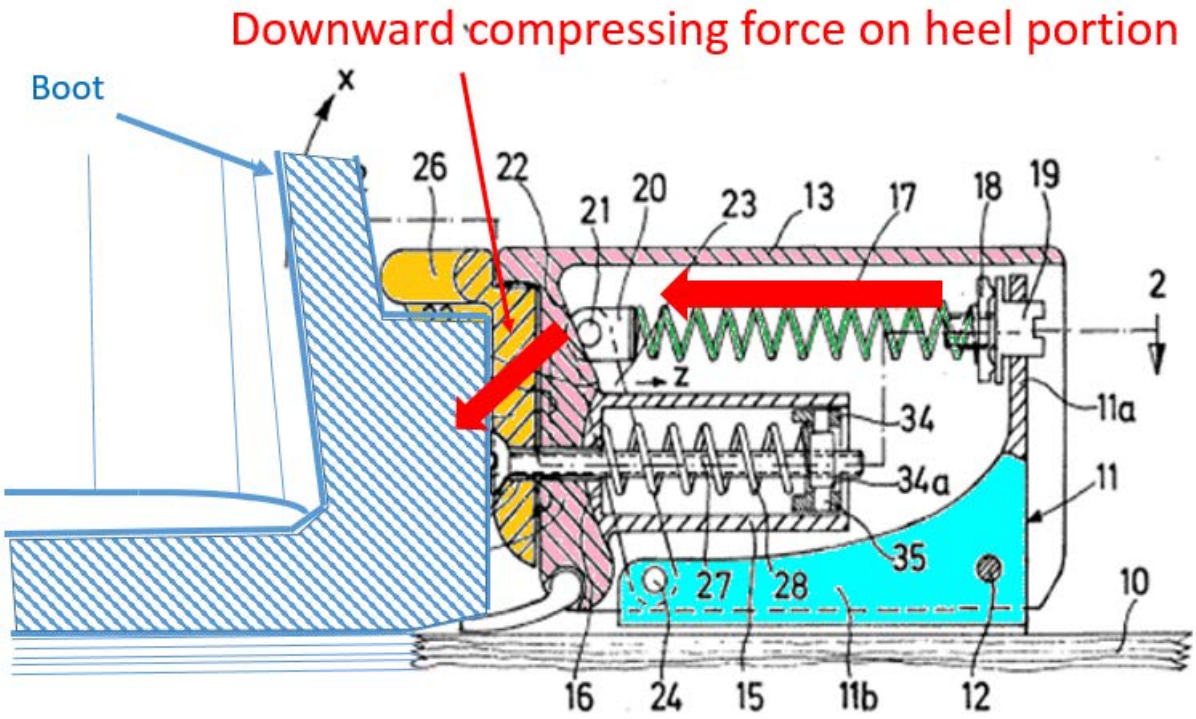
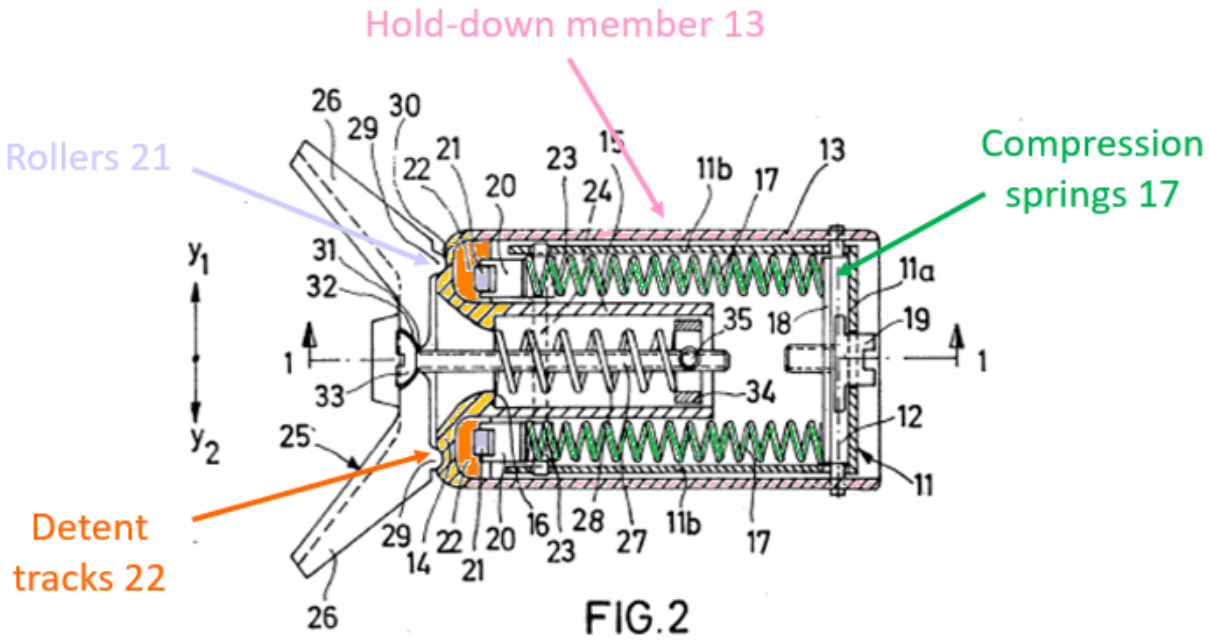


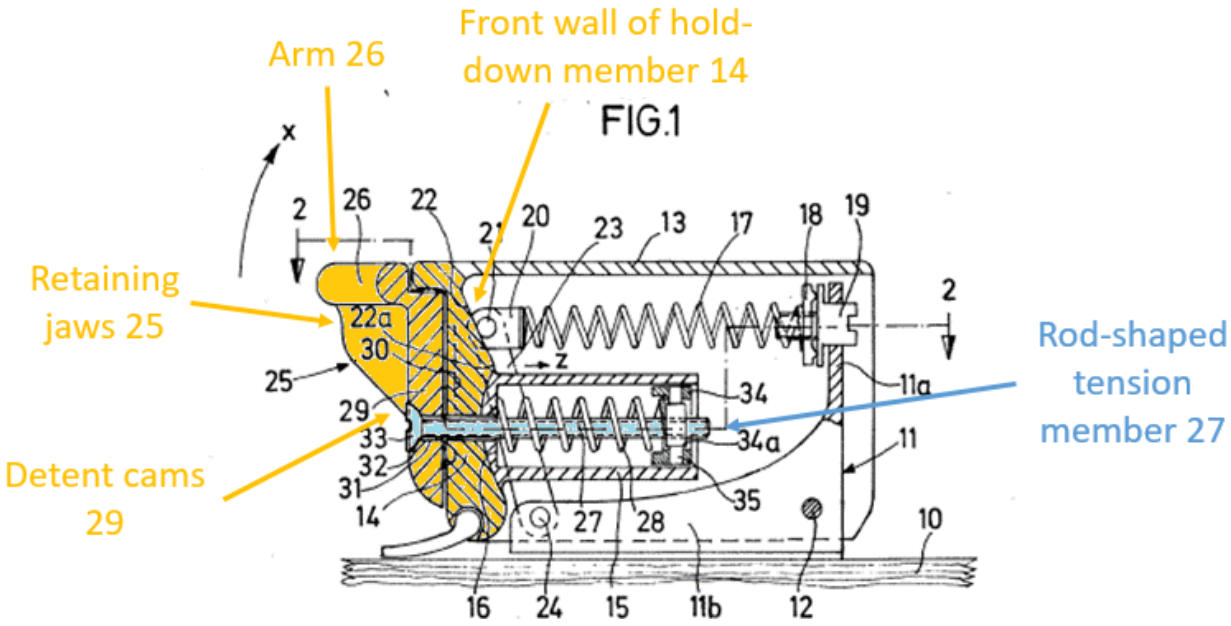
FIG. Q. Detailed side cutaway view of ski binding of DE ’298 with ski boot.



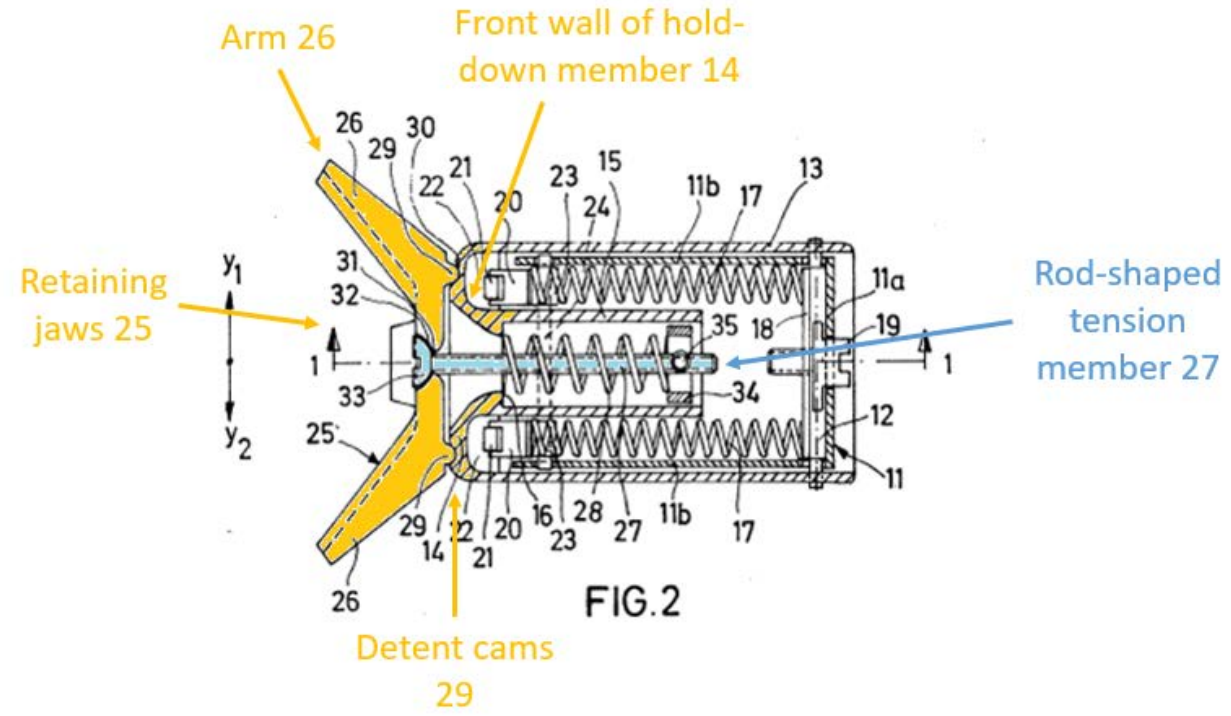
Id., FIG. 1, p. 16 (annotations in color).

[1.5] a linkage element fixedly attached to the lateral release assembly;

73. As described above in [1.3], it is my opinion that DE '298 describes a lateral release assembly comprised of the retaining jaw, the two arms, the two detent cams, and the front wall of the hold-down member (as shown in gold in annotated FIGS. 1 and 2 below). MARKERVOLKL-1004, 4, 8, 11. DE '298 also discloses that a rod-shaped tension member 27 (shown in light blue) fixedly attaches these elements against the front wall of the hold-down member 14, acting as a linkage element. *Id.* 8. In order for the lateral release assembly to work properly, it is my opinion that a POSA would understand that the linkage element must be fixedly attached to the lateral release assembly.



Id., FIG. 1, p. 16 (annotations in color).



Id., FIG. 2, p. 16 (annotations in color).

[1.6] wherein the linkage element, a first surface and a second surface cooperate to limit motion of the lateral release assembly to within a predetermined region within a plane defined by the longitudinal and horizontal axes of the ski.

74. As discussed above in [1.3] and [1.5], it is my opinion that DE '298 discloses a linkage element and a lateral release assembly. DE '298 discloses that:

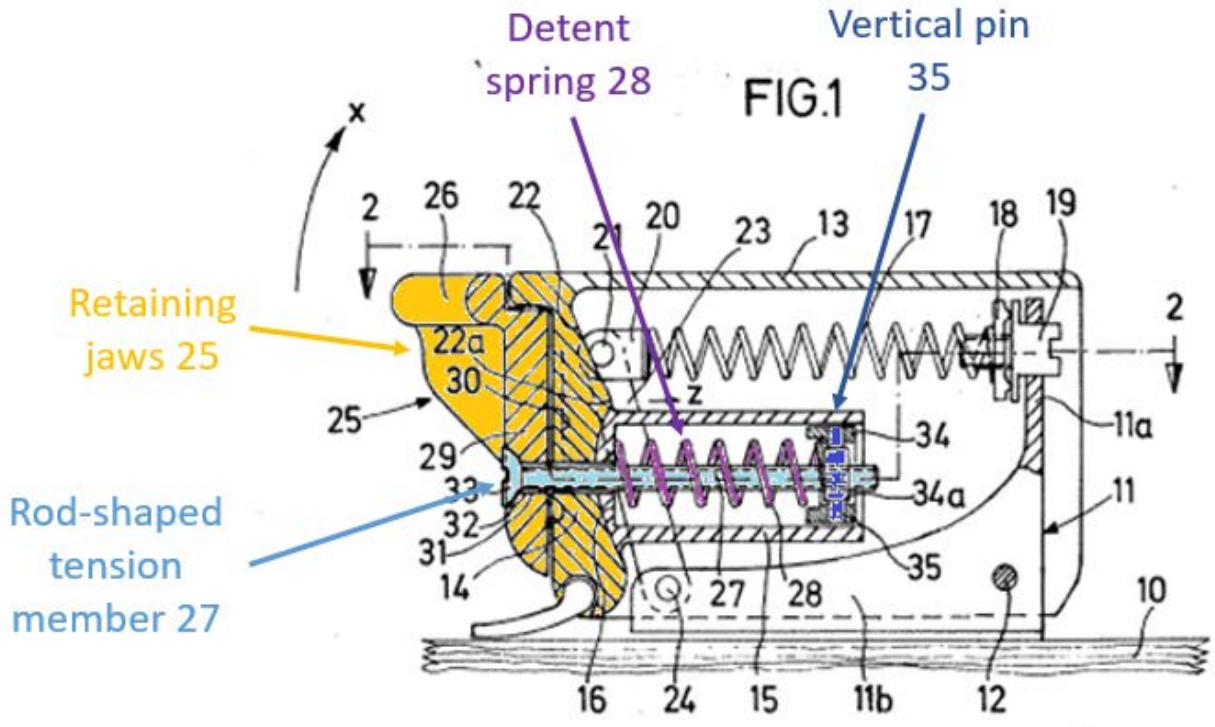
> If there is excessive lateral force in the direction of arrow Y_1 or Y_2, the heel holder 25 swivels in the corresponding transverse direction. As a result, the detent cams 29 are swiveled in their recesses 30 against the action of the detent suspension 28. The tension member 27 can be set inside the detent suspension 28 so as to tilt about the joint 35, an action that is made possible as a result of the spherical engagement of head 33 and the recess 31. In this case the heel holder 25 swivels so far toward the rear until the shoe or more specifically the sole plate, which is connected to the shoe, or the like is released by the retaining device.

MARKERVOLKL-1004, 9.

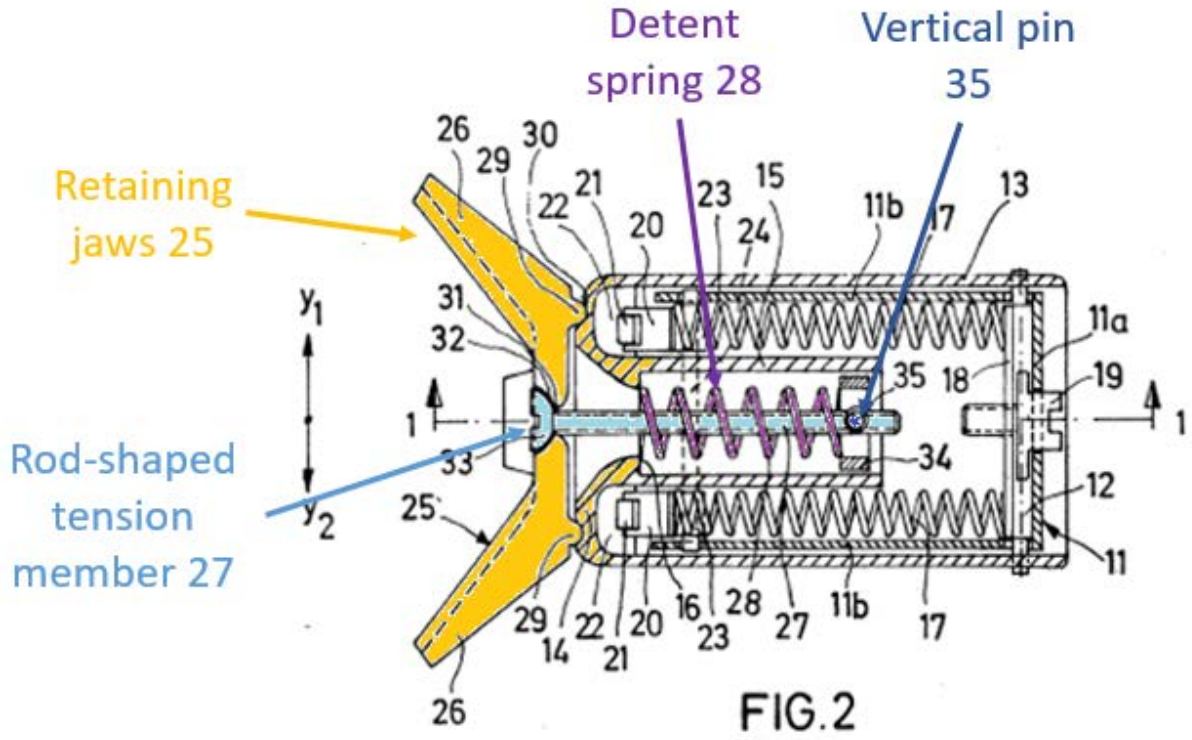
75. The tension member 27 is pivotably attached by vertical pin 35 to allow tension member 27 to swivel in the lateral direction. FIGS. 1 and 2, annotated below, show how the lateral movement of the retaining jaw/heel holder 25 is constrained in lateral movement by the tension member 27 (light blue), vertical pin 35 (dark blue) in cooperation with the surface of the front cross wall 14 (gold) of the hold-down member 13. As such, the vertical pin and the hole receiving it restrict the motion of the retaining jaw in the plane defined by the longitudinal and horizontal plane of the ski, and the interaction of the tension

member with the front cross wall limit the lateral motion of the retaining jaw to a predefined region of that plane.

76. Alternately, the detent cams 29 and detent recesses 30 also limit the lateral movement of the retaining jaw to a predefined region in the plane defined by the longitudinal and horizontal plane of the ski. *See id.*.



Id., FIG. 1, p. 16 (annotations in color).



Id., FIG. 2, p. 16 (annotations in color).

b. Claim 4

[4.0] The vector decoupling assembly of claim 1, wherein the lateral release assembly is maintained in a predetermined neutral position in the absence of force vectors applied to the vector decoupling assembly.

77. DE ’298 teaches that “[t]he object of the present invention is to achieve a reliable retention of the shoe in the normal mode. . .” MARKERVOLKL-1004, 3. DE ’298 uses the term “working position” to describe the positioning of the lateral release assembly in the absence of applied forces:

> In this case said retaining jaw is held in the working position by a central detent suspension which is supported on the hold-down member.

Id., 4.

> Preferably the retaining jaw is supported, for example, in the manner of a detent, in the detent recesses under the action of the detent suspension at two lateral points on the upwardly pivotable hold-down member, and said lateral points are positioned in each instance at an equal distance or approximately equal distance from the central axis of the retaining device.

Id., 5.

78. In other words, tension member 27 and detent spring 28 hold the detent cams 29 of the retaining jaw 25 firmly in the detent recesses 30 of the hold-down member 13 when no external forces are applied, *i.e.* maintain the lateral release assembly in the working or neutral position. MARKERVOLKL-1004, 4. It is my opinion that a POSA would understand that the absence of displacement by lateral or vertical forces would be considered the "normal" or working mode, as long as those forces do not exceed the preset level that is necessary for satisfactory control. In my experience, once those forces exceed the preset level, it is the intention of the design to release in order to avoid potentially harmful forces to the skier's body. Therefore, in my opinion, DE '298 teaches this limitation.

Claim 5 [5.0] The vector decoupling assembly of claim 4, wherein the lateral release assembly moves in both a first direction and a second direction with respect to the neutral position.

79. In my opinion, DE '298 teaches this limitation. One of the objects of the invention is to achieve "maximum safety in the event of a fall, in particular, in the event of a forward or rearward fall and also a rotation fall." MARKERVOLKL-1004, 3. DE '298 specifically teaches that the retaining jaw/heel holder can swivel in the Y_1 direction or the Y_2 direction:

> If there is excessive lateral force in the direction of arrow Y_1 or Y_2, the heel holder 25 swivels in the corresponding transverse direction. . . .In this case the heel holder 25 swivels so far toward the rear until the shoe or more specifically the sole plate, which is connected to the shoe, or the like is released by the retaining device.

Id., 9. In other words, the lateral release assembly as described in [1.3]:

> is supported, for example, in the manner of a detent, under the action of the detent suspension (28) at two lateral points on the upwardly pivotable hold-down member (13) and is swiveled in the recesses (30), which have, for example, the form of a trough, under the action of lateral forces until the shoe or more specifically the sole plate is released and is moved sideways out of these recesses upon overcoming the latching action.

Id., 12 (claim 3). Furthermore, the role of cams 29 is to work within the confines of detent recesses 30 to allow for independent swiveling or lateral movement separate from the vertical movement of the hold-down member 13 about the axis 12 (*i.e.* allows for decoupling of the vertical and lateral movements of the binding). *See id.*, 6–8.

80. It is my opinion that a POSA would know that the swiveling action and the movement sideways out of the recesses to overcome the latching action when lateral forces are applied means that the lateral release assembly can move in a first and a second direction (*e.g.*, left and right) with respect to the working or neutral position. This is true, in part, because the binding is designed to release when forces exceed a preset value in order to prevent excessive forces and, therefore, injury to a skier's lower limbs.

81. In the alternative, the retaining jaw can also move with the hold-down member in response to a force in the vertical direction. DE '298 specifically identifies the ability of the binding to account for vertical and lateral forces by releasing in both directions as a benefit:

> [t]he invention allows the resistance against release in the upward direction, on the one hand, and against release in the lateral direction, on the other hand, to be dimensioned and adjusted independently of each other.

Id., 4.

c. Claim 6

[6.0] The vector decoupling assembly of claim 5, wherein the motion of the lateral release assembly is at least partially rotational.

82. As described in [5.0] above, the lateral release assembly may swivel and move sideways out of the recesses to overcome the latching action when lateral forces are applied. *See* MARKERVOLKL-1004, 9, 12. Specifically, the

lateral release is partially rotational in regard to both the rotation of the retaining jaw's arms about the junction of the cams 29 and detent recesses 30, as well as rotation of the ski boot about the toe radius. Therefore, in my opinion, the motion of the lateral release assembly as described in DE '298 is at least partially rotational as required by this limitation.

d. Claim 7

[7.0] The vector decoupling assembly of claim 5, wherein a force required to move the lateral release assembly increases as the lateral release assembly moves away from the neutral position.

83. It is my opinion that DE '298 teaches this limitation. The invention of DE '298 releases a ski boot "both in the upward direction as well as also in the lateral direction against a release resistance in the event of excessively strong releasing forces." MARKERVOLKL-1004, 2. Compressive springs are used to resist the movement of the retaining jaw/heel holder in both the vertical and lateral direction—springs 17 in the vertical direction and spring 28 in the lateral direction. Any movement of the retaining jaw in the vertical direction compresses springs 17; and any movement of retaining jaw/heel holder in the lateral direction compresses spring 28. In my opinion, a POSA understands that as a spring compresses the force exerted by the spring increases. Thus, any movement of the retaining jaw/heel holder in the vertical or lateral direction is met with an increased force

imparted by the spring, resulting in a greater force being needed to move the retaining jaw/heel holder form its neutral or working position. MARKERVOLKL-1004, 9.

84. Further, my opinion is that a POSA would understand that in order to release the resistance or the latching mechanism, the lateral release assembly would need to meet with an increasing lateral force as the assembly is moved away from the neutral position. The increasing lateral force due to the movement from neutral is based on Hooke's law (first enunciated in 1676). Hooke's law is a principle in physics that states that the force (F) needed to extend or compress a spring by some distance X is proportional to that distance X. That is: $F = kX$, where k is a constant factor characteristic of the spring. An example would be a spring scale where the displacement of the indicator is proportional to the mass (*i.e.* gravitational force) of the object.

e. Claim 8

[8.0] The vector decoupling assembly of claim 7, wherein a relationship between a position of the lateral release assembly with respect to the neutral position and the force required to move the lateral release assembly is linear.

85. It is my opinion that DE '298 discloses this limitation. As described in the '867 patent:

> The longitudinal pressure compensator includes a spring. The spring bias produces linear force between the boot and the jaw (heel interface of the binding) of the binding.

MARKERVOLKL-1001, 5:10-13.

86. Like the ’867 patent, the lateral release assembly in DE ’298 includes a spring that produces a linear force between the heel of the boot and the retaining jaw/heel holder 25, which is in accordance with Hook’s law, *i.e.* displacement is linearly proportional to the force applied.

87. In my experience, as bindings react to applied loads and forces, the relationship between the force applied and the motion of the binding will go through as many as three phases. Ski bindings have two functions: one is to retain the boot to the ski, the other is to release the boot from the ski. The retention function of the binding is described by the first two phases. The release function has only one phase, *i.e.* phase three.

88. The second phase is where the applied force exceeds the preset release value and the binding begins to open, or move through whatever motions it is designed to move through. At this point, the system operates in a linear manner. That is to say, as the force increases, the binding opens further and further. The degree of opening is proportional to the force applied and follows Hooke’ Law. If the applied force never exceeds the ultimate release value, the binding will return to a centered position in a linear manner, less any energy that is lost due to

hysteresis. This can be thought of as the shock absorbent region, or what is often referred to as the elastic phase of binding operation. As long as the applied force does not exceed the ultimate preset release value, the boot is retained to the ski.

89. Therefore, it is my opinion that the force required to move the lateral release assembly of the binding disclosed in DE ’298 from the neutral position may be linear in at least one phase.

f. Claim 9

[9.0] The vector decoupling assembly of claim 7, wherein a relationship between a position of the lateral release assembly with respect to the neutral position and the force required to move the lateral release assembly is non-linear.

90. It is my opinion that DE ’298 discloses this limitation. Specifically, the lateral release assembly can respond to non-linear forces that cause hold-down member 13 to rotate around pivot point 12 where the force is not linear with respect to the neutral position.

91. As discussed above with respect to claim 8, in my experience, as bindings react to applied loads and forces, the relationship between the force applied and the motion of the binding will go through as many as three phases.

92. The first phase is where the forces that pass through the boot to the ski are normal control loads that are below the preset release values of the binding. While in this phase, the relationship between the force applied and the motion of

the binding is non-linear. That is to say, as the force goes from zero up to the point where the force exceeds the preset value, there is no motion of the binding; thus it is a non-linear system and Hooke's Law does not apply. The boot is retained to the ski in this phase.

93. The third phase is when (and if) the force applied to the binding causes the release mechanism to reach the point where the binding no longer retains the boot to the ski. At this point it becomes a discontinuous system where there is no longer any force being applied by the boot to the binding, as there is no longer any binding retention. In most bindings, at this point, the boot is no longer connected in any way to the binding. The toe binding of most ski bindings will automatically return to the normal centered position. Most heel units will remain in an open, or cocked, position so as to facilitate re-entering the ski boot using what is referred to as a step-in design for the heel. In either case, while in this phase, the system is no longer acting in a linear manner but rather what might be thought of as discontinuous or non-linear. This phase is the release phase of the binding operation. *Id.*,

94. Therefore, it is my opinion that the force required to move the lateral release assembly of the binding disclosed in DE '298 from the neutral position may be non-linear in at least two phases of operation.

B. Ground 2: The Challenged Claims are Obvious Over the '772 Patent in View of DE '298

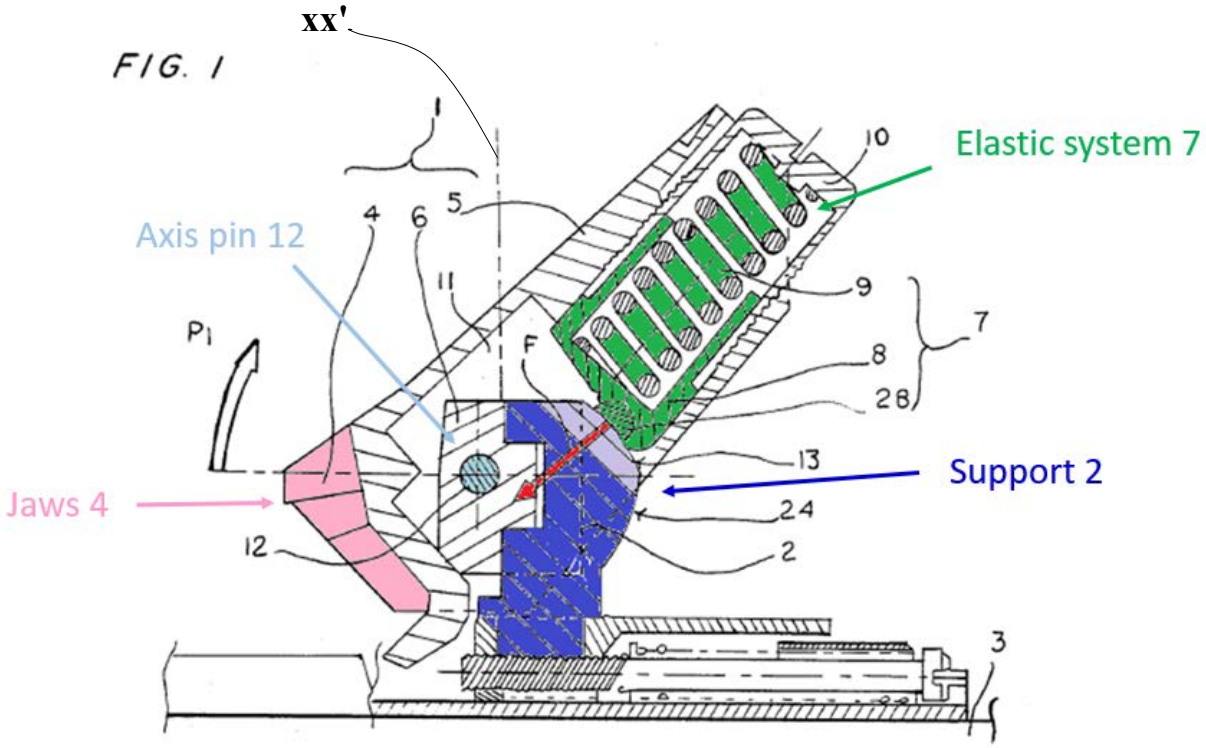
1. The '772 Patent [MARKERVOLKL-1005]

95. The '772 patent relates to a "safety binding adapted to releasably hold a boot on a ski." MARKERVOLKL-1005, 1:14–15. More specifically, the '772 patent relates to a heel binding that holds the back of the boot and permits "the boot to pivot both vertically and laterally." *Id.*, 1:15–19, Abstract. The object of the invention in the '772 patent is "to provide a binding wherein the relationship between the vertical and lateral release forces and moments are correct for a satisfactory release of the boot." *Id.*, 1:65–68. The binding disclosed in the '772 patent includes a support that is attached to a ski and an assembly for pivoting around that support. *Id.*, Abstract.

96. Specifically, the '772 patent's objective is accomplished through "a multidirectional safety binding." *Id.*, 2:1–3. In general, the assembly 1 moves with respect to a support 2 that is attached to a ski 3. *Id.*, 8:1–2. Assembly 1 includes a jaw 4 attached to a body 5 (for holding the boot and to pivot in the vertical and lateral directions), a pivoting element 6 (that is pivotable with respect to the support), and an elastic system 7 (that "biases the jaw against lateral and vertical pivoting," biases the front of the support and the rear of the pivoting element into contact, and "biases the biding to a centered retention position to retain the boot"). *Id.*, 2:5–14, 7:68–13. Furthermore, "[p]ivoting element 6 is

laterally fitted in housing 11 by an axis pin 12 so that jaw 4 is journalled on pivoting element 6 and pivots around a transverse and horizontal axis transverse to the longitudinal axis of the binding and ski and passing through axis pin 12." *Id.*, 8:17–21.

97. FIG. 1, as I have annotated below, identifies the main components of the ski binding for resisting against release in the vertical direction, and FIG. 2, as annotated below, identifies the main components of the ski binding for resisting against release in the lateral direction. FIG. R illustrates the interaction of the disclosed ski binding with a ski boot.



Id., FIG. 1, p. 2 (annotations in color).

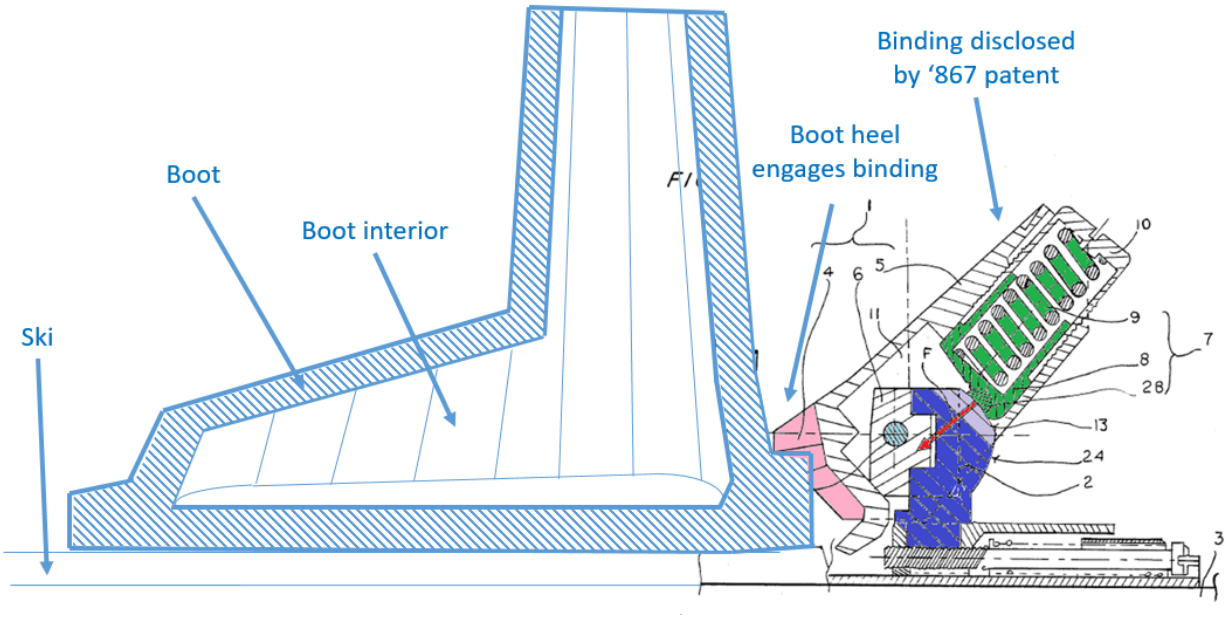
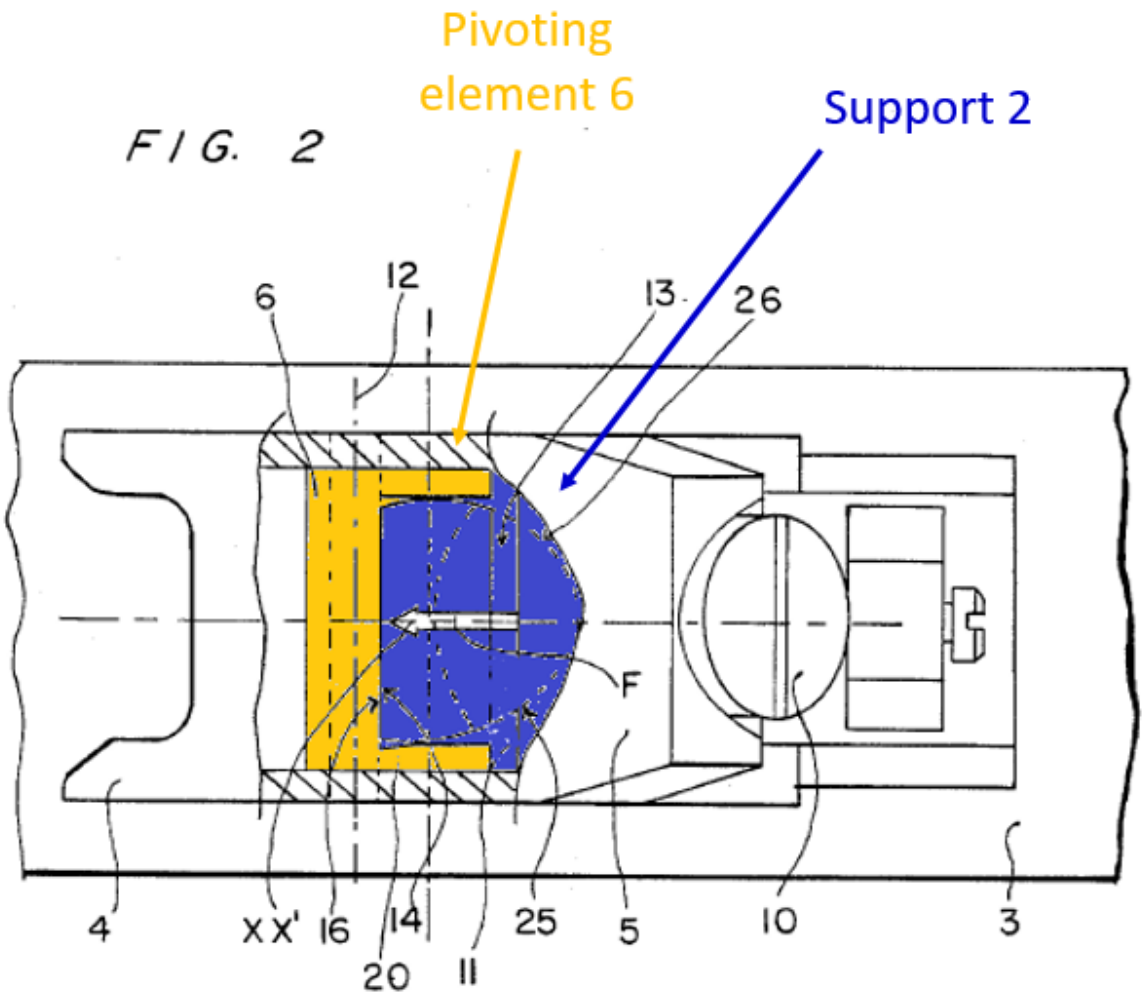


FIG. R. Ski binding of '772 patent and ski boot

98. With reference to FIG. 1, as annotated, with respect to vertical forces, jaw 4 (pink) and assembly 1 pivot vertically around the axis pin 12 (light blue) in the direction P_1. This vertical pivoting of jaw 4 is opposed by the elastic system 7 (green), which exerts a force F (red) (the vertical release retention force) and a moment (the vertical release retention moment) on the vertical release incline 13 (lavender) at the back of the support 2 (dark blue). This allows for the jaw 4 and assembly 1 to be retained in the centered retaining or rest position. *Id.*, 8:22–31.

99. In operation, when pivot 6 pivots vertically in the direction P1 around axis pin 12, piston 8 travels downwardly along incline 13 to release the boot, while incline 13 compresses piston 8 against spring 7. As piston 8 moves down over the back of support 2, passing nose 99, the boot is released from jaw 4. Piston 8 then

travels onto the opening incline 24 to permit elastic system 7 to decompress so that jaw 4 stays open after release. *Id.*, 9:10–23.



Id., FIG. 2, p. 2 (annotations in color).

100. With respect to FIG. 2, as I have annotated, with respect to lateral forces, "[t]he lateral pivoting of the assembly and the pivoting element is performed about one vertical axis passing through the longitudinal axis of the support." *Id.*, 2:14–17. Assembly 1 pivots laterally around vertical axis xx', which passes through the longitudinal axis of the binding and/or support 2 (dark blue),

due to the lateral pivoting of pivoting element 6 (gold). Pivoting element 6 contacts/engages support 2, which is guaranteed by the bias of elastic system 7. Specifically, the substantially flat front surface 14 of support 2 is biased in contact with the substantially flat rear surface 16 of pivoting element 6, such that the pivoting element 6 and support 2 form a lateral pivoting system that pivots laterally around axis xx' of support 2 against the bias/force of elastic system 7 (lateral release retention force). The interaction of elastic system 7 and support 2 creates a torque of moment that resists lateral pivoting (lateral release retention moment). *Id.*, 8:32–52.

101. In operation, assembly 1 pivots in around axis xx' contrary to the bias of elastic system 7. When lateral stress is applied to the boot, assembly 1 and jaw 4 are stressed to pivot in this pure rotation around axis xx' . When lateral stress is applied to the boot, assembly 1 also moves forward. This lateral movement of the assembly results in the lateral release of the boot. *Id.* 9:57–10:2. The arrangement of components allows the ski binding to be a multidirectional safety binding that can accommodate both pure vertical and lateral forces. For example, in response to a vertical force, pivot 6 pivots vertically around axis pin 12 to release the boot. In contrast, when the assembly 1 undergoes a purely lateral stress it pivots laterally and moves forward to provide lateral release of the boot. *Id.*, 2:1–3, 3:5–7, 9:10–23, 9:57–10:2.

2. Claims 1 and 4–9 are Obvious over the ’772 Patent in view of DE ’298

a. Claim 1

[1.0] A vector decoupling assembly for separating and isolating two or more force vectors applied to a safety binding securing a heel portion of a ski boot to a ski, comprising:

102. The preamble of claim 1 of the ’867 patent sets forth an intended use of the vector decoupling assembly as “separating and isolating two or more force vectors applied to a safety binding securing a heel portion of a ski boat to a ski.” I have been informed and understand that, in the related District Court litigation, Patent Owner contends that the preamble merely recites the purpose of the invention, rather than any structural elements of the invention, and hence the preamble is not a limitation. MARKERVOLKL-1011, 11.

103. However, to the extent that the Board determines that the intended use language is a limitation, it is my opinion that the ’772 patent does disclose separate vertical release and lateral release. MARKERVOLKL-1005, 8:22-24, 10:13-14, FIGS. 1 and 7. Should the Board determine that these portions of the specification do not disclose separation and isolation of two or more force vectors, then it is my opinion that it would have been obvious to modify the teachings of the ’772 patent with the teachings of DE ’298 to include this feature. Specifically, the ’772 patent includes a single spring 9 to bias against both vertical and lateral forces. Spring 9

is adjusted by adjustment plug 10. This arrangement does not allow independent adjustment for vertical and lateral forces. In other words, the adjustment plug changes the compression of spring 9, which will affect the biasing effect against vertical and lateral forces in the same direction—it is not possible to only adjust the biasing force in the vertical direction or only in the lateral direction. *See*, *e.g.*, MARKERVOLKL-1005, 8:9–21.

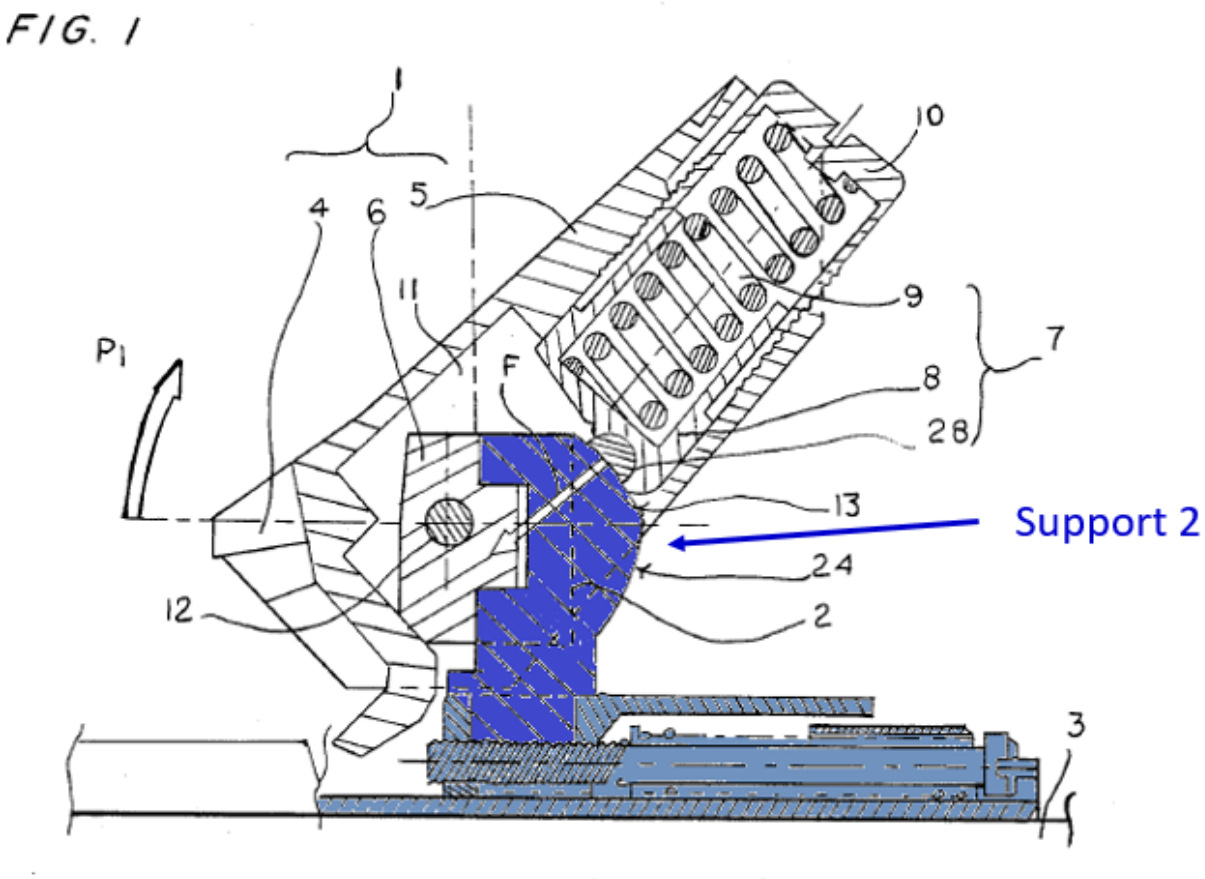
104. On the other hand, DE '298 teaches that it is beneficial to allow a ski binding that resists against release of the ski boot in the upward direction and also resists against release of the ski boot in the lateral direction, wherein the resistance can be "dimensioned and adjusted independently of each other." MARKERVOLKL-1004, 4. DE '298 criticizes prior art bindings where the vertical and horizontal biasing forces are "in a certain fixed relationship." *Id.*, 3. DE '298 proposes a solution that makes it possible "to adjust the retaining suspension for lateral and vertical retention of the shoe to an optimal value in each case." *Id.*, 3–4. The solution is to use separate biasing means in both the vertical and lateral directions. *Id.* Spring 17 biases against vertical forces and detent spring 28 biases against lateral forces. The engagement of springs 17 with front wall 22a means that in response to an upward directed force, hold-down member 13 is swiveled upwards thereby compressing springs 17. However, the vertical movement of hold-down member 13 and compression of springs 17 does not affect

the force applied by detent spring 28 on retaining jaws 25. *Id.*, 9. The vertical and lateral resistances can be "dimensioned and adjusted independently of each other" through adjusting set screw 19 or head 33 of tension member 27, respectively.

105. Thus, in my opinion, a POSA would have been motivated to modify the '772 patent with the teachings of DE '298 to add a second biasing means so that the vertical and lateral resistances would be dimensioned and adjusted independently of each other to achieve the stated purpose of adjusting the retaining suspension for lateral and vertical retention of the shoe to an optimal value in each case.

[1.1] a lower heel assembly attached to the ski;

106. In my opinion, the '772 patent discloses this limitation. The safety binding in the '772 patent contains "an assembly 1 which is adapted to move with respect to a support element or support 2 attached to ski 3." MARKERVOLKL-1005, 8:2. As shown in annotated FIG. 1, the entire area shaded in grey along with the support 2 in dark blue are assembled to attach to the ski 3 and, therefore, together are the lower heel assembly as recited in claim 1 of the '867 patent.

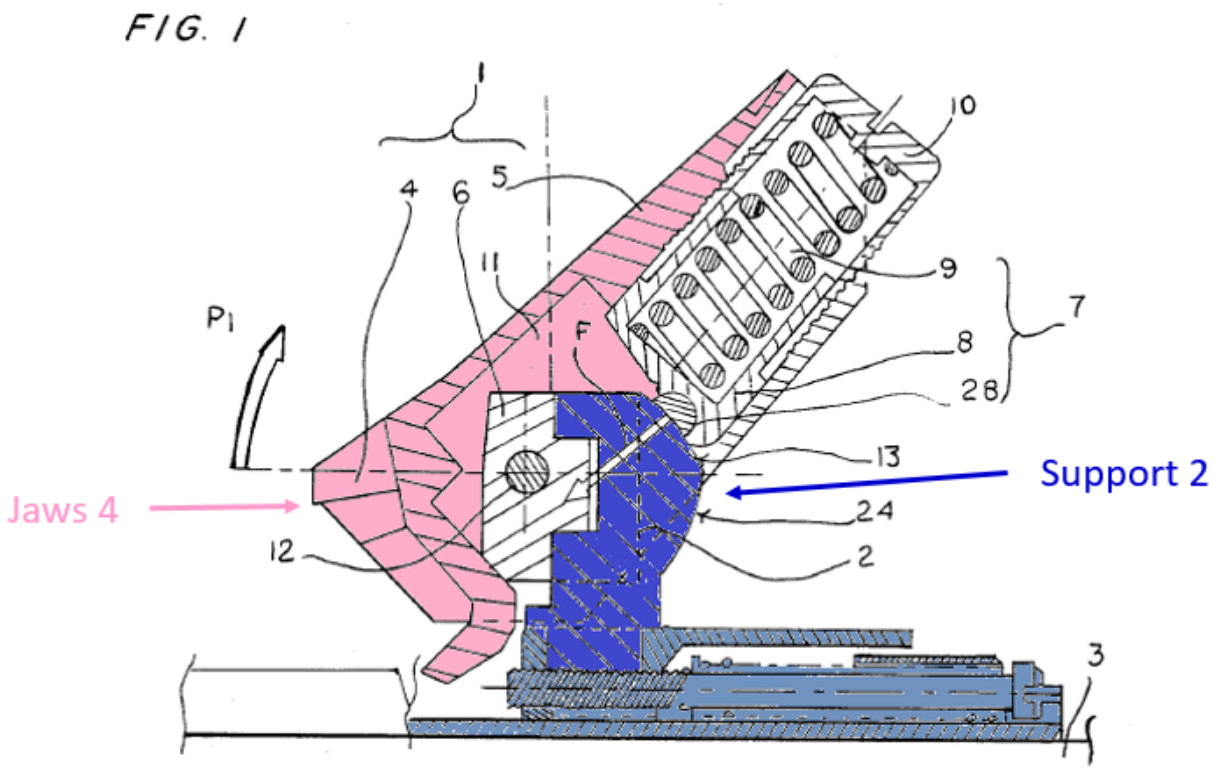


Id., FIG. 1, p. 2 (annotations in color).

[1.2] an upper heel assembly coupled to the lower heel assembly and

107. The '772 patent discloses that "[a]ssembly 1 is adapted to move with respect to a support element or support 2 attached to a ski 3." MARKERVOLKL-1005, 7:68–8:2. The "[a]ssembly 1 comprises a jaw 4 attached to a body 5 and a pivoting element or pivot 6." *Id.*, 8:2–4; *see also id.*, 3:15–17. To the rear of jaw 4, the binding includes a housing 11 "into which support element 2 extends." *Id.* at 8:14–16. Annotated FIG. 1 shows the upper heel assembly comprising the jaw 4, the body 5, and housing 11 (shown together in pink), which is coupled to the lower

heel assembly described in [1.1] above (grey and dark blue). Therefore, it is my opinion that the '772 patent discloses this limitation.



Id., FIG. 1, p. 2 (annotations in color).

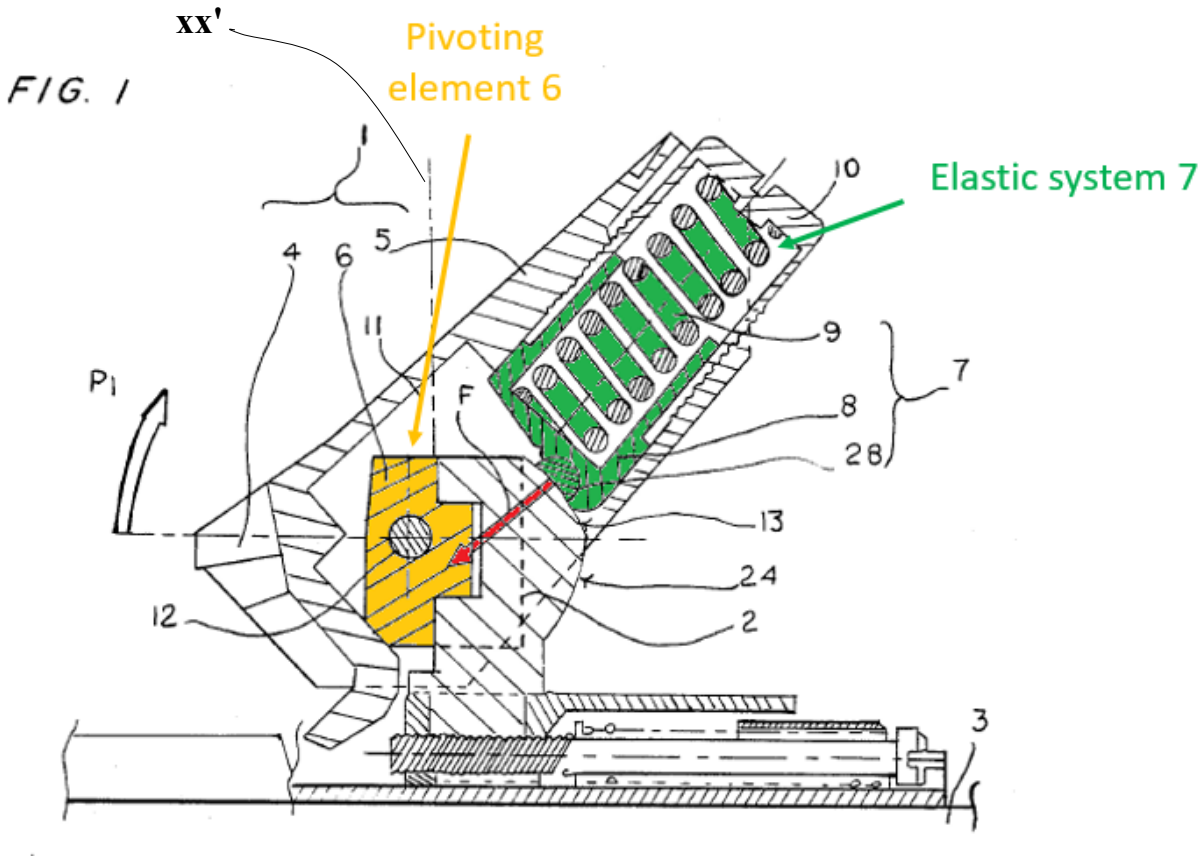
[1.3] having a lateral release assembly for applying lateral securing pressure to the ski boot,

108. The '772 patent describes a pivoting element that is located in the housing at the rear of the jaw in the upper heel assembly. MARKERVOLKL-1005, 8:14–17. The '772 patent also describes an elastic system that is located within the body that is part of the upper heel assembly. *Id.*, 8:11–13.

109. The pivoting element 6 (gold in annotated FIG. 1 below) in conjunction with the elastic system 7 (green) resist the lateral pivoting of assembly 1 around the vertical axis xx' (annotated in FIG. 1):

> Assembly 1 is also adapted to pivot laterally, around a vertical axis xx' passing through the longitudinal axis of the binding and/or support 2. This is accomplished by the lateral pivoting of pivoting element 6 as follows. Pivoting element 6 is adapted to contact or engage support 2. Contact between these two elements is guaranteed by elastic system 7 which biases these elements into contact with one another . . . This bias or force exerted by elastic system 7 to resist the lateral pivoting of assembly 1 and pivot 6 is called the lateral release retention force.

Id., 8:33–52. Therefore, in my opinion, the pivoting element and the elastic means are configured as a lateral release assembly for applying lateral securing pressure to the ski boot as required by this claim limitation.

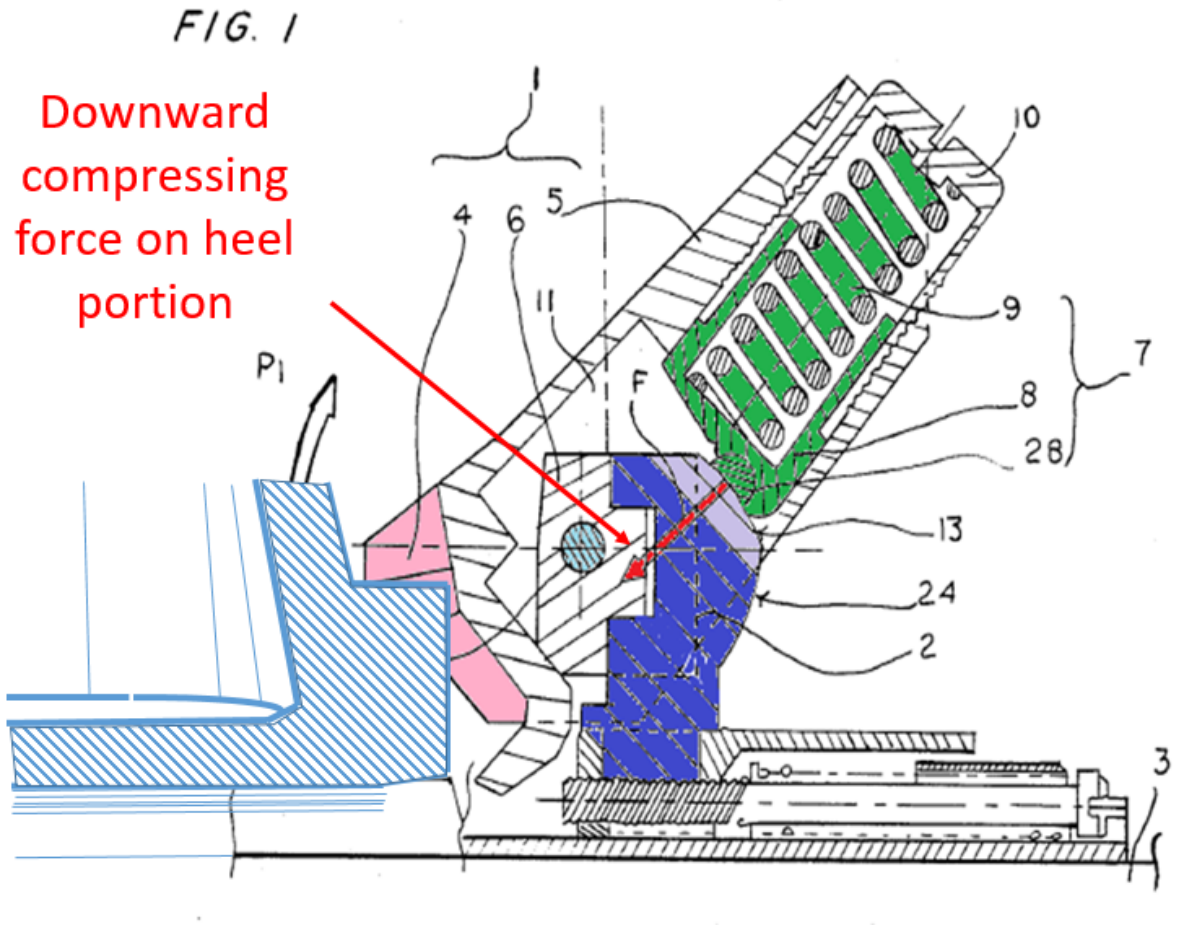


Id., FIG. 1, p. 2 (annotations in color).

[1.4] the upper heel assembly comprising an upper heel housing that is configured to compress the heel portion of the ski boot downward;

110. As described in [1.2], it is my opinion that the '772 patent describes an upper heel assembly comprising the jaw 4, the body 5, and housing 11. FIGS. 1 and 2 show the binding in the centered boot retention position. The body 5 incudes elastic system 7, which comprises a piston 8 biased by a spring 9, and acts to compress the heel portion of the ski boot downward. *Id.* 8:9–14. Specifically,

"[a]ny vertical pivoting performed by jaw 4 is opposed by elastic system 7. Elastic system 7 exerts a force F called the vertical release retention force," which retains "jaw 4 and assembly 1 in the centered retaining or rest position shown in FIGS. 1 and 2." MARKERVOLKL-1005, 8:25–31.



Id., FIG. 1, p. 2 (annotations in color).

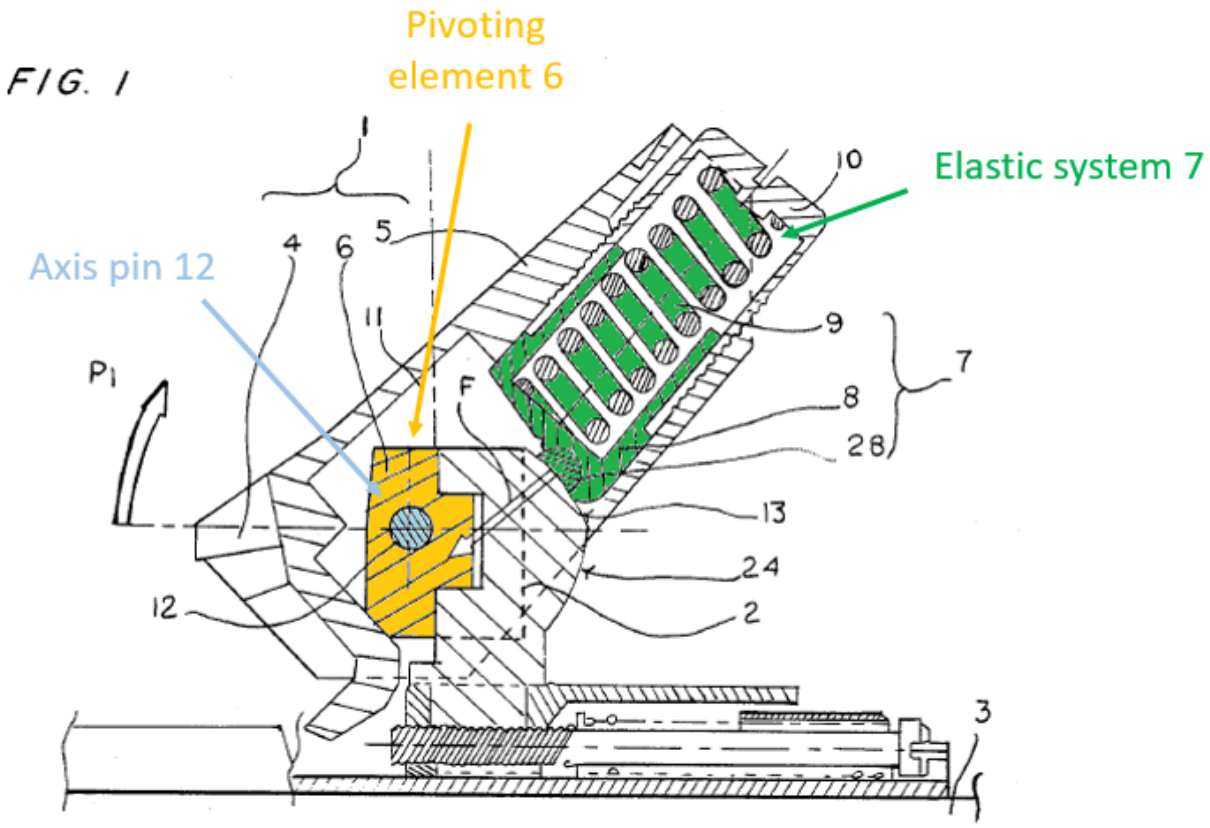
[1.5] a linkage element fixedly attached to the lateral release assembly;

111. As described in [1.3], it is my opinion that the '772 patent describes a lateral release assembly comprised of a pivoting element and an elastic system (shown in gold and green, respectively, in annotated FIG. 1). Pivoting element 6 is

fixedly attached to the lateral release assembly by an axis pin (light blue), as follows:

> Pivoting element 6 is laterally fitted in housing 11 by an axis pin 12 so that jaw 4 is journalled on pivoting element 6 and pivots around a transverse and horizontal axis transverse to the longitudinal axis of the binding and ski and passing through pin 12.

MARKERVOLKL-1005, 8:17–21.



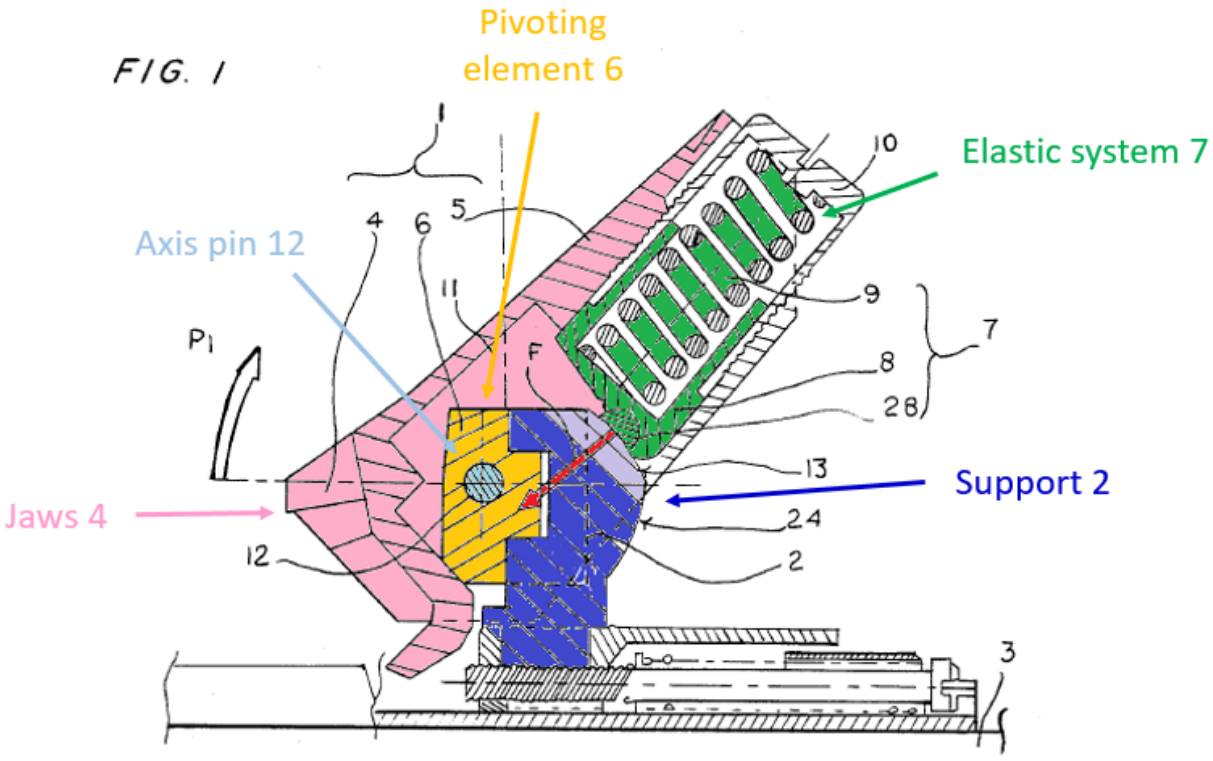
Id., FIG. 1, p. 2 (annotations in color).

[1.6] wherein the linkage element, a first surface and a second surface cooperate to limit motion of the lateral release assembly to within a

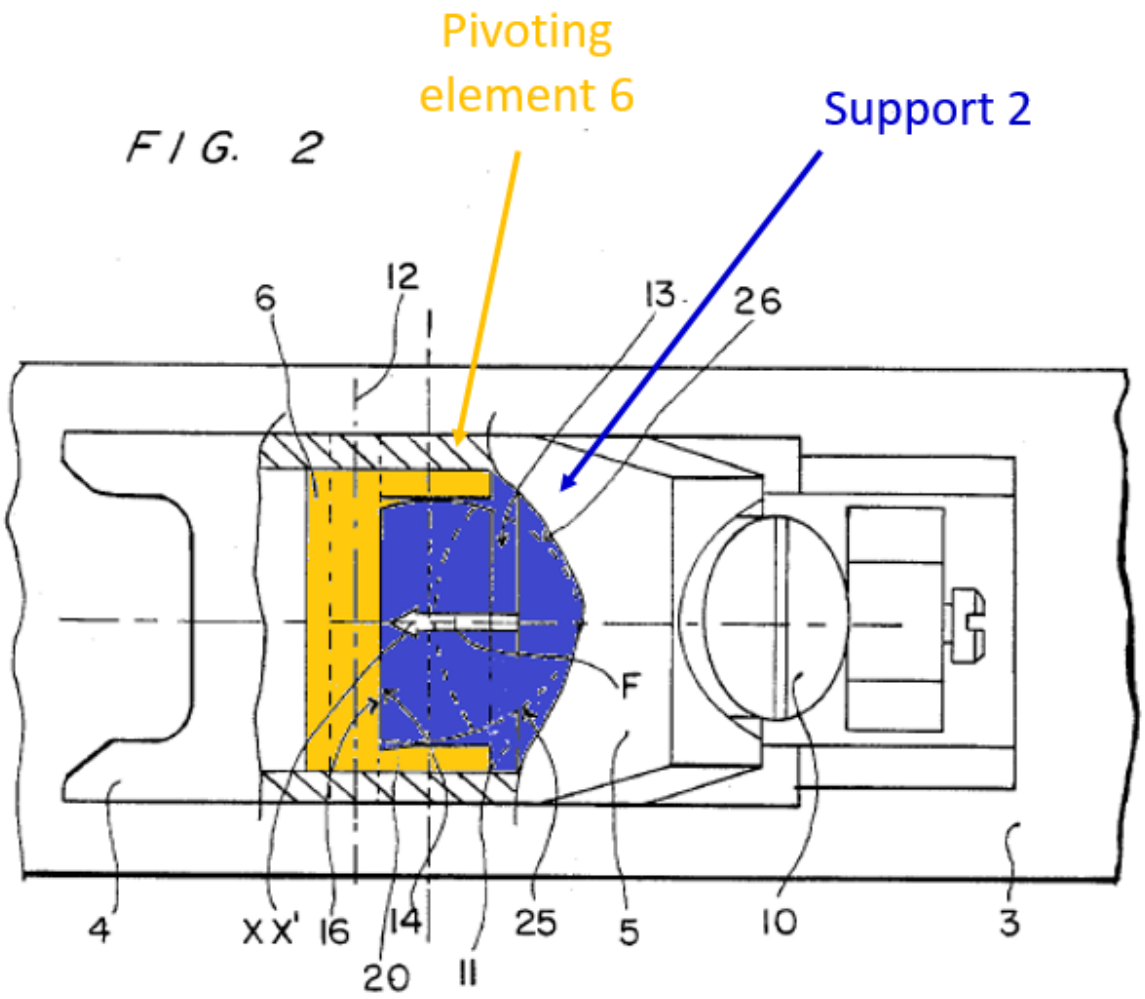
predetermined region within a plane defined by the longitudinal and horizontal axes of the ski.

112. As discussed above in [1.3] and [1.5], in my opinion, the ’772 patent discloses a linkage element and a lateral release assembly. The ’772 patent discloses that “the lateral pivoting of the assembly and the pivoting element is performed about one vertical axis passing through the longitudinal axis of the support.” MARKERVOLKL-1005, 2:14–17. Specifically, as shown in annotated FIGS. 1, 2, and 6, assembly 1 pivots laterally around vertical axis xx', which passes through the longitudinal axis of the binding and/or support 2 (dark blue), due to the lateral pivoting of pivoting element 6 (gold). Pivoting element 6 is fitted into the housing 11 (pink) by axis pin 12(light blue) such that jaw 4 (pink) can pivot around a transverse and horizontal axis transverse to the longitudinal axis of the binding and ski and passing through axis pin 12. *Id.*, 8:17–21. Pivoting element also contacts/engages support 2, which is guaranteed by the bias of elastic system 7. Specifically, the substantially flat front surface 14 of support 2 is biased in contact with the substantially flat rear surface 16 of pivoting element 6 by force F (shown in red), such that the pivoting element 6 and support 2 form a lateral pivoting system that pivots laterally around axis xx' of support 2 against the bias/force of elastic system 7 (lateral release retention force). The interaction of elastic system 7 and support 2 creates a torque or moment that resists lateral pivoting (lateral

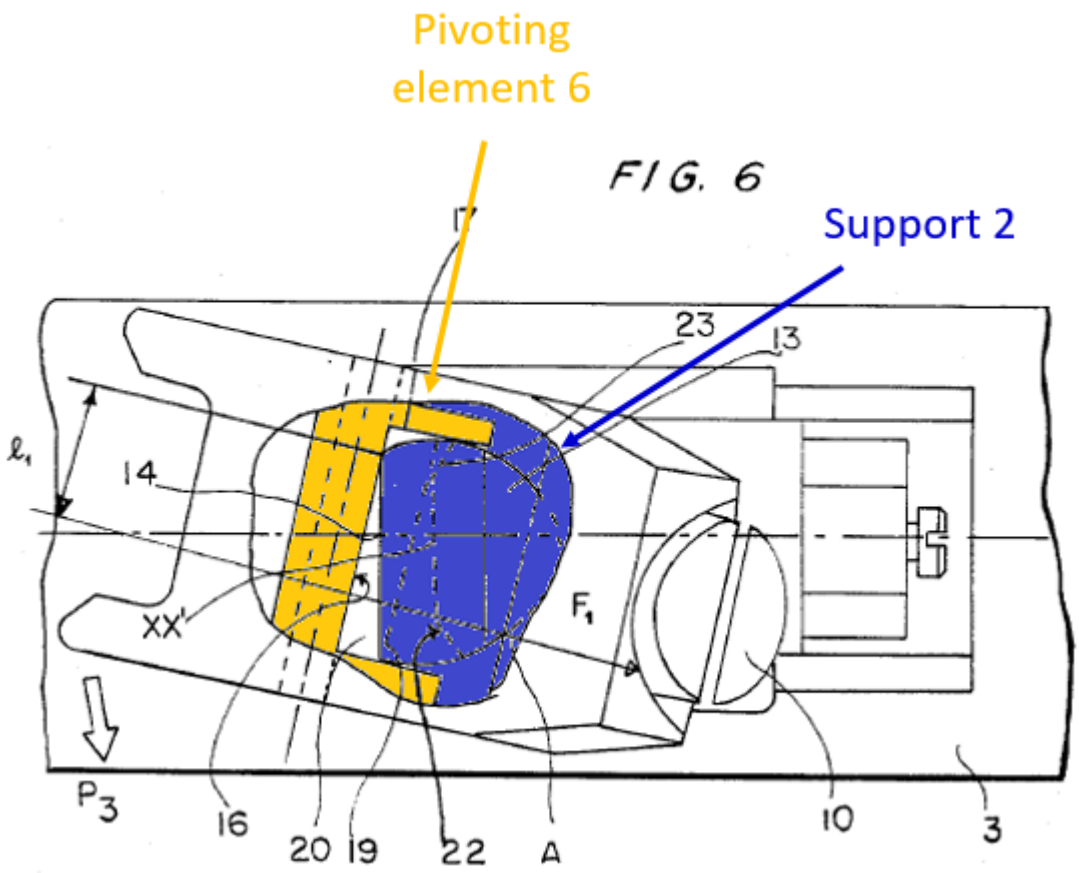
release retention moment). *Id.*, 8:32–52. Therefore, it is my opinion that the pivoting element acts with at least 2 surfaces to limit motion of the lateral release assembly to within a predetermined region within a plane defined by the longitudinal and horizontal axes of the ski.



Id., FIG. 1, p. 2 (annotations in color).



Id., FIG. 1, p. 2 (annotations in color).



Id., FIG. 6, p. 4 (annotations in color).

b. Claim 4

[4.0] The vector decoupling assembly of claim 1, wherein the lateral release assembly is maintained in a predetermined neutral position in the absence of force vectors applied to the vector decoupling assembly.

113. The '772 patent is directed to "a safety binding adapted to releasably hold a boot on a ski." MARKERVOLKL-1005, 1:14–15. The '772 patent uses the term "centered boot retaining position" to describe the positioning of the lateral release assembly in the absence of applied force. For example, in one embodiment

disclosed in the ’772 patent, the binding includes “a compressing means for compressing the elastic means when the elastic means pivots vertically away from a centered boot retaining position.” *Id.*, 3:9–12. In another embodiment of the ’772 patent, “[t]he assembly may further include a locking means for locking the assembly in a centered boot retaining position when the boot is attached to the jaw when the assembly is in an open position.” *Id.* at 4:13–16.

114. The ’772 patent also teaches that

> Elastic system 7 exerts a force F called the vertical release retention force and a moment called the vertical release retention moment on a vertical release incline 13 located on the back or rear portion of support element 2 to retain jaw 4 and assembly 1 in the centered retaining or rest position shown in FIGS. 1 and 2.

Id., 8:26–32. In other words, as the term suggests, elastic system 7 provides a vertical release retention force to retain the binding in a neutral position when no external forces are applied, *i.e.* maintain the lateral release assembly in the centered boot retaining or rest position. *Id.* In my opinion, a POSA would understand that the absence of displacement by lateral or vertical forces would be considered the centered boot retaining position would be considered a “neutral position”, as long as those forces do not exceed the preset level that is necessary for satisfactory control. Based on my experience, once those forces exceed the preset level, it is the intention of the design to release in order to avoid potentially harmful forces to the skier’s body. Therefore, in my opinion, the ’772 patent teaches this limitation.

c. Claim 5

[5.0] The vector decoupling assembly of claim 4, wherein the lateral release assembly moves in both a first direction and a second direction with respect to the neutral position.

115. In my opinion, the '772 patent teaches this limitation. The '772 patent teaches that prior bindings had certain disadvantages:

> Specifically, in these bindings and the relationship between the value of the vertical release forces and moments and the value of the lateral release forces and moments are not correct to ensure safe skiing.
>
> There is, therefore, a need for a binding that can pivot both laterally and vertically so that the relationship between the vertical release retention forces and lateral release retention forces is correct.

MARKERVOLKL-1005, 1:54–62. The '772 patent specifically teaches that the binding may provide both vertical and lateral pivoting from the centered retaining position: "In one embodiment the support element includes an incline adapted to cooperate with the elastic system for producing a release retention moment resisting the vertical and lateral pivoting of the binding away from its centered retention position." *Id.*, 2:24–28. In my opinion, a POSA would understand that the lateral pivoting means that the lateral release assembly can move in a first and a second direction (*e.g.*, left or right) with respect to the centered retaining or neutral position.

116. Alternately, the ’772 patent teaches that “[w]hen the assembly undergoes a pure lateral stress, the assembly pivots laterally and also moves forward.” MARKERVOLKL-1005, 3:5–7. In other words, “[w]hen assembly 1 and jaw 4 are stressed to undergo a pure rotation around XX', for example, as when a lateral stress is applied to the boot, assembly 1 also travels in the forward direction.” *Id.*, 9:63–66. As before, it is my opinion that a POSA would understand that the lateral pivoting means that the lateral release assembly can move in a first and a second direction with respect to the centered retaining or neutral position (*i.e.* right and left) and may also move in the forward direction.

d. Claim 6

[6.0] The vector decoupling assembly of claim 5, wherein the motion of the lateral release assembly is at least partially rotational.

117. As described in [5.0] above, the lateral release assembly may pivot laterally around one axis and/or move forward when lateral forces are applied. *See* MARKERVOLKL-1005, 2:24–28, 3:5–7, 5:44–47, 9:63–66. Specifically, the lateral release is partially rotation in regard to both the rotation of the assembly 1 around the xx' axis, *i.e.* allows the jaw to pivot around a transverse and horizontal axis transverse to the longitudinal axis of the binding and ski and passing through pin 12. MARKERVOLKL-1005, 8:17–21. Therefore, it is my opinion that the

motion of the lateral release assembly as described in the ’772 patent is at least partially rotational as required by this limitation.

e. Claim 7

[7.0] The vector decoupling assembly of claim 5, wherein a force required to move the lateral release assembly increases as the lateral release assembly moves away from the neutral position.

118. It is my opinion that the ’772 patent teaches this limitation. The invention of the ’772 patent is “to provide a binding wherein the relationship between the vertical and lateral release forces and moments are correct for a satisfactory release of the boot.” MARKERVOLKL-1005, 1:65–68. With respect to lateral release forces the elastic system 7 is used to bias the jaw 4 and the pivoting element 6 against lateral and vertical pivoting. Any movement of the jaw 4 in the vertical direction is opposed by the elastic system 7, which exerts a force F on the vertical release incline, and any lateral movement of the pivoting element 6 to engage the support is guaranteed by the bias of the elastic system 7. In my opinion, a POSA understands that any movement of the jaw or pivoting element in the vertical or lateral direction is met with an increased force imparted by the elastic system increases, resulting in a greater force being needed to move the jaw from its neutral or centered boot retaining position. As previously discussed with

respect to Ground 1, the increasing lateral force due to the movement from neutral is based on Hooke's law.

f. Claim 8

[8.0] The vector decoupling assembly of claim 7, wherein a relationship between a position of the lateral release assembly with respect to the neutral position and the force required to move the lateral release assembly is linear.

119. It is my opinion that the '772 patent discloses this limitation. As described in the '867 patent:

> The longitudinal pressure compensator includes a spring. The spring bias produces linear force between the boot and the jaw (heel interface of the binding) of the binding.

MARKERVOLKL-1001, 5:10-13.

120. Similar to the '867 patent, the lateral release assembly in the '772 patent includes an elastic system that produces a linear force between the heel of the boot and the jaw 4, which is in accordance with Hook's law, *i.e.* displacement is linearly proportional to the force applied.

121. In my experience, as bindings react to applied loads and forces, the relationship between the force applied and the motion of the binding will go through as many as three phases. Ski bindings have two functions: one is to retain the boot to the ski, the other is to release the boot from the ski. The retention

function of the binding is described by the first two phases. The release function has only one phase, *i.e.* phase three.

122. The second phase is where the applied force exceeds the preset release value and the binding begins to open, or move through whatever motions it is designed to move through. At this point, the system operates in a linear manner. That is to say, as the force increases, the binding opens further and further. The degree of opening is proportional to the force applied and follows Hooke' Law. If the applied force never exceeds the ultimate release value, the binding will return to a centered position in a linear manner, less any energy that is lost due to hysteresis. This can be thought of as the shock absorbent region, or what is often referred to as the elastic phase of binding operation. As long as the applied force does not exceed the ultimate preset release value, the boot is retained to the ski.

123. Therefore, it is my opinion that the force required to move the lateral release assembly of the binding disclosed in the '772 patent from the neutral position may be linear in at least one phase.

g. Claim 9

[9.0] The vector decoupling assembly of claim 7, wherein a relationship between a position of the lateral release assembly with respect to the neutral position and the force required to move the lateral release assembly is non-linear.

124. In my opinion, the ’772 patent discloses this limitation. As discussed above with respect to claim 8, in my experience, as bindings react to applied loads and forces, the relationship between the force applied and the motion of the binding will go through as many as three phases.

125. Phase one is where the boot remains in the neutral position, which is advantageous for the purpose of skiing in a controlled manner. In this first phase the forces that pass through the boot to the ski are normal control loads that are below the preset release values of the binding. While in this phase, the relationship between the force applied and the motion of the binding is non-linear. That is to say, as the force goes from zero up to the point where the force exceeds the preset value, there is no motion of the binding; thus it is a non-linear system and Hooke’s Law does not apply. The boot is retained to the ski in this phase.

126. The third phase is when (and if) the force applied to the binding causes the release mechanism to reach the point where the binding no longer retains the boot to the ski. At this point it becomes a discontinuous system where there is no longer any force being applied by the boot to the binding, as there is no longer any binding retention. In most bindings, at this point, the boot is no longer connected in any way to the binding. The toe binding of most ski bindings will automatically return to the normal centered position. Most heel units will remain in an open, or cocked, position so as to facilitate re-entering the ski boot using

what is referred to as a step-in design for the heel. In either case, while in this phase, the system is no longer acting in a linear manner but rather what might be thought of as discontinuous or non-linear. This phase is the release phase of the binding operation.

127. Therefore, it is my opinion that the force required to move the lateral release assembly of the binding disclosed in the ’772 patent from the neutral position may be non-linear in at least one phase of operation.

VIII. CONCLUSION

128. For the foregoing reasons, it is my opinion that claims 1 and 4–9 of the ’867 patent are anticipated by DE ’298 and are obvious over the ’772 patent in view of DE ’298.

129. Therefore, it is my opinion on the basis of anticipation and obviousness that claims 1 and 4–9 of the ’867 patent are invalid.

131. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

Dated: April 11, 2017

By: Jasper E Shealy
Jasper Shealy