

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

WALMART INC.
Petitioner

v.

CARAVAN CANOPY INTERNATIONAL, INC.
Patent Owner

Case IPR2020-01026
Patent No. 5,944,040

DECLARATION OF DR. RICHARD W. KLOPP

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I, Richard W. Klopp, declare as follows:

I. INTRODUCTION

1. My name is Richard W. Klopp, and I reside in Redwood City, CA. I am a Principal Engineer in the Mechanical Engineering Practice at Exponent, Inc. I am over eighteen years of age, and I would otherwise be competent to testify as to the matters set forth herein if I am called upon to do so.

2. I have been retained by WALMART INC. (“Petitioner”) in connection with the above-captioned petition for *inter partes* review (“IPR”) of U.S. Patent No. 5,944,040 (the “’040 Patent” or “the Challenged Patent,” Ex-1001). The ’040 patent will be cited herein as “Ex. 1001” with additional column, line, and similar references to specific portions. I understand the ’040 Patent is currently assigned to CARAVAN CANOPY INTERNATIONAL, INC. (“Patent Owner”).

3. I have been asked by Petitioner to offer opinions regarding the ’040 Patent, including whether claims 1-3 (which I will refer to collectively as the “Challenged Claims”) are unpatentable because they were obvious in view of certain prior art. This declaration sets forth the opinions I have reached to date regarding these matters.

4. In forming my opinions, I rely on my knowledge, training, and experience in the field and on documents and information referenced in this

Declaration.

5. My employer, Exponent is being compensated by Petitioner at my standard hourly consulting rate for my time spent on this matter. My compensation is not contingent on the substance of my opinions, on the outcome of the IPR, or on the outcome of any related dispute between Petitioner and Patent Owner.

6. Neither Exponent nor I have a conflict of interest with respect to Petitioner or Patent Owner.

7. I reserve my ability to offer additional opinions in other dispute venues.

A. Background and Expertise

8. My CV is shown in Exhibit A to this declaration.

B. Information Considered

9. In forming my opinions, I have reviewed the '040 Patent and considered each document listed in Exhibit B and any other references cited in this Declaration. In reaching my opinions, I have considered the viewpoint of a person of ordinary skill in the art at the time of the '040 Patent's claimed priority date of May 23, 1997. As explained below, I am familiar with the level of skill of a person of ordinary skill in the art regarding the relevant technology at issue as of that time. I consider myself to have been a person of at least ordinary skill in the

art as of the claimed priority date.

II. LEGAL STANDARDS FOR PATENTABILITY

10. In expressing my opinions and considering the subject matter of the claims of the '040 Patent, I am relying upon certain legal principles that counsel has explained to me and that I have encountered in other work on intellectual property matters.

11. First, I understand that for a claimed invention to be patentable, among other things, it must be new and not obvious in light of the information known to exist before the invention was made.

12. I understand the information that is used to evaluate whether an invention is new and not obvious is generally referred to as “prior art” and generally includes patents and printed publications (e.g., books, articles, product manuals, company publications, etc.).

13. I understand that the “prior art” includes patents and printed publications that existed before the earliest filing date (the “effective filing date”) of the patent. I also understand that a patent will be prior art if it was filed before the effective filing date, while a printed publication will be prior art if it was publicly available before that date.

14. I understand that in this proceeding, it is Petitioner Walmart Inc.’s burden to prove that the Challenged Claims were anticipated by or were obvious in

light of the prior art by a preponderance of the evidence. I understand that “a preponderance of the evidence” is evidence sufficient to show that a fact is more likely true than it is not true.

15. I understand that in this proceeding, the claims must be given the meaning that the terms would have had to a person of ordinary skill in the art at the time of the '040 Patent claimed priority date.¹ The claims so interpreted are then to be evaluated for novelty in light of the prior art.

16. I understand that in the proceeding for which I am submitting this declaration, the scope of prior art is limited to patents and printed publications. My analysis compares the Challenged Claims to patents and printed publications that I understand are prior art to the Challenged Patent.

17. I understand that one way prior art may render a claimed invention unpatentable and its associated patent claims invalid is when the prior art can be shown to have made the claim “obvious” to a person of ordinary skill in the art.² My understanding of the legal standards for obviousness is set forth below.

A. Obviousness

¹ Phillips v. AWH Corp., 415 F.3d 1303, 1313 (Fed. Cir. 2005)

² I am aware that there are other issues that may render patent claims invalid, but those are beyond the scope of this declaration.

18. I understand and have been instructed as to the definition of “obviousness” in the context of U.S. patent law.

19. I understand that patent claim is invalid if it would have been obvious to a person of ordinary skill in the art at the time the invention was made. I understand that the following standards govern the determination of whether a patent claim is obvious.

20. I understand that the obviousness question requires consideration of four factors:

- The scope and content of the prior art;
- The differences between the prior art and the claims at issue;
- The knowledge of a person of ordinary skill in the pertinent art; and
- Whatever objective factors indicating obviousness or non-obviousness may be present in any particular case.

21. I understand that the objective factors (“indicia”) that may bear on the question of obviousness or non-obviousness include whether the claimed invention proceeded in a direction contrary to the accepted wisdom in the field, whether there was a long-felt but unresolved need in the field that was satisfied by the claimed invention, whether others had tried but failed to make the claimed invention, whether others copied the claimed invention, whether the claimed invention achieved any unexpected results, whether the claimed invention was

praised by others, whether others have taken licenses to use the claimed invention, whether experts or those skilled in the field of the claimed invention expressed surprise or disbelief regarding the claimed invention, and whether products incorporating the claimed invention have achieved commercial success.

22. In addition, I understand that the obviousness inquiry should avoid relying on hindsight, and must adopt the perspective of a person of ordinary skill in the relevant art as of the patent's effective filing date.

23. I also understand that under a proper obviousness analysis, any need or problem known in the field of endeavor at the time of invention and addressed by the patent can provide a reason for combining prior art elements in the manner claimed. I also understand combining familiar elements according to known methods is likely to be deemed obvious when it yields no more than predictable results. I further understand that the following are other factors that may show obviousness:

- a combination that only unites old elements with no change in their respective functions is unpatentable. As a result, the combination of familiar elements according to known methods is likely to be deemed obvious when it yields no more than predictable results,
- a predictable variation of a work in the same or a different field of endeavor is likely to be deemed obvious if a person of ordinary skill would be able to implement the variation,
- an invention is deemed obvious if it uses a known technique to improve a similar device in the same way, unless the actual application of the

technique would have been beyond the skill of the person of ordinary skill in the art. In this case, a key inquiry is whether the improvement is more than the predictable use of prior art elements according to their established functions,

- an invention is deemed obvious if there existed at the time of invention a known problem for which there was an obvious solution encompassed by the patent's claims.
- inventions that were "obvious to try" — chosen from a finite number of identified, predictable solutions, with a reasonable expectation of success — are likely to be deemed obvious,
- 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 would have been predictable to one of ordinary skill in the art, and
- an explicit teaching, suggestion, or motivation in the art to combine references, while not a requirement for a finding of obviousness, may be helpful in determining obviousness.

24. Finally, I understand that even if a claimed invention involves more than substitution of one known element for another or the application of a known technique to a piece of prior art ready for improvement, the invention may still be obvious. I also understand that in such circumstances courts may need to look to interrelated teachings of multiple patents; the effects of demands known to the design community or present in the marketplace; and the background knowledge possessed by a person having ordinary skill in the art to determine if the claimed invention is obvious.

III. PERSON OF ORDINARY SKILL IN THE ART

25. I considered several factors to determine the skill level of a person having ordinary skill in the art (“POSITA”) at the time of the claimed priority date of May 23, 1997, including the types of problems encountered in the art, the solutions to those problems, the pace of innovation in the field, the sophistication of the technology, and the education level of active workers in the field.

26. Based on my knowledge, expertise, and the prior art cited in the ’040 Patent, it is my opinion that a POSITA would have had a degree in the mechanical arts (or a related discipline) and at least two years of experiences in the design or analysis of mechanical devices, fabricated frames, and/or kinematic linkages, though additional work experience could substitute for a formal degree and vice versa.

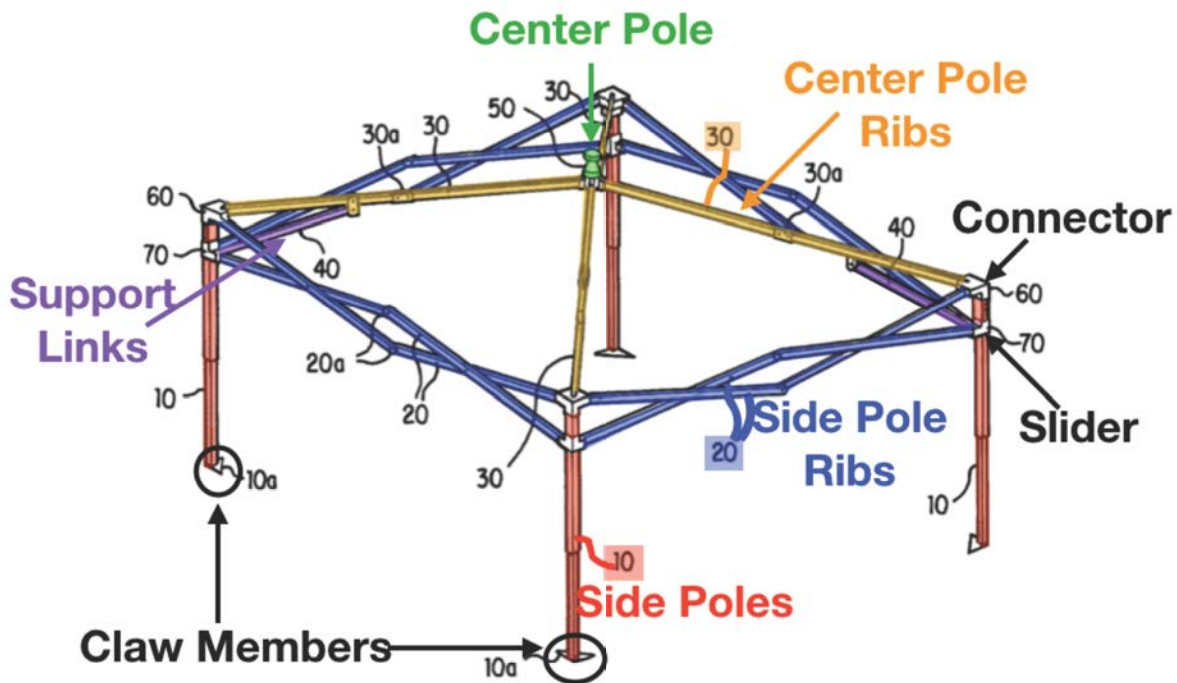


Figure A: Annotated Figure 3 from the '040 Patent showing side poles, side pole ribs, center pole, center pole ribs, connectors, sliders, and claw members as disclosed in the '040 Patent.

IV. U.S. PATENT NO. 5,944,040

27. U.S. Patent No. 5,944,040 was issued to Jung-Woo Jang on August 31, 1999. The '040 Patent application was filed in the U.S. Patent and Trademark Office ("USPTO") on May 21, 1998, claiming priority to a foreign patent application in the Republic of Korea filed May 23, 1997.

28. I have reviewed the '040 Patent and its three claims. The '040 Patent relates to technology for providing a collapsible tent frame, specifically one which

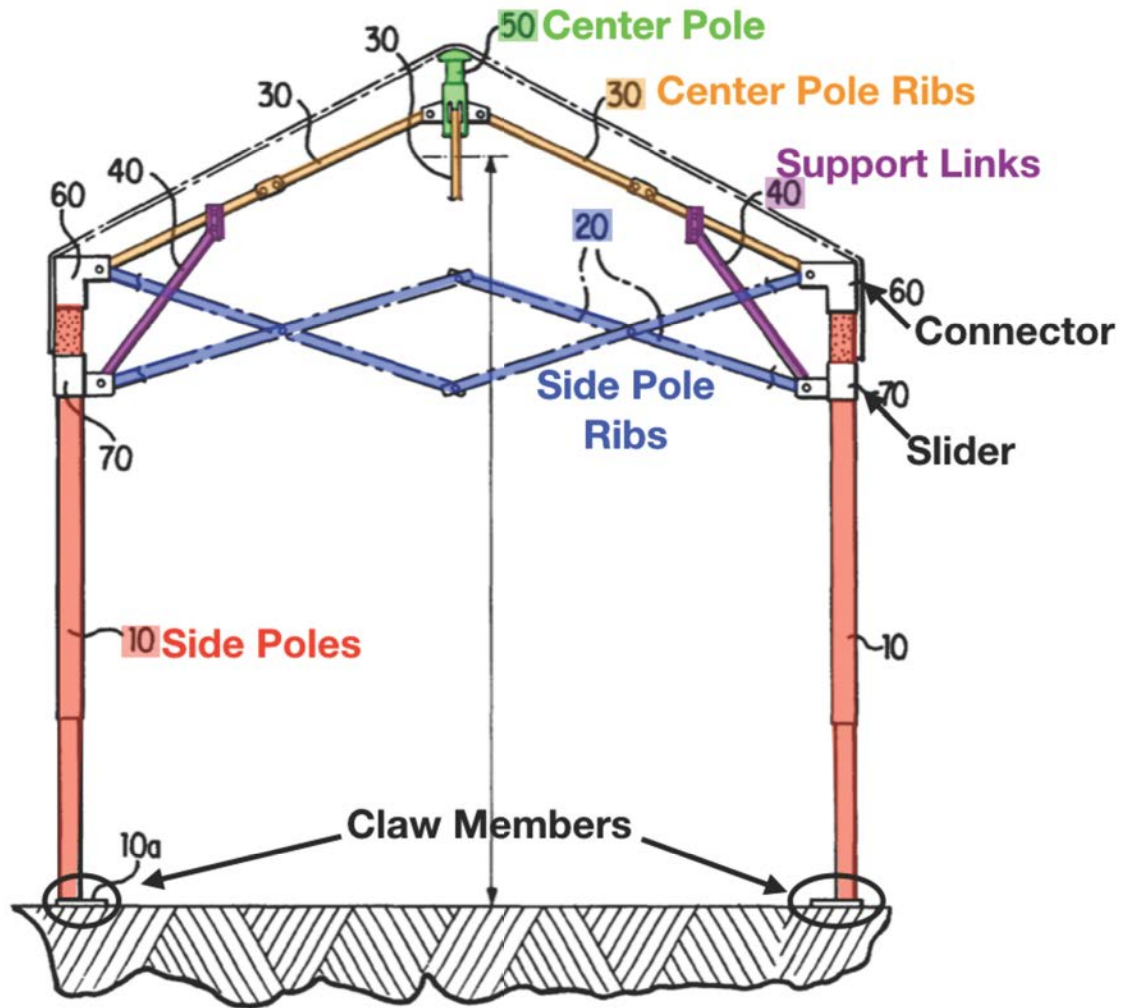


Figure B: Annotated Figure 4 from the '040 Patent showing the same elements as Figure A in a side view of the claimed invention.

is “capable of making, pitching, or striking a tent easily and quickly when necessary and, more particularly, to a collapsible tent frame suitable for giving an enlarged and heightened interior space to users when pitching a tent.” (Ex. 1001, 1:5-10).

29. In general, the '040 Patent teaches a collapsible tent frame which includes a plurality of side poles (four) coupled to each other via scissor-type ribs.

These side poles are also each coupled to a center pole via a plurality of center poles ribs. When fully extended, the four side poles and center pole form a structure upon which material can be stretched so as to provide shelter.

30. More specifically, and with reference to Figure A and Figure B in this report, the '040 Patent teaches a collapsible tent structure with side poles (10), coupled to each other via scissor-type side pole ribs (20). The upper arm of each of the plurality of side pole ribs is coupled to a stationary connector (60), while the lower arm is coupled to a slider (70) placed around the side poles. In this arrangement, as the tent structure is made to expand/contract, the lower arm of the side pole ribs coupled to slider 70 is allowed to move along the side pole, thus allowing the scissor structure of the side pole ribs to close and open.

31. Also shown in Figure A and Figure B are the center pole (50) coupled to the side poles at connectors (60) via center pole ribs (30). These center pole ribs also connect to the sliders (70) on the side poles via support links (40). As the tent structure is folded, the sliders (70) and connected support links (40) slide down the side poles, and the support links (40) pull down the center pole ribs (30), causing the center pole ribs (30) to fold at hinge connections (30a). This folding movement enables the tent structure to collapse into a compact space.

32. The '040 Patent discusses that patents for collapsible tents with side poles, scissor-type connections between each side pole and attached to sliders and connectors on the side poles, and center poles with associated center pole ribs coupled to each other at the center pole already existed at the time the patent was filed (see Ex. 1001, 1:10-49). Further, the '040 Patent also acknowledges that prior art patents also disclosed the striking and collapsing of the tent by the side poles moving together which forces the sliders attached to said side poles to move downwards (Ex. 1001, 1:34-38), which is the same mechanism disclosed in the '040 Patent. However, the '040 Patent identifies a problem with the prior art in that the center pole structure is connected (via the center pole ribs) to the side pole ribs directly via scissor-type connections, as opposed to being connected to the side poles directly. According to the '040 Patent, this arrangement results in an inner frame structure which is overly burdensome because it limits interior head space (causing an obstacle for users entering or exiting the tent), adds unduly complicated construction requirements to the center pole (resulting in higher costs), and adds overall weight (which results in transportation difficulties). (Ex. 1001, 1:54-2:2).

33. With regards to the identified prior art presenting an impediment to users exiting/entering the tent, the '040 Patent specifies the problem in “limiting

the height of the interior space”: “It is thus necessary for a user to be careful lest one bumps one’s head against the center pole ribs 3 or the connector 4 while going out of, coming into or standing in the tent” (Ex. 1001, 1:58-63).

34. With regards to the added construction complexity and ease of transportation, the ’040 Patent teaches that the prior art identified in its application results in a “center pole . . . having a complex construction and increasing the production cost of the tent frame. Another problem of the above collapsible tent frame resides in that it is too heavy for a user to easily handle or move the frame.” (Ex. 1001, 1:66-2:2).

35. The ’040 Patent attempts to ameliorate these claimed shortcomings in the identified prior art by attaching the center pole directly to the side poles (as opposed to the prior art connecting the center pole to the side pole ribs), including adding a support link between the center pole ribs and the side pole to aid in pitching and striking the tent. See Figure A and Figure B.

36. The ’040 Patent contains 3 claims, all of which are being challenged in the current matter:

1. A collapsible tent frame, comprising:

a.) a center pole constructed for stretching and sustaining a tent's roof when a tent is pitched with the tent frame;

b.) a plurality of side poles coupled to each other through a plurality of scissor-type ribs, with upper ends of said ribs being hinged to connectors provided at top ends of said side poles and lower ends of said ribs being hinged to sliders movably fitted over said side poles; and

c.) plurality of center pole ribs coupling said center pole to said connectors of the side poles, said center pole ribs individually comprising two rib members coupled to each other through a hinge joint and being hinged to the slider of an associated side pole through a support link, thus being collapsible at the hinge joint in accordance with a sliding motion of said slider along the side pole.

2. A collapsible tent frame according to claim 1, wherein said rib members of the center pole ribs have a substantially equal length.

3. A collapsible tent frame according to claim 2, further comprising a claw member disposed at a lower end of each side pole.

V. CLAIM INTERPRETATION

37. I understand that the Patent Trial and Appeal Board uses the *Phillips*³ standard for claim construction used in civil courts, which is to say that the claims must be given the meaning that the terms would have had to a person of ordinary skill in the art at the time of the '040 Patent claimed priority date.

38. I understand that the parties in the Underlying Litigation in totality dispute over six different terms in the '040 Patent: “center pole,” “constructed for stretching and sustaining a tent’s roof,” “being collapsible at the hinge joint in accordance with a sliding motion of said slider along the side pole,” “hinge joint,” “support link”, and “substantially equal length”.

Center Pole

39. Independent claim 1 recites “a center pole constructed for stretching and sustaining a tent’s roof when a tent is pitched.” (Ex. 1001, 4:28-29).

40. Within the '040 Patent, the term “pole” is used consistently to refer to long slender objects. Specifically, the term “pole” is used to refer to both “side poles” and the “center pole”, without any indication that the term should be understood differently within these two contexts. Therefore, a POSITA at the time

³ *Phillips v. AWH Corp.*, 415 F.3d 1303, 1313 (Fed. Cir. 2005)

of filing would have understood that “center” and “side” describe the location of the pole and do not change the underlying definition or structure of a “pole”; in recognizing that a “side pole” as taught in the ’040 Patent is a long, slender object provided at the sides or corners of the tent (see side poles 10 in Figure A and Figure B in this report) from just a simple comparison, a POSITA would have similarly construed a center pole to be a “long, slender object located at the center of the tent”.

41. This construction would have also been reinforced by how the center pole is used within the ’040 Patent. For example, a POSITA would have recognized that the center pole would need to be elongated so as to maximize vertical headspace within the tent and provide a maximum angle for water shedding. Additionally, a POSITA would have recognized that the width of the center pole defines how laterally compact the folded tent can be: a POSITA would have thus understood that the center pole needs to also be as slender as is practical. This “slender” condition also arises from the notion that a POSITA would have wanted the tent material to be supported at an apex, instead of a flat portion, again, to maximize water shedding capability. Therefore, the use of the term “center pole” within the ’040 Patent would have also led a POSITA to construe this term as both “long” and “slender”.

42. For further guidance as to how to understand the term “center pole”, a POSITA would have also looked to dictionary definitions of “pole” contemporaneous with the claimed priority date of ’040 Patent, such as “a long, cylindrical, often slender piece of wood, metal, etc.”⁴ and “a long, slender, usually cylindrical object (as a length of wood).”⁵ While these dictionary definitions taken as a whole indicate that a pole is generally cylindrical, within the context of the ’040 Patent it is clear that no such limitation exists (i.e., the side poles are rectangular or square, and the embodiment of the center pole shown in Figure 3 of the ’040 Patent, Figure A in this report, is conical).

43. Accordingly, a POSITA in view of the above requirements for a center pole (in addition to the ’040 Patent specification, claims, and figures) would interpret a center pole as a “centrally disposed, long, slender object”.

Constructed for Stretching and Sustaining a Tent’s Roof

44. Claim 1 of the patent claims a “center pole” (defined above in pars. 39-43) that is “constructed for stretching and sustaining a tent’s roof.” As the ’040

⁴ Ex. 1014 (Webster’s Encyclopedic Unabridged Dictionary of the English Language (1996))

⁵ Ex. 1015 (Merriam-Webster’s Collegiate Dictionary, Tenth Edition (2000))

Patent describes, the “canvas or other material” of the tent roof is “stretched over and sustained by a frame.” (Ex. 1001, 1:11-13). Specifically, the tent roof is most often secured to the side poles and is held up by the center pole and center pole ribs. The center pole specifically heightens the tent roof to create tension in the fabric which prevents sagging. Sagging leads to instability and flapping due to wind or leaking due to a collection of rainwater. These are all common problems identified in the art.

45. Moreover, the purpose of center pole within the '040 Patent is to further heighten the interior space of the tent (see, e.g. Ex. 1001, 3:30-33). This addresses one of the key problems identified in the patent: prior art tents had “limit[ed] the height of the interior space.” (Ex. 1001, 1:56-64).

46. Therefore, from the specification of the '040 Patent, a POSITA would interpret “stretching and sustaining a tent’s roof” to mean the action of a center pole which both heightens and holds up the tent covering.

47. This interpretation of stretching and sustaining comports with how dictionaries at the time of priority would have defined the terms also. For example, the 1996 Oxford Dictionary and Thesaurus defines “stretch” as “place or lie at full

length or spread out (*with a canopy stretched over them*),”⁶ and Webster’s II New Riverside Dictionary, also from 1996, defines “sustain” as “[t]o hold up: support.”⁷

48. Accordingly, a POSITA would have interpreted “constructed for stretching and sustaining a tent’s roof” to mean “made to heighten and hold up the tent covering”.

Petitioner’s Constructions for the Remaining Terms

49. I understand that Petitioner’s proposed constructions of the following additional terms in the Underlying Litigation: “being collapsible at the hinge joint in accordance with a sliding motion of said slider along a side pole”—construed to mean “when the tent frame is collapsed, the center pole ribs bend at the hinge joint, and the slider slides along the side pole”; “hinge joint”—construed to mean “a connector that pivots to raise or lower the collapsible tent frame”; and “support link”—construed to mean “a structure that connects a rib member with a slider associated with a side pole”. See Petitioners Opening Claim Construction brief in the Underlying Litigation, Ex. 1012. Patent Owner countered that each term merits its plain and ordinary meaning. Ex. 1012.

⁶ Ex. 1016 (emphasis in original).

⁷ Ex. 1017.

50. It is my opinion that Petitioner’s proposed constructions in the Underlying Litigation are correct. I have been informed that Petitioner offered these constructions to aid the jury in understanding technical terms. As that issue is not present here, construction of those terms is not necessary for institution purposes or analysis of the obviousness of the Challenged Claims in this proceeding.

51. Regarding the claim term “substantially equal length,” it is my opinion that this term is not explicitly defined or discussed within the ’040 Patent, and neither the specification nor the prosecution history provides any objective boundaries for this term to a POSITA.

52. For the purposes of analyzing the scope of Claim 2 of the ’040 Patent, a POSITA would look to the ’040 Patent specification, which teaches: “The center pole ribs 30 individually comprise two rib members, which have the same construction and are coupled to each other through a hinge joint 30a” (Ex. 1001:66-3:1). A POSITA would understand that center pole ribs made from two rib members “having the same construction” would be within the plain and ordinary meaning of the term “substantially equal length”, even if the full scope of “substantially equal length” cannot be ascertained.

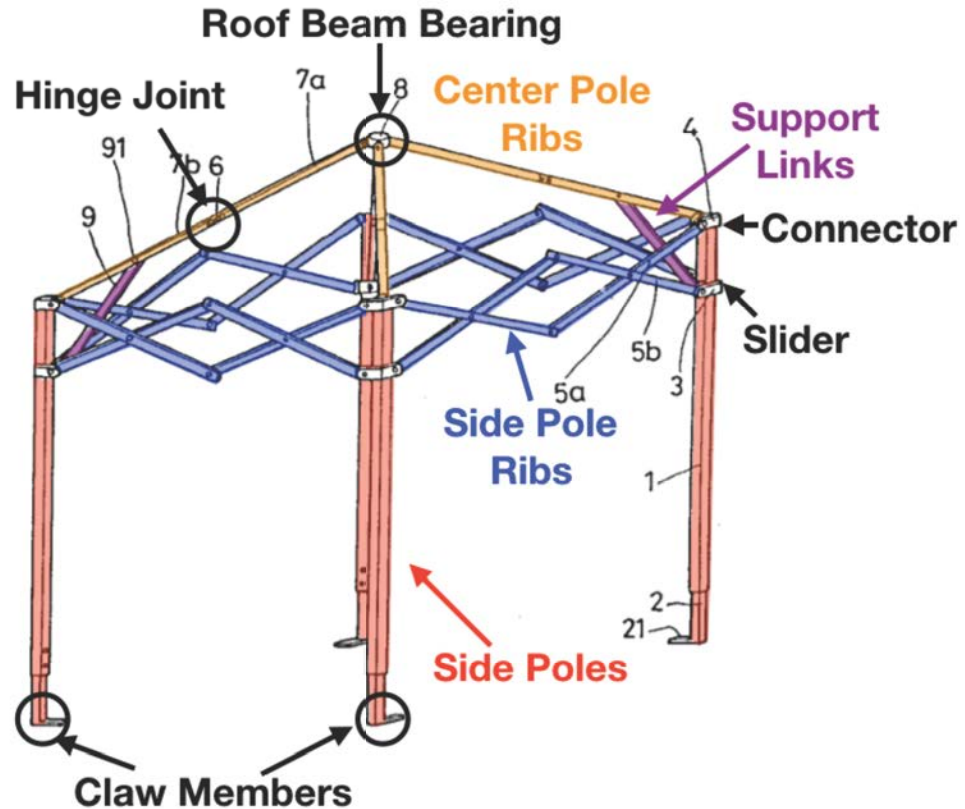


Figure C: The disclosed elements of Yang include side poles, side pole ribs, center pole ribs (with support links), connecting elements (connectors and sliders), roof beam bearing, and claw members.

A POSITA would have understood that “having the same construction” means having the same dimensions to a level relevant to collapsible tent consumer product technology. In that technology, “having the same construction” implies a common part on a bill of materials.

VI. GROUND 1: CLAIMS 1-3 OF THE '040 PATENT ARE OBVIOUS OVER YANG IN VIEW OF LYNCH

A. Japanese Unexamined Utility Model Application H1-61370 for “Telescopic Instant Frame Assembled Building Structure”

53. Japanese Unexamined Utility Model Application H1-61370 for a “Telescopic Instant Frame Assembled Building Structure” was filed by James Chow Lin Yang on October 15, 1987 and published on April 19, 1989. I will refer to this application herein as “Yang”, or “the Yang application”. Yang will be cited to the certified English Translation of Yang as “Ex. 1004” with additional pages indicated to the specific portions referenced. I am informed that Yang qualifies as prior art with respect to the ’040 Patent under 35 U.S.C. §102(b) as it was published nearly 8 years before the claimed priority date of the ’040 Patent. The ’040 Patent inventor Jang did not disclose Yang with his filing, and the examiner did not review Yang during the ’040 Patent prosecution.

54. Yang teaches to the same field of invention identified by the ’040 Patent, that is, collapsible tents which are easily assembled and disassembled: “thus the present invention provides a telescopic frame assembled building structure having an easy and quick operation” (Ex. 1004, at 4-5).

55. Moreover, (and as in the ’040 Patent) Yang identifies goals of reduced complexity of assembly, ease of transportation, and ease of entry and exit: “...the present invention, which has superior points such as follow [sic]: **1. Useful for carrying around due to integrated shape. 2. Saves time and energy because the frame assembly and folding operations are simple.** 3. Neat and pretty after

assembly is complete. 4. Can be moved and positioned at will. 5. No risk of being blown over by wind. **6. Highly mobile. 7. Convenient for aligning the location of the entrance/exit and raising the side bars for entrance and exit of persons. 8. The rooftop is pushed up to increase space for activities for which it is used**” (emphasis added, Ex. 1004, at 5-6).

56. Yang discloses a collapsible tent frame with side poles (“main column 1” and “telescopic support column 2”) which are connected to each other via scissor-style side pole ribs (“side bars” 5a and 5b). As in the ’040 Patent, one arm of the side pole ribs is connected to a stationary connector (“upper fixed support bar shaft body” 4), and the other arm is coupled to the side poles via a movable slider (“lower moving support bar shaft body” 3). See (Ex. 1004, at 7-8) and Figure C.

57. Yang also discloses a connecting hub (referred to as a “roof bearing beam shaft 8”) at the center of the tent which is used to provide support to the tent covering. Like the center pole in the ’040 Patent, the roof bearing beam shaft in Yang is connected to the side poles via ribs (roof support bars 7), which are coupled directly to a connector (4 in Yang) on the side poles, as well as being linked to the side pole sliders (3 in Yang) via support links (“support frame push-up bar” 9 in Yang).

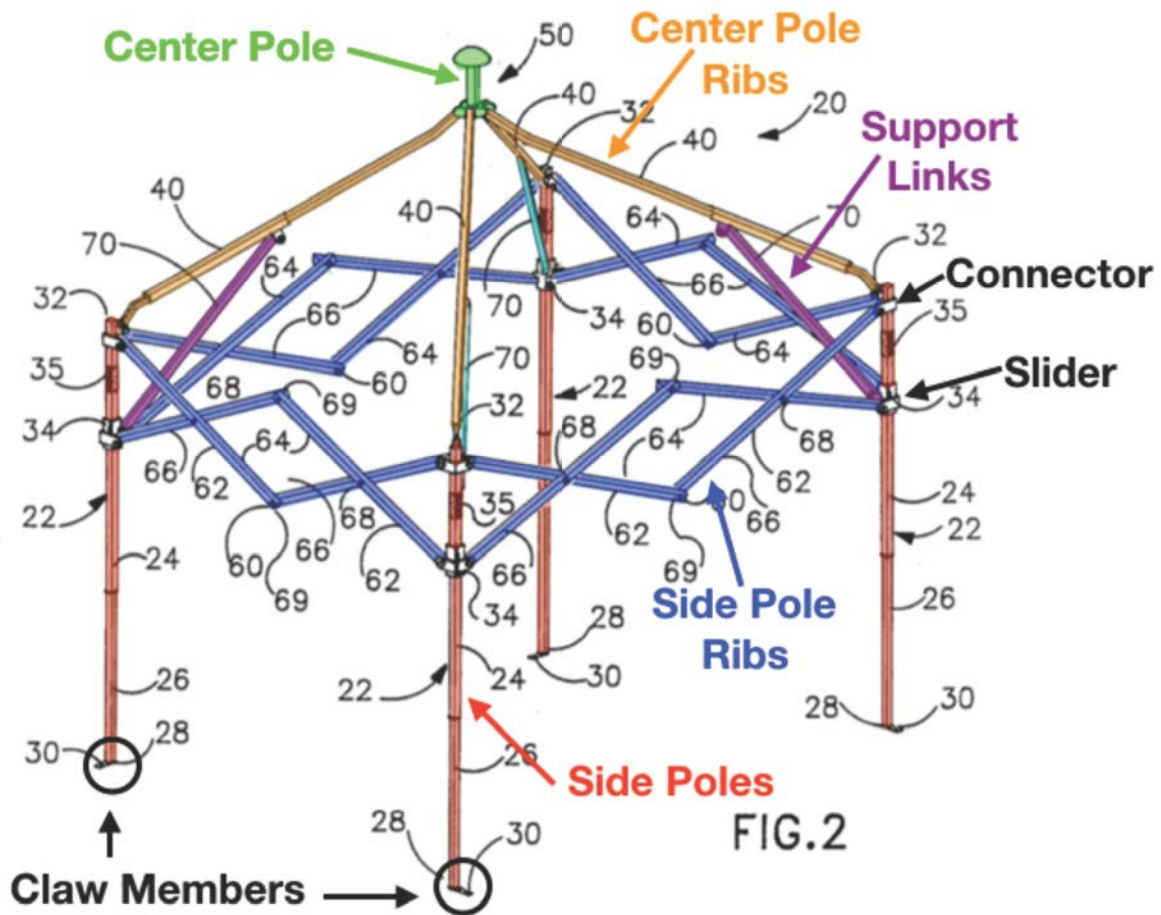


Figure D: Annotated Figure 2 from Lynch showing the side poles, side pole ribs, center pole and center pole ribs (with support links), connecting elements (connectors and sliders), and claw members.

58. A claw member (“bottom stand piece” 21) is welded and fixed to the bottom of the side pole (“telescopic support column” 2) “to reinforce overall stability. (Ex. 1004, at 7).

B. U.S. Patent No. 4,779,635 for “Collapsible Canopy With Telescoping Roof Support Structure”

59. U.S. Patent No. 4,779,635 was issued to James P. Lynch on October 25, 1988. I will refer to this application herein as “Lynch” or “the Lynch Patent”. Lynch will also be cited as “Ex. 1007, ” with additional pages indicated to the specific portions referenced. I am informed that Lynch qualifies as prior art with respect to the ’040 Patent under 35 U.S.C. §102(b) as it was published nearly 9 years before the claimed priority date of the ’040.

60. Lynch teaches to the same field of invention as the ’040 Patent, that is, collapsible canopy tents which are readily portable. Notably, Lynch teaches a portable, temporary shelter with a large surface area which “includes a self-contained roof support structure that telescopically expands with the remaining support framework” (Ex. 1007, 1:10-16).

61. Lynch identifies some of the same problems with prior art tents as those identified by the ’040 Patent and Yang (lack of interior head space, unduly complicated construction/assembly): “Accordingly, despite the advances of the above-described canopy structures, there remains a need for further improved canopy structure which provides a quick erectable temporary shelter which is **easy to expand for use and to collapse for storage in a fast, efficient manner**. There

is a further need for such an improved canopy structure which increases the mechanical strength of the framework and which **provides greater head room** thereby more efficiently using space” (emphasis added, Ex. 1007, 2:10-19).

62. Lynch discloses a collapsible tent frame with four side poles (“corner support members” 22) connected by scissor-type side pole ribs (“scissor units” 62). One arm of the side pole ribs is coupled to a stationary connector on the side poles (“upper end” 32 of corner support members 22), with the other arm of the side pole ribs coupled to a slider disposed on the side pole (“slide bracket” 34). See Figure D in this report.

63. Lynch also discloses a center pole (“apex portion” 50) which is connected to the side poles via center pole ribs (“roof support members” 40). The center pole ribs of Lynch connect the center pole to each of four side poles by connecting to the side poles at connectors (“upper end” 32 of corner support members 22). The side pole ribs of Lynch also couple to support links (“cantilever member” 70) via a hinged connection between the side pole ribs and the sliders disposed on the side poles of Lynch.

64. The examiner initially rejected Claim 1 in the '040 Patent application as anticipated by Lynch,⁸ finding that “Lynch teaches all the limitations of the above claims including side poles (26), center pole (50), scissor-type ribs (62), and center pole ribs (40).” Claim 1 was subsequently amended from “a center pole used for stretching and sustaining a tent’s roof when pitching a tent” to “a center pole constructed for stretching and sustaining a tent’s roof when a tent is pitched with the tent frame”⁹.

65. The patentee also stated that Lynch did not teach the “center pole ribs” because the “roof support member 40” of Lynch collapsed by telescoping, as opposed to folding at a hinge joint. The patentee also stated that the center pole (“apex portion 50”) of Lynch would be adjacent to the bottom ends of the side poles when the tent frame is completely collapsed, which could trap the roof material of the tent and interfere with folding. The purported invention of the '040 Patent application had the center pole adjacent to the top ends of the side poles when the tent frame is completely collapsed.

⁸ See Ex. 1002, at 52.

⁹ See Ex. 1002, at 59.

66. The patentee did not contest that Lynch teaches a center pole.

67. Amended Claim 1 was then allowed without further amendment, and the '040 Patent was granted.¹⁰

C. Motivation to Combine Yang and Lynch

68. Both Yang and Lynch teach to the fields of collapsible tent frames and specifically identify the goals of producing a frame which increases ease of assembly and/or disassembly, compactness for storage and/or transportation, and increased overhead room for users (see Ex. 1004, at 5-6 and Ex. 1007, 2:10-19).

69. Yang and Lynch also teach compatible functionality with regards to compact storage and ease of assembly and striking. For example, Yang teaches that when its frame is easily expanded and contracted: “a rooftop portion in which the side bars, the rooftop support bars, and push-up bars on the main body link with each other and all screw tightened portions of endpoints are rotatable at an angle, thereby configuring a building and enabling extension or contraction is a special

¹⁰ See Ex. 1002 at 67.

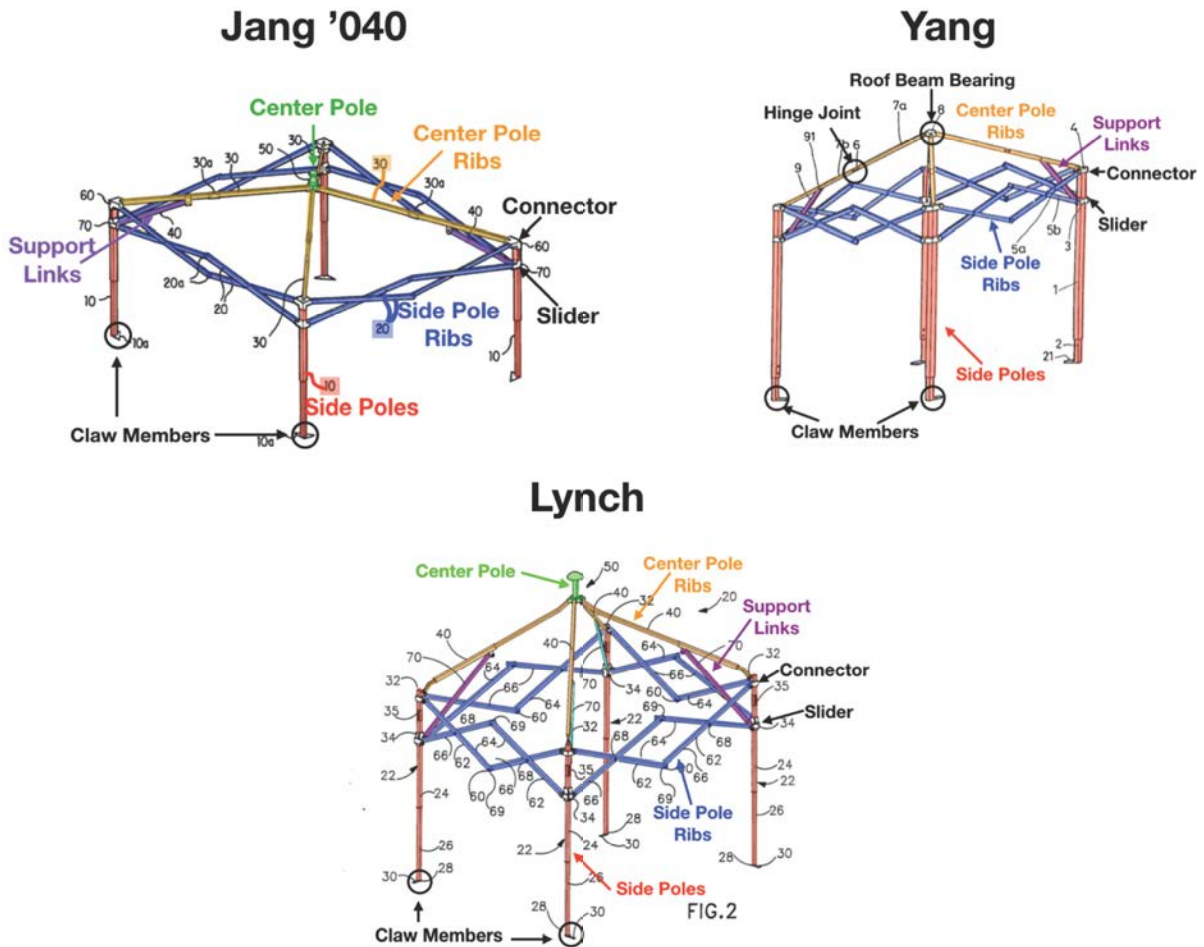


Figure E: A comparison of the disclosures of the '040 Patent, Yang, and Lynch. The three disclosures present strikingly similar designs; for instance, Yang and Lynch only differ significantly in Lynch's use of a telescoping center pole rib member design and an elongated center pole.

feature of the present invention” (Ex. 1004, at 1-2). Yang also teaches a tent frame which collapses into a compact footprint: “the angle of each joint portion is close to zero, the volume is also extremely small” (Ex. 1004, at 10). Similarly, Lynch teaches a “quick erectable temporary shelter which is easy to expand for use and to collapse for storage in a fast, efficient manner” (Ex. 1007, 2:12-16).

70. Given the striking similarities between the overall design and included elements (e.g. side poles connected via scissor-type ribs, slider mechanisms which allow the tent to be assembled, center pole structures with support links), a POSITA viewing Yang would have looked to Lynch (and vice versa) to compare and contrast features and inform possible improvements or alternative approaches to perform the same functions within the same general structure. For example, Yang and Lynch effectively provide the same structure with the exception of telescoping center pole rib members in Lynch (as opposed to hinged rib members in Yang) and an elongated center pole within Lynch, see Figure E in this report (see “iron groove joints” at Ex. 1004, at 6). A POSITA would have seen nothing to suggest that combining features from Yang and Lynch involved anything more than simple mechanical substitutions of features and that the results of combining such features would be have more than a reasonable chance of success due to the relative simplicity of both Yang and Lynch’s features.

71. For an example of such a simple mechanical substitution, the center pole (apex portion 50) of Lynch could be readily substituted for Yang’s roof bearing beam shaft 8 without impacting the function of the apex portion or the joints between the apex portion and the roof support members.

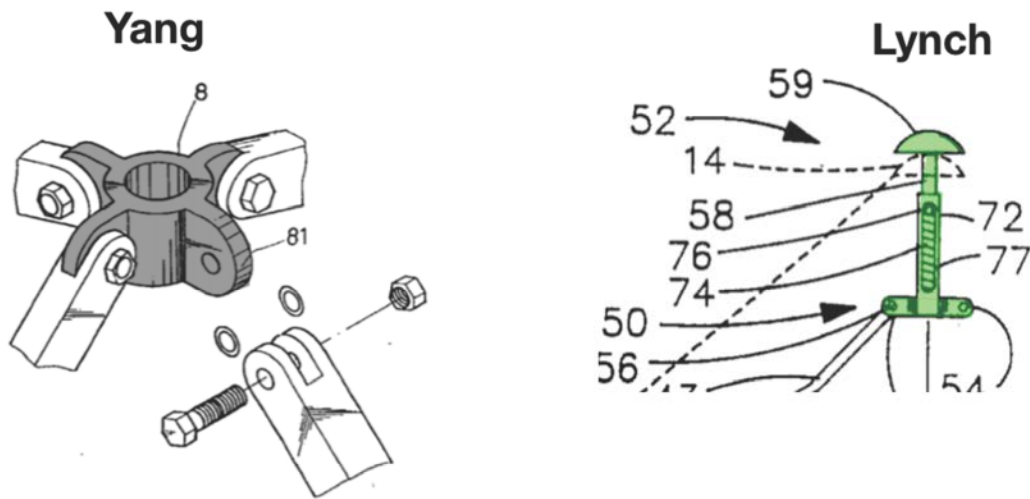


Figure F: The roof bearing beam shaft 8 of Yang (left, grey) and the center pole of Lynch (right, green).

72. Moreover, POSITA would have recognized that this modification of Yang to include an extended center pole of Lynch would have provided benefits including increased headroom inside the tent (facilitating easier entry and exit by users), increased pitch of the tent roof to shed rainwater, and increased support and pitch of the tent roof to make the canopy more aesthetically pleasing; all of these features disclosed as goals of Yang (Ex. 1004, at 5-6).

D. Analysis of Claims 1-3 in View of Yang and Lynch

Claim 1:

1.pre. “A collapsible tent frame, comprising:

73. Yang discloses an “instant frame assembled building structure capable of quickly extending and contracting” (Ex. 1004, at 1) and also discloses this frame

can be used to support a tent: “the height of the location of an entrance and exit of the tent or building structure is suitably raised” (Ex. 1004, at 3).

1.a.) a center pole constructed for stretching and sustaining a tent’s roof when a tent is pitched with the tent frame;

74. Yang discloses a “roof beam bearing (8) [which] is round or another shape” with “a plurality of roof support shaft fixed shaft pieces (81) [...] provided around it.” (Ex. 1004, at 9).¹¹ Because Yang suggests that the roof bearing beam (8) could be “round *or another shape*”, a POSITA would understand that the roof beam bearing 8 could have its shape modified without affecting its performance; using the roof beam bearing 8 as a bushing to accommodate the addition of a center pole is also within the realm of possible alterations that would have occurred

¹¹ I understand that Patent Owner’s claim construction in the Underlying Litigation is a “centrally disposed element for stretching and sustaining a tent’s roof.” To the extent the Board adopts that construction, Yang’s roof bearing beam 8 is a “centrally disposed element for stretching and sustaining a tent’s roof” and thus meets Patent Owner’s proposed construction of “center pole” in the Underlying Litigation.

to a POSITA, especially when Lynch teaches the benefit of having an elongated center pole.

75. Lynch teaches “a centrally located elongated rod” used for stretching and sustaining a tent’s roof when a tent is pitched with the tent frame as “apex portion 50”, see Figure F in this report.

76. The specification of Lynch discloses the use of apex portion 50 to stretch and sustain the tent roof in that it aids in counterbalancing the downwards forces from the tent covering: “**By placing canopy covering 12 on roof support members 40**, each of members 40 is placed in compression. This tends to expand, that is, force apart each of corner support members 42 so that scissor assemblies 60 are placed in tension. **Any downwardly directed force on apex 50 tends to slide bracket 34 downwardly due to its interconnection with cantilever 70 but such motion is resisted since scissor assemblies 60 cannot open**, since opening the them would draw corner support members 22 together. **Thus, the mechanical forces of a canopy framework unit is in balance.**” (emphasis added, Ex. 1007, 8:2-12).

77. A POSITA viewing Yang would have found it obvious to adapt a simple version of Lynch’s elongated center pole (i.e. a simple pole without a spring mechanism). The Yang specification teaches a roof design intended to prevent rainwater intrusion by providing a suitable slope: “[the frame] is configured such

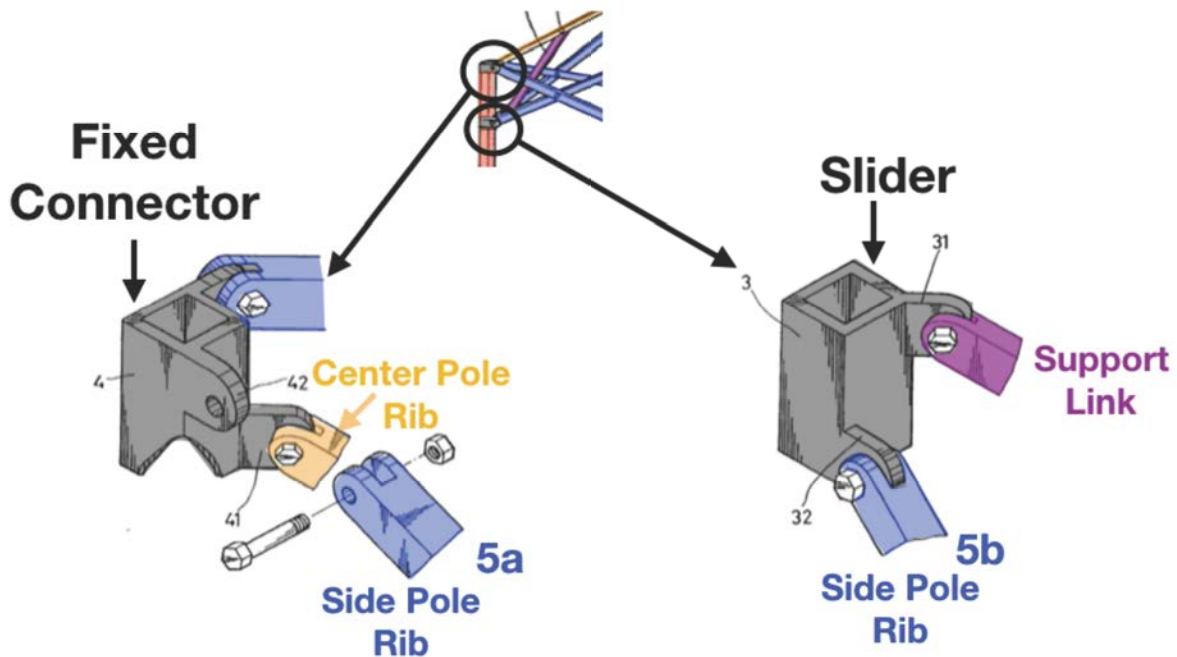


Figure G: Annotated figures from Yang showing the upper ends of side pole ribs (5a) hingedly connected to a fixed connector (4) with the lower ends of the side pole ribs (5b) being hingedly connected to slider 3.

that there is no risk whatsoever of the smooth sloped roof collapsing, bending, or leaking rainwater when raining” (Ex. 1004, at 5). A POSITA would have recognized that by placing an elongated center pole akin to Lynch within Yang, the roof slope could be increased, leading to enhanced rain-shedding ability. Additionally, Yang teaches a desire to raise the roof of the tent covering in order to provide additional head room: “The rooftop is pushed up to increase space for activities for which it is used (Ex. 1004, at 5-6).

78. By way of example, as shown in Figure F, the roof bearing beam shaft in 8 of Yang has a hollow cylindrical section which could easily accommodate a simple version of the center pole in Lynch. Likewise, by way of example, the roof

bearing beam shaft 8 of Yang could be replaced by the apex portion 50 of Lynch (which includes a bushing portion which could replace the roof beam bearing shaft). This incorporation would not present a technical challenge to a POSITA at either the design or manufacturing stage and would not impact the function of any of the other elements within Yang (i.e. the side pole ribs would not need to be modified nor their connections to the modified central element).

79. The inclusion of the center pole of Lynch within Yang amounts to a combining prior art elements according to known methods to yield predictable results (increase water shedding capability), a simple substitution of one known element for another to obtain predictable results (substituting the roof bearing beam shaft 8 in Yang with the apex portion 50 of Lynch); a predictable use of prior art elements according to their established functions (provide a slope to the tent covering); and 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 reference teachings to arrive at the claimed invention (the desire articulated within Yang to provide a water resistant tent structure).

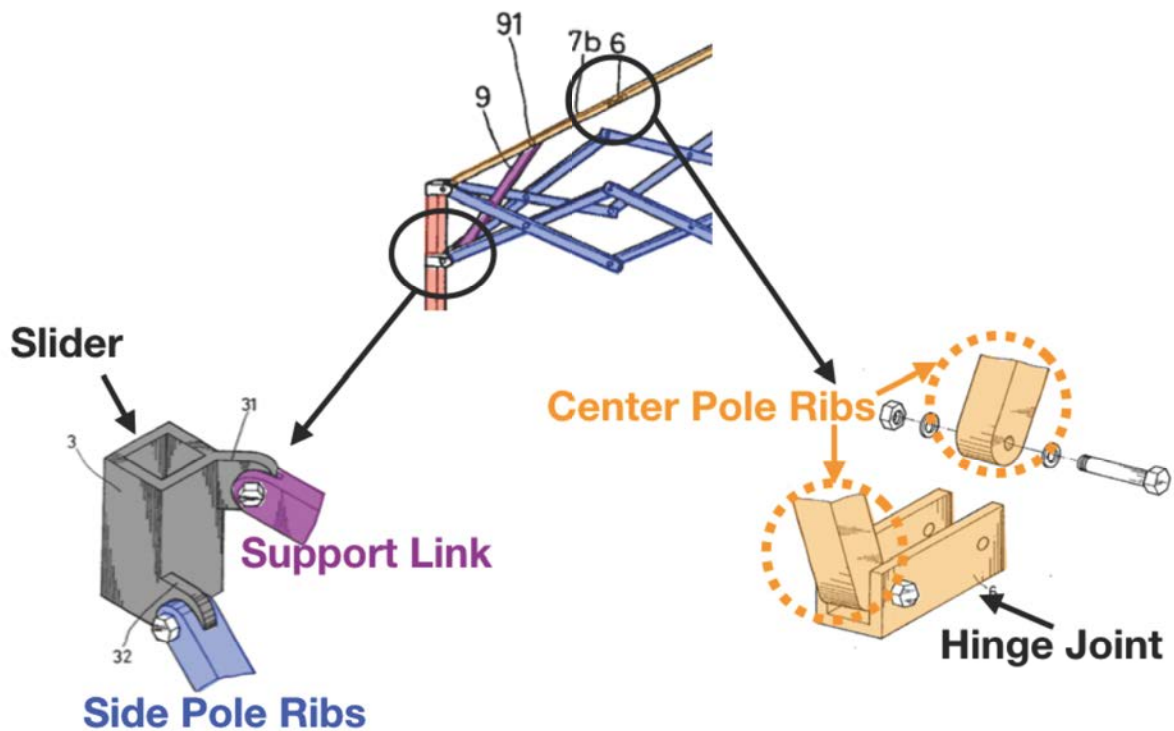


Figure H: Annotated figures from Yang showing one of the plurality of center pole ribs 7 (comprised of sections 7a and 7b connected via hinge 6, right). Also shown is one of the plurality of center pole rib support links (cyan) hingedly connected to slider 3.

1.b.) a plurality of side poles coupled to each other through a plurality of scissor-type ribs, with upper ends of said ribs being hinged to connectors provided at top ends of said side poles and lower ends of said ribs being hinged to sliders movably fitted over said side poles; and

80. Shown in Figure G, Yang teaches side poles (red) connected by scissor-type ribs (5, blue). The upper ends of the ribs (5a) are hinged to connectors 4 and the lower ends of the ribs (5b) are connected to sliders 3. Also see Figure H in this report.

1.c.) plurality of center pole ribs coupling said center pole to said connectors of the side poles, said center pole ribs individually comprising two rib members coupled to each other through a hinge joint and being hinged to the slider of an associated side pole through a support link, thus being collapsible at the hinge joint in accordance with a sliding motion of said slider along the side pole.

81. Yang discloses a plurality of center pole ribs 7 extending from the central connecting hub 8. The upper ends of the ribs (7a) are connected to the roof beam bearing 8, with the lower ends of the ribs (7b) connected to stationary connectors 4 as well as being coupled to sliders 3 on side poles 1 via support links 9 (see Figure G and Figure H in this report). These ribs also have two parts (as discussed below in the analysis of Claim 2) connected via a hinge joint 6. When the sliders 3 move downward along the side poles, this causes the hinge joint 6 to pivot, thus allowing the center pole rib members to fold with respect to each other.

82. Accordingly, the ribs 7 within Yang read on the '040 Patent Claim 1c's center pole ribs and have the same functionality and configuration, independently of whether Yang teaches a center pole.

83. As described above, it would have been obvious to a POSITA to incorporate a center pole into Yang so as to increase the overall roof pitch and corresponding water shedding ability. This addition would not have required any substantive changes to the center pole ribs of Yang.

84. Accordingly, Yang discloses “center pole ribs” as they are taught within the ’040 Patent.

85. Yang’s center pole ribs are comprised of two rib members (7a and 7b) connected via a hinge 6. The support link shown in Figure H couples the center pole rib member to slider element 4.

86. As the tent frame is collapsed, the side poles are contracted: “four main support columns (1) are pulled to the center” (Ex. 1004, at 11-12), which causes the slider 3 to move down the side pole and causes the support link 9 to collapse the center pole rib at the hinge joint 6: “When the entirety of the ‘telescopic instant frame assembled building structure’ of the present invention is contracted, the angle of each joint portion is close to zero” (Ex. 1004, at 10), also see Figure I.

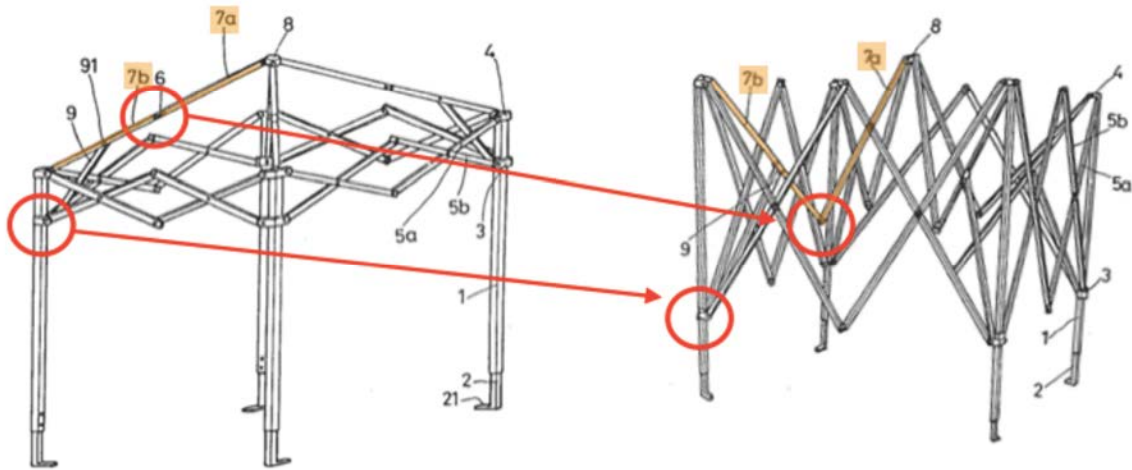


Figure I: The center pole ribs of Yang (7) comprised of two separate members having substantially equal length, attached via a hinged connection. As sliders 3 move down side poles 1, this urges the support link 9 downwards, which in turn causes center pole rib to fold at hinge joint 6.

87. Accordingly, for at least the reasons stated above, Yang in combination with Lynch discloses all elements of The '040 Patent Claim 1.

88. Accordingly, Claim 1 of the '040 Patent would have been obvious over Yang in view of Lynch to a person of ordinary skill in the art.

Claim 2. A collapsible tent frame according to claim 1, wherein said rib members of the center pole ribs have a substantially equal length.

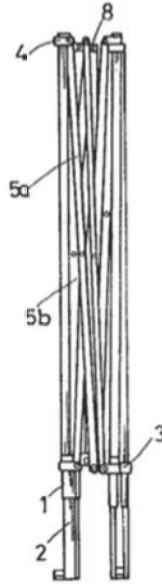


Figure J: Figure 8 from Yang showing the disclosed tent canopy in a compacted state. The roof beam bearing 8 can be seen as being at equal height to the side pole members; a POSITA would have recognized that this is only possible if the center pole rib members of Yang are of equal length.

89. Figure I shows Yang's rib members 7a and 7b comprising the plurality of center pole ribs 7. On the scale of the figure, the members 7a and 7b are equal in length. Therefore a POSITA would have understood that Yang depicts rib members 7a and 7b as having equal length. Additionally, Figure J shows Yang in a compact state with the roof beam bearing 8 at an equal height to the side pole members. A POSITA would have recognized that if the center pole rib members were not of equal length, when the tent frame of Yang was folded, this would force the roof beam bearing to be either higher or lower than the height of the side poles.

90. There is nothing in Yang that suggests the rib members are of different lengths. Even if the Yang drawing can be interpreted to show that rib

members 7a and 7b are not equal in length, a POSITA would be motivated to make them equal in length so as to provide the most compact folding possible. After all, the most compact configuration possible with a single fold as shown in Yang is to fold exactly in half.

91. Additionally, a POSITA would have recognized that using center pole rib members of equal length would have minimized manufacturing costs as only a single length piece need be produced, with two such single length pieces being connected to form a center pole rib.

92. As stated above, Claim 1 of the '040 Patent is obvious in light of Yang in view of Lynch; as Claim 2 is dependent on Claim 1 and in light of the above analysis, Claim 2 of the '040 Patent would also have been obvious in light of Yang in view of Lynch to a person of ordinary skill in the art.

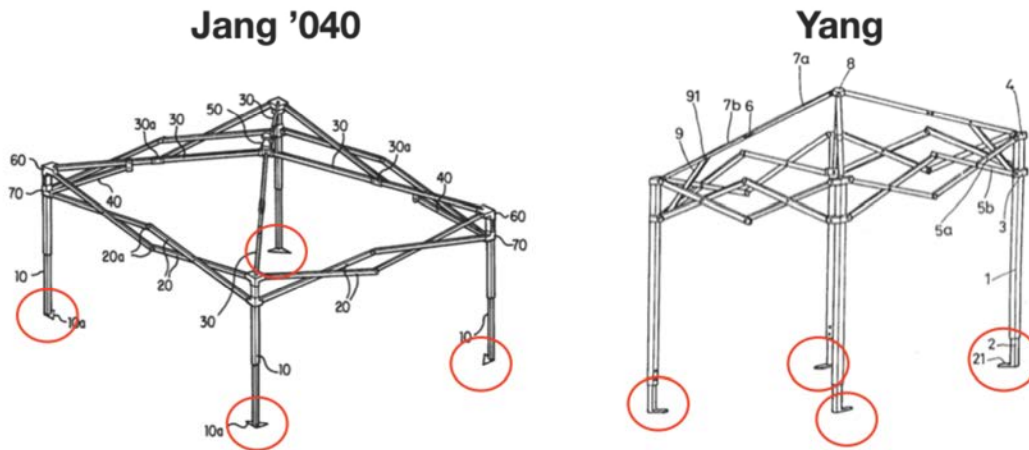


Figure K: Claw member elements as disclosed in the '040 Patent (left) and Yang (right) identified by red circles.

Claim 3. A collapsible tent frame according to claim 2, further comprising a claw member disposed at a lower end of each side pole.

93. The '040 Patent does not specifically define the geometry of “a claw member,” nor was “claw member” a special term of art that a POSITA would recognize at the time of filing (or now). The only disclosure representing a claw member in the '040 Patent is the element attached at the bottom of each pole as shown in Figure A. Otherwise, the '040 Patent specification only refers to the function of a claw member to hold the side poles stably on the ground: “Each of the side poles 10 is provided with a claw 10a at the lower end, thus being stably held on the ground”. (Ex. 1001, 3:7-8).

94. Accordingly, a POSITA would be left in the position of interpreting any structure that extends from the bottom of the side poles (at the intersection

between the ground and pole) and that stably holds the side poles on the ground as a “claw member”.

95. The bottom stand piece 21 of Yang provides stability to the frame via connecting at the intersection between the ground and the side poles (in Yang, nested elements 1 and 2): “the lower end of the telescopic support column (2) has a bottom stand piece (21) welded and fixed thereto to reinforce overall stability” (Ex. 1004, at 7). See Figure K in this report. As these bottom stand pieces are connected to the side poles at the intersection between the ground and the side poles, and as they provide stability to the side poles, they satisfy the claim limitation of “claw member”.

96. As discussed above in pars. 89-92, Claim 2 of the '040 Patent is obvious in light of Yang in view of Lynch. Accordingly, for at least the reasons above, Claim 3 of the '040 Patent would also have been obvious in light of Yang in view of Lynch to a person of ordinary skill in the art.

97. In conclusion, for at least the reasons stated above, Claims 1-3 of the '040 Patent would have been obvious over Yang in view of Lynch to a person of ordinary skill in the art.

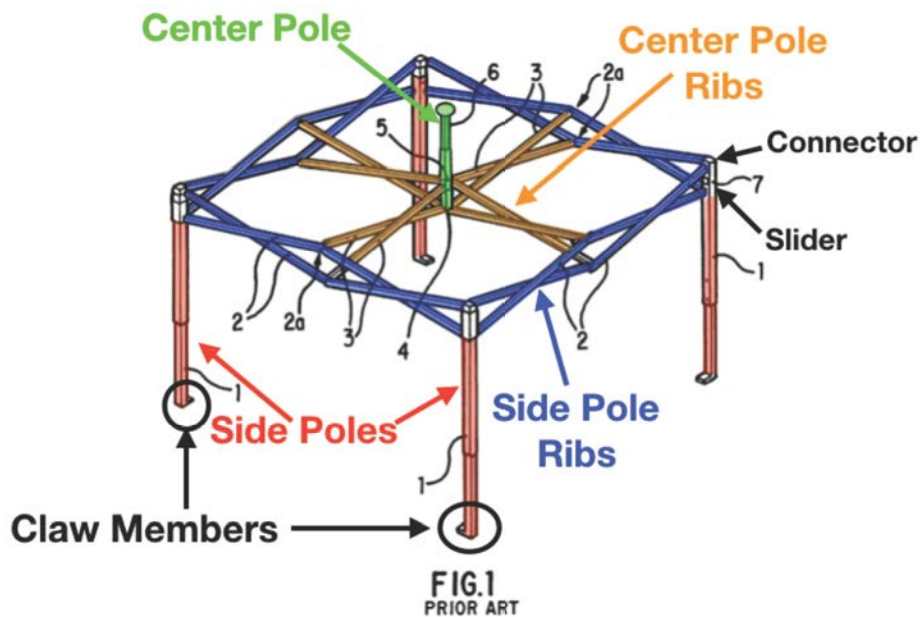


Figure L: The collapsible canopy frame disclosed by the Admitted Prior Art with side poles, side pole ribs, center pole, and center pole ribs.

VII. GROUND 2: CLAIMS 1-3 OF THE '040 PATENT ARE OBVIOUS OVER YANG IN VIEW OF ADMITTED PRIOR ART

98. Yang is described in pars. 53-58.

A. Admitted Prior Art Within The '040 Patent

99. Within the “Description of the Prior Art” section of the '040 Patent (Ex. 1001, 1:10-2:2), the '040 Patent discusses several prior art collapsible tents as well as their perceived technological drawbacks. This discussion is augmented by the inclusion of two figures (Figure 1 and Figure 2 in the '040 Patent) labelled as “Prior Art”, see for example, Figure L in this report. I will refer to this discussion in the '040 Patent and these figures as “Admitted Prior Art”. I have been informed

that the Admitted Prior Art contained within the patent qualifies as prior art for purposes of analyzing anticipation and obviousness.

100. The '040 Patent identifies examples of the Admitted Prior art as U.S. Patent Nos. 4,641,676; 4,779,635; 4,947,884; 5,275,188; and 5,421,356. The '040 Patent teaches that the Admitted Prior Art discloses side poles and scissor-style side pole ribs connected these poles: “the above U.S Patents individually disclose a collapsible tent frame which comprises a plurality of side pole ribs 2, with each pair of ribs 2 being coupled to each other at the center of them into a scissor assembly as shown in Figure L. The scissor assemblies of the side pole ribs 2 are also coupled to each other at joints 2a and are connected to four side poles 1 at their outside ends.” (Ex. 1001, 1:23-29).

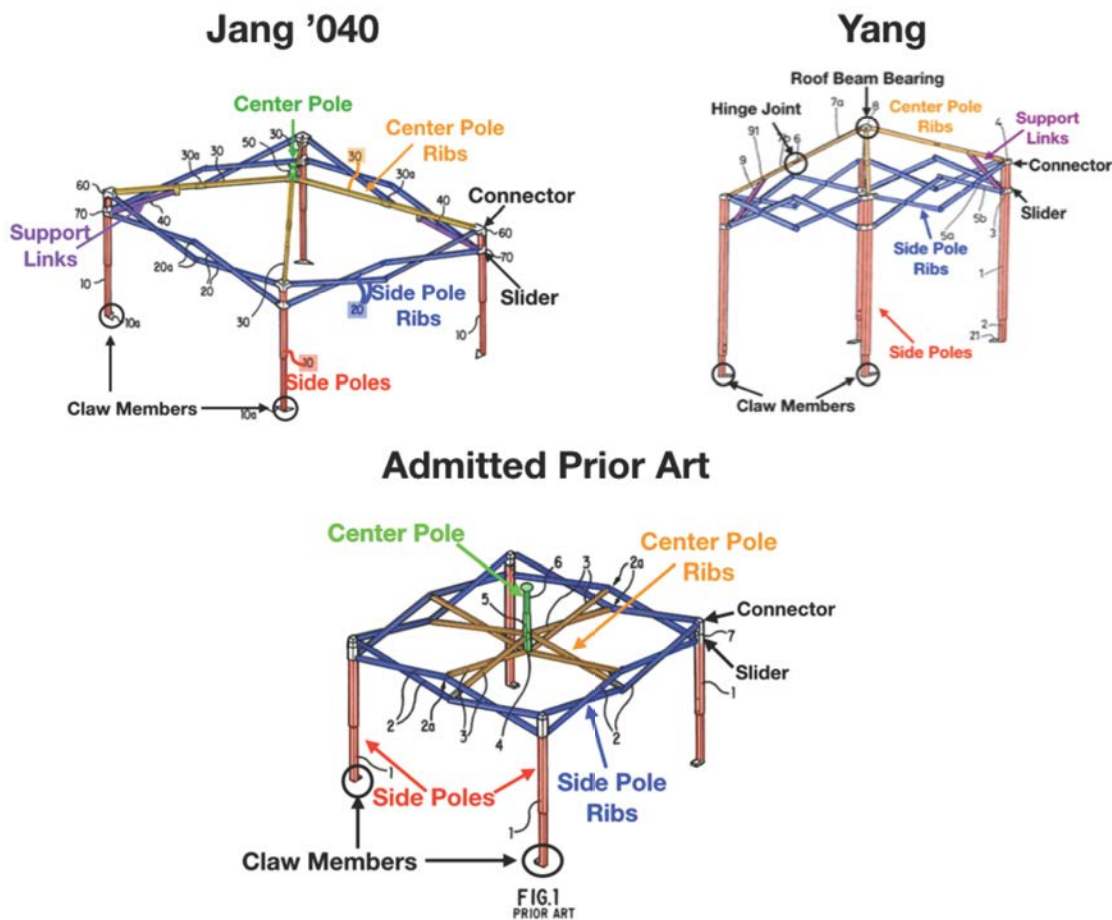


Figure M: A comparison of the disclosures of the '040 Patent, Yang, and the Admitted Prior Art.

101. The '040 Patent also teaches that the Admitted Prior Art discloses that one arm of the side pole ribs is coupled to the side poles at a connector, with the other arm of the side pole ribs being coupled to the side poles at a movable slider: “the outside upper end of each scissor assembly of the ribs 2 is hinged to the top end of a side pole 1, while the outside lower end of each scissor assembly is hinged to a slider 7 movably fitted over the side pole.” (Ex. 1001, 1:30-37).

102. Additionally, The '040 Patent teaches that the Admitted Prior Art discloses a center pole 6 connected to the side pole ribs via center pole ribs, see Figure L.

B. Motivation to Combine Yang and Admitted Prior Art

103. Both Yang and the Admitted Prior Art teach to the fields of collapsible tent frames with side poles linked by scissor-style side pole ribs.

104. Additionally, there are a striking number of structural similarities between Yang and the Admitted Prior Art (e.g. side poles connected via scissor-type ribs, slider mechanisms which allow the tent to be assembled, center pole ribs, etc.). A POSITA viewing Yang would have looked to the Admitted Prior Art (and vice versa) to compare and contrast features and inform possible improvements or alternative approaches to perform the same functions within the same general structure. For example, the center pole ribs of the Admitted Prior Art differ from those disclosed in Yang by connecting from the center pole directly to the center of the side pole rib members, and by making the connection via a scissor-style mechanism, see Figure M.

105. Additionally, a POSITA would have recognized that given these similarities in design and the simple mechanics involved, there would be a more

than reasonable expectation of success in incorporating features from each within the other, i.e., adding features from one design into the other would not present a technological hurdle or unexpectedly alter the fundamental operation of either frame and would amount to simple substitutions of known mechanical elements with predictable results.

106. An example of such a substitution would have been the inclusion of the center pole of the Admitted Prior Art within Yang. One goal of Yang was to increase head space by pushing up the rooftop to increase the ease by which users could enter or leave the tent (Ex. 1004, at 6). Given this, a POSITA would have looked to prior art which teach an elongated center pole to raise the tent roof and provide more head space under the canopy, such as the center pole 6 taught within the Admitted Prior Art. A POSITA also would have recognized that using such an elongated center pole (as taught by the Admitted Prior Art) would increase the roof pitch and that steeper roof pitches were advantageous to shed rainwater, as explicitly taught by Yang (Ex. 1004, at 5-6).

107. A POSITA would have recognized that the center pole 6 of the Admitted Prior Art could readily be substituted for Yang's roof bearing beam 8 without impacting the function of the center pole 6 or the joints between the center pole 6 and the roof support bars 7.

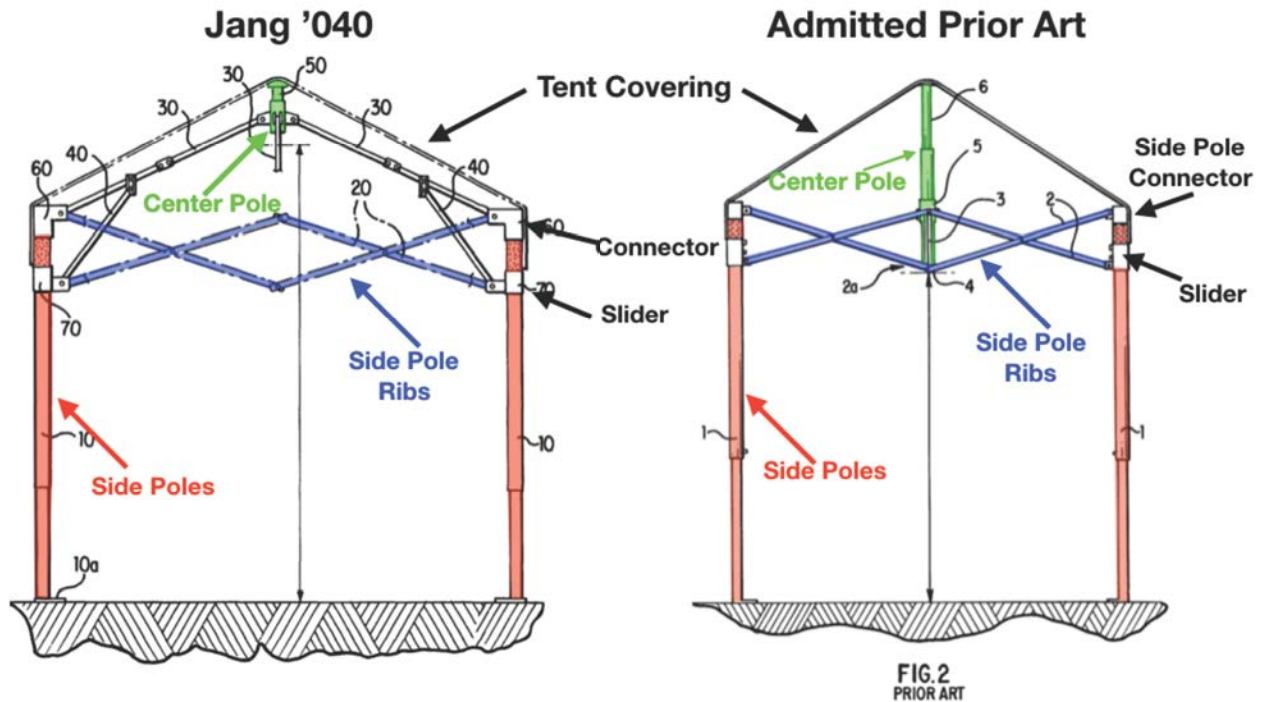


Figure N: Annotated figures from the '040 Patent (left) and the Admitted Prior Art (right). Both disclosures have a center pole which abuts the tent covering. As can be seen, to the extent that the center pole of the '040 Patent is shown to stretch and support the tent covering, so is the center pole of the Admitted Prior Art.

C. Analysis of the '040 Patent Claims 1-3 in View of Yang and Admitted Prior Art

Claim 1:

1.pre. "A collapsible tent frame, comprising:

108. Yang discloses a collapsible tent frame (see par. 73).

1.a.) a center pole constructed for stretching and sustaining a tent's roof when a tent is pitched with the tent frame;

109. Yang discloses a “roof beam bearing (8) [which] is round or another shape” with “a plurality of roof support shaft fixed shaft pieces (81) [...] provided around it.” (Ex. 1004, at 9).¹² Because Yang suggests that the roof bearing beam (8) could be “round *or another shape*”, a POSITA would understand that the roof beam bearing 8 could have its shape modified without affecting its performance. A POSITA would have recognized the shape of the beam bearing 8 would function as a bushing for guiding and supporting an added center pole. A POSITA would understand that it could include a long, slender shape of the center pole.

110. The Admitted Prior Art includes a center pole 6, see Figure N. The center pole 6 in the Admitted Prior Art is shown as stretching and supporting the tent covering similar to how the center pole 50 of the ‘040 Patent is shown to stretch and support a tent cover. Accordingly, if the function of the center pole disclosed in Yang ’040 is for stretching and sustaining a tent’s roof when a tent is

¹² I understand that Patent Owner’s claim construction in the Underlying Litigation is a “centrally disposed element for stretching and sustaining a tent’s roof.” To the extent the Board adopts that construction, Yang’s roof bearing beam 8 is a “centrally disposed element for stretching and sustaining a tent’s roof” and thus meets Patent Owner’s proposed construction of “center pole” in the Underlying Litigation.

pitched with the tent frame, so is function of the center pole 6 within the Admitted Prior Art.

111. Additionally, as discussed above in par. 106, a POSITA attempting to design a collapsible tent framework would have recognized that the slope of the tent covering provided by Yang could be improved by incorporating an elongated structure such as the center pole as taught by the Admitted Prior Art in order to shed water at a greater rate.

112. The inclusion of the center pole of the Admitted Prior Art within Yang amounts to a combination of prior art elements according to known methods to yield predictable results (increase water shedding capability and increase headroom), a simple substitution of one known element for another to obtain predictable results (combining the roof bearing beam shaft 8 in Yang with the center pole 6 of the Admitted Prior Art); a predictable use of prior art elements according to their established functions (provide a slope to the tent covering); and 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 reference teachings to arrive at the claimed invention (the desire articulated within Yang to provide a water resistant tent structure).

1.b.) a plurality of side poles coupled to each other through a plurality of scissor-type ribs, with upper ends of said ribs being hinged to connectors provided at top ends of said side poles and lower ends of said ribs being hinged to sliders movably fitted over said side poles; and

113. As discussed in par. 80, Yang discloses all features of Claim 1.b.

c.) plurality of center pole ribs coupling said center pole to said connectors of the side poles, said center pole ribs individually comprising two rib members coupled to each other through a hinge joint and being hinged to the slider of an associated side pole through a support link, thus being collapsible at the hinge joint in accordance with a sliding motion of said slider along the side pole.

114. As discussed above at pars. 81-82, Yang discloses all features of Claim 1.c.

115. Accordingly, for at least the reasons described above, Claim 1 of the '040 Patent would have been obvious over Yang in view of Admitted Prior Art to a person or ordinary skill in the art.

Claim 2. A collapsible tent frame according to claim 1, wherein said rib members of the center pole ribs have a substantially equal length.

116. Yang in view of Admitted Prior Art discloses all features of Claim 1 (see pars. 108-115). Yang discloses all additional features introduced by Claim 2, see pars. 89-91.

117. Accordingly, Claim 2 of the '040 Patent would have been obvious over Yang in view of Admitted Prior Art to a person of ordinary skill in the art.

Claim 3. A collapsible tent frame according to claim 2, further comprising a claw member disposed at a lower end of each side pole.

118. Yang in view of Admitted Prior Art discloses all features of Claim 2 (see pars. 116-117). Yang discloses all additional features introduced by Claim 3 (see pars. 93-95).

119. Accordingly Claims 1-3 of the '040 Patent would have been obvious over Yang in view of Admitted Prior Art to a person of ordinary skill in the art.

VIII. GROUND 3: CLAIMS 1-3 OF THE '040 PATENT ARE OBVIOUS OVER YANG IN VIEW OF BERG

120. For a description of Yang, please see pars. 53-58.

A. U.S. Patent No. 1,502,898 for “Tent”

121. U.S. Patent No. 1,502,898 for “Tent” was issued to Frederick O. Berg on July 29, 1924. I will refer to this patent herein as “Berg” or “the ’898 Patent”. Berg will also be cited as “Ex. 1008” with additional pages indicated to the specific portions referenced. I understand that, as Berg was issued nearly 73 years before the claimed priority date of the ’040 Patent, Berg qualifies as prior art with respect to the ’040 Patent under 35 U.S.C. §102(b). Berg was not in front of the examiner during prosecution of the ’040 Patent.

122. Berg is an early example of the type of collapsible tent technology disclosed by both the ’040 and prior art patents, that is, tents or canopy frames with foldable/compactable structural elements.

123. Additionally, Berg identifies similar goals to the ’040 Patent with regards to ease of transport: “When dismantled the walls and frame of the tent are retained in connected relation and are capable of being folded and wrapped into a single compact bundle which may then be placed in a storage bag or receptacle for transportation, as upon an automobile” (Ex. 1008, 1:21-27).

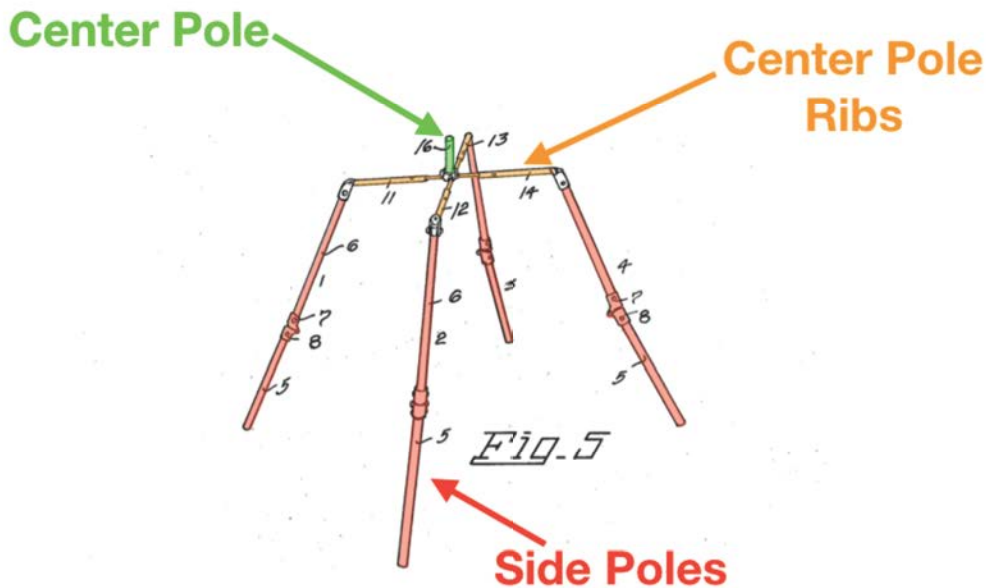


Figure O: Annotated Berg Figure 5 showing the disclosed side poles, center pole, and center pole ribs.

124. Also as in the '040 Patent, Berg also identifies a goal of increasing the available headspace for users while in the tent: “The foldable frame and walls of the tent are so combined and arranged as to facilitate the erection of the tent with an interior space from which poles or posts are eliminated thus affording a maximum space for commodious use and accommodations” (Ex. 1008, 1:14-20).

125. Berg discloses a tent frame with four side poles (post sections 5 and 6), and a center pole 16 (housed within central bushing 15) connected to the side poles by center pole ribs (diagonally arranged frame bars 11-14). See Figure O.

B. Motivation to Combine Yang and Berg

126. Both Yang and Berg teach to the field of collapsible tent frames, as described above. Moreover, both Yang and Berg identify the goals of producing a tent frame which is easily made compact for both storage and transport, as well as producing a tent that maximizes interior overhead space (see Ex. 1004, at 5-6 and Ex. 1008, 1:14-27).

127. Given the relative simplicity of Berg and its date of filing (1924), a POSITA would have recognized that the collapsible tent frame disclosed by Berg represents a basic approach to the general problems of ease of storage and assembly. Upon viewing Yang, a POSITA would have been motivated to compare Berg's early technological approach with the approach disclosed by Yang and to combine features from each.

128. For example, a POSITA would have been motivated to substitute Yang's roof bearing beam 8 for Berg's central bushing 15 and elongated center pole 16 to increase headspace and improve tensioning of the tent fabric and thereby reduce canopy sag, as taught by Yang (Ex. 1004, at 3). A POSITA would have recognized that the roof beam bearing 8 of Yang was nearly identical to the central bushing 15 of Berg (which houses the center pole 16 of Berg). Therefore, the center pole 16 of Berg could be accommodated within Yang without any need to otherwise modify the structure of the Yang canopy.

C. Analysis of the ‘040 Patent Claims 1-3 in View of Yang and Berg

Claim 1:

1.pre. “A collapsible tent frame, comprising:

129. Yang discloses a collapsible tent frame (see par. 73).

1.a.) a center pole constructed for stretching and sustaining a tent’s roof when a tent is pitched with the tent frame;

130. Yang discloses a “roof beam bearing (8) [which] is round or another shape” with “a plurality of roof support shaft fixed shaft pieces (81) ... provided around it.” (Ex. 1004, at 9).¹³ Because Yang suggests that the roof bearing beam (8) could be “round *or another shape*”, a POSITA would understand that the roof beam bearing 8 could have its shape modified without affecting its performance. A

¹³ I understand that Patent Owner’s claim construction in the Underlying Litigation is a “centrally disposed element for stretching and sustaining a tent’s roof.” To the extent the Board adopts that construction, Yang’s roof bearing beam 8 is a “centrally disposed element for stretching and sustaining a tent’s roof” and thus meets Patent Owner’s proposed construction of “center pole” in the Underlying Litigation.

POSITA would have recognized the shape of the beam bearing 8 would function as a bushing for guiding and supporting an added center pole.

131. Berg discloses a center pole: “At their upper ends the corner posts are rigidly connected by a horizontally disposed cruciform composed of diagonally arranged frame bars 11, 12, 13, and 14, all of which are extended inwardly toward a central bushing 15 in which a center of comparatively short length or height as indicated at 16 is retained by a set bolt or screw 17.” (Ex. 1008, 1:83-91).

132. The center pole 16 in Berg is taught as an element used to both support and stretch an overlaying tent material: “Thus the pole when the tent is erected provides means for a slanting roof” (Ex. 1008, 1:99-100). This support and stretching function of the center pole in Berg can also be seen in Figure P which shows adjustable set screw (17) used to raise and lower center pole: “When the tent is to be erected this center pole is extended upwardly from the bushing and secured by the set screw 17” (Ex. 1008, 1:91-94).

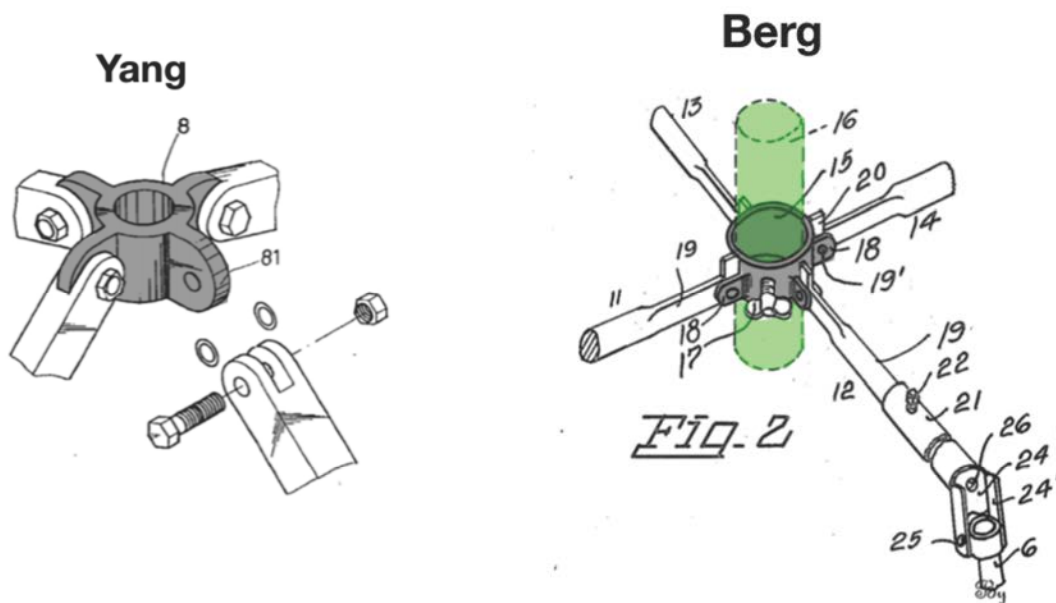


Figure P: The center connector designs of Yang (left) and Berg (right). Given the similarities between the designs of these two elements, a POSITA would have realized that the design of Berg (including a bushing 15 and center pole 16) could have been easily incorporated into Yang's roof bearing beam (gray, 8) so as to allow for a center pole (as in Berg, green element 16).

133. A POSITA attempting to design a collapsible tent framework would have recognized that the slope of the tent covering provided by Yang could be improved by incorporating an elongated structure such as the center pole taught by Berg in order to shed water at a greater rate. Specifically, the disclosure in Berg of a bushing 15 which accommodated the center pole. As shown in Figure P, the center connector designs of Yang and Berg are similar; a POSITA viewing both Yang and Berg would have realized that the roof bearing beam shaft 8 of Yang could be modified into the bushing 15 of Berg, thus allowing for the accommodation of a center pole.

134. Given the simplicity of the center pole and bushing design of Berg, there would have been no significant technological challenges associated with incorporating the center pole of Berg within Yang. Additionally, this incorporation would not have affected any of the other elements (such as center pole ribs) in Yang.

135. The inclusion of the center pole of Berg within Yang amounts to a combining prior art elements according to known methods to yield predictable results (increase water shedding capability), a simple substitution of one known element for another to obtain predictable results (substituting the roof bearing beam shaft 8 in Yang with the bushing 15 and center post 16 of Berg); a predictable use of prior art elements according to their established functions (provide a slope to the tent covering); and 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 reference teachings to arrive at the claimed invention (the desire articulated within Yang to provide a water resistant tent structure).

1.b.) a plurality of side poles coupled to each other through a plurality of scissor-type ribs, with upper ends of said ribs being hinged to connectors provided at top ends of said side poles and

lower ends of said ribs being hinged to sliders movably fitted over said side poles; and

136. As discussed above in par. 80, Yang discloses all features of Claim 1.b.

1.c.) plurality of center pole ribs coupling said center pole to said connectors of the side poles, said center pole ribs individually comprising two rib members coupled to each other through a hinge joint and being hinged to the slider of an associated side pole through a support link, thus being collapsible at the hinge joint in accordance with a sliding motion of said slider along the side pole.

137. As discussed above at pars. 81-86, Yang discloses all features of Claim 1.c.

138. Accordingly, for at least the reasons described above, Claim 1 of the '040 Patent would have been obvious over Yang in view of Berg to a person of ordinary skill in the art.

Claim 2. A collapsible tent frame according to claim 1, wherein said rib members of the center pole ribs have a substantially equal length.

139. As shown above, Yang in view of Berg discloses all features of Claim 1. Yang discloses all additional features added by Claim 2, see pars. 89-91.

140. Accordingly, Yang in view of Berg discloses all features of Claim 2 of the '040 Patent.

141. Accordingly, for at least the reasons described above, Claim 2 of the '040 Patent would have been obvious over Yang in view of Berg to a person of ordinary skill in the art.

Claim 3. A collapsible tent frame according to claim 2, further comprising a claw member disposed at a lower end of each side pole.

142. As shown above, Yang in view of Berg discloses all features of Claim 2. Yang discloses all additional features added by Claim 3, see pars. 93-95.

143. Accordingly, Yang in view of Berg discloses all features of Claim 3 of the '040 Patent.

144. Accordingly, for at least the reasons described above, Claim 3 of the '040 Patent would have been obvious over Yang in view of Berg to a person of ordinary skill in the art.

145. In conclusion, for at least the reasons described above, Claims 1-3 of the '040 Patent would have been obvious over Yang in view of Berg to a person of ordinary skill in the art.

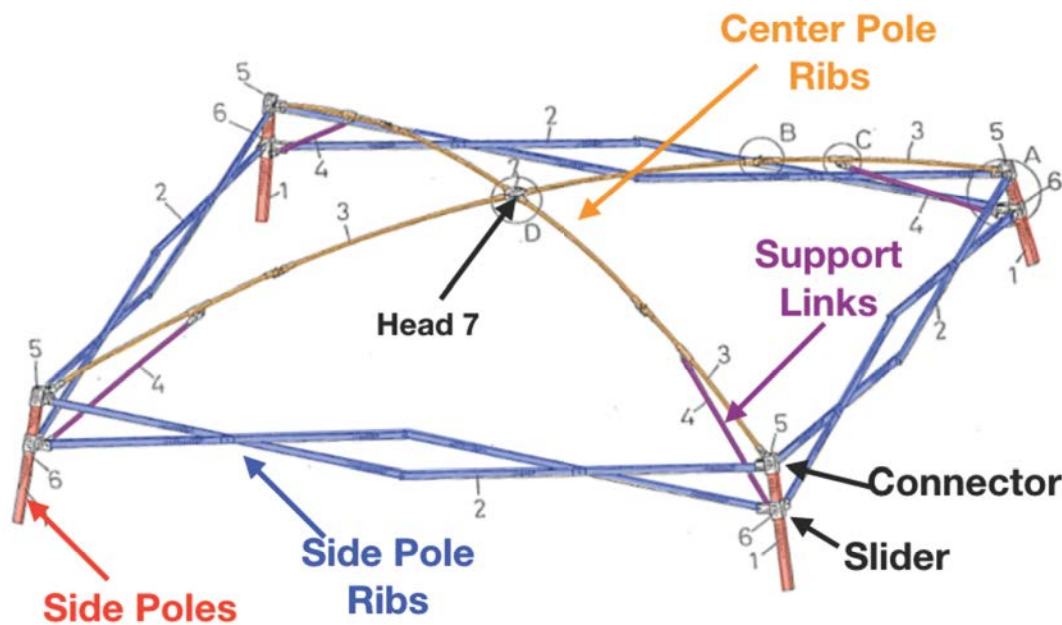


Figure Q: Annotated Figure 1 from Tsai showing the side poles, side pole ribs (coupled to connectors and sliders), center pole ribs, and associated support links. Also shown is the head 7, which stretches and sustains the tent's roof.

IX. GROUND 4: CLAIMS 1-3 OF THE '040 PATENT ARE OBVIOUS OVER TSAI IN VIEW OF LYNCH

A. U.S. Patent 5,638,853 for "Tent Structure"

146. U.S. Patent 5,638,853 for "Tent Structure" was filed by Tony Tsai on March 7, 1996 and granted on June 17, 1997. I will refer to this patent herein as "Tsai", "the Tsai Patent". Tsai will be cited as "Ex. 1006" with additional pages indicated to the specific portions referenced. I understand that the filing date of Tsai was before the claimed priority date of the '040 Patent and that the publication date of Tsai was after the claimed priority date of the '040 Patent, thus

qualifying the Tsai patent as prior art with respect to the '040 Patent under 35 U.S.C. §102(e). Tsai was not before the examiner during prosecution.

147. Tsai teaches to the field of canopies and tents with collapsible frames and seeks to provide a tent frame which is sturdy, durable, and easy to open and close (see e.g., Ex. 1006, 1:29-36). Tsai discloses that many prior art tent frames have scissor-type connections similar to those taught by the '040 patent (i.e. one scissor leg fixed in place with another scissor leg connected to a sliding mechanism) (Ex. 1006, 1:12-14). Tsai discloses prior art in which scissor-type connections only existing between the tent side poles and a central fixture (i.e., having no connections between side poles. (See Tsai Figures 16 and 17). Tsai teaches that a reliance on scissor connections between a center connector and side pole ribs results in a tent structure which is subject to easy destruction (see Ex. 1006, 1:24-26).

148. With reference to Figure Q, Tsai teaches a frame with four side poles (vertical poles 1), connected by scissor-style side pole ribs (scissors-type linkages

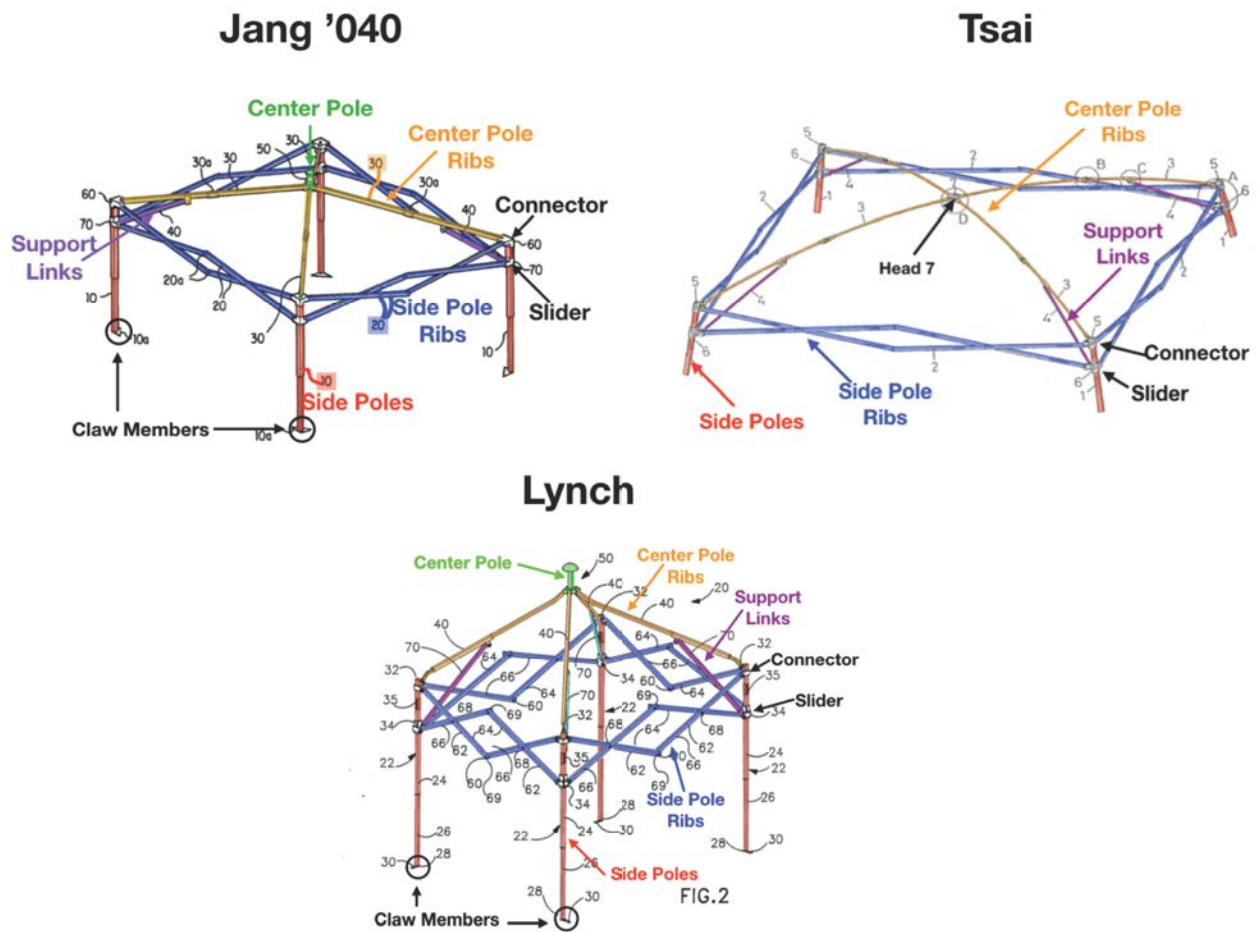


Figure R: A comparisons of the disclosure of the '040 Patent, Tsai, and Lynch. All three have many elements in common as well as strikingly similar designs and construction.

2). One scissor arm is coupled to connectors fixed to the top of the side poles (fixed connectors 5) with the other scissor arm is connected to sliders (sliding connectors 6) that are able to slide on the side poles.

149. Tsai discloses a central connecting element (head connector 7) which is connected to each of the four side poles via center pole ribs (rods 3) which couple to connectors 5. The center pole ribs are also coupled to sliders 6 via support links (linking rods 4).

150. For a description of Lynch please see pars. 59-63.

B. Motivation to Combine Tsai and Lynch

151. Both Tsai and Lynch teach to the fields of collapsible tent frames (see pars. 147 and 60, respectively). Additionally, both Tsai and Lynch identify the goals of producing a frame which is easily assembled (Ex. 1006, 1:31-34, Ex. 1007, 2:10-18).

152. Moreover, given the striking similarities between the overall design and included elements (e.g. side poles connected via scissor-type ribs, slider mechanisms which allow the tent to be assembled, center pole structures with support links) a POSITA viewing Tsai would have looked to Lynch (and vice versa) to compare and contrast features and inform possible improvements or alternative approaches to perform the same functions within the same general structure. For example, Tsai and Lynch effectively provide the same collapsible structure with the exception of telescoping center pole rib members in Lynch (as opposed to hinged rib members) and an elongated center pole within Lynch, see Figure R.

153. Due to these similarities and relatively simple technology involved, a POSITA would have recognized that elements from Tsai and Lynch could have

been incorporated within each other's designs with a more than reasonable chance of success as doing so would not have presented any significant technological hurdles.

154. For an example of such a simple mechanical substitution, the center pole (the apex portion 50) of Lynch could readily be substituted for Tsai's head connector 7 without impacting the function of the apex portion or the joints between the apex portion and the roof support members, as taught by Tsai.

155. Moreover, POSITA would have recognized that this modification of Tsai to include an extended center pole of Lynch would have provided benefits including increased headroom inside the tent, increased pitch of the tent roof to shed rainwater, and increased support and pitch of the tent roof to make the canopy more aesthetically pleasing. For instance, replacing the head connector of Tsai with the apex portion of Lynch would allow for a user to pitch the tent's roof at a greater angle and provide for increased tautness and water shedding capability and to prevent the roof material from sagging.

C. Analysis of Claims 1-3 in View of Tsai and Lynch

Claim 1:

1.pre. "A collapsible tent frame, comprising:

156. Tsai discloses a collapsible tent frame: “A tent structure includes four poles interconnected by four scissors-type linkages forming a square structure and four intermediate pivot connecting members [...] the tent is erected when the intermediate pivot connecting members are lifted to the upmost position and the tent is collapsed when the intermediate pivot connecting members are urged downwardly.” (ellipses added, Ex. 1006, Abstract).

1.a.) a center pole constructed for stretching and sustaining a tent’s roof when a tent is pitched with the tent frame;

157. Tsai discloses a head connector 7 which connects to and is held up by center pole ribs (rod members 3) in a sturdy position in the center of the tent.¹⁴

158. Lynch discloses a center pole for stretching and sustaining a tent’s roof when a tent is pitched with the tent frame (apex portion 50, see par. 63-64).

¹⁴ I understand that Patent Owner’s claim construction in the Underlying Litigation is a “centrally disposed element for stretching and sustaining a tent’s roof.” To the extent the Board adopts that construction, Tsai’s head connector 7 is a “centrally disposed element for stretching and sustaining a tent’s roof” and thus meets Patent Owner’s proposed construction of “center pole” in the Underlying Litigation.

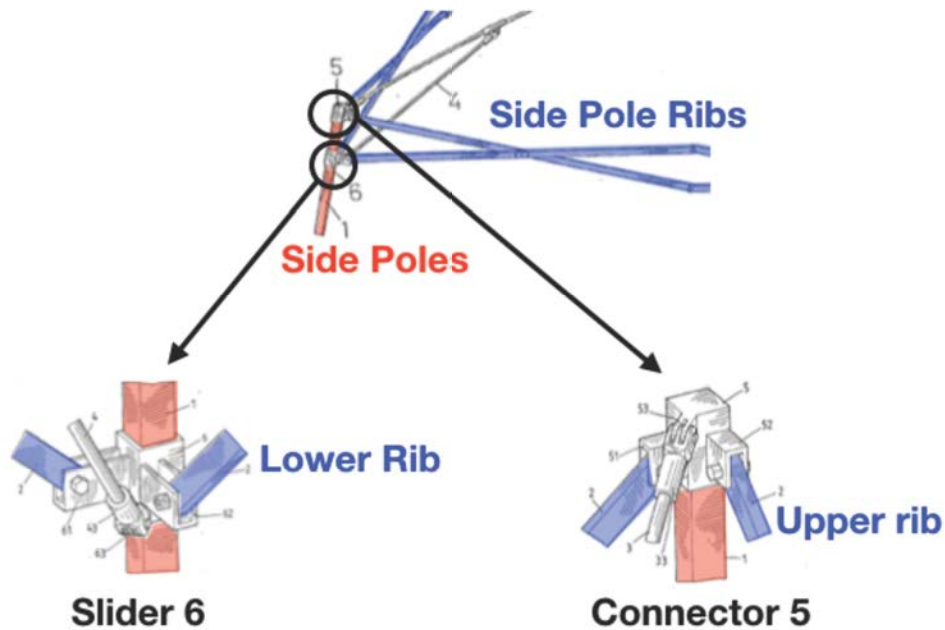


Figure S: The support structure of Tsai including side poles connected via scissor-style ribs coupled to both stationary connectors 5 (right) and movable sliders 6 (left).

159. Given the overall structural similarities between Tsai and Lynch, a POSITA would have been motivated to try and incorporate the center pole of Lynch within Tsai (by replacing the head connector 7 of Tsai with the apex portion 50 of Lynch) in order to increase the tautness of the roof material and to increase the ability of the tent's roof to shed water. For instance, replacing the head connector of Tsai with the apex portion of Lynch would allow for a user to pitch the tent's roof at a greater angle and provide for increased tautness and water shedding capability and to prevent the roof material from sagging.

160. Moreover, including the center pole of Lynch into Tsai would have been both feasible from a technological perspective and would not have affected

the design or functionality of any of the other features of Tsai (such as the center pole ribs).

161. The inclusion of the center pole of Lynch within Tsai amounts to combining prior art elements according to known methods to yield predictable results (increase water shedding capability and increase tautness of the roof), a simple substitution of one known element for another to obtain predictable results (substituting the head connector 7 in Tsai with a version of the apex portion 50 of Lynch); and a predictable use of prior art elements according to their established functions (provide an increased slope to the tent covering);

**1.b.) a plurality of side poles coupled to each other through a plurality of scissor-type ribs, with upper ends of said ribs being hinged to connectors provided at top ends of said side poles and lower ends of said ribs being hinged to sliders movably fitted over said side poles;
and**

162. Tsai discloses a plurality of side poles connected in the manner described in Claim 1b: “Each pole 1 has a fixed connector 5 at top end and a sliding connector 6 under the fixed connector 5” (Ex. 1006, 2:5-6). This arrangement of connectors which shows upper and lower ribs of side pole ribs

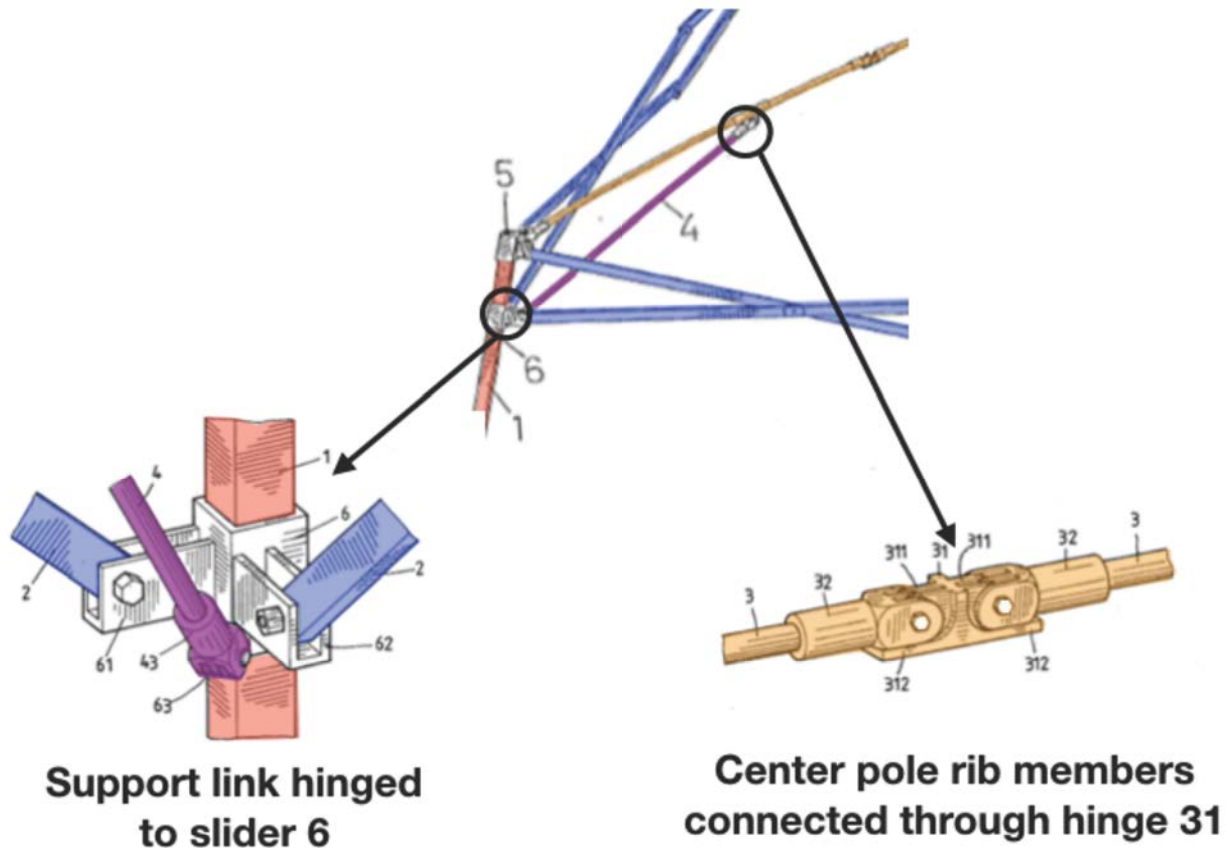


Figure T: The center pole ribs 3 of Tsai made of separate members connected via a hinge 31 (right). Also shown on the left is the support link 4 of Tsai which hingedly couples the rib members to slider 6.

hingedly connected to fixed and sliding connectors (respectively) is shown in Figure S.

c.) plurality of center pole ribs coupling said center pole to said connectors of the side poles, said center pole ribs individually comprising two rib members coupled to each other through a hinge joint and being hinged to the slider of an associated side pole through

a support link, thus being collapsible at the hinge joint in accordance with a sliding motion of said slider along the side pole.

163. As with Yang, it is my opinion that Tsai teaches center pole ribs, regardless of whether Tsai discloses a center pole or not (see discussion of Claim 1.c in light of Yang at par. 81-86).

164. Tsai discloses the center pole ribs as rods 3 made of two rod members connected by a hinge joint: “Each rod 3 is formed by two rod members pivotally connected to an intermediate pivot connecting member 31” (Ex. 1006, 2:16-17).

165. The center pole rib members are also coupled to a support link (linking rod 4) which is pivotally connected to a slider (sliding connector 6), see Figure T.

166. This arrangement of elements in Tsai results in the center pole ribs in Tsai collapsing at the hinge joint (31) when the slider (6) is moved: “In collapsing the tent, all scissors-type linkages 2 are urged downwardly and all intermediate pivoting members 31 or manually rotated which causes the rod members 3 to pivot toward each other.” (Ex. 1006, 2:48-52). Here, the movement of the side pole ribs (scissors-type linkages 2) is a proxy for the movement of the sliders 6, as one cannot move downwards without the other.

167. As described above, it would have been obvious to a POSITA to incorporate a center pole into Tsai so as to increase the overall roof pitch and corresponding water shedding ability. This addition would not have required any substantive changes to the center pole ribs of Tsai.

168. Accordingly, Tsai discloses all features of Claim 1.c of the '040 Patent.

169. Accordingly, for at least the reasons stated above, Tsai in view of Lynch discloses all features of Claim 1 of the '040 Patent.

170. Accordingly, Claim 1 of the '040 Patent would have been obvious over Tsai in view of Lynch to a person of ordinary skill in the art.

Claim 2. A collapsible tent frame according to claim 1, wherein said rib members of the center pole ribs have a substantially equal length.

171. Figure U shows two separate rib members comprising the plurality of center pole ribs 3. On the scale of the figure, the rib members are equal in length and furthermore any differences in length that are not captured by the scale of the figure would not affect the performance of the rib members.

172. Therefore, the rib members of Tsai have equal length. A POSITA would have recognized that Tsai teaches rib members of equal length.

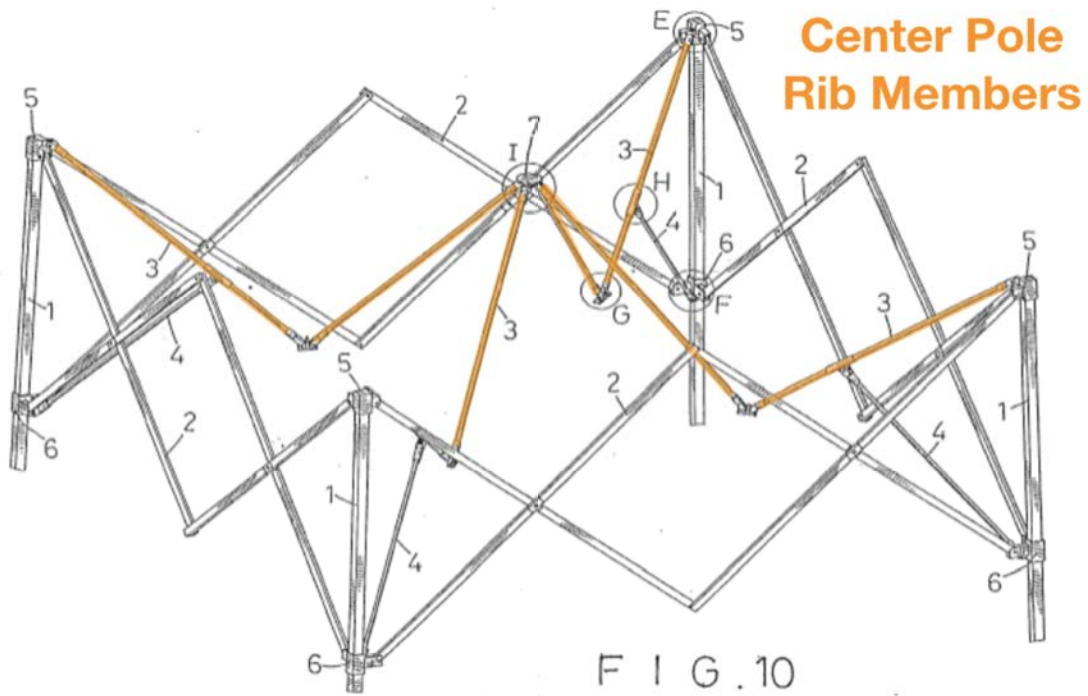


Figure U: Annotated Figure 10 of Tsai showing the plurality rib members (orange), pairs of which comprise the center pole ribs. These rib members are of substantially equal length.

173. As explained above, the Tsai drawings show rib members that are of equal length. But even if the Tsai drawing were somehow be interpreted to show rib members are not equal in length, a POSITA would be motivated to make them equal in length so as to provide the most compact folding possible. After all, the most compact configuration possible with a single fold is to fold exactly in half.

174. Additionally, a POSITA would have recognized that using center pole rib members of equal length would have minimized manufacturing costs as only a single length piece need be produced, with two such single length pieces being connected to form a center pole rib.

175. As Tsai in view of Lynch includes all elements of Claim 1 of the '040 Patent (see above) and Tsai includes all additional features disclosed by Claim 2, Tsai in view of Lynch also discloses all features of Claim 2 of the '040 Patent.

176. Accordingly, Claim 2 of the '040 Patent would have been obvious over Tsai in view of Lynch to a person of ordinary skill in the art.

Claim 3. A collapsible tent frame according to claim 2, further comprising a claw member disposed at a lower end of each side pole.

177. Lynch discloses a claw member (foot 30) located at the base of each side pole (see elements 30 in Figure D). A POSITA would have recognized that the feet 30 within Lynch accomplish the same function (stabilize the side poles) as the claw members disclosed within the '040 Patent. As these feet members are connected to the side poles at the intersection of the ground and the side poles and provide stability to the side poles, they satisfy the limitation of “claw members” as the term is used in the '040 Patent.

178. Tsai teaches a desire to produce a tent frame which is stable: “It is the primary object of the present invention to provide a tent structure which is solid and strong.” (Ex. 1006, 1:29-30). A POSITA in view of this requirement would have realized that an obvious improvement to the design of Tsai which would

improve the overall stability of the frame would be to add feet members such as in Lynch.

179. These feet members would be easily adapted and included at the bottom of the side poles in Tsai and increase the ability of the structure to resist moments imparted to it (by e.g., wind).

180. The inclusion of the claw members (feet 30) of Lynch within Tsai amounts to combining prior art elements according to known methods to yield predictable results (increased stability), a simple substitution of one known element for another to obtain predictable results (substituting the straight side poles of Tsai with the side poles equipped with feet 30 of Lynch); a predictable use of prior art elements according to their established functions (provide increase stability); and 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 reference teachings to arrive at the claimed invention (the desire articulated within Tsai to provide a stable tent structure).

181. Accordingly, for at least the reasons above, Claim 3 of the '040 Patent would have been obvious over Tsai in view of Lynch to a person of ordinary skill in the art.

182. Accordingly, for at least the reasons above, Claims 1-3 of the '040 Patent would have been obvious over Tsai in view of Lynch to a person of ordinary skill in the art.

X. GROUND 5: CLAIMS 1-3 OF THE '040 PATENT ARE OBVIOUS OVER TSAI IN VIEW OF ADMITTED PRIOR ART

183. For a description of Tsai and Admitted Prior Art please see pars. 146-149, and 99-102 respectively.

A. Motivation to Combine Tsai and the Admitted Prior Art

184. Both Tsai and the Admitted Prior Art teach to the fields of collapsible tent frames and both identify the goals within their respective teachings of providing a tent frame which has an increased ease of assembly (see e.g. Ex. 1006, 1:32-34 and Ex. 1001, 1:15-22).

185. Additionally, there are a number of conspicuous structural similarities between Tsai and the Admitted Prior Art (e.g. side poles connected via scissor-type ribs, slider mechanisms which allow the tent to be assembled, center pole ribs). A

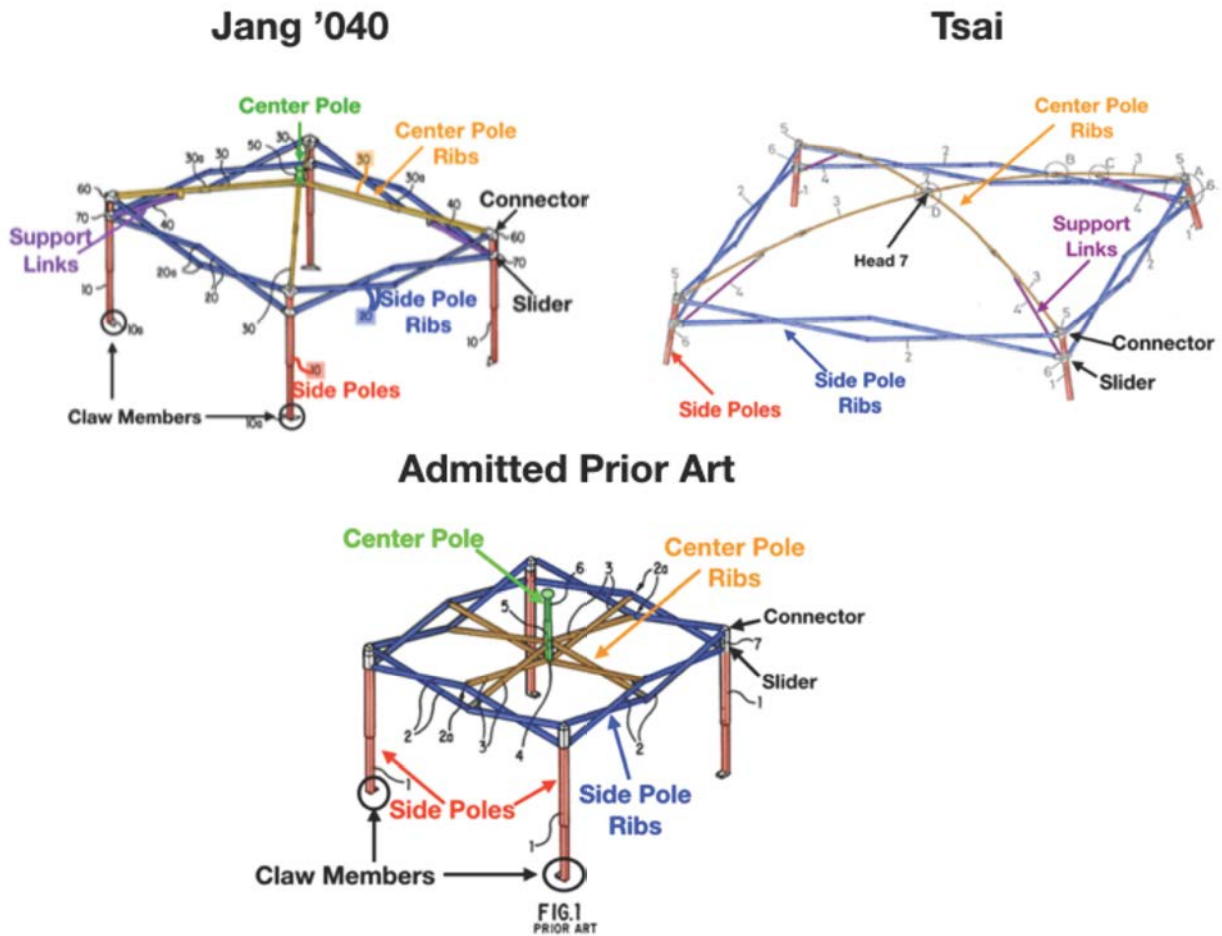


Figure V: A comparison between the canopy frames of the '040 Patent, Tsai, and the Admitted Prior Art.

POSITA viewing Tsai would have looked to the Admitted Prior Art (and vice versa) to compare and contrast features and inform possible improvements or alternative approaches to perform the same functions within the same general structure. For example, the center pole ribs of the Admitted Prior Art differ to those disclosed in Tsai by connecting from the center pole directly to the center of the side pole rib members, and the use of a scissor-style mechanism, see Figure V.

186. Given these similarities, a POSITA would have recognized that there would be a more than reasonable chance of success in combining elements from Tsai and the Admitted Prior Art as there would be no significant technological hurdle in doing so.

B. Analysis of the '040 Patent Claims 1-3 in View of Tsai and Admitted Prior Art

Claim 1:

1.pre. "A collapsible tent frame, comprising:

187. Tsai discloses a collapsible tent frame, see par. 156.

1.a.) a center pole constructed for stretching and sustaining a tent's roof when a tent is pitched with the tent frame;

188. Tsai discloses a head connector 7 which connects to and is held up by center pole ribs (rod members 3) in a sturdy position in the center of the tent.¹⁵

¹⁵ I understand that Patent Owner's claim construction in the Underlying Litigation is a "centrally disposed element for stretching and sustaining a tent's roof." To the extent the Board adopts that construction, Tsai's head connector 7 is a "centrally disposed element for stretching and sustaining a tent's roof" and thus meets Patent Owner's proposed construction of "center pole" in the Underlying Litigation.

189. The Admitted Prior Art discloses a center pole constructed for stretching and sustaining a tent's roof when a tent is pitched with the tent frame as a "center pole 6", see par. 102.

190. A POSITA would have recognized that the slope of the tent covering provided by Tsai could be improved by incorporating an elongated structure such as the center pole as taught by the Admitted Prior Art in order to increase the tautness of the material (and thus preventing sagging and improve water shedding ability). As there is an existing structure in Tsai (head connector 7), it would have been obvious to a POSITA to replace this structure with the center pole 6 as taught by the Admitted Prior Art.

191. The inclusion of the center pole of the Admitted Prior Art within Tsai amounts to a combining prior art elements according to known methods to yield predictable results (increase tautness and water shedding capability), a simple substitution of one known element for another to obtain predictable results (substituting the head connector 7 with the center pole 6 of the Admitted Prior Art); and a predictable use of prior art elements according to their established functions (provide a slope to the tent covering).

1.b.) a plurality of side poles coupled to each other through a plurality of scissor-type ribs, with upper ends of said ribs being hinged to connectors provided at top ends of said side poles and lower ends of said ribs being hinged to sliders movably fitted over said side poles; and

192. Tsai discloses all features of Claim 1.b., see par. 162 and Figure S.

1.c.) plurality of center pole ribs coupling said center pole to said connectors of the side poles, said center pole ribs individually comprising two rib members coupled to each other through a hinge joint and being hinged to the slider of an associated side pole through a support link, thus being collapsible at the hinge joint in accordance with a sliding motion of said slider along the side pole.

193. As described above at pars. 163-168, Tsai discloses all features of Claim 1.c.

194. Accordingly, for at least the reasons above, Claim 1 of the '040 Patent would have been obvious over Tsai in view of the Admitted Prior Art to a person of ordinary skill in the art.

Claim 2. A collapsible tent frame according to claim 1, wherein said rib members of the center pole ribs have a substantially equal length.

195. Tsai in view of Admitted Prior Art includes all features of Claim 1 of the '040 Patent (see pars. 187-194). Tsai also discloses all of the additional features added by Claim 2, see pars. 171-174.

196. Accordingly, Tsai in view of Admitted Prior Art discloses all features of Claim 2 of the '040 Patent.

197. Accordingly, Claim 2 of the '040 Patent would have been obvious over Tsai in view of Lynch to a person of ordinary skill in the art.

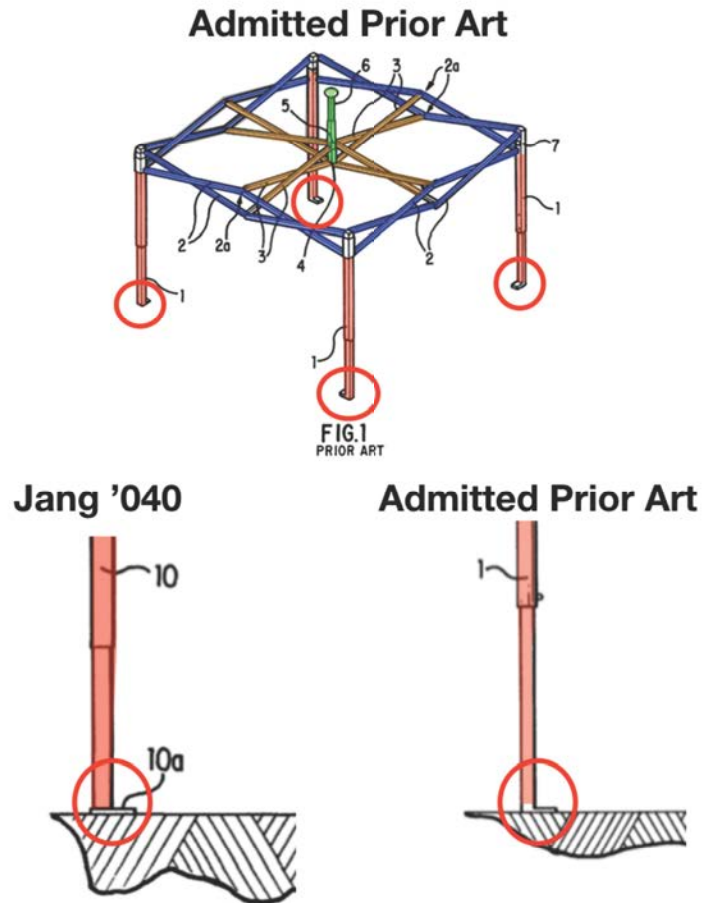


Figure W: Annotated figures from the '040 Patent showing both the claw members as disclosed in the '040 Patent as well as the claw members as taught by the Admitted Prior Art.

Claim 3. A collapsible tent frame according to claim 2, further comprising a claw member disposed at a lower end of each side pole.

198. The Admitted Prior Art discloses a claw member located at the base of each side pole (see circled elements in Figure W). A POSITA viewing these elements would recognize that they were for maintaining the stability of the

canopy frame by contacting the ground. As these members are connected to the side poles at the intersection of the ground and the side poles and provide stability to the side poles, they satisfy the limitation of “claw members” as the term is used in the ’040 Patent.

199. Tsai teaches a desire to produce a tent frame which is stable: “It is the primary object of the present invention to provide a tent structure which is solid and strong.” (EX. 1006, 1:29-30). A POSITA in view of this requirement would have realized that an obvious improvement to the design of Tsai which would improve the overall stability of the frame would be to add feet members such as in the Admitted Prior Art.

200. These feet members would be easily adapted and included at the bottom of the side poles in Tsai and increase the ability of the structure to resist moments imparted to it (by e.g., wind).

201. The inclusion of the claw members of the Admitted Prior Art within Tsai amounts to combining prior art elements according to known methods to yield predictable results (increased stability), a simple substitution of one known element for another to obtain predictable results (substituting the straight side poles of Tsai with the side poles equipped with claw members of the Admitted Prior Art); a predictable use of prior art elements according to their established functions (provide increase stability); and 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 reference teachings to arrive at the claimed invention (the desire articulated within Tsai to provide a stable tent structure).

202. As, Tsai in view of Admitted Prior Art includes all features of Claim 2 of the '040 Patent (see above), and Tsai in view of Admitted Prior Art discloses all additional features added by Claim 3, for at least the reasons above, Claim 3 of the '040 Patent would have been obvious over Tsai in view of the Admitted Prior Art to a person of ordinary skill in the art.

203. Accordingly, for at least the reasons above, Claims 1-3 of the '040 Patent would have been obvious over Tsai in view of the Admitted Prior Art to a person of ordinary skill in the art.

XI. GROUND 6: CLAIMS 1-2 OF THE '040 PATENT ARE OBVIOUS OVER TSAI IN VIEW OF BERG

204. For descriptions of Tsai and Berg, please see pars. 146-149 and 121-125, respectively.

A. Motivation to Combine Tsai and Berg

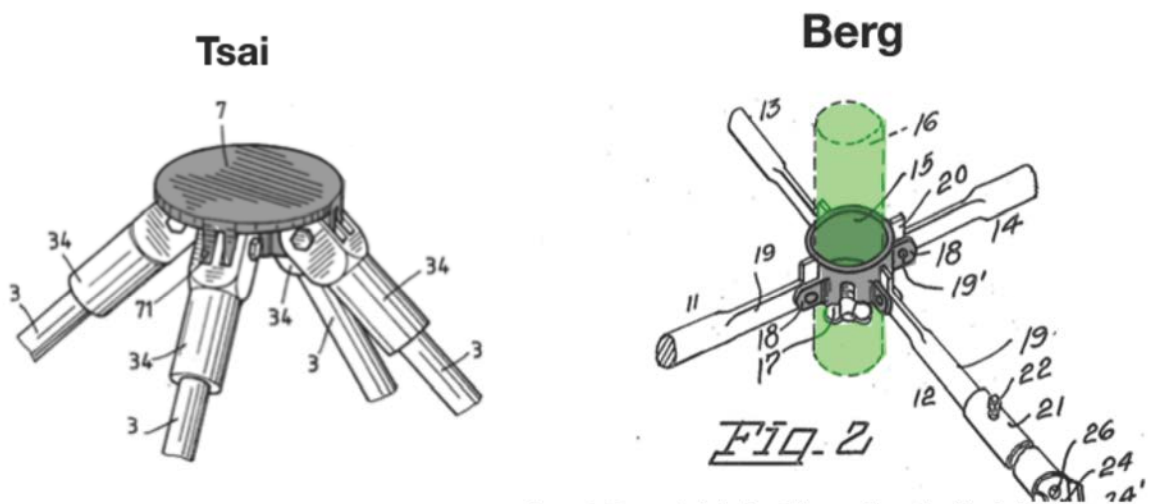


Figure X: The center hub designs of Tsai (left) and Berg (right). Given the similarities between the designs of the connectors to these two elements, a POSITA would have realized that the design of Berg (including a bushing 15 and center pole 16) could have been easily incorporated into Tsai (and replace head connector 7, gray) so as to allow for a center pole (as in Berg, green element 16).

205. Both Tsai and Berg teach to the field of collapsible tent frames, as described above. Moreover, both Tsai and Berg identify the goals of producing a tent frame which is sturdy and stable (see e.g. Ex. 1006, 1:29-36 and Ex. 1008, 1:20-21).

206. Given the relative simplicity of Berg and its date of filing (1924), a POSITA would have recognized that the collapsible tent frame disclosed by Berg represents a basic approach to the general problems of sturdy tent frame. Upon viewing Tsai, a POSITA would have been motivated to compare Berg's early technological approach with the approach disclosed by Tsai and to combine features from each.

207. Given the simplicity of the design of Berg, a POSITA would have known that there would have been a more than reasonable chance of success in combining elements from Berg into Tsai as there would not have been any significant technological hurdles in doing so.

B. Analysis of the '040 Patent Claims 1-3 in View of Tsai and Berg

Claim 1:

1.pre. "A collapsible tent frame, comprising:

208. Tsai discloses a collapsible tent frame, see par. 156.

1.a.) a center pole constructed for stretching and sustaining a tent's roof when a tent is pitched with the tent frame;

209. Tsai discloses a head connector 7 which connects to and is held up by center pole ribs (rod members 3) in a sturdy position in the center of the tent.¹⁶

¹⁶ I understand that Patent Owner's claim construction in the Underlying Litigation is a "centrally disposed element for stretching and sustaining a tent's roof." To the extent the Board adopts that construction, Tsai's head connector 7 is a "centrally disposed element for stretching and sustaining a tent's roof" and thus meets Patent Owner's proposed construction of "center pole" in the Underlying Litigation.

210. Berg discloses a center pole constructed for stretching and sustaining a tent's roof when a tent is pitched with the tent frame, see pars. 131-132.

211. Given the simplicity in design of Berg, a POSITA upon viewing Tsai would have been motivated to include the center pole of Berg in order to increase the tautness of the tent material in Tsai as well as its ability to shed water.

212. Moreover, the similarities in the central connecting elements between Tsai and Berg (i.e. hinged connectors from the center pole ribs to a central hub, see Figure X) would have motivated a POSITA to incorporate the center pole of Berg within Tsai in order to increase the flexibility of a user in pitching the angle of the tent material. Specifically, bushing 15 and center pole 16 in Berg could easily replace the head connector 7 in Tsai, realizing the ability to incorporate a center pole.

213. Including the center pole of Berg into Tsai would not have presented any significant technological challenges and it would not have affected the design or performance of any of the remaining features of Tsai (for instance, the center pole ribs).

214. The inclusion of the center pole of Berg within Tsai amounts to a combining prior art elements according to known methods to yield predictable

results (increase water shedding capability and tent pitch angle), a simple substitution of one known element for another to obtain predictable results (substituting the head connector 7 in Tsai with the bushing 15 and center post 16 of Berg); and a predictable use of prior art elements according to their established functions (provide a slope to the tent covering).

1.b.) a plurality of side poles coupled to each other through a plurality of scissor-type ribs, with upper ends of said ribs being hinged to connectors provided at top ends of said side poles and lower ends of said ribs being hinged to sliders movably fitted over said side poles; and

215. Tsai discloses all features of Claim 1.b., see par. 162 and Figure S.

1.c.) plurality of center pole ribs coupling said center pole to said connectors of the side poles, said center pole ribs individually comprising two rib members coupled to each other through a hinge joint and being hinged to the slider of an associated side pole through a support link, thus being collapsible at the hinge joint in accordance with a sliding motion of said slider along the side pole.

216. As described in pars. 163-168, Tsai discloses all features of Claim 1.c.

217. Accordingly, for at least the reasons above, Claim 1 of the '040 Patent would have been obvious over Tsai in view of Berg to a person of ordinary skill in the art.

Claim 2. A collapsible tent frame according to claim 1, wherein said rib members of the center pole ribs have a substantially equal length.

218. As Tsai in view of Berg discloses all of the features of Claim 1 (see above), and Tsai discloses the additional features added by Claim 2 (see pars. 171-174), Claim 2 of the '040 Patent would have been obvious over Tsai in view of Berg to a person of ordinary skill in the art.

219. Accordingly, Claims 1-2 of the '040 Patent would have been obvious over Tsai in view of Berg to a person of ordinary skill in the art.

XII. GROUND 7: CLAIMS 1-3 OF THE '040 PATENT ARE OBVIOUS OVER TSAI IN VIEW OF BERG AND CARTER

220. For descriptions of Tsai and Berg, please see pars. 146-149 and 121-125, respectively.

A. U.S. Patent No. 5,511,572 for “Collapsible Shelter With Flexible, Collapsible Canopy”

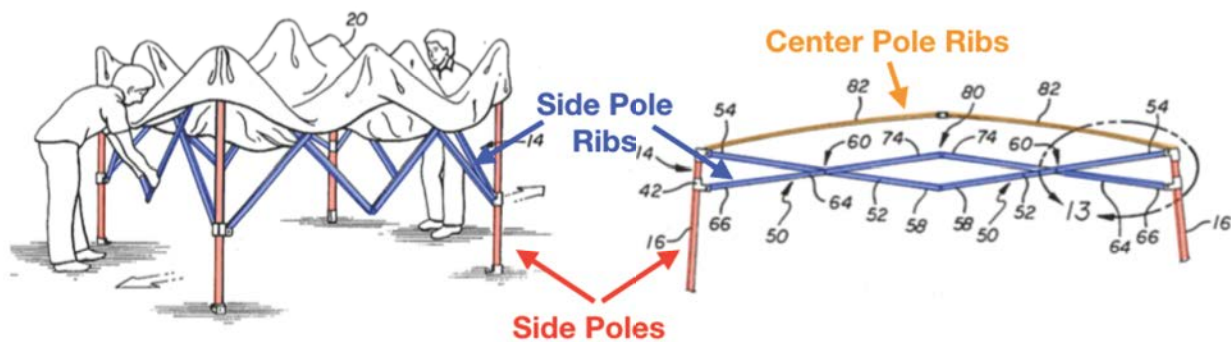


Figure Y: Annotated figures from Carter showing the disclosed canopy frame including side poles, scissor-style side pole ribs, and center pole ribs.

221. U.S. Patent No. 5,511,572 for “Collapsible Shelter With Flexible, Collapsible Canopy” was filed by Mark C. Carter on July 25, 1994 and issued on April 30, 1996. Carter will also be cited as “Ex. 1009” with additional pages indicated to the specific portions referenced. I understand that, as Carter was issued more than one year before the claimed priority date of the ’040 Patent, Carter qualifies as prior art with respect to the ’040 Patent under 35 U.S.C. §102(b). Carter was not in front of the examiner during prosecution of the ’040 Patent.

222. Carter teaches to the field of collapsible canopies and tent frames: “This invention relates generally to folding, collapsible structures, and more particularly relates to a collapsible, field shelter structure having an elevated canopy.” (Ex. 1009, 1:7-9).

223. Carter identifies some of the same problems with prior art tents as those identified by the '040 Patent as well as other prior art tents identified in this declaration (lack of interior head space, complicated construction, angle of covering for shedding water): “It would be desirable to provide an improved collapsible shelter with a support framework for the canopy that rises above the supporting legs, **to provide for more headroom within the structure, to shed precipitation and debris from the top of the shelter [...]**. It would also be desirable to if such a canopy were to be **less expensive to construct** that prior art canopies.” (ellipses and emphasis added, Ex. 1009, 1:33-46).

224. Carter discloses a collapsible tent frame with side poles (legs 16). Each side pole (leg 16) includes “a foot portion 34 for engagement with the ground or other floor surface.” (Ex. 1009, 4:10-21). The side poles are coupled via scissor-type side pole ribs with upper and lower members (truss pairs with first and second link members 52 and 64). Upper side pole rib members are connected to a connector (socket 68), with lower side pole rib member attached to slider (leg slider member 42). Also see Figure Y.

B. Motivation to Combine Tsai, Berg, and Carter

225. All three Tsai, Berg, and Carter teach to the fields of collapsible canopy frames as described above. Moreover, Tsai, Berg, and Carter all identify the goals of producing a tent frame which is sturdy and stable (see e.g. Ex. 1006, 1:29-36 and Ex. 1008, 1:20-21) and Carter with reference specifically to building a sturdy tent to withstand wind loading: “It would also be desirable to provide a canopy that bends and collapses in strong winds, to reduce exposure of the shelter to the force of winds that can lift and topple the shelter, for improved strength and stability in strong winds, and to allow support of larger, lighter collapsible shelter structures.” (Ex. 1009, 1:39-44).

226. Given the relative simplicity of Berg and its date of filing (1924), a POSITA would have recognized that the collapsible tent frame disclosed by Berg represents a basic approach to the general elements of sturdy tent frame. Upon viewing Tsai and Carter, a POSITA would have been motivated to compare Berg’s early technological approach with the approach disclosed by Tsai and Carter and to combine features from each.

227. Moreover, a POSITA would have recognized that incorporating various features within these three patents would have had a more than reasonable likelihood of success as such combinations would not have presented a significant technological hurdle.

C. Analysis of The '040 Patent Claims 1-3 in View of Tsai, Berg, and Carter

Claim 1:

1.pre. "A collapsible tent frame, comprising:

228. Tsai discloses a collapsible tent frame, see par. 156.

1.a.) a center pole constructed for stretching and sustaining a tent's roof when a tent is pitched with the tent frame;

229. Tsai discloses a head connector 7 which connects to and is held up by center pole ribs (rod members 3) in a sturdy position in the center of the tent.¹⁷

Berg discloses a center pole constructed for stretching and sustaining a tent's roof when a tent is pitched with the tent frame, see pars. 131-132. Moreover, a POSITA would have found it obvious to incorporate the center pole of Berg within Tsai, see pars. 209-214.

¹⁷ I understand that Patent Owner's claim construction in the Underlying Litigation is a "centrally disposed element for stretching and sustaining a tent's roof." To the extent the Board adopts that construction, Tsai's head connector 7 is a "centrally disposed element for stretching and sustaining a tent's roof" and thus meets Patent Owner's proposed construction of "center pole" in the Underlying Litigation.

1b.) a plurality of side poles coupled to each other through a plurality of scissor-type ribs, with upper ends of said ribs being hinged to connectors provided at top ends of said side poles and lower ends of said ribs being hinged to sliders movably fitted over said side poles; and

230. Tsai discloses all features of Claim 1.b., see par. 162 and Figure S.

c.) plurality of center pole ribs coupling said center pole to said connectors of the side poles, said center pole ribs individually comprising two rib members coupled to each other through a hinge joint and being hinged to the slider of an associated side pole through a support link, thus being collapsible at the hinge joint in accordance with a sliding motion of said slider along the side pole.

231. As described above, at pars. 163-168, Tsai discloses center pole ribs with the properties taught in Claim 1.c.

232. Accordingly, for at least the reasons above, Claim 1 of the '040 Patent would have been obvious over Tsai in view of Berg and Carter to a person of ordinary skill in the art.

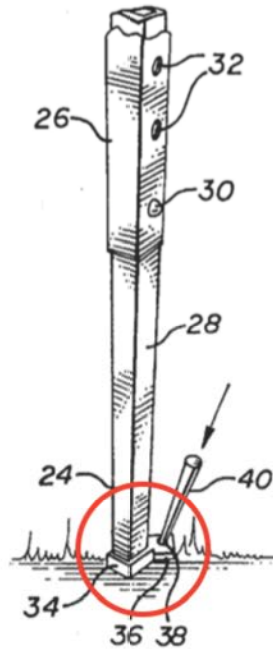


Figure Z: One of the plurality of side poles disclosed in Carter, made of telescoping section 26 and 28. The claw member 34 is shown disposed at the bottom of the side pole in a red circle providing support to the pole.

Claim 2. A collapsible tent frame according to claim 1, wherein said rib members of the center pole ribs have a substantially equal length.

233. Tsai in view of Berg and Carter discloses all features of Claim 1 of the '040 Patent (see above, pars. 228-232). Additionally, Tsai discloses all of the additional features added by Claim 2, see pars. 171-174.

234. Accordingly, Claim 2 of the '040 Patent would have been obvious over Tsai in view of Berg and Carter to a person of ordinary skill in the art.

Claim 3. A collapsible tent frame according to claim 2, further comprising a claw member disposed at a lower end of each side pole.

235. The term claw member has been construed as a member attached to the lower end of a side pole which provides stability to the side poles by interfacing with the surface on which the canopy frame is disposed. Carter teaches such claw members as foot portions 34 disposed at the lower ends of each side poles: “The extendable lower section also preferably includes a foot portion 34 for engagement with the ground or other floor surface, and preferably includes a flange 36 with an aperture 38 for receiving a stake or peg 40 for securing the legs to the ground.” (Ex. 1009, 4:17-21). Also see Figure Z. As these feet are connected to the side poles at the intersection of the ground and the side poles and provide stability to the side poles, they satisfy the limitation of “claw members” as the term is used in the ’040 Patent.

236. Tsai teaches a desire to produce a tent frame which is stable: “It is the primary object of the present invention to provide a tent structure which is solid and strong.” (Ex. 1006, 1:29-30). A POSITA in view of this requirement would have realized that an obvious improvement to the design of Tsai which would improve the overall stability of the frame would be to add claw members such as in Carter.

237. These claw members would be easily adapted and included at the bottom of the side poles in Tsai and increase the ability of the structure to resist moments imparted to it (by e.g., wind).

238. Incorporating these claw members of Carter within Tsai would have not presented any significant technological challenges, and moreover, it would not have affected the design or functionality of any of the remaining features of Tsai.

239. The inclusion of the claw members of Carter within Tsai amounts to combining prior art elements according to known methods to yield predictable results (increased stability), a simple substitution of one known element for another to obtain predictable results (substituting Carter's side poles equipped with feet 34 of into Tsai) a predictable use of prior art elements according to their established functions (provide increase stability); and 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 reference teachings to arrive at the claimed invention (the desire articulated within Tsai to provide a stable tent structure).

240. As Tsai in view of Berg includes all features of Claim 2 of the '040 Patent (see above), and Tsai in view of Carter includes all of the additional features added by Claim 3, Claim 3 of the '040 Patent is obvious over Tsai in view of Berg and Carter.

241. Accordingly, Claims 1-3 of the '040 Patent would have been obvious over Tsai in view of Berg and Carter to a person of ordinary skill in the art.

242. My opinions are held to a reasonable degree of engineering certainty, meaning they rise to the level of at least more likely than not and are based on logical reasoning from the evidence. My opinions are based on the information available to me. If additional information becomes available, I reserve the right to supplement this declaration. I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge.

Dated: June 1, 2020



Richard W. Klopp, Ph.D., P.E., F.A.S.M.E.

Exhibit A – Klopp CV



Exponent[®]
Engineering & Scientific Consulting

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Professional Profile

Dr. Klopp specializes in mechanical engineering and the mechanics of materials. He has particular expertise in laboratory-based testing, mechanical design, failure analysis and prevention, and manufacturing. His mechanical engineering background includes extensive experience in machining; machinery; analysis of fasteners, gears, and bearings; power generation; mechanical power transmission; optical systems; metrology; hydraulic systems; and fluid handling components. His mechanics of materials background includes extensive experience in fracture mechanics, high strain rate deformation and failure, impact and shock wave loading, mechanical testing and optical measurement methods.

Dr. Klopp has applied his expertise to machine tools, industrial machinery, laser systems, electric and gas utilities, automobiles, trucks, potable, fire protection, and wastewater system components, plumbing, computer equipment, electronic packaging, consumer products, hand and power tools, medical equipment and medical devices, toys, recreational products, railroad tank cars, chemical storage tanks, underground tunnels, armor/antiarmor, and missile defense. Dr. Klopp has studied the mechanical behavior of metals, ceramics, rock, plastics, advanced composites, liquids, and wood.

Dr. Klopp has provided consulting services on matters of industrial problem solving, product recalls, product defect litigation, intellectual property disputes, national defense, and insurance issues.

Dr. Klopp is a skilled machinist qualified to set up and operate machine tools such as lathes, milling machines and other shop equipment. His personal machine shop is equipped with a computer numerical control (CNC) milling machine, a manual milling machine, two toolroom lathes, grinders, and a wide variety of supporting tooling and equipment.

Prior to joining Exponent, Dr. Klopp was a Research Engineer at SRI International and worked as a Research Associate at Brown University. He is a Fellow of the American Society of Mechanical Engineers.

Academic Credentials & Professional Honors

Ph.D., Engineering, Brown University, 1987

Sc.M., Applied Mathematics, Brown University, 1986

Sc.M., Engineering, Brown University, 1984

B.S., Mechanical Engineering, Lehigh University, 1981

Fellow, American Society of Mechanical Engineers, 2019

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SRI International Postdoctoral Fellowship

University Fellowship, Brown University

Ingersoll Rand Award

Alfred Stenning Award

Pi Tau Sigma

Tau Beta Pi

Licenses and Certifications

Licensed Professional Mechanical Engineer, California, #M31530

Licensed Professional Engineer, Nevada, #024867

Licensed Professional Engineer, Texas, #113452

Licensed Professional Engineer, Washington, #52816

Prior Experience

Research Engineer, SRI International Poulter Laboratory, 1987-1999

Postdoctoral Fellow, SRI International Poulter Laboratory, 1986-1987

Professional Affiliations

Community Service

Mentor to the FIRST Robotics teams at Woodside High School, Woodside, CA.

Affiliations

American Society of Mechanical Engineers (ASME - Fellow)

ASME B16 Subcommittee L - Gas Shutoffs and Valves

ASME B5 Technical Committee 52 - Machine Tool Performance

ASM International — American Society for Metals

American Water Works Association

Society of Manufacturing Engineers

Peer reviewer for ASM International Journal of Materials Engineering and Performance

Peer reviewer for Proceedings of the iMechE Part E: Journal of Process Mechanical Engineering

Peer reviewer for ASME 2010 International Design Engineering Technical Conferences (IDETC) and

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Computers and Information in Engineering Conference(CIE)

Peer reviewer for ASME 2013 International Design Engineering Technical Conferences (IDETC) and Computers and Information in Engineering Conference (CIE)

Peer reviewer for ASME 2015 International Design Engineering Technical Conferences (IDETC) and Computers and Information in Engineering Conference (CIE)

Peer reviewer for ASME 2015 International Mechanical Engineering Congress and Exhibition (IMECE)

Community Service

Mentor to the FIRST Robotics teams at Woodside High School, Woodside, CA.

Publications

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de Resseguier T, Klopp RW, Seaman L, Kanazawa C, Curran DR. Characterization and modeling penetration of ceramic armor. Final Report to Army Research Office on Contract DAAL03-92-K-0004, February 1995.

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Invited Lectures

Klopp, RW. Techniques of failure analysis. In: Failure Analysis: The Science of What Went Wrong, ASME Professional Development Seminar/Webinar, Santa Clara, CA, March 23, 2013.

Guest lecturer, Engineering 448 - Electrical Power Systems, San Francisco State University, December 7,

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2013.

Klopp, RW. Techniques of failure analysis. In: Failure Analysis: The Science of What Went Wrong, ASME Professional Development Seminar/Webinar, Santa Clara, CA, April 5, 2014.

Project Experience

Intellectual Property

Analyzed semiconductor wafer chemical mechanical polishing patents. Developed opinions relating to enablement and written description.

Characterized thermal strains in ball-grid-array semiconductor packages using Moiré interferometry for an International Trade Commission matter. Prepared interferograms that demonstrated infringement.

Characterized the adhesion between coatings and medicines for an IP dispute involving gel-coated pills.

Analyzed laser surgery fiber optic connector patents for infringement and invalidity. Testified in deposition.

Analyzed claim construction in gemstone laser micro-inscribing equipment patents and then analyzed the patents for infringement and invalidity. Testified in deposition, at a Markman hearing, and at trial.

Demonstrated that a patent on granular pesticide morphology claimed a natural phenomenon.

Analyzed design patent claims to folding pocketknives for functional features. Court adopted sections of expert report in summary judgment ruling of noninfringement.

Performed analysis supporting a successful Daubert motion to exclude reports and testimony relating to testing of handheld power tools for patent infringement. Demonstrated that plaintiff's testing was improper and conclusions based on them lacked sufficient basis.

Analyzed claims for a web-cam support asserted by a Patent Assertion Entity for anticipation and obviousness in light of prior art.

Analyzed linkage motion in fruit-pitting machinery in light of prior art linkages extending back to the time of James Watt and his steam engine.

Machine Tools

Demonstrated the impact strength of CNC lathe guard windows by launching simulated workpieces at them using Exponent's automotive crash rail.

Surveyed a large lathe and identified numerous design and manufacturing defects.

Examined and tested a high-speed milling machine to diagnose and resolve an intermittent control fault.

Analyzed shop-wide machine tool lubrication system failures in light of the design and construction of such systems and oil contamination.

Analyzed the root cause of vacuum workholding failure and high-speed ejection of a workpiece from a CNC milling machine enclosure.

Cranes, Elevators, Escalators, and Mining Equipment

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Performed a critical safety assessment of the controls for the cableways used to construct the Mike O'Callaghan - Pat Tillman Memorial Bridge (Hoover Dam Bypass), recommended modifications, and performed extensive testing.

Identified a critical design issue with the tower luffing bearings on the Hoover Dam Bypass cableways, and proposed a solution that avoided dismantling the cranes for repairs.

Determined the root cause of escalator chain failures involving lateral movement of connector pins that ostensibly were press-fit and secured with clips.

Assisted in machinery damage assessment after a fire at a facility for processing iron ore into pig iron via direct reduction.

Analyzed the root causes of failures of machinery plant-wide at an iron ore concentrator facility based on computer plant historian records and physical evidence, in light of claims of overall plant under-performance.

Analyzed damage to and repair of the world's largest tunnel boring machine being used to mine a tunnel to replace the Alaskan Way Viaduct in Seattle.

Food Machinery

Analyzed bearing failure in an ice cream freezer that resulted in a recall to address plastic material in the product.

Analyzed the rebuilding and subsequent failure of positive-displacement butter pumps that resulted in a recall to address plastic material in the product.

Analyzed contributions of mechanical component defects to fires in cracker baking and drink powder packaging lines.

Analyzed failures of wine fermenter heat exchangers leading to product contamination with coolant, and failures of wine fermenter tank hardware resulting in product spills.

Medical Devices and Equipment

Developed special machines to test the durability of neonatal warmer support arms and portable ventricular assist device pneumatic hoses.

Developed a time-lapsed cinematography technique to characterize micron-level motion of an insulin pump plunger at low dosage rates.

Analyzed the effect on dosage accuracy of insulin pump systems subjected to altitude changes.

Analyzed the collapse failure of an endoscope support arm during brain surgery, and collapse failure of a medical bed during eye surgery.

Water Supply, Wastewater, Natural Gas Piping and Plumbing

Determined that hydraulic jump due to improperly configured waste piping in a 42-story hotel/condominium building was the root cause of sewer backups.

Performed successful field testing of a large sewer line bladder plug in a remote location, coordinating with contractors sight-unseen.

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Tested the effect of out-of-tolerance polyethylene gas pipe on the integrity of a wide range of coupling methods.

Determined that water hammer associated with rapid closing of a fire hydrant was the root cause of underground pipe joint failures.

Led a multi-year, multi-million-dollar study on the design, manufacture, and maintenance of fire hydrants and the effect of different food-grade greases on corrosion of the valve operating mechanism.

Investigated multi-million-dollar hospital flood. Determined root cause was failure of ductile iron pipe bell and spigot joints due to lack of axial restraint. Identified actions by the designers, plumbers, and inspectors that, in combination, created conditions leading to the failure.

Investigated the root cause of erosion-corrosion failures of copper piping in a condominium complex with a hybrid domestic/hydronic hot water circulating system. Developed a flow model to demonstrate that the system could function correctly when properly balanced.

Successfully performed laboratory testing to replicate the slow crack growth field failure of a high-density polyethylene (HDPE) water main fitting at a fusion weld.

Investigated the root cause of electrofusion saddle fitting field failures and replicated failures in the laboratory.

Performed testing of gas distribution valves according to consensus standards, in order to qualify the valves for a public utility application.

Automotive Technology and Engines

Analyzed the depreciation of peer brands and models of cars in light of recall publicity.

Developed an analytical model for the behavior of truck power steering systems under impact conditions.

Determined the root cause of cylinder liner cracking in Fairbanks-Morse opposed-piston Diesel and gas engines.

Determined the root cause of the catastrophic failure of a Caterpillar marine engine.

Determined that repeated crankshaft fatigue failures in automobile engines used in an industrial application were due to vibrations peculiar to four-cylinder engines.

Determined the root cause of the catastrophic failure of a state-of-the-art piston engine powered by anaerobic digester gas at a wastewater treatment facility.

Consumer Products

Tested window shade cord strangulation safety release devices as part of a Consumer Product Safety Commission (CPSC) inquiry.

Authored proposed Window Covering Manufacturers Association test standards for roll-up window coverings (shades). Standards are being revised to incorporate tests for cord release devices intended to reduce risk of child strangulation.

Analyzed existing and improved designs for pocketknife safety latch mechanisms as part of a CPSC

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inquiry.

Analyzed the design and manufacturing of tract home air conditioner coils in light of allegations of premature failure due to corrosion.

Electricity Generation

Determined the cause of malfunction of a generator brush spring mechanism that led to a flashover event and outage.

Analyzed the catastrophic over-speed failure of a steam turbine generator due to the combination of trip valve oxidation and governor valve wear.

Identified the root cause of gas turbine compressor blade damage in sister turbines based on physical evidence inspection, finite element analysis, and review of operating records.

Analyzed weld cracking due to vibration-induced fatigue that led to a flashover event in a steam turbine generator. Subsequently assessed the efficacy of tuning masses added to the generator housing to reduce vibration amplitudes.

Performed ISO 281 bearing capacity and life analysis for wind turbine main rotor bearings, considering bearing clearances and preloads.

Determined the failure of a steam turbine babbitt bearing was due to insufficient cooling and turning gear rotation following emergency shutdown.

Consulted on the analysis and repair of a steam turbine generator that was significantly damaged by an over-speed event and subsequent thermal shock.

Exhibit B Materials Relied Upon

PETITION EXHIBIT	DOCUMENT
1001	U.S. Patent No. 5,944,040 (“the ’040 Patent”)
1002	Prosecution history of U.S. Patent No. 5,944,040
1004	Certified English Translation of Japanese Unexamined Utility Model Application Publication No. H1-61370 to Yang, et al. (English) (“Yang”)
1005	Japanese Unexamined Utility Model Application Publication No. H1-61370 to Yang, et al. (Japanese)
1006	U.S. Patent No. 5,638,853 to Tsai (“Tsai”)
1007	U.S. Patent No. 4,779,635 to Lynch (“Lynch”)
1008	U.S. Patent No. 1,502,898 to Berg (“Berg”)
1009	U.S. Patent No. 5,511,572 to Carter (“Carter”)
1010	Joint Claim Construction Statement, dated May 18, 2020
1011	Plaintiff Caravan Canopy International, Inc.’s Opening Claim Construction Brief
1012	Defendants’ Joint Opening Claim Construction Brief
1013	<i>Int’l E-Z Up, Inc. v. Caravan Canopy Int’l, Inc., et al.</i> , No. CV-01-06530-SVW (C.D. Cal), Claim Construction Opinion and Caravan’s Briefing
1014	Webster’s Encyclopedic Unabridged Dictionary of the English Language (1996)

1015	Merriam-Webster's Collegiate Dictionary, Tenth Edition (2000)
1016	Oxford Dictionary and Thesaurus (1996)
1017	Webster's II New Riverside Dictionary (1996)