

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

GLOBAL SHADE CORPORATION,
Petitioner,

v.

WITH-U E-COMMERCE (SHANGHAI) CO., LTD.,
Patent Owner.

IPR2023-00580
U.S. Patent No. 10,669,738

DECLARATION OF JEFFREY L. STEIN, PH.D.
IN SUPPORT OF PETITION FOR *INTER PARTES* REVIEW
OF U.S. PATENT NO. 10,669,738

Global Shade Ex. 1002 IPR Petition USP 10,669,738

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Global Shade v. With-U E-Commerce
Declaration of Jeffrey L. Stein, Ph.D.

I, Jeffrey L. Stein, declare as follows:

1. I am making this declaration at the request of Global Shade Corporation.

2. I am being compensated for my work in this matter and I am being reimbursed at cost for my expenses. My compensation in no way depends upon the outcome of this proceeding.

3. In preparing this Declaration, I considered the following materials:

Exhibit No.	Description
1001	U.S. Patent No. 10,669,738 (“the ’738 patent”)
1003	U.S. Patent No. 6,345,639 (“Rousselle”)
1004	International Patent Publication No. WO2000/023676 (“Chang”)
1005	UK Patent Application No. GB2321913A (“Tsai”)
1006	U.S. Patent No. 8,066,300 (“Ohnishi”)
1007	U.S. Patent Publication No. 2005/0241688 (“Wu”)
1008	U.S. Patent No. 6,929,017 (“Byun”)
1009	U.S. Patent No. 7,735,505 (“Carter”)
1010	U.S. Patent Publication No. 2005/0178419 (“Tseng”)
1011	U.S. Patent No. 3,335,815 (“Oakes”)
1012	U.S. Patent No. 5,944,040 (“Jang”)
1013	Excerpts from Thomas W. Barber, <i>The Engineer’s Sketch-Book of Mechanical Movements, Devices, Appliances, Contrivances and Details</i> (3d ed. 1897)

Global Shade v. With-U E-Commerce
Declaration of Jeffrey L. Stein, Ph.D.

Exhibit No.	Description
1014	Excerpts from the '738 Patent File History

I. BACKGROUND

A. Experience and Qualifications

4. My experience and qualifications are summarized in my *curriculum vitae*, a copy of which is provided as Exhibit 1015.

5. I received an S.B. and S.M. in 1976 and a Ph.D. in 1983, all in Mechanical Engineering and all from the Massachusetts Institute of Technology. I began my teaching career shortly thereafter as an Assistant Professor at the University of Michigan and have risen through the ranks as an Associate Professor and then to full Professor in the Department of Mechanical Engineering until my retirement from teaching at the end of 2022. In that capacity, I am the former Associate Director of the Automotive Research Center at the University of Michigan and a former Principal Investigator in the NSF Engineering Research Center on Reconfigurable Manufacturing Systems. I have studied, taught and/or researched in the design and control of mechanical systems for over 40 years.

6. In my capacity as a Professor, I have taught undergraduate and graduate courses in mechanical design and manufacturing, dynamics, systems, and control engineering. I have done research in the area of vehicle system design and control as well as manufacturing machine design and control. In several of my research projects, my students and I discovered unique ways to model, design, and control mechanical systems including vehicle and manufacturing systems.

7. In addition to being the former Associate Director of the Automotive Research Center at the University of Michigan, I am also the former Principal Investigator (“PI”) of the project “A Multi-Scale Design and Control Framework for Dynamically Coupled Sustainable and Resilient Infrastructures, with Application to Vehicle-to-Grid Integration.” I am also the former PI of the project “Sustainable Transportation for a 3rd Century: An Interdisciplinary Approach to Addressing the Last Mile Problem for Enhanced Accessibility.” In my work at the Automotive Research Center, and on these projects, I have developed computer-based methods for facilitating the design evaluation of automotive powertrains including hybrid electric powertrains, as well as four and six-wheel drive vehicles.

8. From 1983 through 1987, and 1991 through the present, I have also worked as an independent consultant concentrating in the area of design and risk analysis of mechanical systems and manufacturing machines. Some examples of systems and machines I have worked on include adjustable hospital beds, agricultural seed meters, hybrid electric vehicles, automated mechanical transmissions, hydraulic brakes for bicycles, four-wheel drive vectoring and transfer cases for on-demand, four-wheel drive vehicles. As part of my consulting work, I have also studied retractable canopies for use with automobiles (e.g., soft tops for convertibles).

9. From 1988 through 1991, I was also employed as an independent consultant for Failure Analysis Associates in San Francisco, California, focusing on the design and risk analysis of mechanical systems and manufacturing machines.

10. I was a registered Professional Engineer in the State of Michigan for close to four decades, and have been a member of several professional engineering organizations, including the Society of Automotive Engineers, National Society of Professional Engineers, the American Society of Mechanical Engineers, the Society of Manufacturing Engineers, and the American Society for Engineering Education. I am currently the chair of the ASME Energy and Environment Standards Advisory Board.

11. I have received numerous awards and recognition for my research, teaching and service at the University of Michigan and for ASME. They include the Paynter Outstanding Research Award, best paper awards, teaching excellence recognition, and outstanding contributions to service. These awards, and other details about my experience and qualifications, are listed in my CV.

12. My education, work, teaching and research have helped me develop a broad base of knowledge regarding machine design and mechanical systems design. This field of technology encompasses machines in general, their structural members and components, such as fasteners, slides, hinges, and bearings. I am familiar with the design and analysis of linkages like those used in collapsible canopies and

discussed in this Declaration. Accordingly, I am familiar with how mechanical engineers would have understood and interacted with the concepts and principles underlying the design of collapsible canopies and central locks.

B. Applicable Legal Standards

13. I have been asked to provide my opinion as to whether certain claims of U.S. Patent No. 10,669,738 (“the ’738 patent”) would have been obvious to a person of ordinary skill in the art at the time of the alleged invention, in view of the prior art.

14. I am an engineer by training and profession. The opinions I am expressing in this report involve the application of my training and technical knowledge and experience to the evaluation of certain prior art with respect to the ’738 patent.

15. Although I have been involved as a technical expert in patent matters before, I am not an expert in patent law. Therefore, the attorneys from Knobbe, Martens, Olson & Bear, LLP have provided me with guidance as to the applicable patent law in this matter. The paragraphs below express my understanding of how I must apply legal principles relating to patent validity in my analysis.

16. It is my understanding that in determining whether a patent claim is obvious in view of the prior art, the Patent Office construes the claim by giving the claim its ordinary and customary meaning ascribed to it by a person of ordinary skill

in the art at the time of the invention, consistent with the specification. I also understand that in reading the claim, I must not import limitations from the specification into the claim terms; in other words, I must not narrow the scope of the claim terms by implicitly adding disclosed limitations that have no express basis in the claims.

17. It is my understanding that a claim is “obvious” if the claimed subject matter as a whole would have been obvious to a person of ordinary skill in the art at the time of the alleged invention. I also understand that an obviousness analysis takes into account the scope and content of the prior art, the differences between the claimed subject matter and the prior art, and the level of ordinary skill in the art at the time of the invention.

18. In determining the scope and content of the prior art, it is my understanding that a reference is considered appropriate (e.g., analogous) prior art if it falls within the field of the inventor’s endeavor. In addition, a reference is prior art if it is reasonably pertinent to the particular problem with which the inventor was involved. A reference is reasonably pertinent if it logically would have commended itself to an inventor’s attention in considering his problem. If a reference relates to the same problem as the claimed invention, that supports use of the reference as prior art in an obviousness analysis.

19. To assess the differences between prior art and the claimed subject matter, it is my understanding that the law requires the claimed invention to be considered as a whole. This “as a whole” assessment requires showing that one of ordinary skill in the art at the time of invention, confronted by the same problems as the inventor and with no knowledge of the claimed invention, would have selected the elements from the prior art and combined them in the claimed manner.

20. It is my understanding that something is “inherent in,” and therefore taught by, the prior art, if it necessarily flows from the explicit disclosure of the prior art. I understand that the fact that a certain result or characteristic may be present in the prior art is not sufficient to establish inherency. However, if the result or characteristic is necessarily present based upon the explicit disclosure in the prior art, it is inherent in the prior art and is therefore disclosed.

21. It is my further understanding that the law recognizes several rationales for combining references or modifying a reference to show obviousness of claimed subject matter. Some of these rationales include: combining prior art elements according to known methods to yield predictable results; simple substitution of one known element for another to obtain predictable results; a predictable use of prior art elements according to their established functions; applying a known technique to a known device (method or product) ready for improvement to yield predictable results; choosing from a finite number of identified, predictable solutions, with a

reasonable expectation of success; and some teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill to modify the prior art reference or to combine prior art reference teachings to arrive at the claimed invention.

22. I understand that a prior art reference may also suggest a limitation of the claims. In that case, even if the prior art reference does not explicitly or inherently disclose the limitation, the motivation to modify the prior art reference to include the limitation may exist within the prior art reference itself. Thus, the limitation would have been obvious over that prior art reference alone. This is the case if a person of ordinary skill in the art would have had a simple design choice or a finite number of identified, predictable solutions, for example, and if the modification furthers the goals of the prior art reference.

23. I further understand that the obviousness analysis must be performed from the perspective of a person of ordinary skill in the art at the time of the alleged invention. This is to avoid using impermissible hindsight in the analysis. The claims of the patent must not be used to provide a road map for obviousness; instead, the claims would have been obvious if a person of ordinary skill in the art would have been motivated to combine the teachings of the prior art to arrive at the claimed invention and had a reasonable expectation of success in doing so.

24. I also understand that an obviousness analysis must consider whether there are additional factors that would indicate that the invention would not have

been obvious. These factors include whether there was: (i) a long-felt need in the industry; (ii) any unexpected results; (iii) skepticism of the invention; (iv) a teaching away from the invention; (v) commercial success; (vi) praise by others for the invention; and (vii) copying by other companies. I am not aware of any evidence that would suggest that the claims of the '738 patent would have been non-obvious. To the extent Patent Owner submits such evidence during the course of the *inter partes* review, I may provide my opinion on such evidence if asked to do so by counsel.

C. Person of Ordinary Skill in the Art

25. It is my understanding that when interpreting the claims of the '738 patent, I must do so based on the perspective of a person of ordinary skill in the art at the relevant priority date. As discussed below, I understand the earliest possible priority date to be July 26, 2016.

26. The '738 patent describes the use of well-known technologies for design, manufacturing, and use of collapsible canopies and central locks. Based on my review of the specification and claims of the '738 patent, it is my opinion that a person of ordinary skill in the art would be a person having a Bachelor's degree in the mechanical arts, or a related discipline, and at least two years of experience in the design and/or analysis of mechanical devices, fabricated frames, and/or

kinematic linkages. Additional work experience could serve as a substitute for a formal degree and vice versa.

27. I am able to make this assessment because in the 2000s and 2010s, I was familiar with design and operation principles common in the mechanical arts. The engineers and engineering Bachelor's, Master's, and Ph.D. students that I worked with during the 2000s and 2010s had the requisite knowledge to make and use systems as described in the claims of the '738 patent. Because I have worked with and supervised mechanical engineers and engineering students, I know very well what their capabilities were in the 2000s and 2010s, how those engineers would interpret and understand the claims of the '738 patent, and how they would understand the disclosures in the prior art discussed herein.

28. In my opinion, as set forth in more detail below, a person having ordinary skill in the art at the time of the invention would have considered the devices and methods claimed in the '738 patent to be obvious in view of the prior art.

II. BACKGROUND OF THE TECHNOLOGY

29. The '738 patent discusses and claims a collapsible canopy including a center lock. The '738 patent's center lock and canopy are shown below:

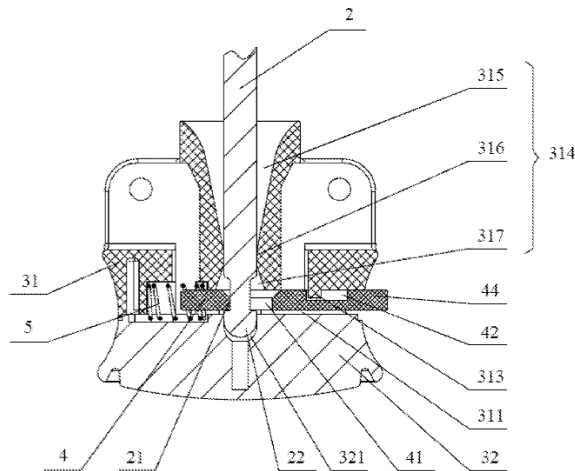


FIG. 6

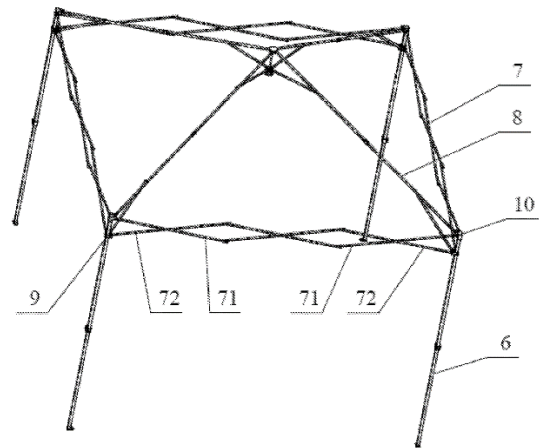


FIG. 16

Ex. 1001 ('738 patent), Figs. 6, 16.

30. Collapsible canopies and central locks like those claimed by the '738 patent were well-known in the art for over a decade by 2016. *See, e.g.*, Exs. 1003, 1004, 1005. For example, in 2002, Rousselle disclosed a collapsible canopy with a central lock that “very securely maintains the structure in an erected position.” Ex. 1003 (Rousselle), Abstract. Rousselle’s central lock “includes a generally vertical pin ... that is received inside a socket” which “has an engaging member therein that can engage a groove in the generally vertical pin[.]” *Id.*

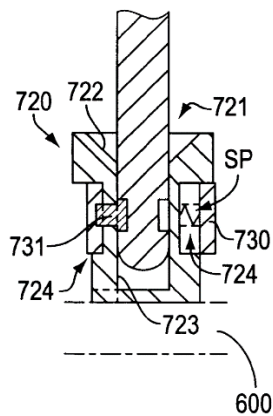


FIG. 2(A)

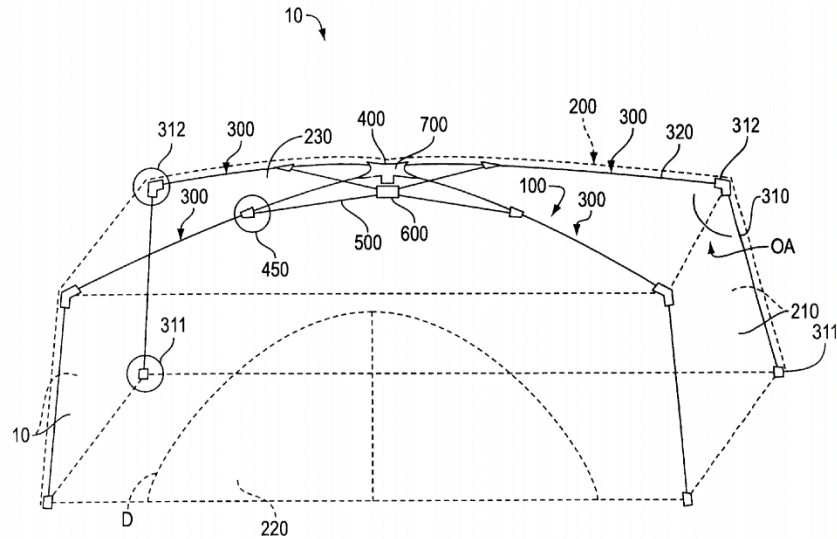


FIG. 1(A)

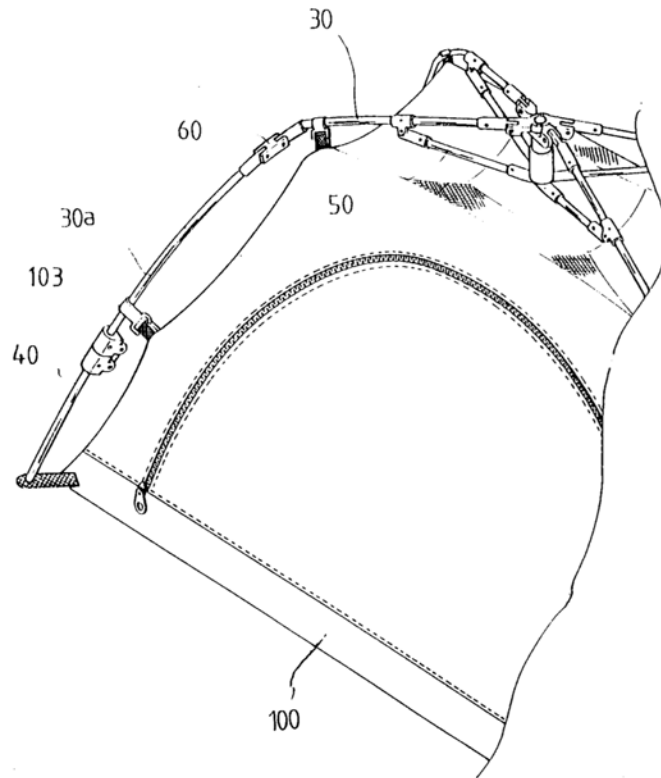
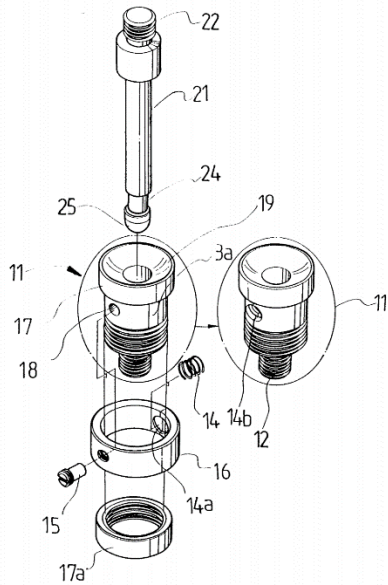
Id., Figs. 1(A), 2(A).

31. A second example, Chang, disclosed a similar collapsible canopy with a central lock in 2000. Chang's canopy is "pitched and disassembled like an umbrella by one touch[.]" Ex. 1004 (Chang), Abstract. Chang includes a locking mechanism consisting of "the Lock Pipe (11) and the Lock Pin (21)," which locks together an Upper Hub Assembly (10) and a Lower Hub Assembly (20) "in order to prevent their separation" and thereby keep the canopy frame intact and in position.

Id., 14:5-8, Figs. 8-8C.

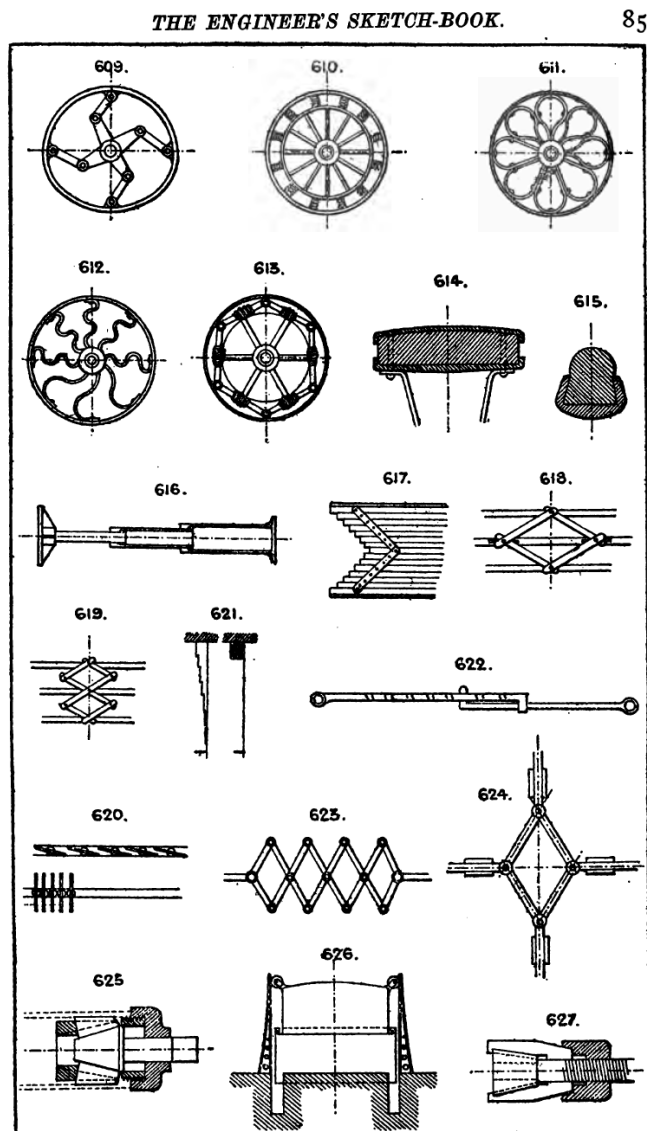
Fig. 11

Fig. 8B



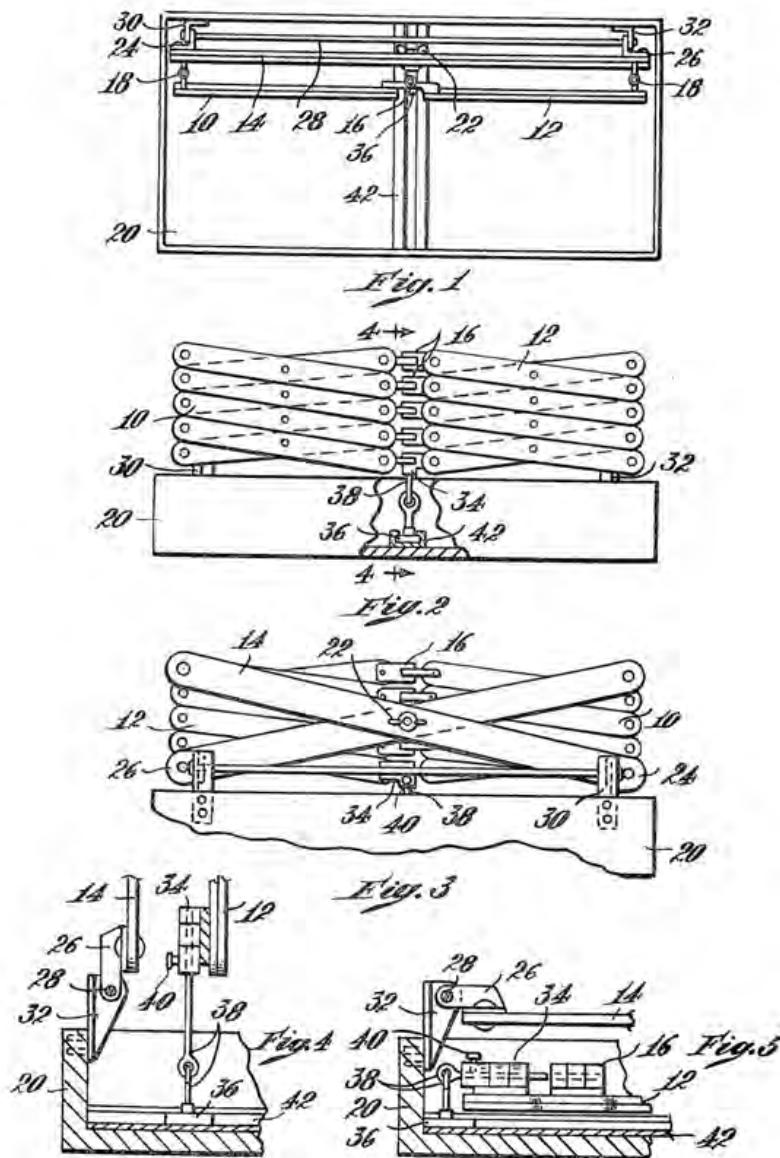
Id., Figs. 8B, 11.

32. More generally, collapsible devices that expand and contract were well-known. Examples of expanding and contracting devices are shown below in an illustration from 1897:



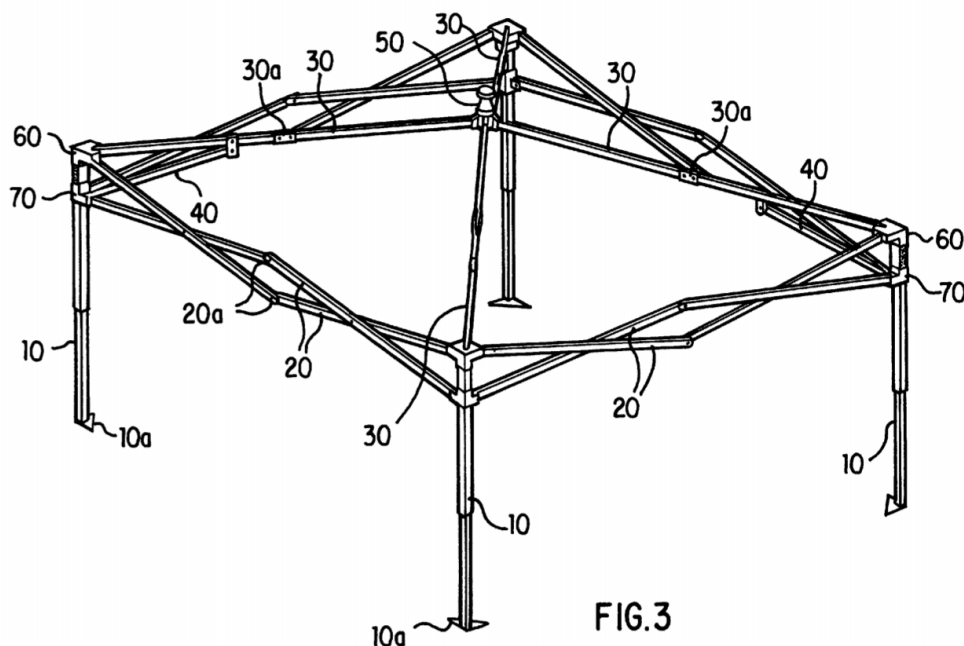
Ex. 1013 (Barber) at 85. In particular, item 618 shows four bars that are hinged to form a frame that can extend and retract. *Id.* The use of bars to form a folding articulated frame is also shown in item 623. *Id.*

33. A variety of expanding and contracting structures that can be formed by different configurations of bars are shown below in a 1967 patent to Oakes:



Ex. 1011 (Oakes), Figs. 1-5.

34. A collapsible tent frame that uses bars (attached to form x-shaped members) to fold from an expanded open position to a contracted closed position is shown below in a 1999 patent to Jang:



Ex. 1012 (Jang), Fig. 3.

35. Thus, collapsible canopy frames were well-known to persons of ordinary skill in the art.

36. Other references disclosed center locks like those disclosed in the '738 patent well before it was filed. For example, in 2011, Ohnishi disclosed a center lock for a collapsible cart or carriage. Ohnishi's center lock includes a pole with a groove and a spring-loaded locking piece that clamps around the groove in a locked state but allows the pole to pass through in an unlocked state. Ex. 1006 (Ohnishi), 7:18-8:29, Figs. 9-11.

FIG. 9

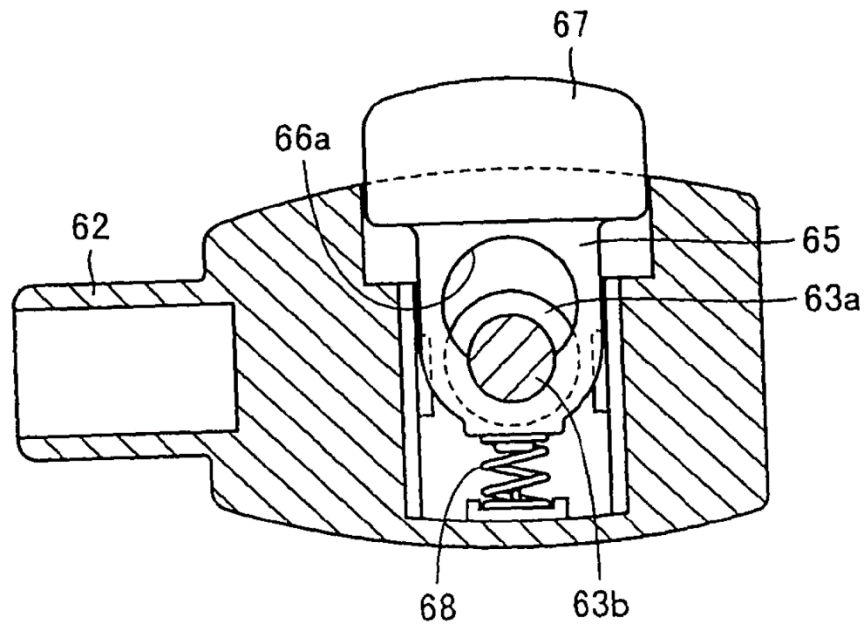
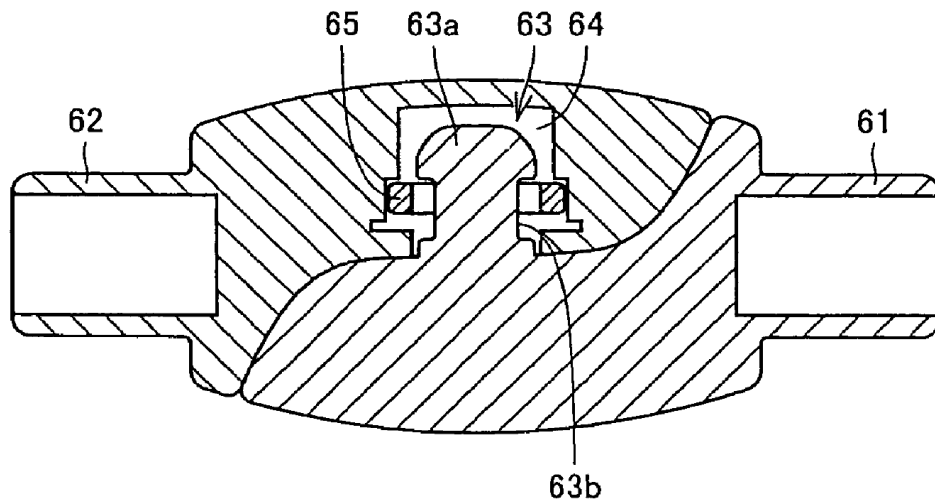


FIG. 11



Id., Figs. 9, 11.

III. THE '738 PATENT

A. Summary of the '738 Patent

1. The Specification

37. The '738 patent discloses nothing more than well-known features of collapsible canopies and central locks. The patent describes a collapsible canopy including a frame and a central lock. Ex. 1001 ('738 patent), 3:31-4:17. The canopy frame includes supporting legs, outer retractable units connected between each pair of adjacent legs, and inner retractable units connected to each leg, such that the outer retractable units and the inner retractable units form a roof frame for the canopy. *Id.* The patent's central lock is connected to the inner units and allows the canopy to be locked in an erected state. *See id.*, 4:18-59. The overall structure of the '738 patent's canopy is shown in Figure 16:

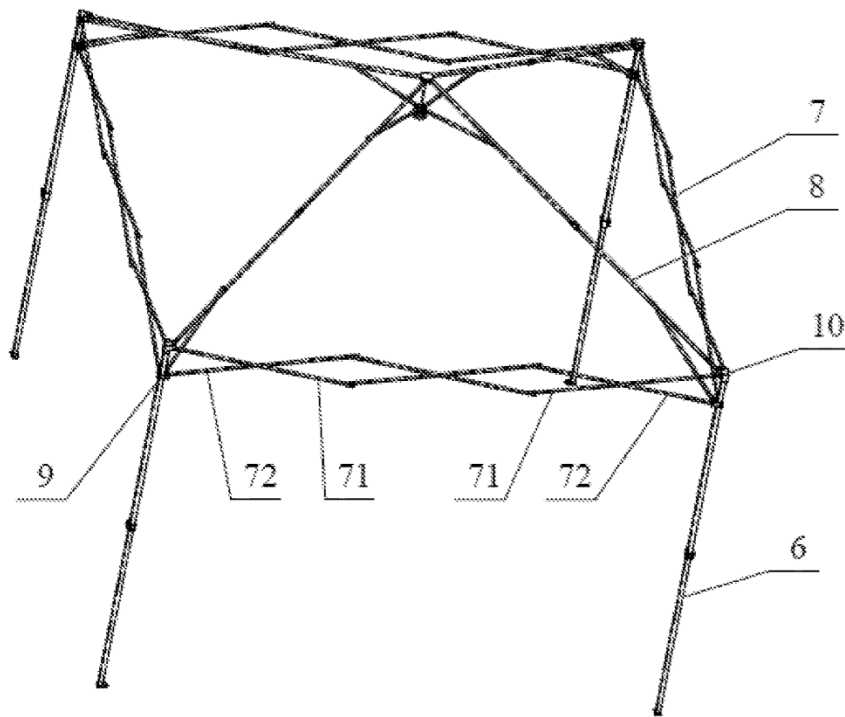


FIG. 16

Id., Fig. 16. The specification describes this as follows:

As illustrated in FIG. 16, the canopy mounted with the central lock comprises at least three supporting legs 6, outer retractable units 7 connected between every two adjacent supporting legs 6 and inner retractable units 8 connected to each supporting leg 6, the outer retractable units 7 and the inner retractable units 8 form a roof frame of the canopy[.]

Id., 3:67-4:6.

38. The roof frame formed by the outer retractable units 7 and the inner retractable units 8 combines with the supporting legs 6 to form the canopy frame.

Id., 4:6-7 (“the roof frame and the plurality of supporting legs 6 form a canopy frame

of the canopy”). The outer retractable units 7 and the inner retractable units 8 provide the ability of the canopy frame to fold. This is illustrated in Figures 19 and 20:

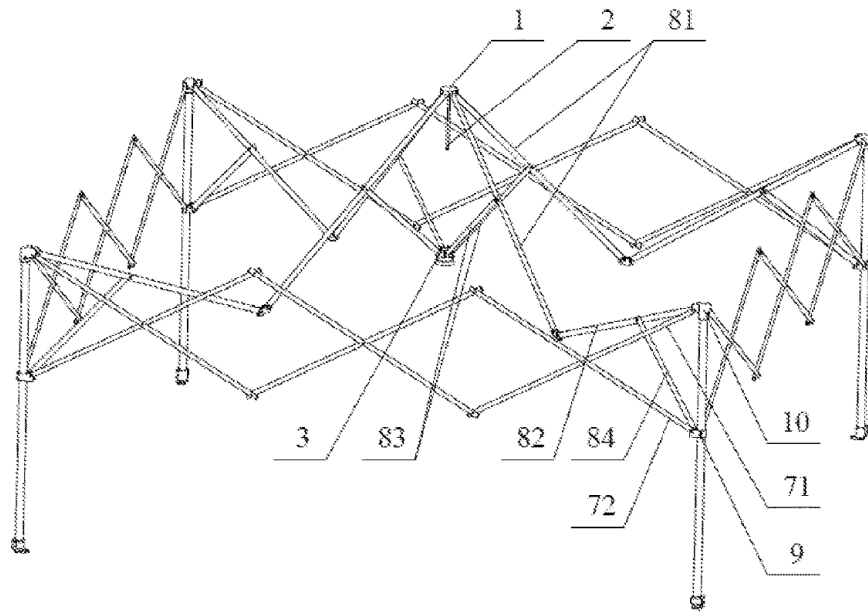


FIG. 19

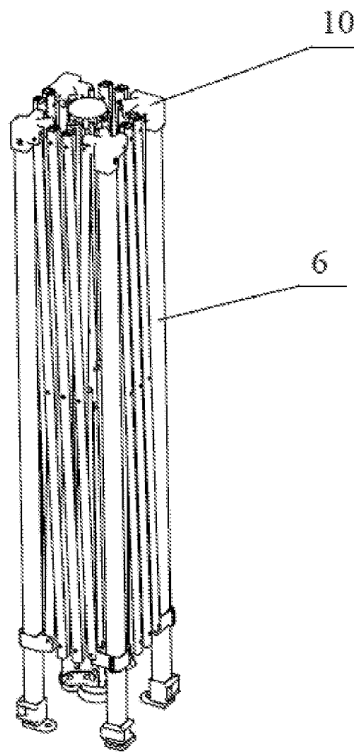


FIG. 20

Id., Figs. 19, 20.

39. The '738 patent also discloses and claims a particular central lock embodiment that comprises known features. The central lock of the '738 patent engages and disengages a center pole from a center bottom cap using a locking piece that is located in or connected to the center bottom cap. The locking piece engages a clamping groove in the center pole. Figure 1 of the '738 patent shows the center pole 2, the locking piece 4, and the center bottom cap 3:

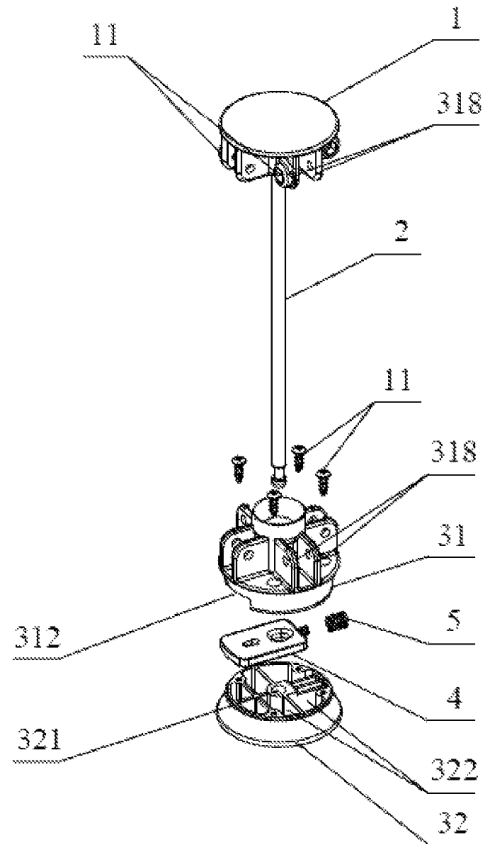


FIG. 1

Id., Fig. 1.

40. The central lock of the '738 patent has an unlocked state, in which the center pole 2 is separated from the center bottom cap 3, as shown in Figure 19:

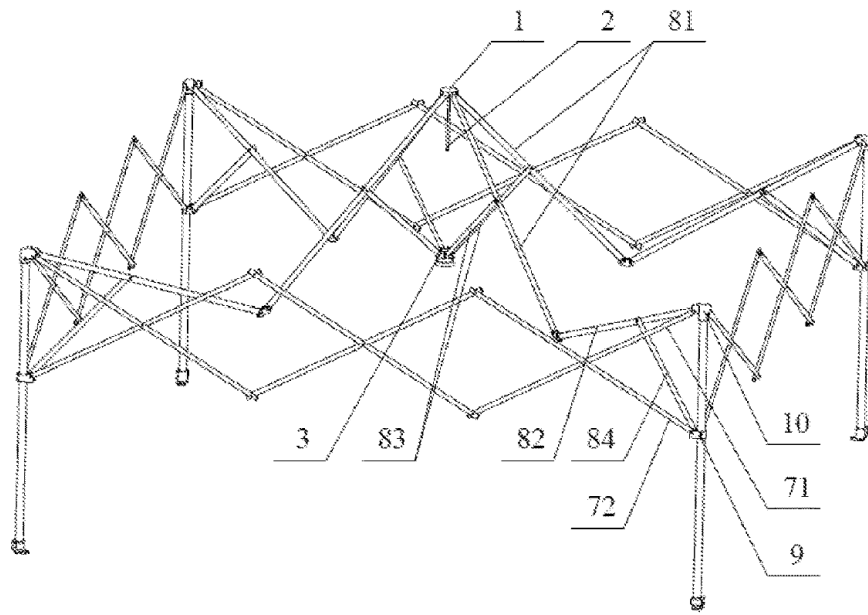


FIG. 19

Id., Fig. 19; *e.g.*, *id.*, 4:18-24. The lock also has a locked state, in which the center pole 2 is clamped to the center bottom cap 3, as shown in Figure 21:

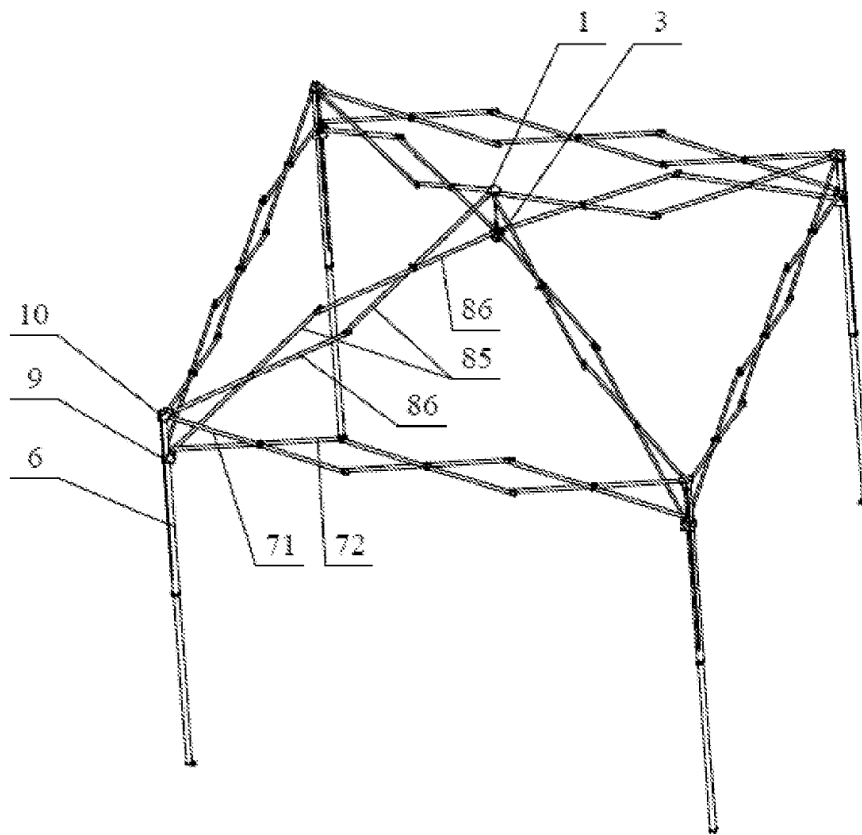


FIG. 21

Id., Fig. 21; *e.g.*, *id.*, 4:24-43.

41. The '738 patent achieves the locked state by having the locking piece 4 of the center bottom cap 3 engage the clamping groove 21 in the center pole 2. Clamp locking part 22, which is at the end of the center pole beyond the clamping groove, prevents the center pole from moving. Figure 6 shows the locking piece 4 clamped with the clamping groove 21, which means the central lock is in the locked state:

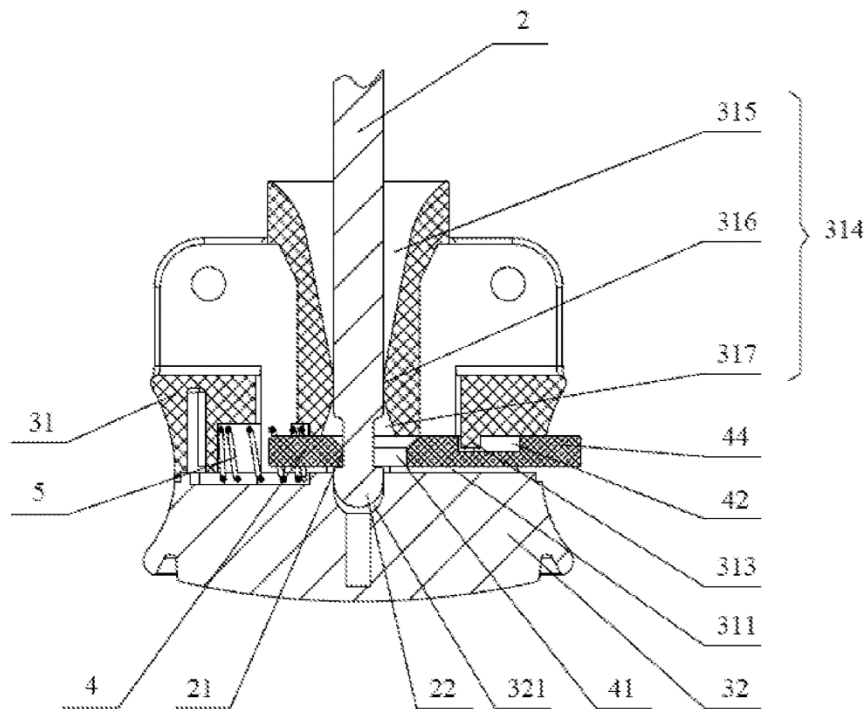


FIG. 6

Id., Fig. 6. This is described in the '738 patent as follows:

When the central lock is in a locked state, as illustrated in FIG. 6, part of an inner wall of the first through hole 41 of the locking piece 4 is clamped with the clamping groove 21 of the center pole 2, an upper end surface of the clamp locking part 22 abuts against a lower end surface of the locking piece 4, thus the clamp locking part 22 cannot thread the first through hole 41 and the center pole 2 and the center bottom cap 3 are in a mutually connected state.

Id., 3:47-55.

42. The center pole 2 is separated from the center bottom cap by moving the locking piece 4 out of engagement with the clamp locking groove 21. This is described as follows:

When the central lock is in an unlocked state, as illustrated in FIG. 11, the locking piece 4 moves along the radial direction of the center pole 2 such that the inner wall of the first through hole 41 of the locking piece 4 is separated from the clamping groove 21[.]

Id., 3:55-59. Thus, the center pole 2 can separate from the center bottom cap 3 when the locking piece 4 is moved out of the clamp locking groove 21.

43. One embodiment of the locking piece 4 can be seen in Figure 13:

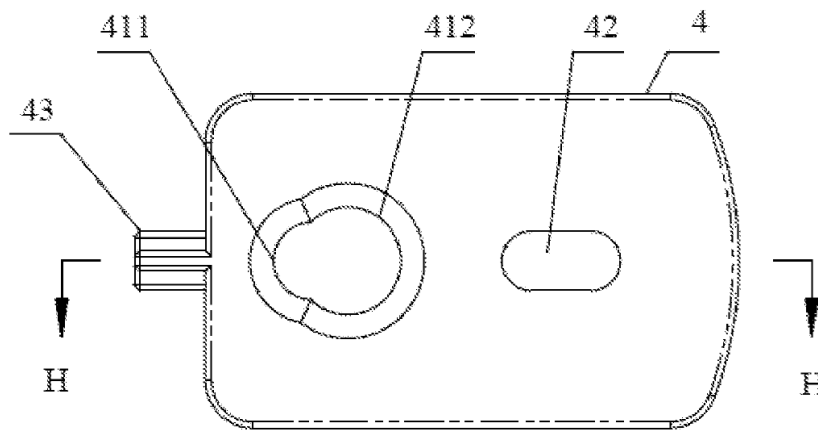


FIG. 13

Id., Fig. 13. This embodiment includes a first through hole 41 that engages the clamping groove 21. This is described as follows:

When the central lock is in a locked state, the locking piece 4 applies an acting force to center pole 2 in the radial direction by means of elastic force of the elastic element, to enable part of the inner wall of the first

through hole 41 to be located in the clamping groove 21, i.e., to enable part of the inner wall of the first through hole 41 to be clamped with the clamping groove 21 to restrict the center pole 2 from falling out of the first through hole 41 along an axial direction.

Id., 6:57-65. The clamping hole part 411 is the section of the first through hole 41 that is sized to engage the clamping groove 21; its diameter is sized to fit into the clamping groove 21. *Id.*, 7:15-17 (“the diameter of the clamping hole part 411 is equal to or slightly greater than the diameter of the clamping groove 21”). The result is that the locking piece 4 engages the clamping groove and clamps the center pole 2: “when the central lock is in the locked state, the clamping groove 21 at the lower end of the center pole 2 is clamped with the clamping hole part 411 of the first through hole 41[.]” *Id.*, 7:18-21.

44. The central lock of the ’738 patent may be used in a canopy, though it could also be used in other devices. *Id.*, 3:64-67 (“[T]he central lock is mainly mounted in a canopy, so that the canopy can have a better supporting effect. Of course, the central lock may also be mounted in other devices.”).

2. The Claims

45. The ’738 patent includes 14 claims. I offer opinions regarding claims 1, 2, 4, 13, and 14 in this Declaration. Of those, claim 1 is independent. Claim 1 recites:

1. A collapsible canopy frame, comprising:

- A. at least three supporting legs,
- B. a plurality of outer retractable units, each outer retractable unit connected between two adjacent supporting legs, each said outer retractable unit comprises a plurality of hinged X-shaped rod members, each X-shaped rod member comprises a first eave pipe and second eave pipe hinged to one another,
- C. a plurality of inner retractable units comprising inner ends, each inner retractable unit connected to a supporting leg, wherein said outer retractable units and said inner retractable units form a roof of said collapsible canopy frame, and
- D. a central lock, comprising:
 - 1. a center top cap,
 - 2. a center bottom cap,
 - 3. a center pole positioned between said center top cap and said center bottom cap, wherein said central lock is locked when said center pole is connected to both said center top cap and said center bottom cap, and wherein said center lock is unlocked when there is a disconnection between said center bottom cap and said center pole, wherein said central lock locks said collapsible canopy frame in an unfolded state when said central lock is locked and permits said collapsible canopy frame to be folded into a folded state when said central lock is unlocked, wherein said

inner ends of said inner retractable units are connected through said central lock.

46. Dependent claim 2 depends from claim 1 and further recites:

wherein: each said supporting leg comprises a sliding sleeve for moving along a length direction of said respective supporting leg, an upper and of each said supporting leg is fixed with a fixed joint, each said inner retractable unit comprises a first oblique top pipe and second oblique top pipe hinged to one another, said first oblique top pipe is hinged with a first connecting rod, said second oblique top pipe is hinged with a second connecting rod, an inner end of said first oblique top pipe is hinged with a center top cape of said central lock, an inner end of said first connecting rod is hinged with a center bottom cap of said central lock, an outer end of a first eave pipe and an outer end of said second oblique top pipe are hinged with said fixed joint, an outer end of said second eave pipe and an outer end of said second connecting rod are hinged with said sliding sleeve.

47. Dependent claim 4 depends from claim 1 and further recites:

where said central lock further comprises: a locking piece capable of moving back and forth along a radial direction of said center pole, wherein said locking piece is received in said center bottom cap, a first through hole through which said center pole can pass through is provided in said locking piece, and an end portion of said center pole is provided with a clamping groove and a clamp locking part located at the lower end of said clamping groove; when said central lock is in a locked state, part of an inner wall of said first through hole of said

locking piece is clamped with said clamping groove of said center pole, and an upper end surface of said clamp locking part abuts against a lower end surface of said locking piece; and when said central lock is in said unlocked state, said inner wall of said first through hole of said locking piece is separated from said clamping groove and said clamp locking part can pass through said first through hole.”

48. Dependent claim 13 depends from claim 4 and recites:

wherein: the said first through hole comprises a clamping hole part and a through hole part arranged side by side, said clamping hole part has a diameter not smaller than that of said clamping groove, said through hole part has a diameter greater than that of said clamp locking part.

49. Dependent claim 14 depends from claim 4 and further recites:

wherein: said clamping groove is an annular groove, an end portion of said clamp locking part is provided with a guide part of a semispherical shape or a conical shape with a gradually decreased diameter.

B. Priority Date of the '738 Patent

50. For purposes of this analysis, I have been asked to assume that the '738 patent's earliest possible priority date is its earliest claimed priority date, July 26, 2016.

C. Claim Construction

51. I understand that claim construction in this proceeding requires that claims be construed using the same claim construction standard that would be used

in a district court action, including giving the claim language its ordinary and customary meaning as understood by a person of ordinary skill in the art at the time of filing and in accordance with the specification and prosecution history. I have applied that standard in my analysis.

IV. PRIOR ART

52. In this Declaration, I rely on several references that are prior art to the '738 patent. These references include Rousselle (U.S. Pat. No. 6,345,639) (Ex. 1003); Tsai (UK Patent Application No. GB2321913A) (Ex. 1005); and Ohnishi (U.S. Pat. No. 8,066,300) (Ex. 1006).

A. Rousselle

53. Rousselle discloses a collapsible canopy that includes “an improved locking mechanism that very securely maintains the structure in an erected position.” Ex. 1003 (Rousselle), Abstract. Rousselle’s canopy includes a collapsible frame that is covered by a sheet-material cover. *Id.*, 6:30-38, Fig. 1(A). The collapsible frame includes legs which are attached via a roof frame structure to upper and lower clevises 400 and 600. *Id.*, 6:54-64. The upper and lower clevises are detachably connected by, and part of, a locking mechanism. *Id.*, 6:54-67. Rousselle’s canopy is shown in Figure 1(A):

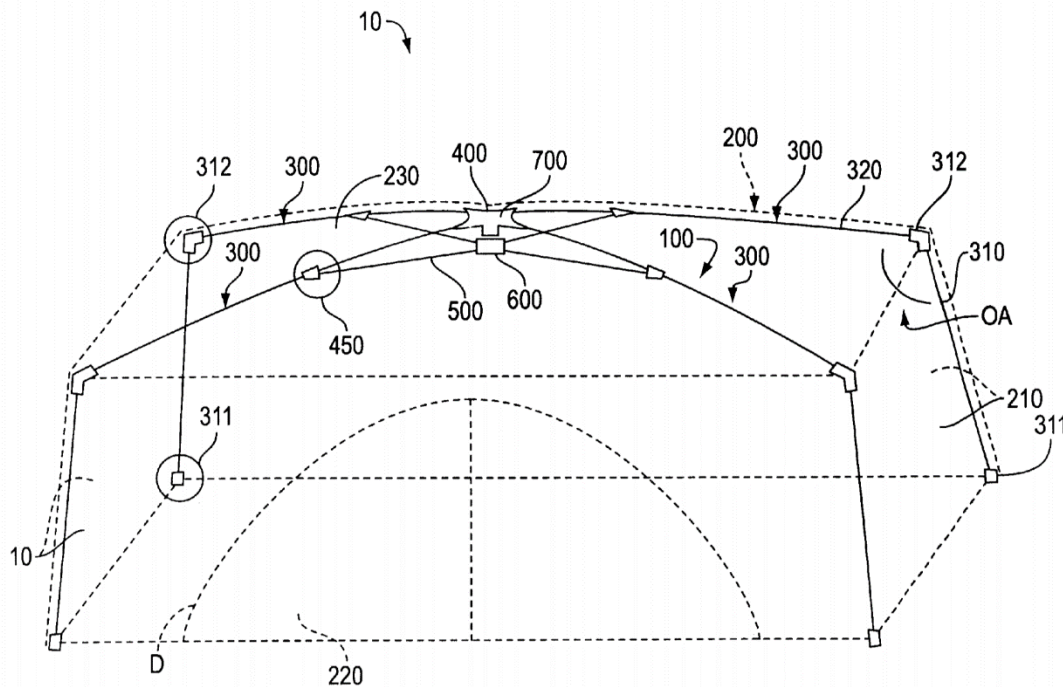


FIG. 1(A)

Id., Fig. 1(A).

54. To erect the canopy, a user brings the upper and lower clevises together until the locking mechanism is engaged, which locks the canopy into its erected state. *Id.*, 13:5-29. To collapse the canopy, a user disengages the locking mechanism and detaches the upper and lower clevises. *Id.*, 14:29-59. Figure 1(D) shows the canopy frame in its collapsed state:

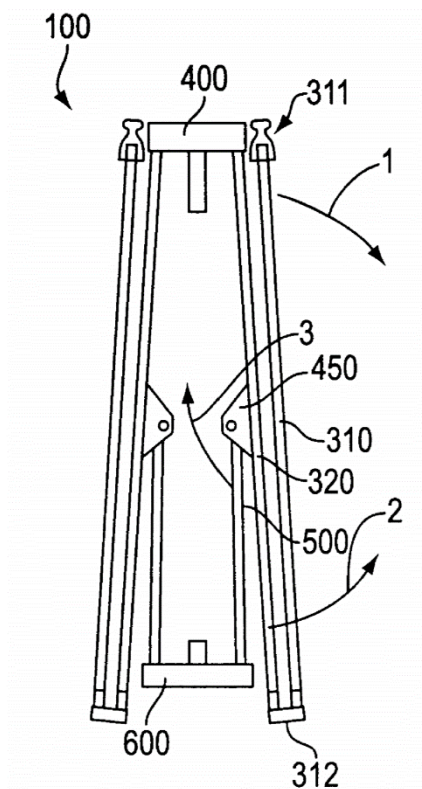


FIG. 1(D)

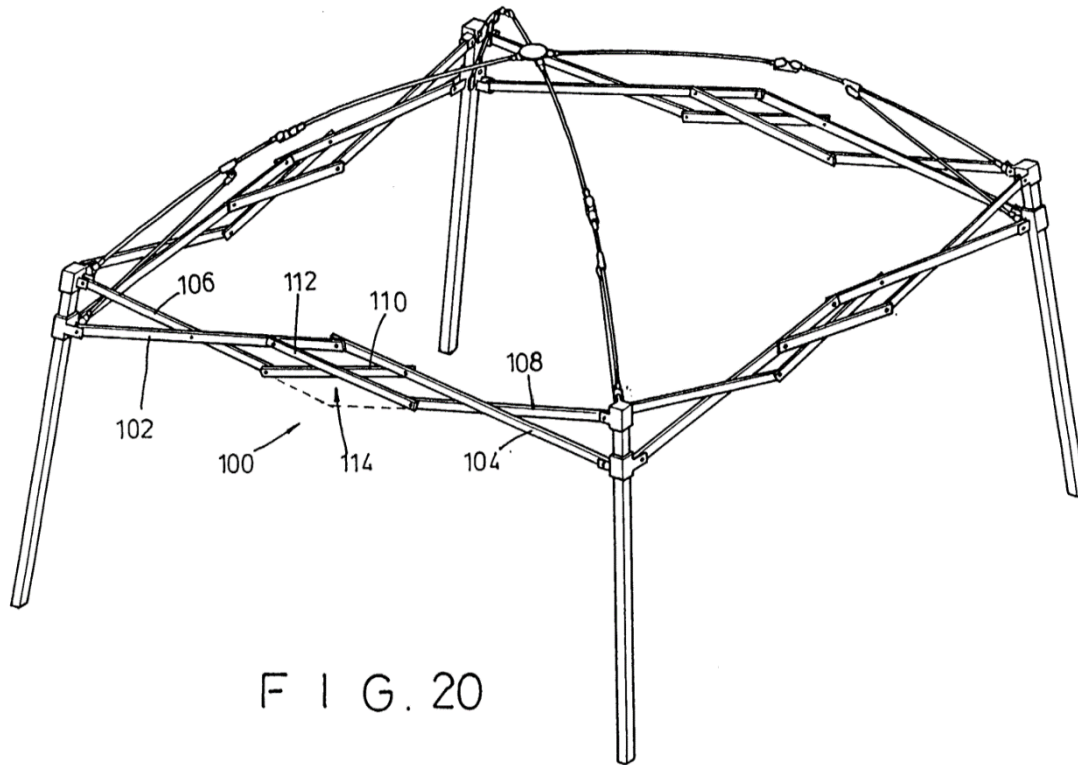
Id., Fig. 1(D).

B. Tsai

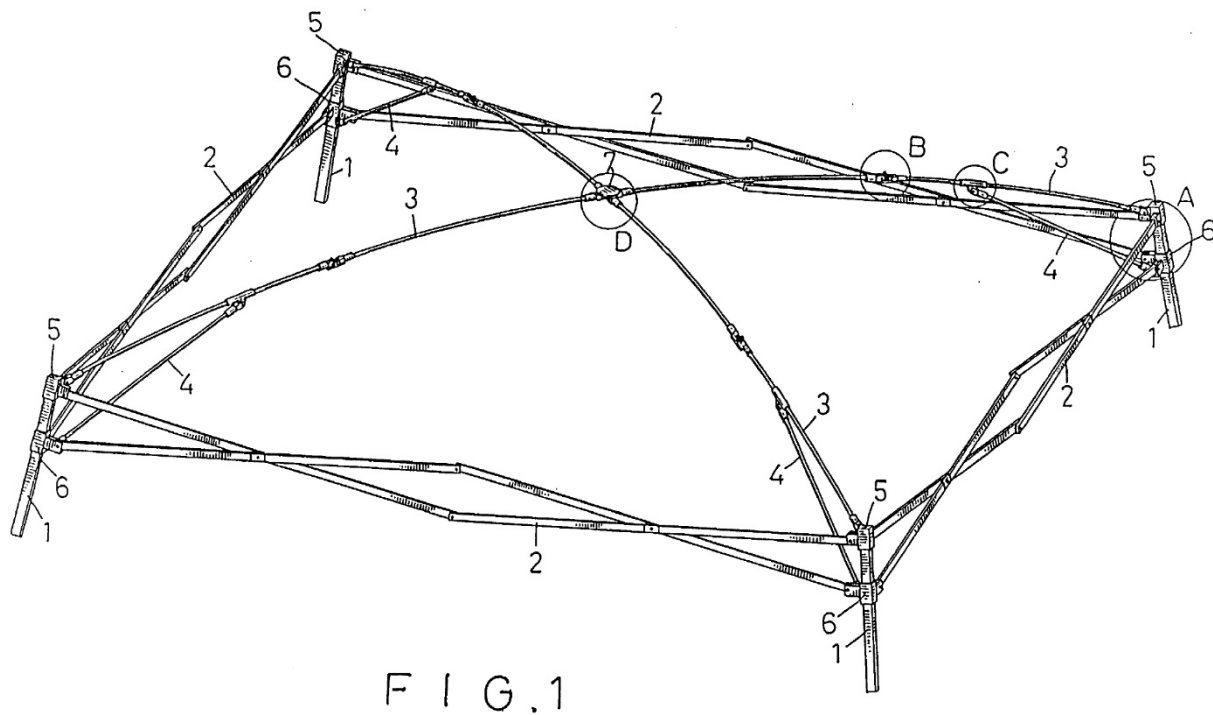
55. Tsai discloses a collapsible canopy. Ex. 1005 (Tsai), 3:11-13. Tsai's canopy includes a "shelter frame that is less likely to allow the canopy to sag, will not reduce tent headroom and will ultimately produce an attractive shelter." *Id.*, 3:16-19. Tsai discloses that prior canopies "will often sag" and, as a result, Tsai's canopy provides "canopy support rod[s]" secured between the perimeter and center of the canopy, resulting in "an aesthetically pleasing shelter canopy that is less likely to sag." *Id.*, 2:22-25, 4:11-22. Tsai's canopy also includes "linking assembl[ies]"

connecting each supporting leg, which Tsai discloses results in increased stability.

Id., 2:28-32, 3:20-4:4. An example of Tsai's canopy is shown in Figure 20:



Id., Fig. 20. Figure 1 shows another embodiment of the top of Tsai's canopy:



Id., Fig. 1.

C. Ohnishi

56. Ohnishi discloses a central lock for a collapsible cart or carriage. Ex. 1006 (Ohnishi), 7:18-8:19, Figs. 9-11. Ohnishi's central lock comprises a pole 63 with a groove 63b that is clamped by a spring-loaded locking piece (65, 67). *Id.* Ohnishi's locking piece includes a shaped through-hole 66 designed to allow the grooved pole to pass through in an unlocked state (through the larger area 66a) but be securely clamped in a locked state (by the smaller area 66b). *Id.* Ohnishi's central lock is shown in Figures 9-11:

FIG. 9

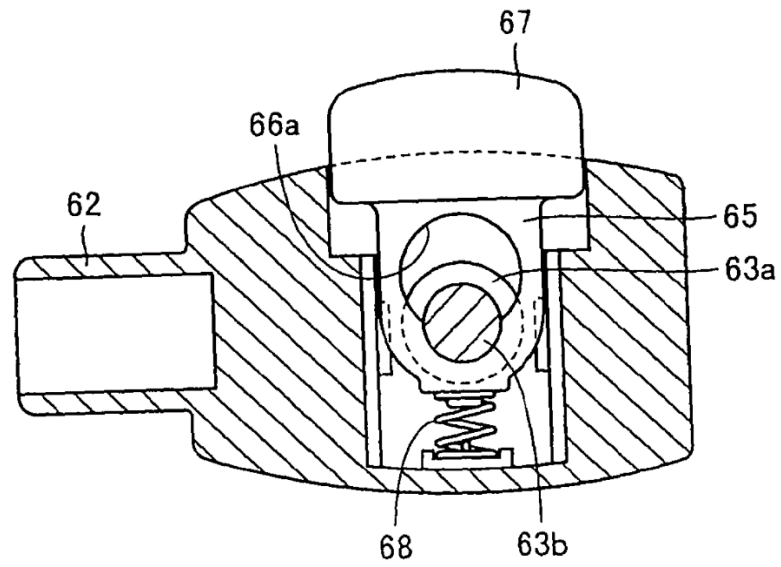


FIG. 10

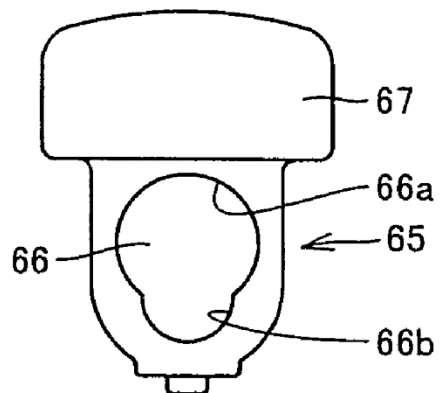
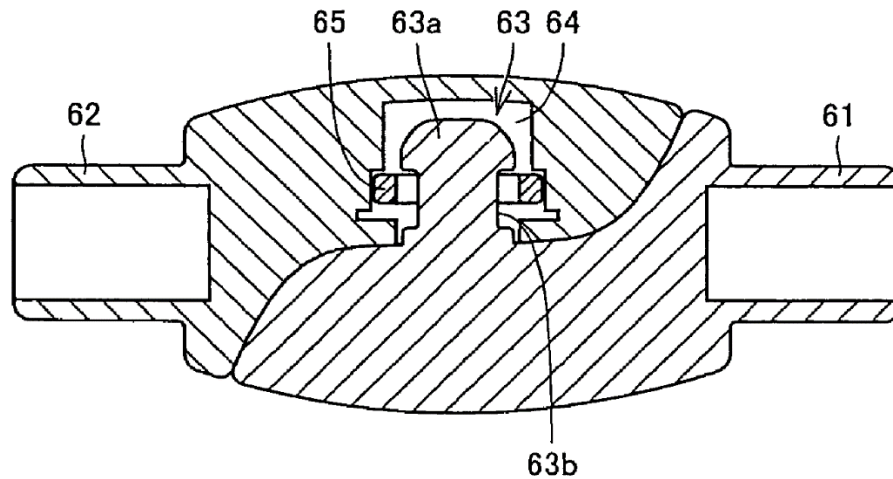


FIG. 11



Id., Figs. 9-11.

V. CLAIMS 1, 2, 4, 13, AND 14 OF THE '738 PATENT WOULD HAVE BEEN OBVIOUS

57. In view of the background provided above, and further in view of the reasons set forth below, it is my opinion that claims 1, 2, 4, 13, and 14 of the '738 patent would have been obvious to a person of ordinary skill in the art as of July 26, 2016.

58. The '738 patent relates to tents and canopies as well as locking mechanisms, including both those used to secure tents and canopies in an erected position, and those used for other purposes. Rousselle and Tsai, like the '738 patent, relate to collapsible tents or canopies. In addition, each addresses the same problem (the need for sturdy, resilient, easy-to-use collapsible tents or canopies), is in the same field of endeavor (collapsible tents or canopies), and uses similar technology

(e.g., mechanical linkages). While Ohnishi does not relate to tents or canopies specifically, it relates to the same type of locking mechanisms for collapsible structures discussed in the '738 patent. *See* Ex. 1001 ('738 patent), 3:64-67 (central lock may be “mounted in a canopy” or “may also be mounted in other devices”). Ohnishi also addresses the same problem (the need for easy-to-use, reliable locking mechanisms for collapsible structures), is in the same field of endeavor (locking mechanisms for collapsible structures), and uses similar technology (e.g., locking onto a grooved central pole) as the '738 patent. Thus, each of the references I rely on to show obviousness is reasonably pertinent to a particular problem with which the inventors of the '738 patent were concerned, e.g., constructing sturdy, resilient, easy-to-use collapsible canopies and/or constructing easy-to-use, reliable locking mechanisms for collapsible structures.

A. Claims 1, 2, 4, and 14 Would Have Been Obvious Over Rousselle and Tsai

59. As I explain below, Rousselle, alone or in combination with Tsai, discloses, or at least suggests, each element of claims 1, 2, 4, and 14. Accordingly, in my opinion, Rousselle and Tsai render each of claims 1, 2, 4, and 14 obvious as a whole.

1. Claim 1

a. Preamble

60. The preamble of claim 1 recites “[a] collapsible canopy frame[.]” Rousselle discloses a collapsible canopy frame, e.g., “[a] collapsible shelter/tent,” that “includes an improved locking mechanism that very securely maintains the structure in an erected position.” Ex. 1003 (Rousselle), Abstract. Rousselle therefore discloses this limitation.

b. Supporting Legs

61. Claim 1 recites “at least three supporting legs.” Rousselle and Tsai both disclose this limitation. Rousselle’s canopy can include “three or more legs[.]” Ex. 1003 (Rousselle), 2:50-53; *see also id.*, 6:54-57 (“Although four legs are preferred, the frame can have only three legs or can have five or more legs.”), Figs. 1(A)-1(C). Each of Rousselle’s legs 300 includes a “leg tube 310” that extends from the ground to “hinge 312.” *Id.*, 6:57-61. Figure 1(A) discloses an embodiment with four legs:

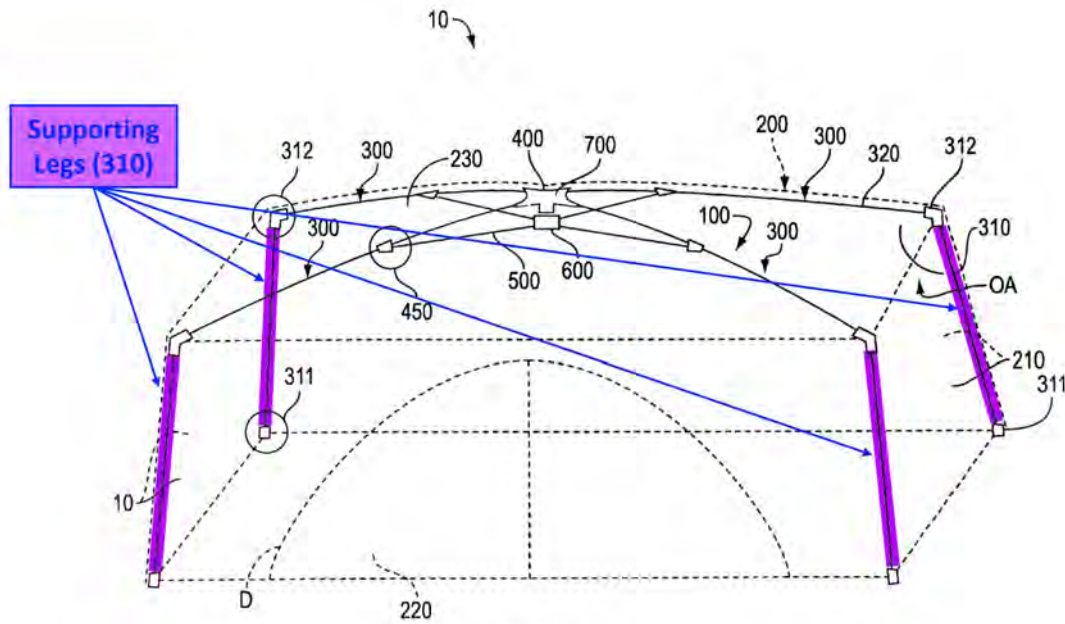
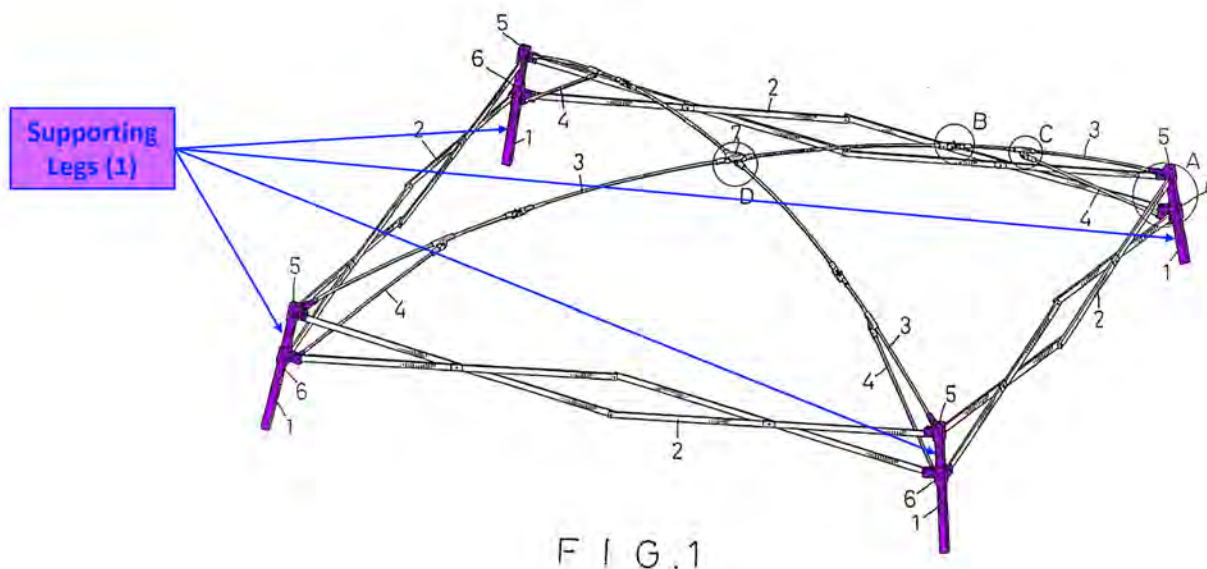


FIG. 1(A)

Id., Fig. 1(A).¹ As shown above, each leg tube 310 is a supporting leg, and thus, Rousselle discloses at least three supporting legs (leg tubes 310). *Id.* Accordingly, Rousselle discloses, or at least suggests, this limitation.

62. Tsai also discloses a canopy having “four upwardly extending poles 1” (e.g., four supporting legs). Ex. 1005 (Tsai), 7:4-20.

¹ Figures have been colored and annotated for clarity.



Id., Fig. 1; *see also id.*, Fig. 20. Thus, Tsai also discloses, or at least suggests, this limitation.

c. **Outer Retractable Units Comprising a Plurality of Hinged X-Shaped Rod Members**

63. Claim 1 recites “a plurality of outer retractable units, each outer retractable unit connected between two adjacent supporting legs, each said outer retractable unit comprises a plurality of hinged X-shaped rod members, each X-shaped rod member comprises a first eave pipe and second eave pipe hinged to one another.” Tsai discloses this limitation. For clarity, each of the “outer retractable units” and “X-shaped rod members” portions of this limitation are discussed separately below.

i. Outer Retractable Units

64. Figure 16 of the '738 patent shows an example of outer retractable units:

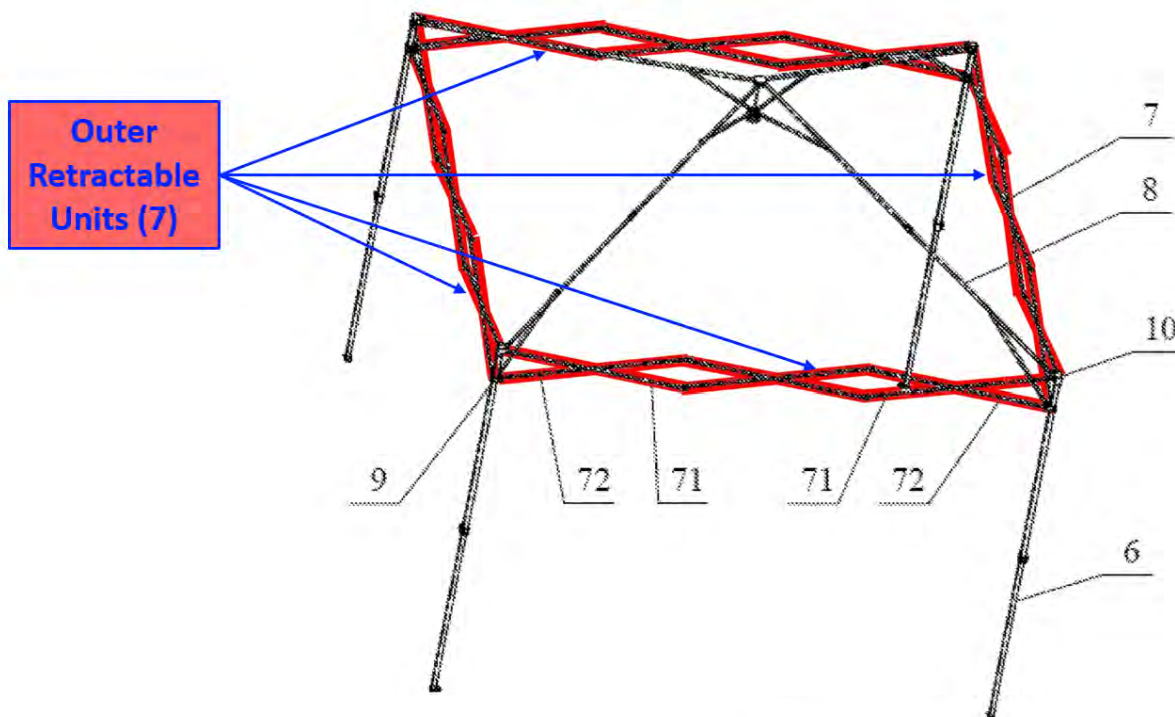
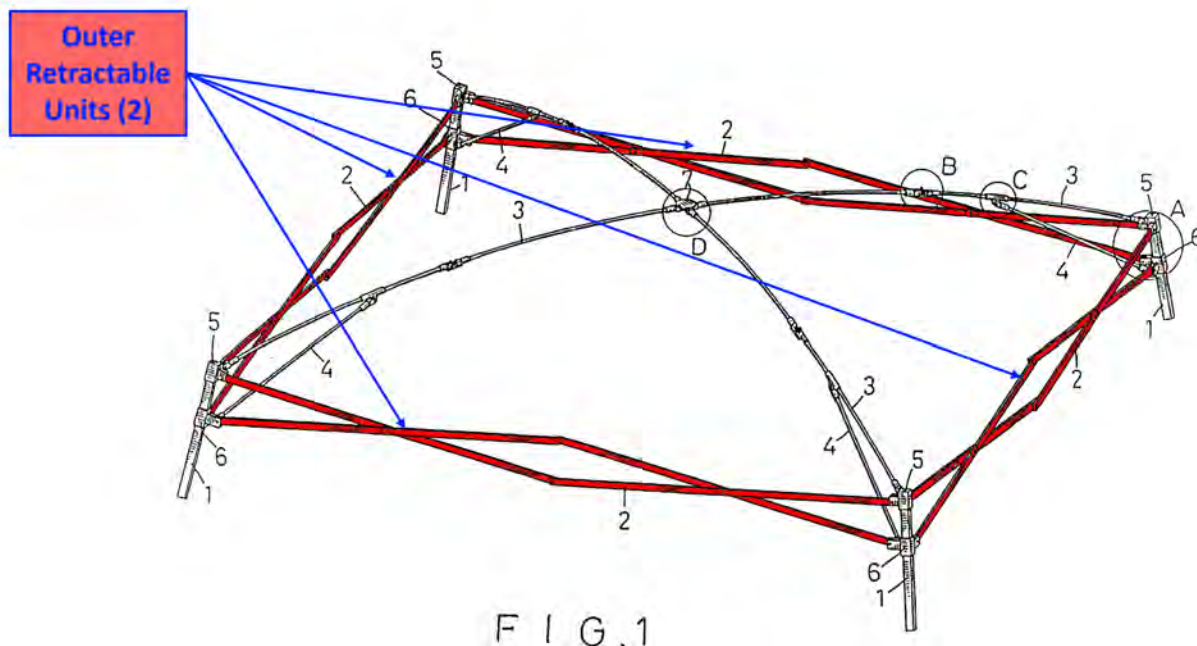


FIG. 16

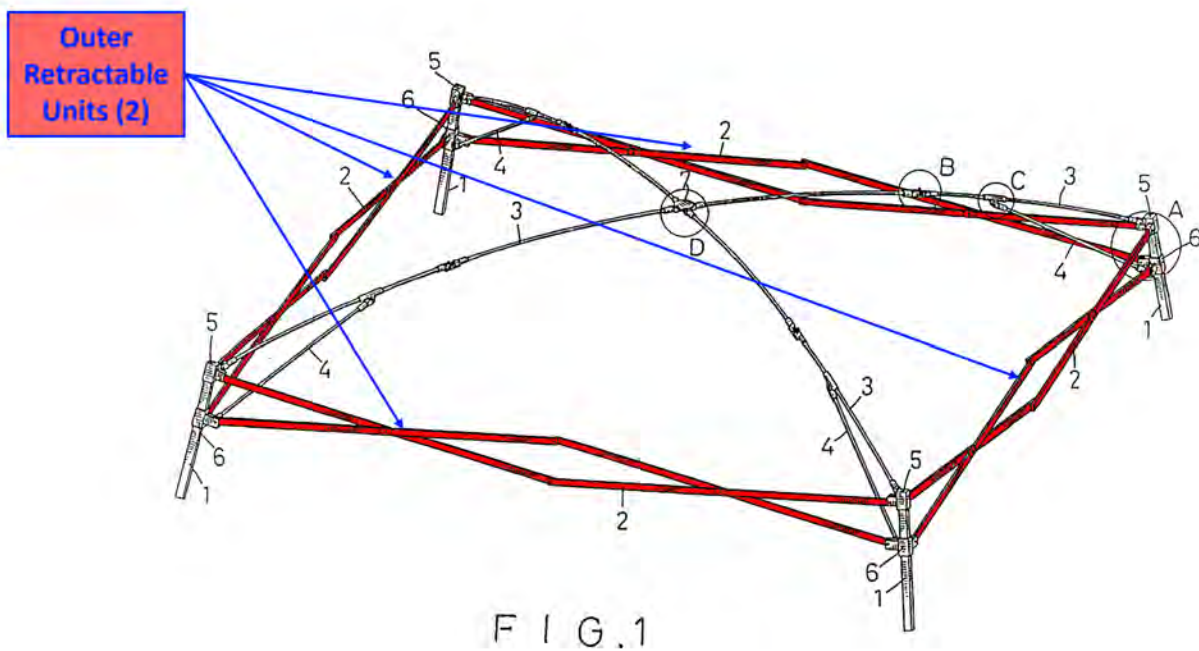
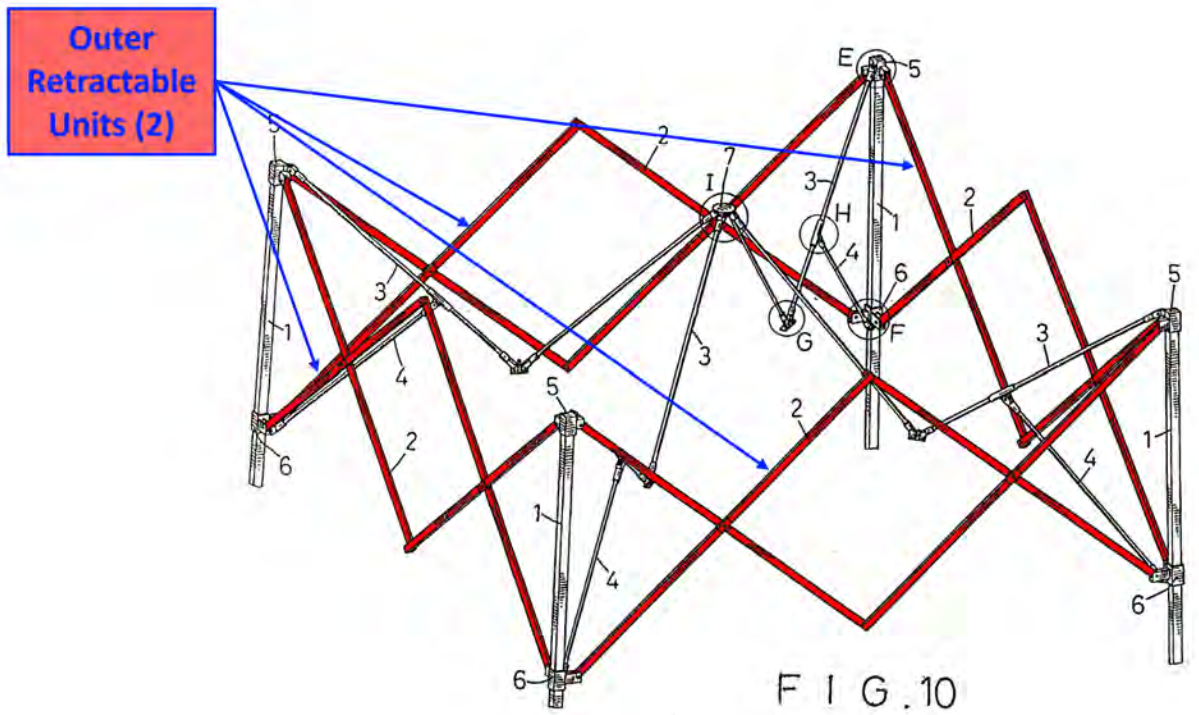
Ex. 1001 ('738 patent), Fig. 16.

65. Tsai discloses a “collapsible shelter” that includes a “shelter frame.” Ex. 1005 (Tsai), 3:11-19. Tsai’s shelter frame includes supporting legs that are “connected by a linking assembly having first and second scissors-type linkages and a linking device.” *Id.*, 3:20-4:4; *see also id.*, 7:4-20, Figs. 1, 20. Figure 1 shows Tsai’s “linking assembly” may comprise an outer retractable unit connected between two adjacent supporting legs:



Id., Fig. 1; *see also id.*, Fig. 20. As shown in Figures 1 and 20, Tsai's linking assembly (outer retractable units) may be placed between every two adjacent supporting legs. *Id.*

66. Tsai's outer units are retractable both because they are designed to extend and retract with respect to the supporting legs (e.g., they connect two supporting legs, which are closer together when the canopy is collapsed and farther apart when the canopy is erected) and because they are designed to extend and retract with respect to the center of the canopy (e.g., they are farther from the center of the canopy when the canopy is erected than when it is collapsed). For example, Figure 10 shows the canopy partially collapsed, whereas Figure 1 shows the canopy erected:



Id., Figs. 1, 10. Accordingly, Tsai's outer units are retractable.

ii. **X-Shaped Rod Members**

67. Figure 16 of the '738 patent shows an example of a canopy with outer retractable units comprising a plurality (in this case, three) of hinged X-shaped rod members:

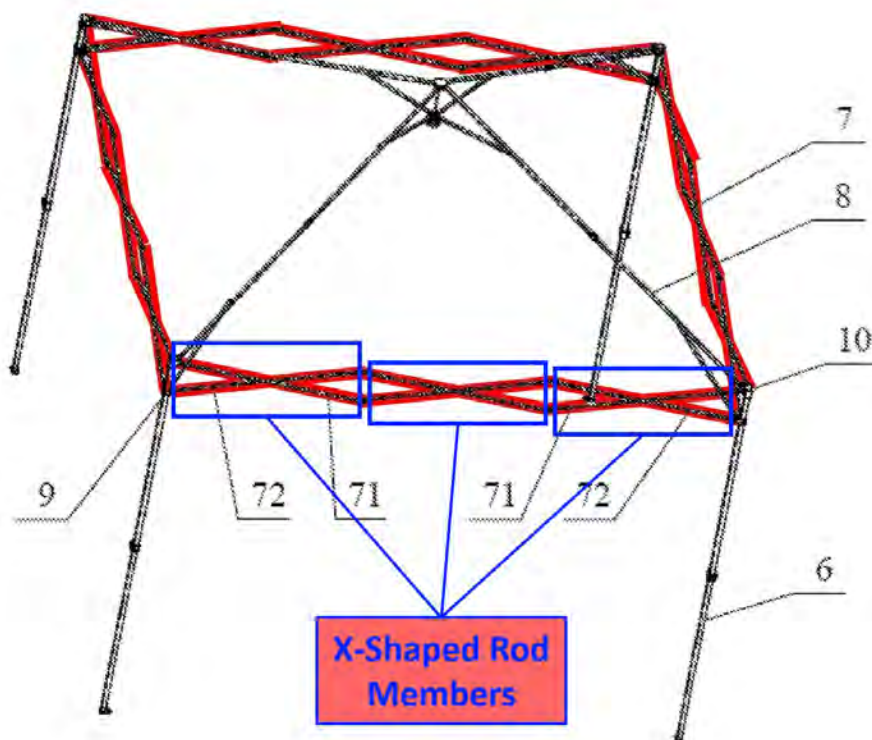
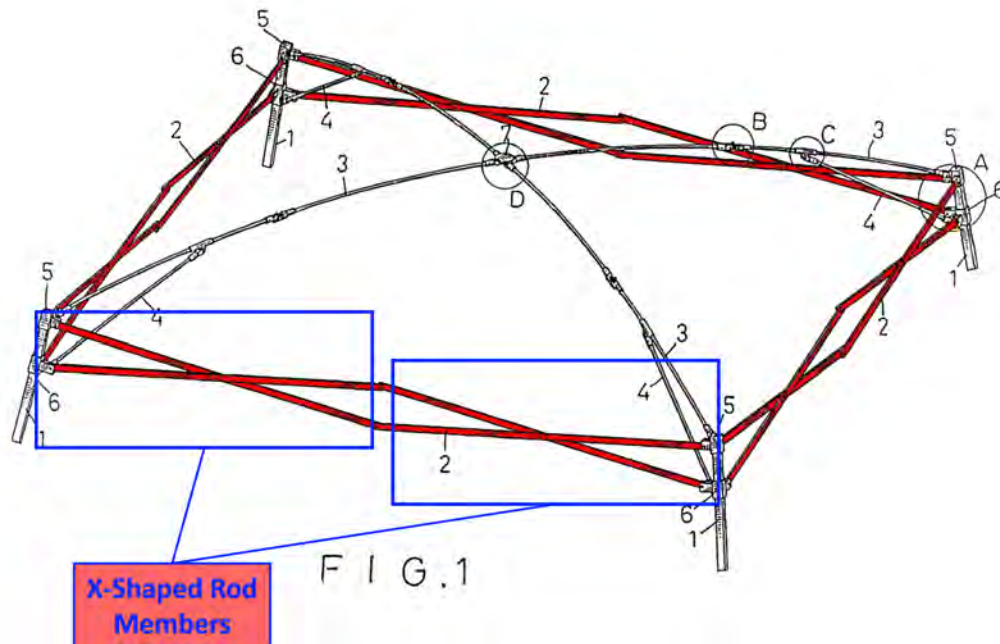


FIG. 16

Ex. 1001 ('738 patent), Fig. 16; *see also id.*, 5:14-20 (“The outer retractable unit 7 comprises three hinged X-shaped rod members, each X-shaped rod member comprises a first eave pipe 71 and a second eave pipe 72 hinged to one another, with a hinging point between the first eave pipe 71 and the second eave pipe 72 being located at or close to a midpoint of the first eave pipe 71 or the second eave pipe 72.”).

68. Tsai's outer retractable units likewise comprise a plurality (two) of hinged X-shaped rod members:



Ex. 1005 (Tsai), Fig. 1; *id.*, Fig. 20. Tsai's specification confirms that each of its canopy's supporting legs are connected by "pairs of scissors-type (or x-type) linkages" which are "pivotally secured" to each other and to the legs. *Id.*, 7:7-15.

69. Furthermore, each of Tsai's x-shaped rod members comprises a first eave pipe hinged to a second eave pipe, as shown in Figure 1. Tsai discloses that each of the "scissors-type linkages" (e.g., x-shaped rod members) comprises "respective first structural members pivotally coupled to respective second structural members[.]" *Id.*, claim 1. A person of ordinary skill in the art would have understood that the structural members that form Tsai's x-shaped rod members are eave pipes because they perform the same function in the same manner as the eave

pipes claimed in the '738 patent. *Compare, e.g.*, Ex. 1001 ('738 patent), Fig. 16 with Ex. 1005 (Tsai), Fig. 1.

70. Even if Tsai's structural members were not "eave pipes," it would have been obvious to use such pipes or rods as Tsai's structural members. A person of ordinary skill would have understood that pipes and rods were well-known examples of structural members and were commonly used in canopies like Tsai's. *See generally* Ex. 1003 (Rousselle) (discussing "center tube 500" and "leg tube 310"); Ex. 1005 (Tsai), 7:15-20 (discussing "canopy supporting rods"); Ex. 1009 (Carter), 1:62-2:18 (discussing roof members composed of "roof rods"); Ex. 1010 (Tseng) ¶¶[0004]. [0026] (discussing roof members composed of rods). Tsai discloses that "numerous modifications and/or additions to the above-described preferred embodiments would be readily apparent to one skilled in the art" and are within the scope of Tsai's disclosure. Ex. 1005 (Tsai), 11:12-23. Thus, Tsai suggests the modification. Furthermore, a person of ordinary skill in the art would have been motivated to use pipes and rods in Tsai's canopy frame because pipes and rods are lightweight, strong structural members. *See id.*, 1:16-25 (discussing goals of stability and portability).

71. Thus, Tsai discloses, or at least suggests, this limitation.

iii. Motivation to Combine

72. A person of ordinary skill in the art would have been motivated to include Tsai's outer retractable units in Rousselle's canopy for several reasons.

73. First, Tsai discloses the benefits of outer retractable units. Tsai explains that "prior open-type collapsible tent[s]" (Ex. 1005 (Tsai), 1:26-2:11), which do not include outer retractable units, are "somewhat unstable because the legs . . . are not directly connected to one another and, instead, are only connected to one another by the [central] structure[.]" *Id.*, 2:12-25. Tsai discloses that "stability is increased [when] adjacent support poles are connected to one another by respective pairs of scissors-type linkages." *Id.*, 2:26-32.

74. Second, Rousselle suggests the combination because it discloses that "various aspects of the present invention are not limited to frame structures exactly as described" and that "the locking mechanisms 700 . . . can be used with a variety of other frame structures[.]" Ex. 1003 (Rousselle), 15:59-63.

75. Third, outer retractable units like those disclosed in Tsai were well-known, leading a person of ordinary skill in the art to reasonably expect success in the combination. *See, e.g.*, Exs. 1007 (Wu), 1008 (Byun), 1009 (Carter), 1010 (Tseng) (disclosing outer retractable units).

76. Fourth, the combination represents nothing more than the simple addition of one known element (Tsai's outer retractable unit) to another known

element (Rousselle's shelter/tent) to obtain predictable results (a shelter/tent as in Rousselle with outer retractable units).

77. Fifth, the combination represents the use of a known technique (erecting a canopy including outer retractable units like Tsai's) to improve a similar device and method (Rousselle's shelter/tent) in the same way.

78. Sixth, the combination applies a known technique (including outer retractable units like Tsai's with a canopy structure) to a known device and method (Rousselle's shelter/tent) that is ready for improvement and yields predictable results (a canopy that includes outer retractable units).

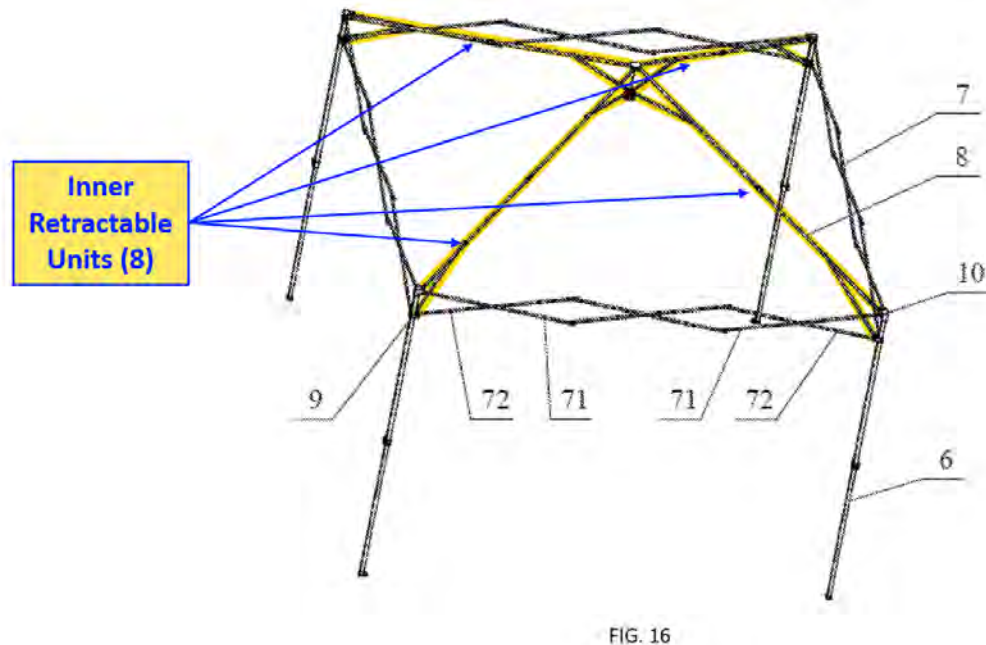
d. Inner Retractable Units

79. Claim 1 recites "a plurality of inner retractable units comprising inner ends, each inner retractable unit connected to a supporting leg." Rousselle and Tsai both disclose this limitation.

80. The '738 patent explains that, in the embodiment of Figure 16, [t]he inner retractable unit 8 comprises a first oblique top pipe 81 and a second oblique top pipe 82 hinged to one another . . . , a first connecting rod 83 is hinged at or close to a midpoint of the first oblique top pipe 81, a second connecting rod 84 is hinged at or close to a midpoint of the second oblique top pipe 82 In this embodiment, the first oblique top pipe 81 and the first connecting rod 83, as well as the second oblique top pipe 82 and the second connecting pipe 84, forms a Y-shaped

member, i.e., the inner retractable unit 8 consists of a plurality of Y-shaped members.

Ex. 1001 ('738 patent), 5:20-41. Figure 16 of the '738 patent shows an example of a canopy having four inner retractable units:

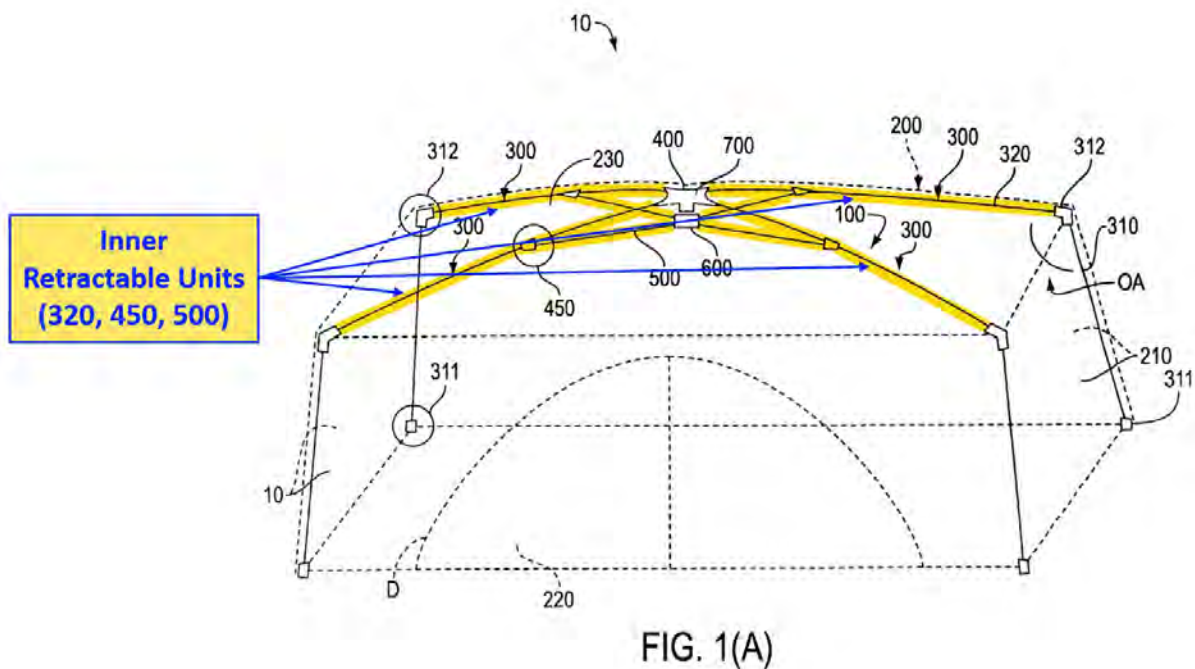


Id., Fig. 16.

i. Rousselle

81. Rousselle discloses a canopy comprising inner retractable units, as shown in Figure 1(A), below. Each of Rousselle's legs 300 includes "a band bar 320 extending from the hinge 312 to the upper clevis 400." Ex. 1003 (Rousselle), 6:57-61. Additionally, "[e]ach of the legs 300 also includes a hinge 450 that pivotally supports an outer end of a center tube 500, while an inner end of the center tube 500 is pivotally connected to a lower clevis 600." *Id.*, 6:61-64. Thus, Rousselle

discloses a plurality of inner units (each comprised of band bar 320, hinge 450, and center tube 500) and discloses that an inner unit is connected to each supporting leg (leg tube 310, via hinge 320). *Id.*; *see also id.*, Figs. 1(A)-1(C).



Id., Fig. 1(A).

82. Rousselle's inner units are retractable at least because they are designed to extend and retract relative to the center of the canopy. For example, Figure 1(A), above, shows Rousselle's canopy in an erected state, while Figure 1(D), below, shows Rousselle's canopy in a collapsed state, with the inner units retracted relative to the center of the canopy:

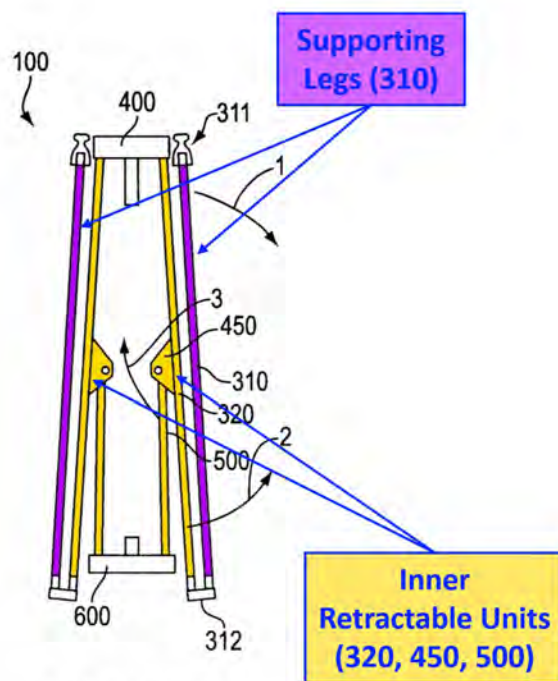


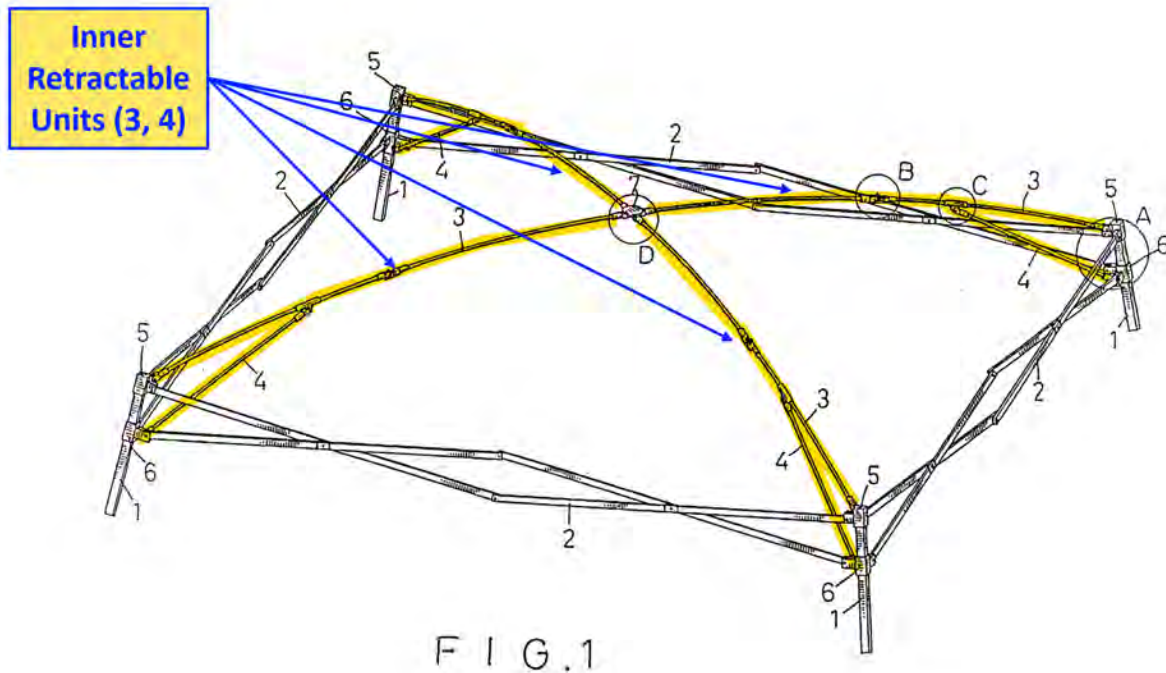
FIG. 1(D)

Id., Fig. 1(D). Rousselle’s inner units are also retractable because they are designed to retract on themselves (e.g., the center tube 500 folds in against the band bar 320, as shown above in Figure 1(D)). *Id.* Accordingly, Rousselle’s inner units are retractable. Rousselle discloses, or at least suggests, this limitation.

ii. Tsai

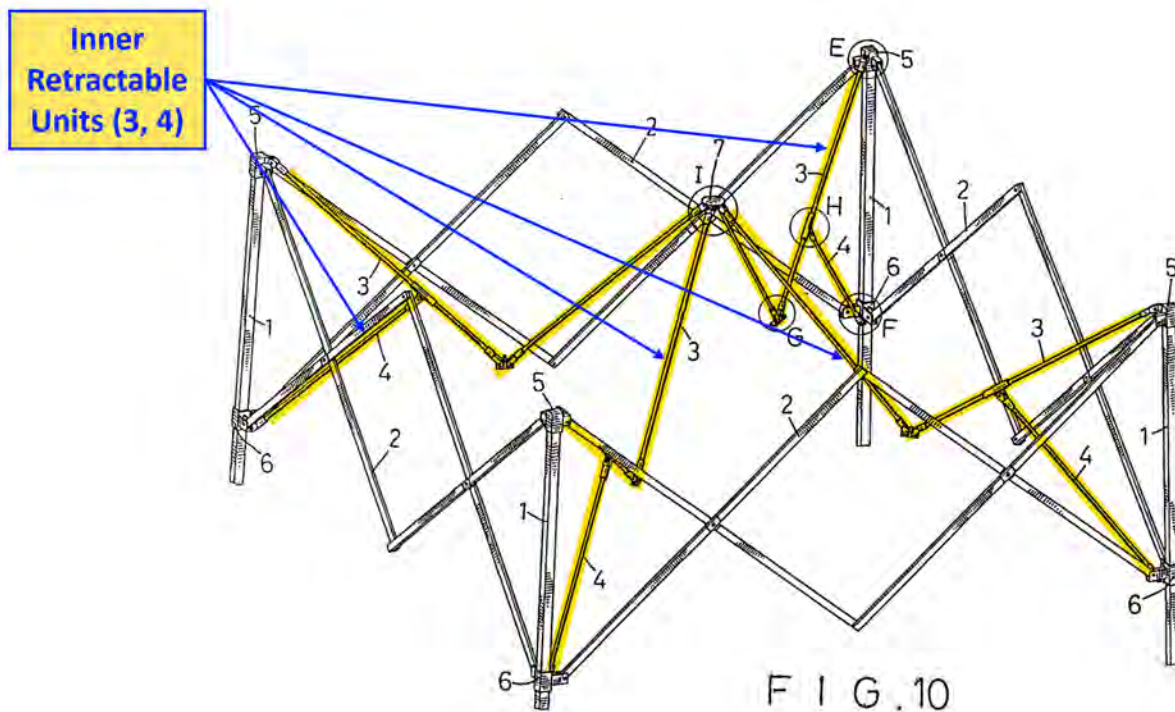
83. It would also have been obvious to a person of ordinary skill in the art to combine Rousselle’s canopy with Tsai’s inner retractable units to arrive at this feature. Tsai’s canopy includes “canopy support rod[s] 3” which “consist[] of two rod members pivotally connected to one another by an intermediate pivot connector 31.” Ex. 1005 (Tsai), 8:34-9:10. Tsai’s canopy support rods 3, along with “linking

rods 4” (which are “pivotally secured” to the canopy support rods), are inner units that connect a supporting leg to the central hub of the canopy. *See id.*, 8:34-9:35, Figs. 1, 20.



Id., Fig. 1; *see also id.*, Fig. 20.

84. Tsai’s inner units are retractable because they are designed to extend and retract relative to the center of the canopy, including folding on themselves. For example, Figure 1, above, shows the canopy in its erected state, while Figure 10, below, shows the canopy in a collapsed state, with the inner units retracted and folded:



Id., Fig. 10; *see also id.*, Fig. 21. Tsai's inner units are also retractable because they are designed to retract on themselves (e.g., the lower support extending from the leg folds in against the upper support, as shown in Figure 10). *Id.* Accordingly, Tsai discloses that its inner units are retractable.

85. A person of ordinary skill in the art would have understood that, when combining Tsai's inner retractable units (canopy support rods 3 and linking rods 4) with Rousselle's canopy, it would be preferred to retain Rousselle's hinge 450 and center tube 500, so as to connect Tsai's canopy support rod to both the upper and lower clevis of Rousselle. The resulting inner retractable units would have a Y-shaped member at the outside, attached to the supporting leg (as in Tsai), and a Y-shaped member at the inside, attached to the upper and lower clevises (as in

Rousselle). A person of ordinary skill in the art would have been motivated to make this modification because they would have understood the benefits of such an arrangement; for example, that such inner retractable units would allow for the functioning of Rousselle's center lock while providing additional stability as in Tsai. A person of ordinary skill in the art would have reasonably expected success because each of Rousselle's hinge and center tube and Tsai's canopy support rods and linking rods would function in the same way as in Rousselle or Tsai's canopy.

iii. Motivation to Combine

86. A person of ordinary skill in the art would have been motivated to combine Tsai with Rousselle for several reasons.

87. First, a person of ordinary skill in the art would have understood that Tsai's folding inner retractable units, which fold in half as the canopy is collapsed, would allow for a more compact collapsed canopy. *See, e.g.*, Ex. 1005 (Tsai), Figs. 10, 21.

88. Second, a person of ordinary skill in the art would have understood that the additional bracing at the connection to the supporting legs provided by Tsai's inner retractable units would increase stability.

89. Third, Rousselle suggests the combination because it discloses that "various aspects of the present invention are not limited to frame structures exactly

as described” and that “the locking mechanisms 700 . . . can be used with a variety of other frame structures[.]” Ex. 1003 (Rousselle), 15:59-63.

90. Fourth, inner retractable units such as that disclosed in Tsai were well-known, leading a person of ordinary skill in the art to reasonably expect success in the combination. *See, e.g.*, Exs. 1004 (Chang), 1007 (Wu), 1008 (Byun), 1009 (Carter) (disclosing outer retractable units).

91. Fifth, the combination represents nothing more than the simple addition of one known element (Tsai’s inner retractable unit) to another known element (Rousselle’s shelter/tent) to obtain predictable results (a shelter/tent as in Rousselle with folding inner retractable units).

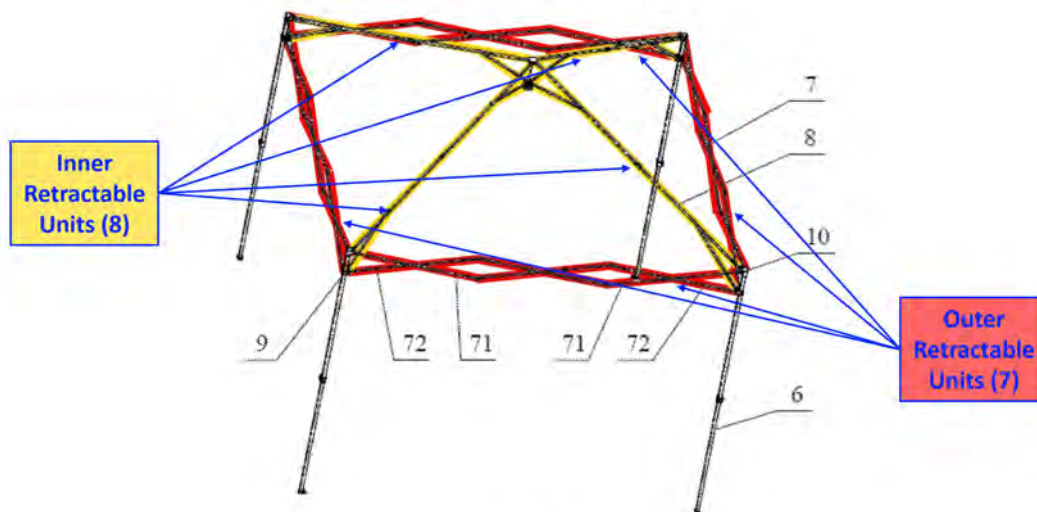
92. Sixth, the combination represents the use of a known technique (erecting a canopy including folding inner retractable units like Tsai’s) to improve a similar device and method (Rousselle’s shelter/tent) in the same way.

93. Seventh, the combination applies a known technique (including folding inner retractable units like Tsai’s with a canopy structure) to a known device and method (Rousselle’s shelter/tent) that is ready for improvement and yields predictable results (a canopy that includes folding inner retractable units).

e. Roof Frame

94. Claim 1 further recites “wherein said outer retractable units and said inner retractable units form a roof of said collapsible canopy frame.” Tsai and/or Rousselle disclose, or at least suggest, this limitation.

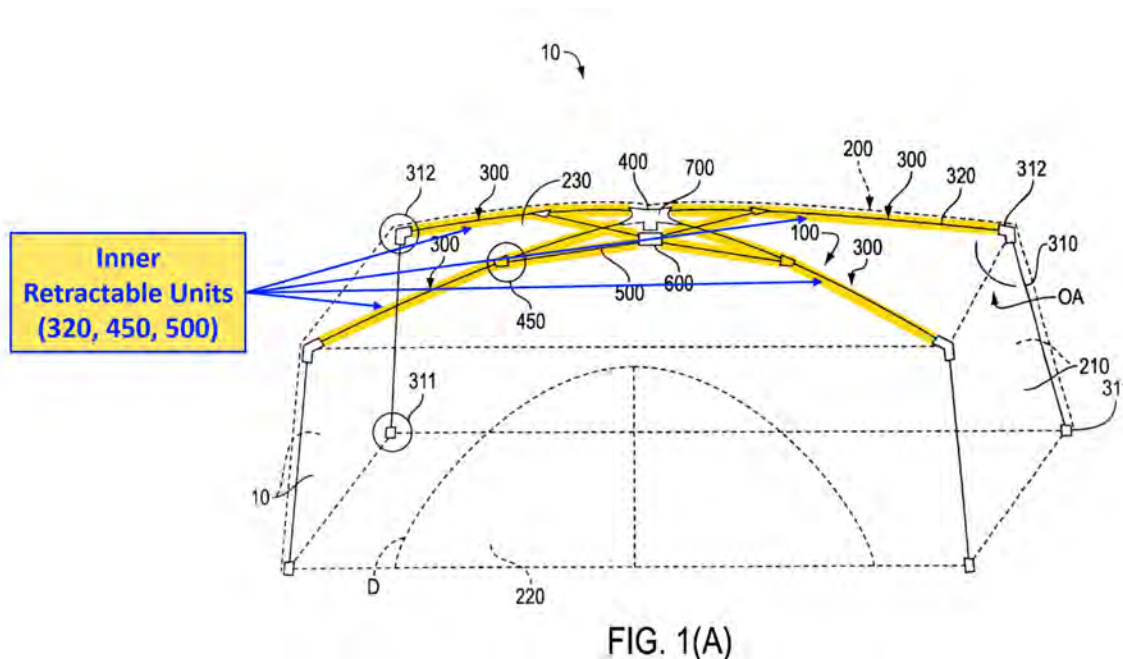
95. The '738 patent discloses that canopies generally comprise “a foldable canopy frame and a canopy fabric, the canopy frame consists of a roof frame and four or more supporting legs . . . the canopy fabric covers the roof frame and is used for sun-shading, rain sheltering or wind sheltering.” Ex. 1001 ('738 patent), 1:15-21. Accordingly, a person of ordinary skill in the art would have understood that a “roof” of a “frame” provides support for a fabric roof. Figure 16 of the '738 patent shows an example of such a roof frame, made up of inner and outer retractable units:



Id., Fig. 16. As shown, the roof frame provides structure and support for a canopy roof.

i. Rousselle

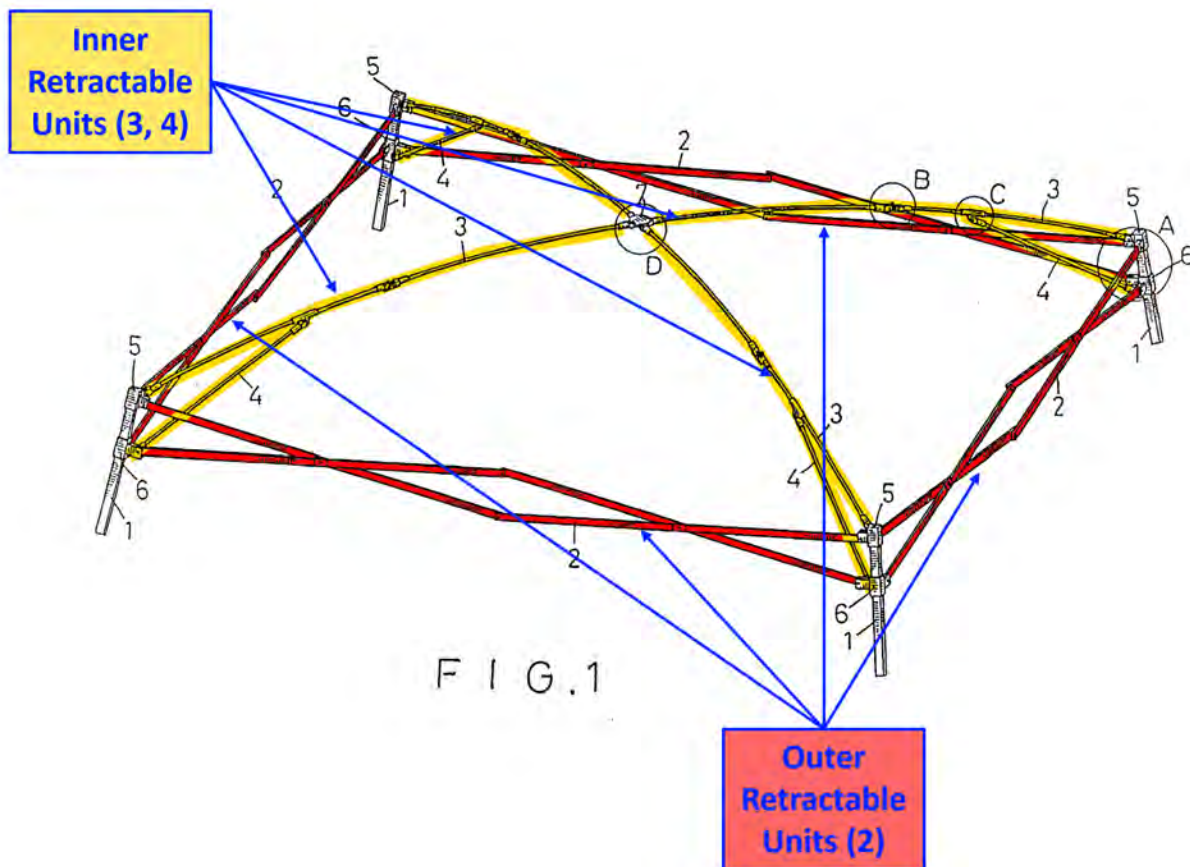
96. Rousselle discloses that its inner retractable units make up a “collapsible frame 100” which “supports a sheet-material cover 200[.]” Ex. 1003 (Rousselle), 6:30-33, Fig. 1(A).



Id., Fig. 1(A). As shown in Figure 1(A), Rousselle's inner retractable units form a roof frame because they extend over the top of the canopy, supporting the roof formed by the sheet-material cover 200. *Id.* In addition, if, as discussed above (see ¶¶63-78, above), a person of ordinary skill in the art included outer retractable units in Rousselle's canopy, those outer retractable units would form part of a roof frame because they would extend around the edge of the top of the canopy, supporting the roof cover.

ii. Tsai

97. As discussed above (see ¶¶65-78, 83-93, above), Tsai discloses a “shelter frame” including a “canopy support” comprising outer retractable units (e.g., x-type linkages 2) and inner retractable units (e.g., canopy support rods 3 and linking rods 4). Ex. 1005 (Tsai), 7:4-20, Figs. 1, 20.



Id., Fig. 1; *see also id.*, Fig. 20. As shown in Figure 1, Tsai’s inner retractable units form a roof frame because they extend over the top of the canopy, supporting the roof cover. *Id.* Likewise, Tsai’s outer retractable units form part of a roof frame

because they extend around the edge of the top of the canopy, supporting the roof cover. *Id.*

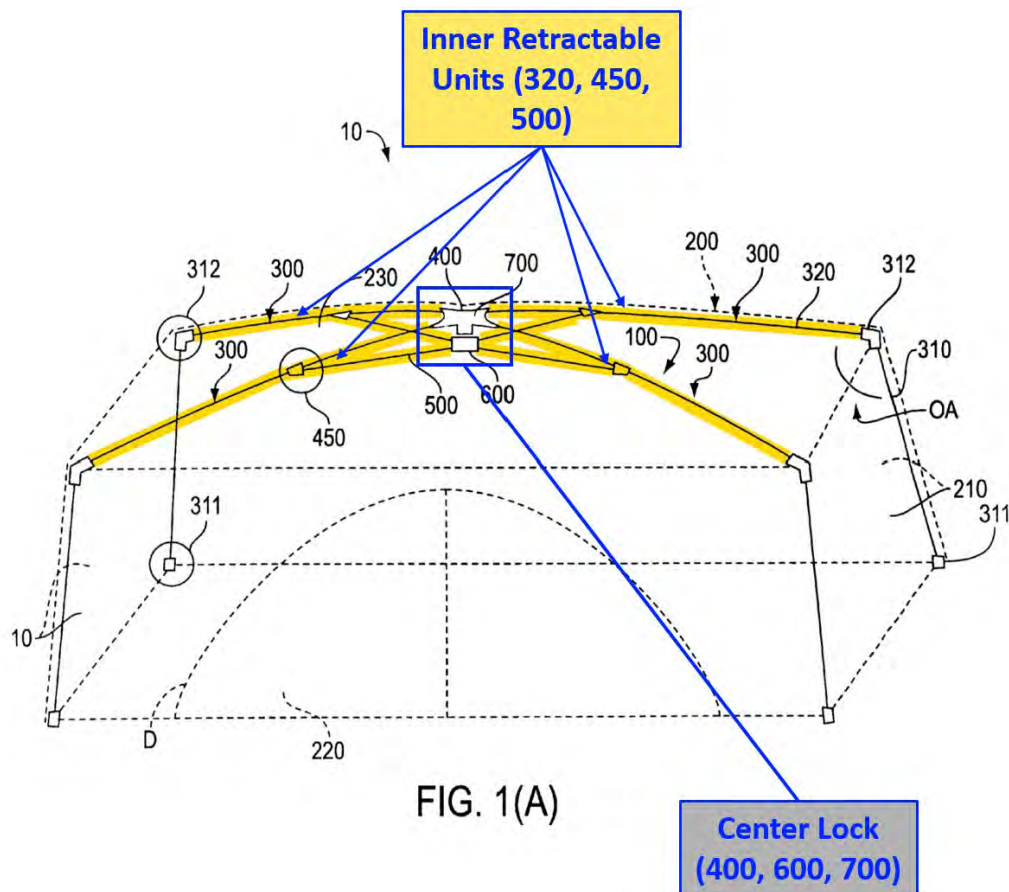
98. Thus, Rousselle's frame, as modified by Tsai, discloses inner retractable units and outer retractable units that form a roof frame for the collapsible canopy. A person of ordinary skill in the art would have been motivated to combine Rousselle with Tsai, and would have had a reasonable expectation of success in doing so, for the reasons discussed above. See ¶¶72-78, 86-93, above. Accordingly, Rousselle and/or Tsai disclose, or at least suggest, this limitation.

f. Central Lock

99. Claim 1 further recites "a central lock." Rousselle discloses, or at least suggests, this limitation.

100. Rousselle discloses "a novel locking mechanism 700" which connects the "upper and lower devises² 400 and 600." Ex. 1003 (Rousselle), 6:65-67. Rousselle's locking mechanism 700 along with the upper and lower clevises comprise a central lock. Figure 1(A) shows that the locking mechanism 700 and upper and lower clevises are centrally located:

² Rousselle uses the terms "devises" and "clevises" interchangeably when referring to elements 400 and 600.



Id., Fig. 1(A). Accordingly, Rousselle discloses, or at least suggests, this limitation.

i. Motivation to Combine

101. As discussed above, a person of ordinary skill in the art would have been motivated to combine Tsai's outer and/or inner retractable units with Rousselle's canopy. *See* ¶¶72-78, 86-93, above. Alternatively, a person of ordinary skill in the art would have been motivated to combine Rousselle's central lock with Tsai's canopy (which includes supporting legs and inner and outer retractable units that form a roof frame) for the following reasons.

102. First, Rousselle discloses the benefits of center locks over the locking mechanisms used in the prior art, including in Tsai. Tsai includes separate locking mechanisms on each leg 1, which include a spring-loaded button that pops out to retain the bracket 6 in position when the canopy is erected. Ex. 1005 (Tsai), 4:29-5:5, 8:5-33, Figs. 1-2, 18-19. Rousselle discloses benefits of a central lock over Tsai's individual-leg locking system; for example, that a center lock is "more convenient for the user because the user can unlock the device from a position within the shelter/tent." Ex. 1003 (Rousselle), 3:45-47. Furthermore, a central lock "does not need to be exposed to the environment since, for example, the locking mechanism can be internalized within the clevis assembly, and notably substantially within the lower clevis member," which means that the locking mechanism "is thus less likely to become corroded, to accumulate dirt or dust, etc., which could negatively effect [sic] the device or its operation." *Id.*, 3:38-44. Accordingly, Rousselle discloses benefits of center locks like the embodiments disclosed in Rousselle that would motivate a person of ordinary skill to modify Tsai's canopy to include one.

103. A person of ordinary skill would also have recognized further benefits of a central lock. For example, a central lock provides a way for a user to unlock the entire canopy at once, whereas Tsai's individual-leg system requires the user to unlock each leg separately. Thus, a person of ordinary skill would have recognized

that replacing Tsai's individual-leg locks with Rousselle's central lock would make the canopy easier and more convenient for a single user to operate. Alternatively, a person of ordinary skill would have recognized that using Rousselle's central lock while retaining Tsai's individual-leg locks would have resulted in increased assurance that the canopy would stay in the erected or locked position and would not collapse.

104. Second, Rousselle suggests the combination because it discloses that "various aspects of the present invention are not limited to frame structures exactly as described" and that "the locking mechanisms 700 . . . can be used with a variety of other frame structures[.]" Ex. 1003 (Rousselle), 15:59-63. This would reinforce a person of ordinary skill in the art's reasonable expectation of success in such a combination, which would already be strong because center locks were well-known and understood in the art. *See, e.g.*, Exs. 1003 (Rousselle), 1004 (Chang).

105. Third, the combination represents nothing more than the simple addition of one known element (Rousselle's center lock) to another known element (Tsai's canopy) to obtain predictable results (a canopy with the claimed center lock).

106. Fourth, the combination represents the use of a known technique (locking using a center lock as disclosed in Rousselle) to improve a similar device and method (Tsai's canopy) in the same way.

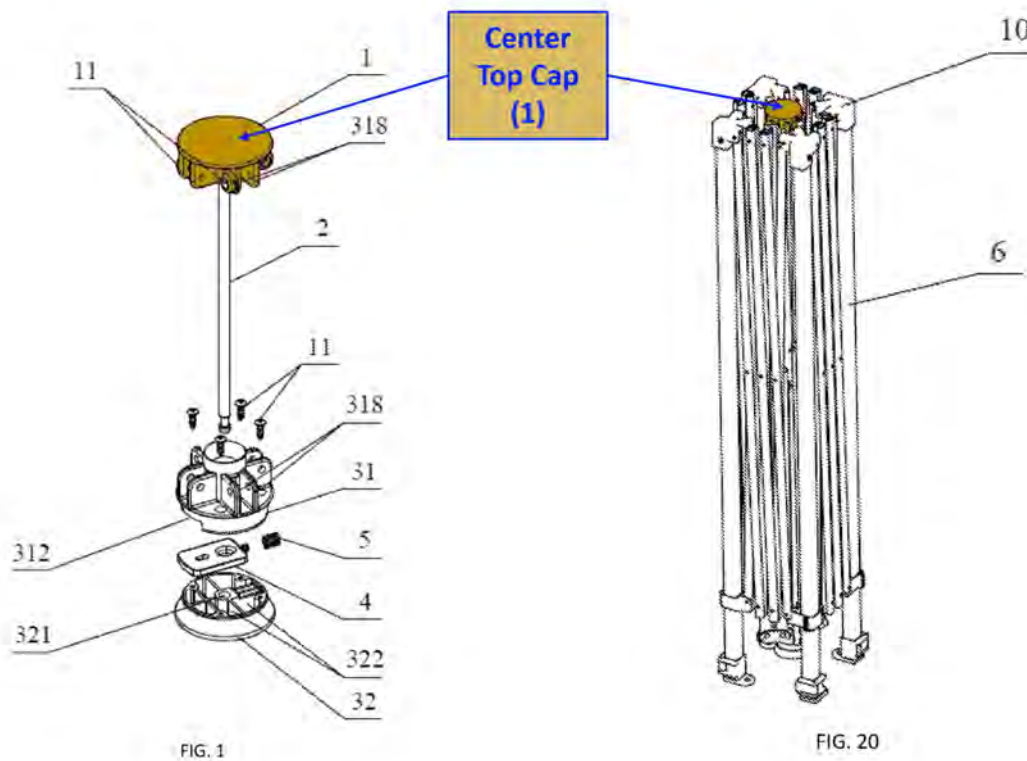
107. Fifth, the combination applies a known technique (locking using a center lock as disclosed in Rousselle) to a known device and method (Tsai's canopy) that is ready for improvement and yields predictable results (a canopy with the claimed center lock).

108. A person of ordinary skill would have modified Tsai's canopy to include Rousselle's hinges 450 and center tubes 500 to connect Tsai's inner retractable units with both the top and bottom of Rousselle's central lock. A person of ordinary skill would have been motivated to do so, and reasonably expected success, for the reasons I discuss above. See ¶¶85-93, above.

g. Center Top Cap

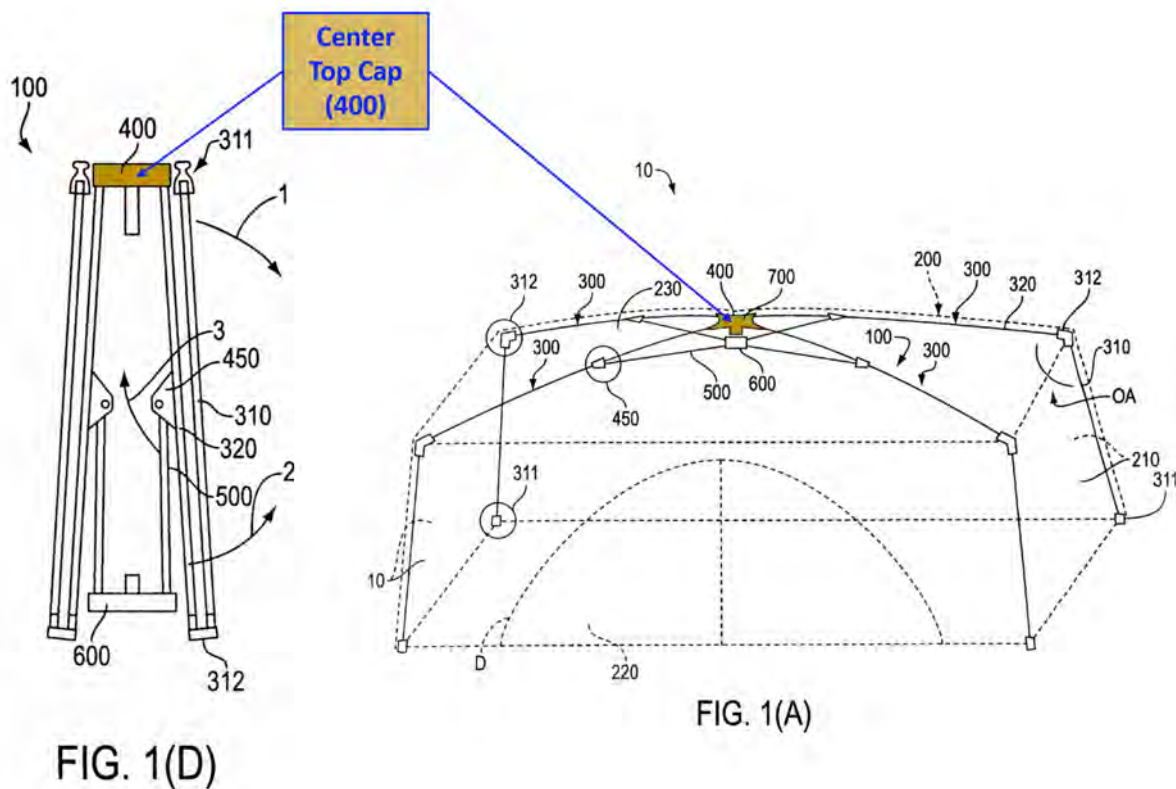
109. Claim 1 recites that the central lock comprises "a center top cap." Rousselle discloses, or at least suggests, this limitation.

110. The '738 patent shows an example of a center top cap in Figures 1 and 20:



Ex. 1001 ('738 patent), Figs. 1, 20. As shown, the '738 patent's center top cap is located in the center and at the top of the canopy, and connects the inner retractable units. *Id.*

111. Rousselle discloses that its locking mechanism 700 includes a center top cap referred to as an "upper clevis 400." Ex. 1003 (Rousselle), 6:65-7:19, Figs. 1(A), 1(D).

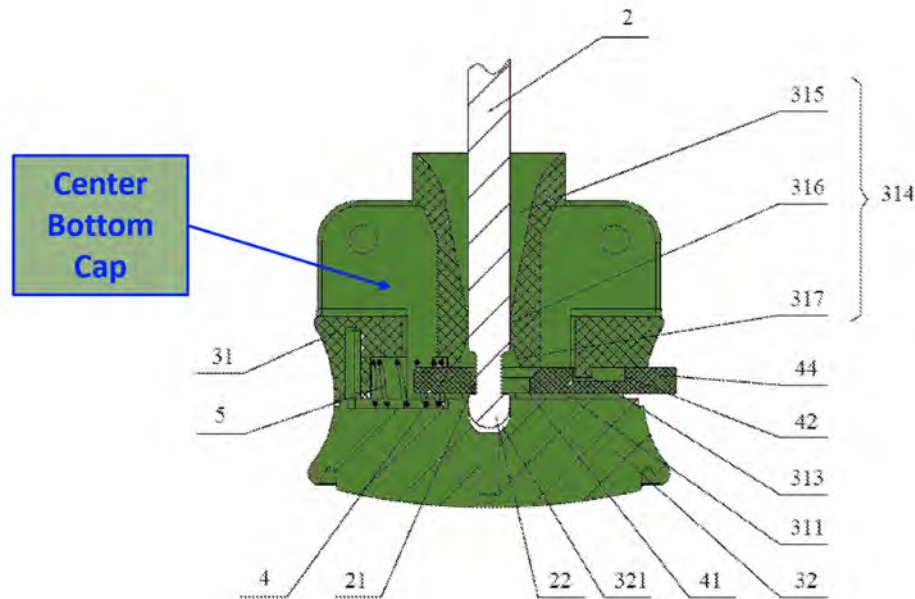


Id., Figs. 1(A), 1(D). Rousselle's upper clevis 400 performs the same function in the same manner as the '738 patent's center top cap. For example, Rousselle's upper clevis 400 is centrally located and at the top of both the locking mechanism 700 and the canopy as a whole. *Id.*, Figs. 1(A), 1(D). Furthermore, as shown, Rousselle's upper clevis 400 connects the inner retractable units. *Id.* Accordingly, Rousselle's upper clevis 400 is a center top cap, and thus Rousselle discloses, or at least suggests, this limitation.

h. Center Bottom Cap

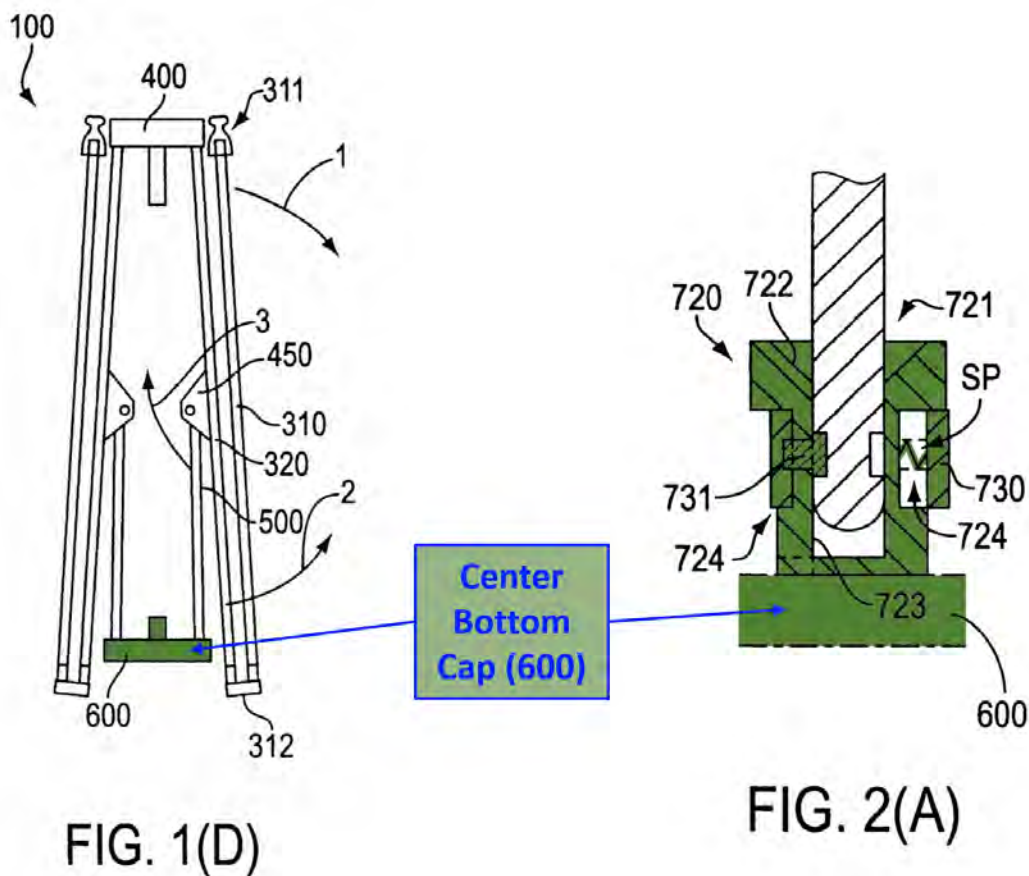
112. Claim 1 recites that the central lock comprises "a center bottom cap." Rousselle discloses, or at least suggests, this limitation.

113. The '738 patent shows an example of a center bottom cap in Figure 6:



Ex. 1001 ('738 patent), Fig. 6. As shown, the '738 patent's center bottom cap receives a center pole (see ¶¶115-117, below). *Id.*

114. Rousselle discloses that its locking mechanism includes a “socket 720 fixed to the lower clevis 600,” which together comprise a center bottom cap, as shown in Figures 1(D) and 2(A):

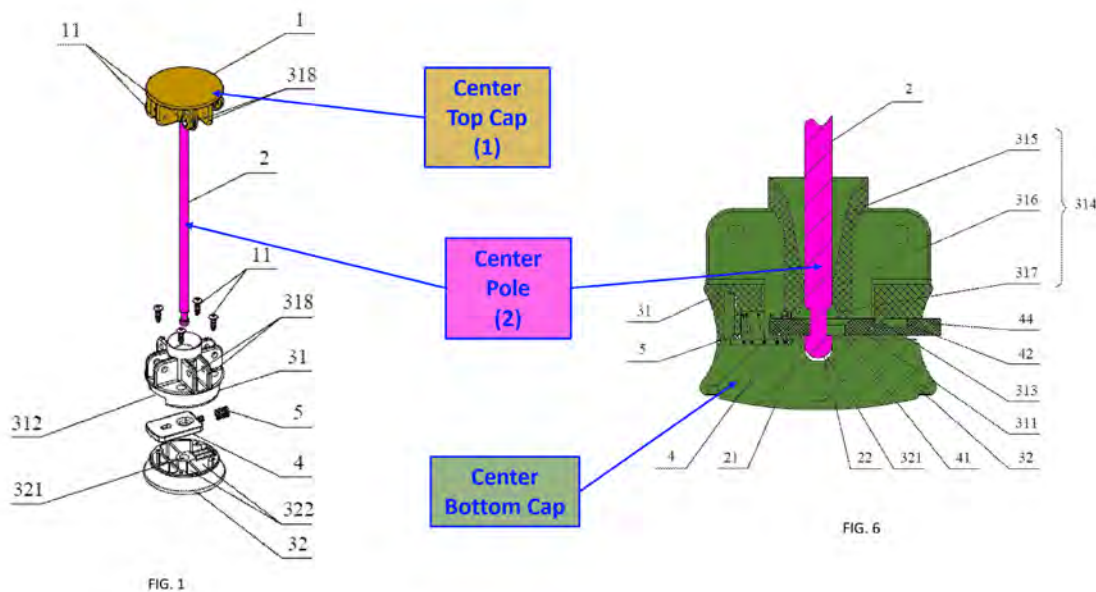


Ex. 1003 (Rousselle), 7:1-5, Figs. 1(D), 2(A). Rousselle's lower clevis 600 and socket 720 perform the same function in the same manner as the '738 patent's center bottom cap. For example, Rousselle's center bottom cap is centrally located in the canopy, is at the bottom of Rousselle's central lock, and receives a center pole. *Id.*; see ¶¶115-117, below. Thus, Rousselle discloses, or at least suggests, a center bottom cap (socket 720 and lower clevis 600).

i. Center Pole

115. Claim 1 recites that the central lock comprises “a center pole positioned between said center top cap and said center bottom cap.” Rousselle discloses, or at least suggests, this limitation.

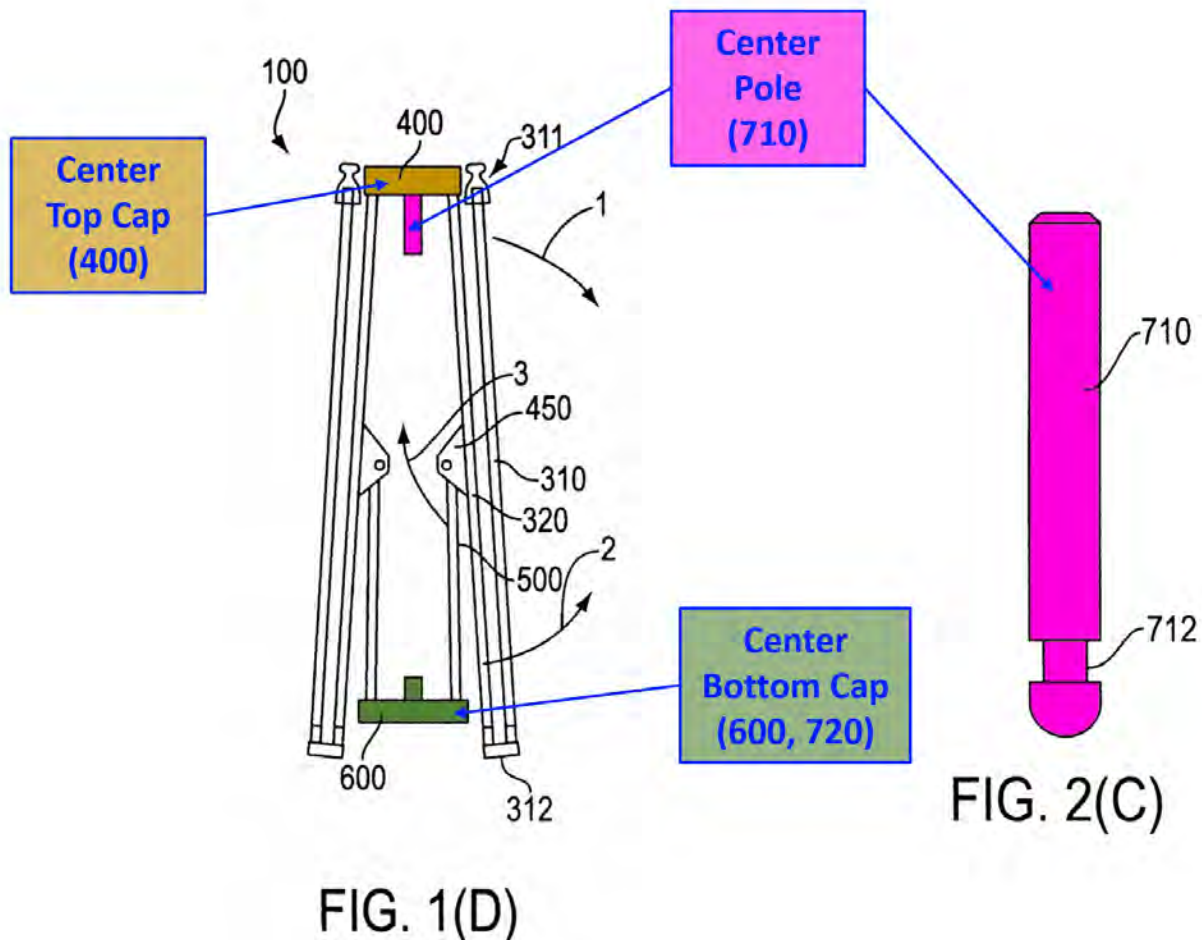
116. The '738 patent shows an example of a center pole in Figures 1 and 6:



Ex. 1001 ('738 patent), Fig. 1. As shown, the '738 patent's center pole is positioned between the center top cap and center bottom cap and is received by the center bottom cap.

117. Rousselle discloses that its locking mechanism 700 includes a center pole referred to as a “pin 710.” Ex. 1003 (Rousselle), 7:1-19; *id.* Figs. 1(D), 2(A)-2(C). Rousselle's pin 710 performs the same function in the same manner as the '738

patent's center pole. For example, Figure 1(D) shows that Rousselle's center pole (pin 710) is positioned between Rousselle's center top cap and center bottom cap.



Id., Figs. 1(D), 2(C). Furthermore, Rousselle discloses that the pin 710 is received in Rousselle's center bottom cap:

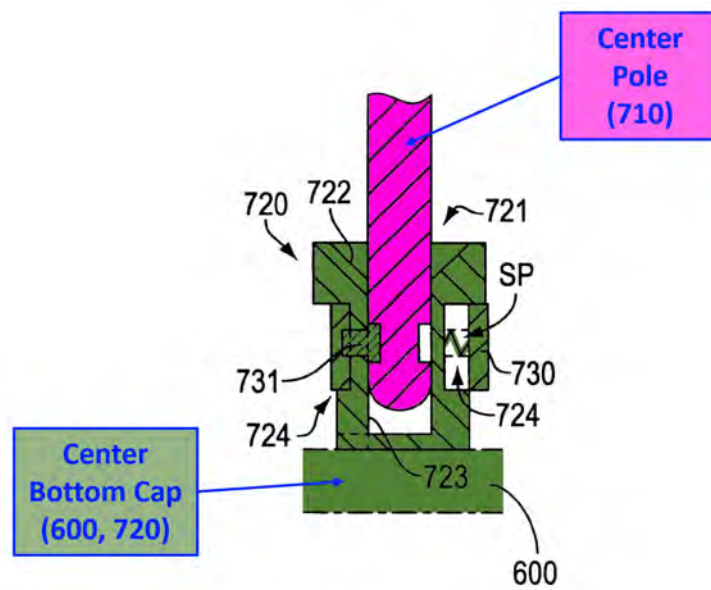


FIG. 2(A)

Id., Fig. 2(A). Thus, Rousselle discloses, or at least suggests, this limitation.

j. Locked State

118. Claim 1 recites “wherein said central lock is locked when said center pole is connected to both said center top cap and said center bottom cap.” Rousselle discloses, or at least suggests, this limitation.

119. As discussed in further detail below (¶¶122-123, below), Rousselle discloses that its central lock is locked when the pin 710 (center pole), which is rigidly connected to the upper clevis 400 (center top cap), is also connected to the lower clevis 600 (center bottom cap). For example, Rousselle discloses that a pin 731, which is part of the center bottom cap, is inserted into a groove 712 in the pin 710 (center pole) “to lock the upper and lower devises 400 and 600 together[.]” Ex. 1003 (Rousselle), 7:25-40; *id.*, 13:37-40 (“the frame is securely locked via the

locking mechanism 700”). Rousselle further discloses that in the locked state, “the upper and lower devises are securely locked together via the locking mechanism 700,” of which pin 710 is a part. *Id.*, 13:22-36. Thus, Rousselle discloses, or at least suggests, this limitation.

k. Unlocked State

120. Claim 1 recites “wherein said central lock is unlocked when there is a disconnection between said center bottom cap and said center pole.” Rousselle discloses, or at least suggests, this limitation.

121. As discussed in further detail below (§§124-125, below), Rousselle discloses that its central lock is unlocked when the pin 710 (center pole) is disengaged from the lower clevis 600 (center bottom cap). *See* Ex. 1003 (Rousselle), 7:32-35, 14:44-50. In this unlocked state, a user “can thus move the upper clevis 400 away from the lower clevis 600,” which also moves the pin 710 (center pole) away from the lower clevis 600 (center bottom cap). *Id.*, 14:57-59. Thus, Rousselle discloses, or at least suggests, this limitation.

l. Central Lock that Locks the Canopy in an Unfolded State When Locked

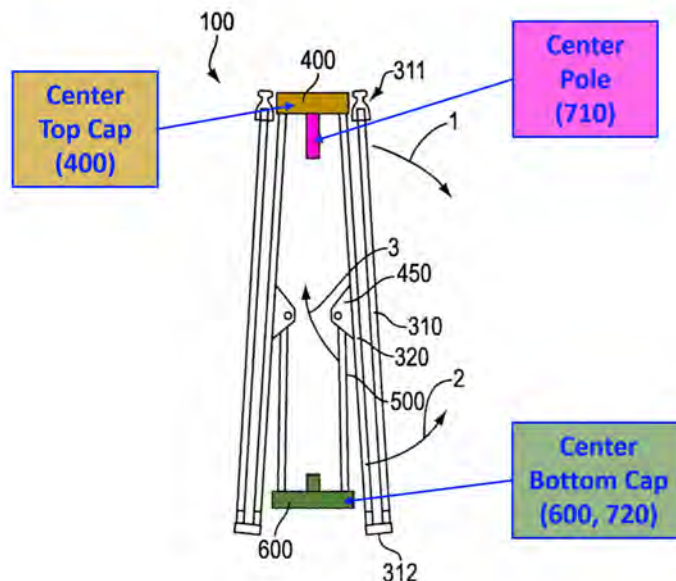
122. Claim 1 recites “wherein said central lock locks said collapsible canopy frame in an unfolded state when said central lock is locked.” Rousselle discloses, or at least suggests, this limitation.

123. Rousselle discloses that a user sets up its canopy by first moving it to an unfolded state. Ex. 1003 (Rousselle), 13:5-29. Once in an unfolded state, and with the central lock engaged, “the upper and lower devises are securely locked together via the locking mechanism 700,” and thus “the frame is securely locked via the locking mechanism 700.” *Id.*, 13:30-41. Thus, the central lock locks Rousselle’s collapsible canopy frame in an unfolded state when the central lock is locked. Rousselle therefore discloses, or at least suggests, this limitation.

m. Central Lock that Allows the Canopy to be in a Folded State When Unlocked

124. Claim 1 recites that the central lock “permits said collapsible canopy frame to be folded into an unfolded state when said central lock is unlocked.” Rousselle discloses, or at least suggests, this limitation.

125. Rousselle discloses that, when the central lock is unlocked (for example, before the canopy is erected), the frame is in “an initially collapsed state.” Ex. 1003 (Rousselle), 13:5-8. This is shown in Figure 1(D), which shows the upper and lower clevises (center top cap and center bottom cap) separated and the central lock unlocked:

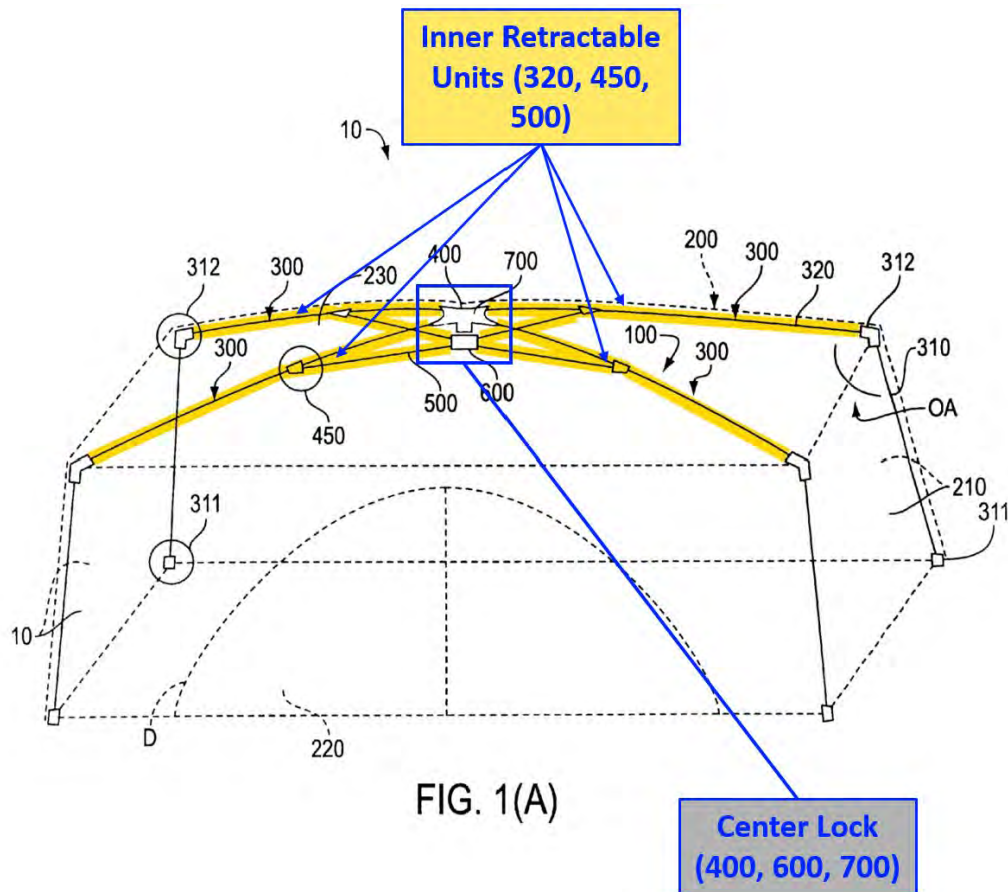


Id., Fig. 1(D). A person of ordinary skill in the art would have understood that the frame could be returned to this collapsed (e.g., folded) state whenever the center lock is unlocked. Thus, Rousselle discloses, or at least suggests, this limitation.

n. Inner Retractable Units Connected Through a Central Lock

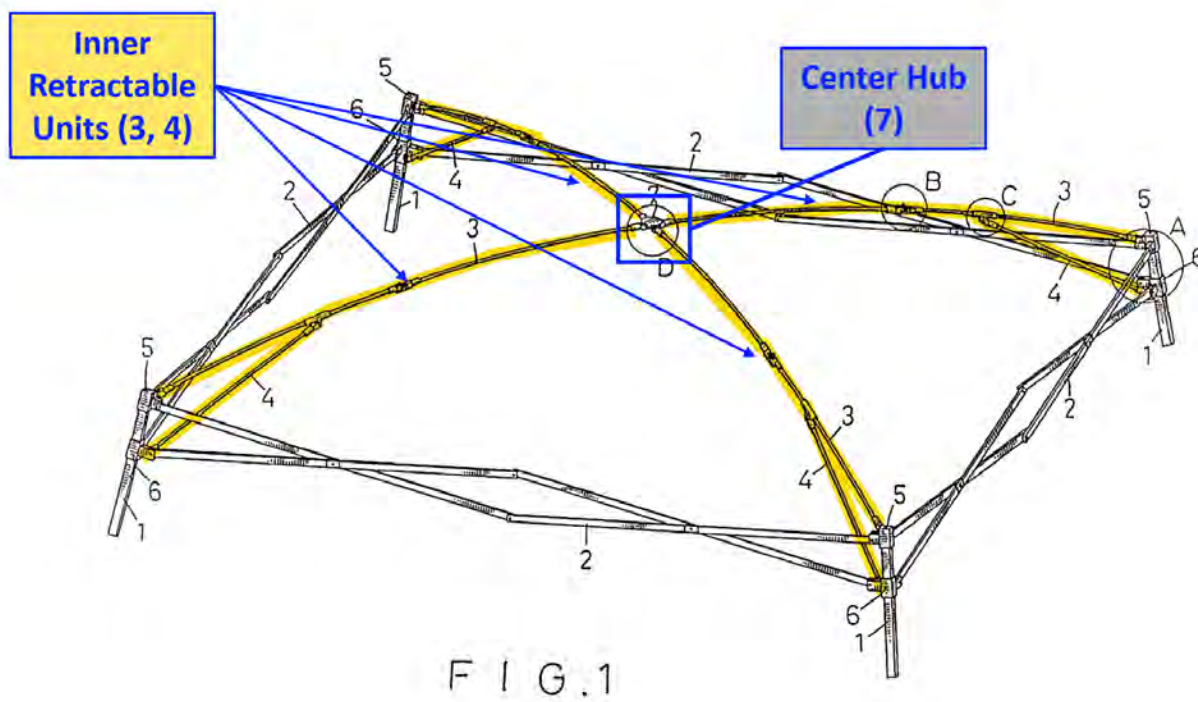
126. Claim 1 recites “wherein said inner ends of said inner retractable units are connected through said central lock.” Rousselle and Tsai disclose, or at least suggest, this limitation.

127. Rousselle discloses that its inner retractable units (e.g., band bars 320, hinges 450, and center tubes 500) are connected to both upper and lower clevises (400, 600) and thus are connected to, and through, the central lock. Ex. 1003 (Rousselle), 6:61-67, Fig. 1(A).



Id., Fig. 1(A). Thus, Rousselle discloses, or at least suggests, this limitation.

128. While Tsai does not disclose a center lock, its inner retractable units (e.g., canopy support rods 3 and linking rods 4) are connected to, and through, a central hub (e.g., head 7). Ex. 1005 (Tsai), 9:11-13 (“one end of each canopy support rod 3 is secured to a fixed linkage 5 and the other end is secured to the head 7”). Figure 1 shows this:



Id., Fig. 20. Thus, if Tsai's inner retractable units are combined with Rousselle's canopy as discussed above (§§79-93, above), Tsai's inner retractable units would connect to, and through, Rousselle's center lock, which is in the same place as Tsai's center hub. See §85, above. Accordingly, Tsai discloses, or at least suggests, this limitation.

129. Thus, Rousselle and Tsai disclose, or at least suggest, each element of claim 1, and claim 1 would have been obvious as a whole to a person of ordinary skill in the art in view of Rousselle and Tsai.

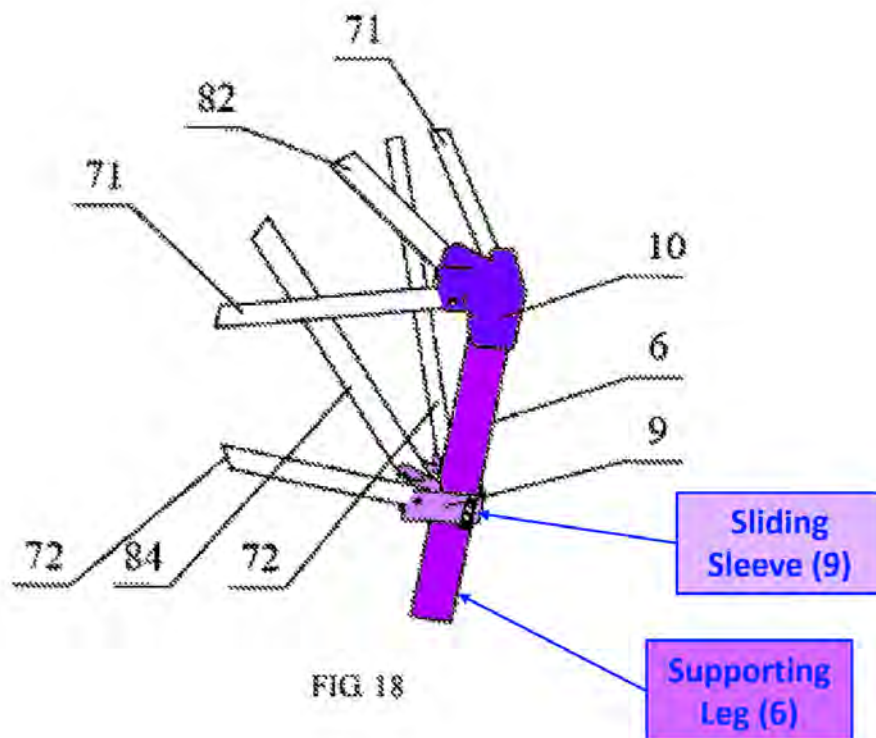
2. Claim 2

130. Claim 2 depends from claim 1 and recites several additional limitations, each of which is disclosed by the prior art.

a. Sliding Sleeve

131. Claim 2 recites “each said supporting leg comprises a sliding sleeve for moving along a length direction of said respective supporting leg.” Tsai discloses, or at least suggests, this limitation.

132. Figure 18 of the '738 patent shows a sliding sleeve 9 for moving along a length direction of the supporting leg 6:



Ex. 1001 ('738 patent), Fig. 18; *id.*, 5:11-14.

133. Tsai discloses that its canopy includes “sliding connectors 6” (e.g., sliding sleeves) “which slide[] along the poles [1]” (e.g., supporting legs). Ex. 1005 (Tsai), 7:4-20. These are shown in Figure 2:

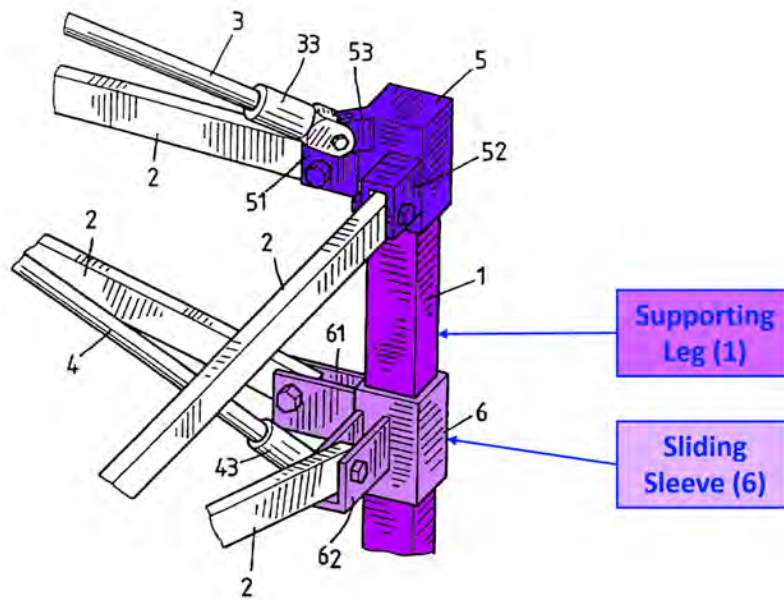


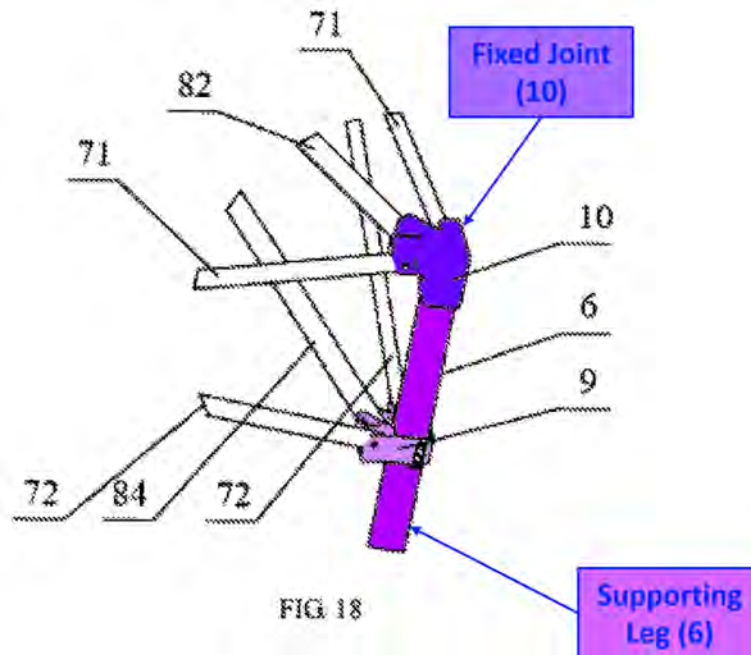
FIG. 2

Id., Fig. 2. Tsai's sliding connectors perform the same function in the same manner as the '738 patent's sliding sleeves. Thus, Tsai discloses, or at least suggests, this limitation.

b. Fixed Joints

134. Claim 2 recites "an upper end of each said supporting leg is fixed with a fixed joint." Tsai discloses, or at least suggests, this limitation.

135. Figure 18 of the '738 patent shows a fixed joint 10 at the upper end of its supporting legs 6:



Ex. 1001 ('738 patent), Fig. 18; *id.*, 5:11-14.

136. Similarly, Tsai discloses that its canopy includes “fixed connectors 5” (e.g., fixed joints), which are “secured to the top of each pole [1]” (e.g., supporting leg). Ex. 1005 (Tsai), 7:4-20. These are shown in Figure 2:

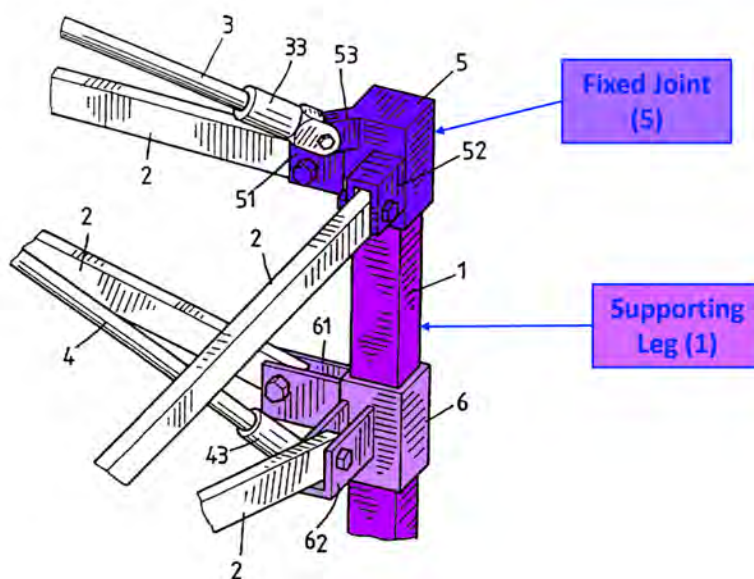


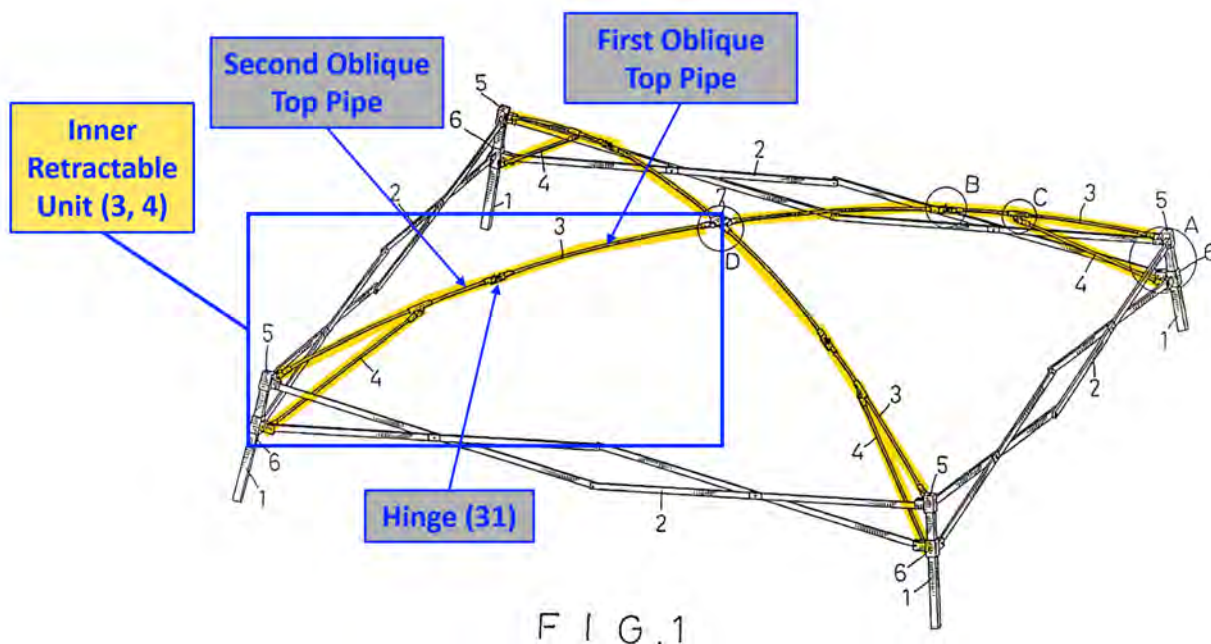
FIG. 2

Id., Fig. 2. Tsai's fixed connectors perform the same function in the same manner as the '738 patent's fixed joints. Thus, Tsai discloses this limitation.

c. First and Second Oblique Top Pipes Hinged to One Another

137. Claim 2 recites “each said inner retractable unit comprises a first oblique top pipe and a second oblique top pipe hinged to one another.” Tsai discloses, or at least suggests, this limitation.

138. Tsai discloses that its “canopy support rod[s] 3” (e.g., part of its inner retractable units) “consist[] of two rod members pivotally connected to one another by an intermediate pivot connector 31.” Ex. 1005 (Tsai), 8:34-9:10. These are shown in Figure 1:



Id., Fig. 1. Each of Tsai’s rod members are oblique top pipes because they perform the same function in the same manner as the ’738 patent’s oblique top pipes.

139. Alternatively, it would have been obvious to a person of ordinary skill in the art to use top pipes with Tsai’s canopy. A person of ordinary skill would have understood that pipes were well-known and were commonly used in canopies like Tsai’s. *See generally* Ex. 1003 (Rousselle) (discussing “center tube 500” and “leg tube 310”); Ex. 1005 (Tsai), 7:15-20 (discussing “canopy support rods”); Ex. 1009 (Carter), 1:62-2:18 (discussing roof members composed of “roof rods”); Ex. 1010 (Tseng) ¶¶[0004]. [0026] (discussing roof members composed of rods). Tsai discloses that “numerous modifications and/or additions to the above-described preferred embodiments would be readily apparent to one skilled in the art” and are within the scope of Tsai’s disclosure. Ex. 1005 (Tsai), 11:12-23. Thus, Tsai

suggests the modification. Furthermore, a person of ordinary skill in the art would have been motivated to use pipes in Tsai's canopy frame because pipes are lightweight, strong structural members. *See id.*, 1:16-25 (discussing goals of stability and portability).

140. Thus, Tsai discloses that its inner retractable units comprise first and second oblique top pipes hinged to one another. Tsai therefore discloses, or at least suggests, this limitation.

d. First Oblique Top Pipe Hinged with a First Connecting Rod

141. Claim 2 further recites that "said first oblique top pipe is hinged with a first connecting rod." Rousselle discloses, or at least suggests, this limitation.

142. As discussed above, when combining Rousselle's central lock with Tsai's canopy, it would be preferred to retain Rousselle's hinge 450 and center tube 500, so as to connect Tsai's canopy support rod to both the upper and lower clevis of Rousselle. ¶¶85-93, above. A person of ordinary skill in the art would have understood that Rousselle's center tube 500 is a connecting rod that would connect with Tsai's first oblique top pipe via Rousselle's hinge 450, and would have been motivated to use such an arrangement for the reasons discussed above. *Id.* Rousselle's center tube 500 is shown in Figure 1(A):

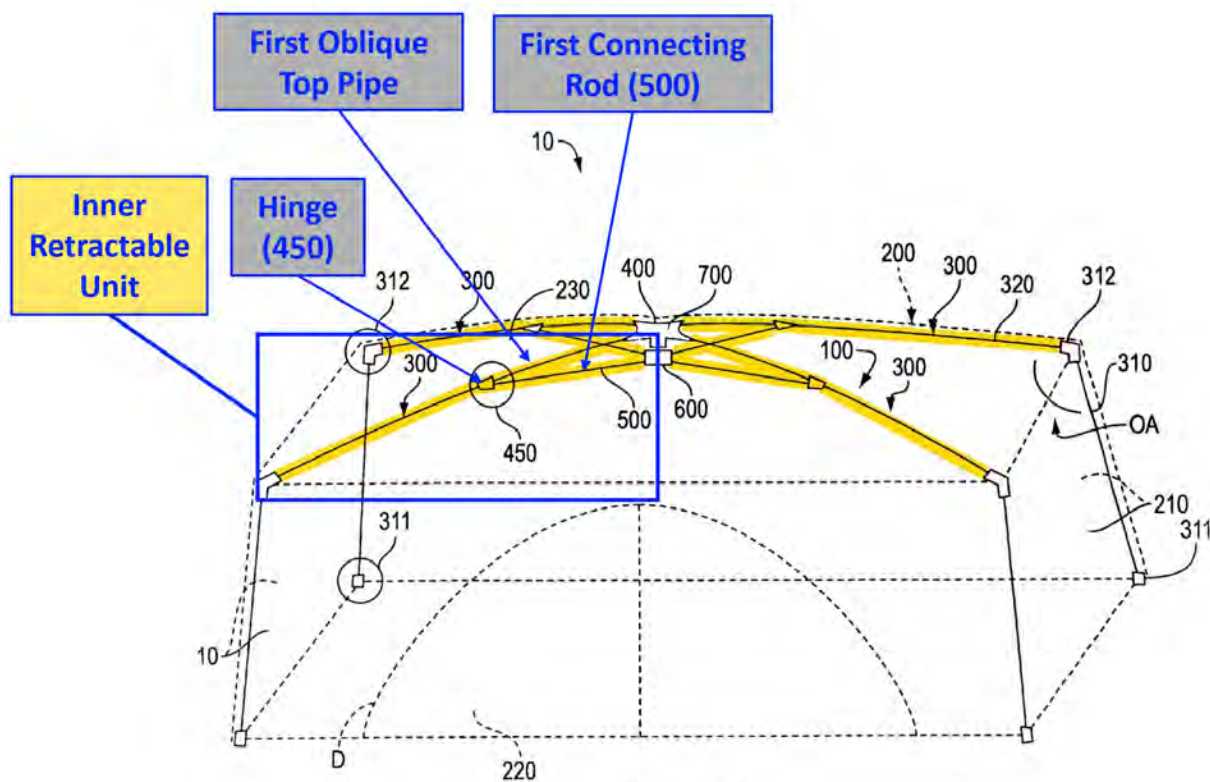


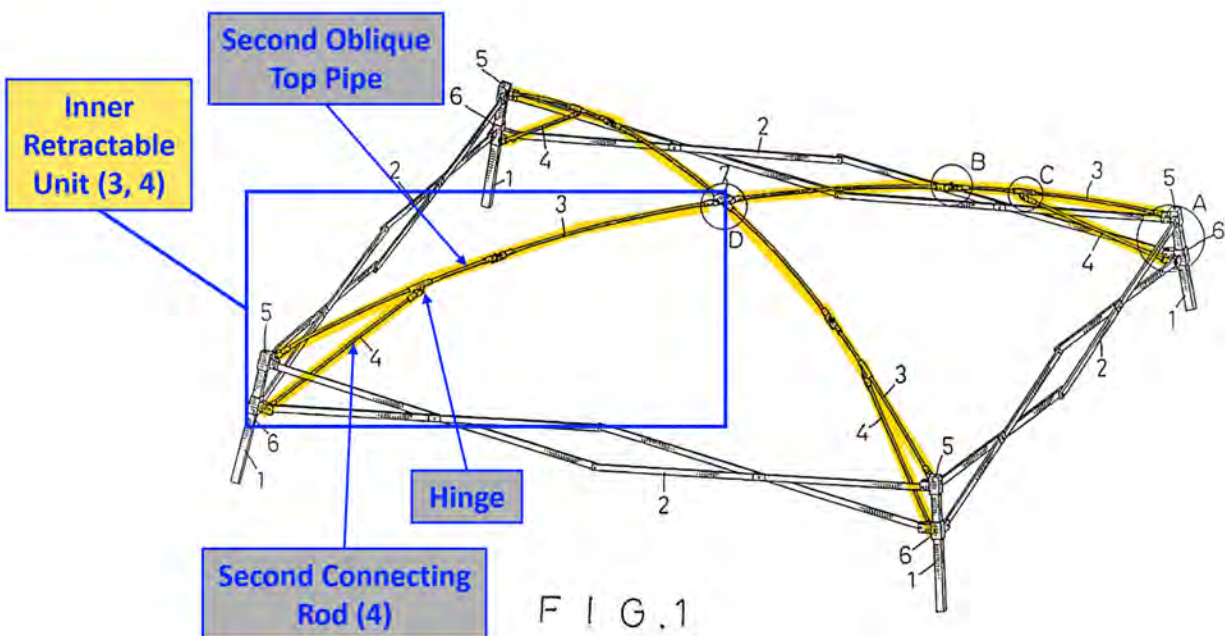
FIG. 1(A)

Ex. 1003 (Rousselle), Fig. 1(A). Thus, Rousselle discloses, or at least suggests, this limitation.

e. Second Oblique Top Pipe Hinged with a Second Connecting Rod

143. Claim 2 further recites that the “said second oblique top pipe is hinged with a second connecting rod.” Tsai discloses, or at least suggests, this limitation.

144. Tsai discloses that its canopy support rods 3 (e.g., including the second oblique top pipes) are “pivotally secured to respective linking rods 4” (e.g., second connecting rods). Ex. 1005 (Tsai), 7:4-20. This is shown in Figure 1:

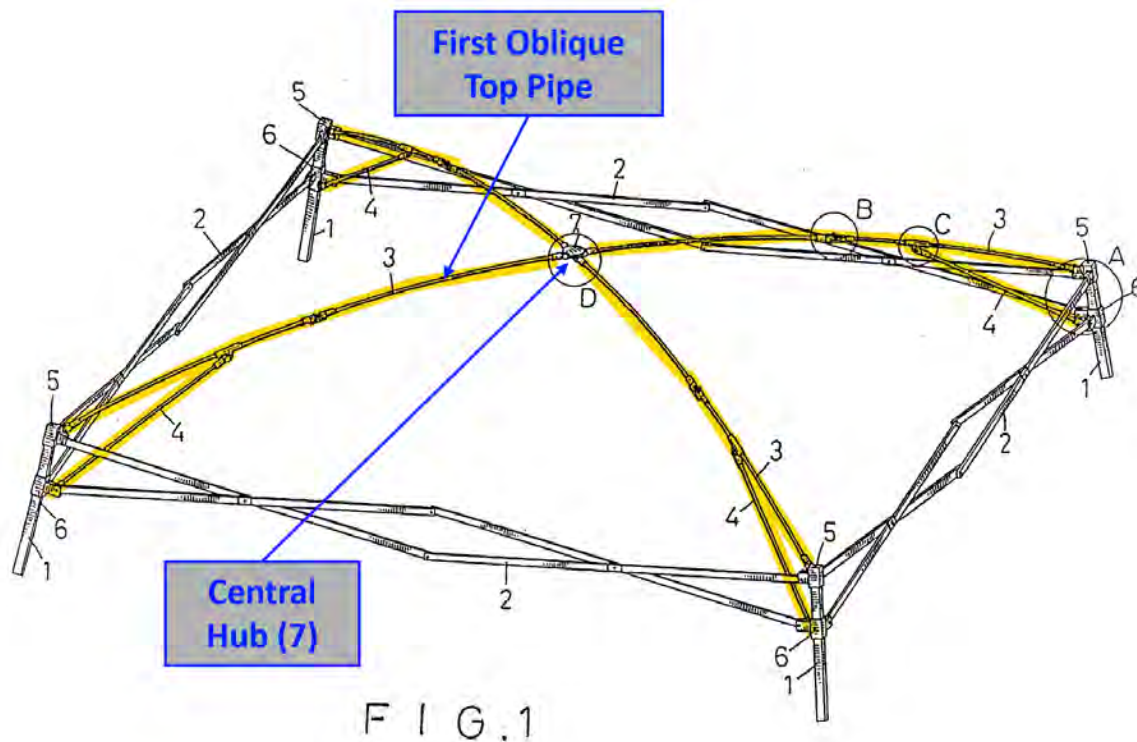


Id., Fig. 1. Thus, Tsai discloses, or at least suggests, this limitation.

f. First Oblique Top Pipe Hinged with the Center Top Cap

145. Claim 2 further recites that “an inner end of said first oblique top pipe is hinged with a center top cap of said central lock.” Tsai and Rousselle each disclose, or at least suggest, this limitation.

146. Tsai discloses that its canopy support rods 3 (e.g., including the first oblique top pipes) are “pivotally secured to a head 7,” which is a central hub, as shown in Figure 1. Ex. 1005 (Tsai), 7:4-20, Fig. 1.



Id., Fig. 1. Accordingly, a person of ordinary skill in the art would have understood that, when combining Tsai's inner retractable units with Rousselle's central lock, the inner end of Tsai's first oblique top pipe would be hinged to Rousselle's center top cap because Rousselle's center top cap serves an analogous purpose to Tsai's central hub 7. Thus, Tsai discloses, or at least suggests, this limitation.

147. Furthermore, Rousselle discloses that the inner end of an inner retractable unit (e.g., the inner end of a first oblique top pipe) may attach to its center top cap, as shown in Figure 1(A):

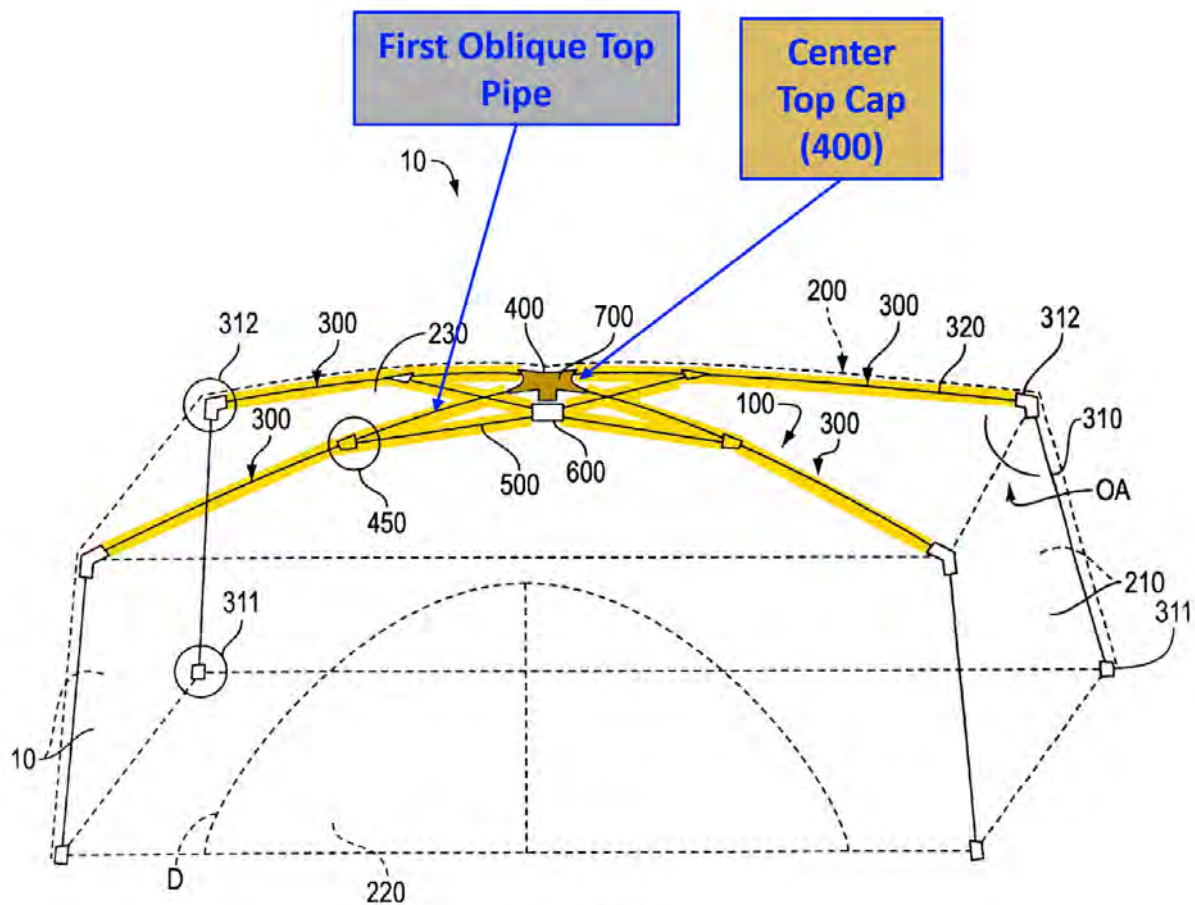


FIG. 1(A)

Ex. 1003 (Rousselle), Fig. 1(A). Thus, Rousselle also discloses, or at least suggests, this limitation.

g. First Connecting Rod Hinged with the Center Bottom Cap

148. Claim 2 further recites that “an inner end of said first connecting rod is hinged with a center bottom cap of said central lock.” Rousselle discloses, or at least suggests, this limitation.

149. Rousselle discloses that “an inner end of the center tube 500” (e.g., the first connecting rod) “is pivotally connected to a lower clevis 600” (e.g., the center bottom cap). Ex. 1003 (Rousselle), 6:61-64. This is shown in Figure 1(A):

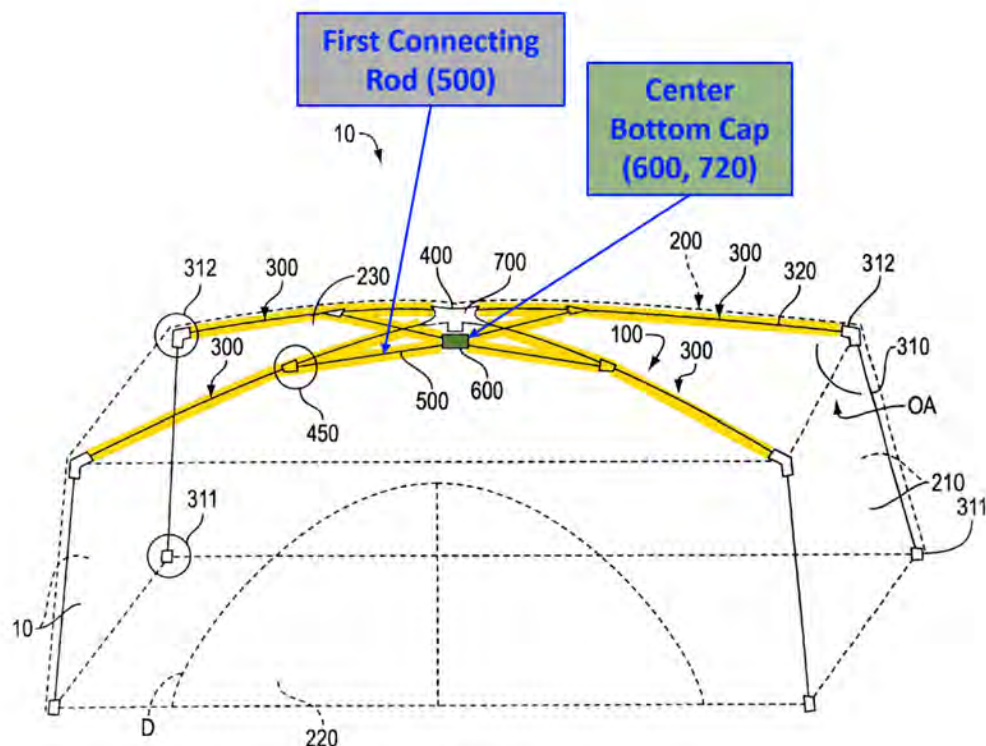


FIG. 1(A)

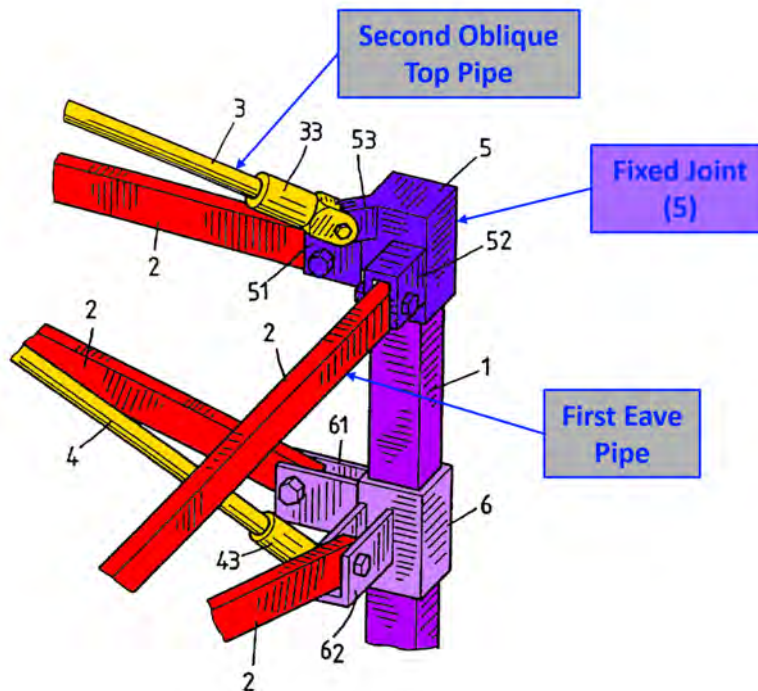
Id., Fig. 1(A). Thus, Rousselle discloses, or at least suggests, this limitation.

h. First Eave Pipe and Second Oblique Top Pipe Hinged with Fixed Joint

150. Claim 2 further recites that “an outer end of a first eave pipe and an outer end of said second oblique top pipe are hinged with said fixed joint.” Tsai discloses, or at least suggests, this limitation.

151. As discussed above, Tsai discloses that its “scissors-type linkages 2” (e.g., outer retractable units) are composed of a plurality of x-shaped members that are each made of two eave pipes hinged with each other. ¶¶68-71, above. Tsai discloses that each of the scissors-type linkages “is pivotally secured to . . . one of the poles 1” including through a connection with “fixed connectors 5.” Ex. 1005 (Tsai), 7:4-20. Thus, Tsai discloses that one of the two eave pipes (e.g., a first eave pipe) is hinged to the fixed connector 5 (e.g., the fixed joint).

152. Tsai further discloses that “canopy supporting rods 3” (which includes the second oblique top pipes) “are also pivotally secured to ... fixed connectors 5.” *Id.*, 7:4-20. Thus, Tsai also discloses that the second oblique top pipe is hinged with the fixed joint. These connections are shown in Figure 2:



Id., Fig. 2. Thus, Tsai discloses, or at least suggests, this limitation.

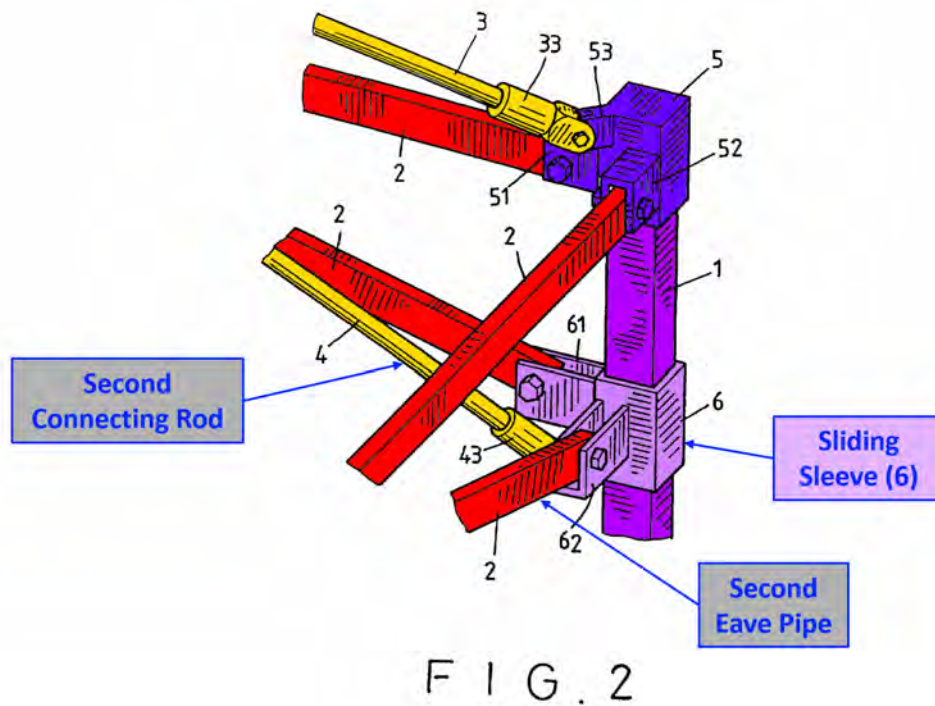
i. **Second Eave Pipe and Second Connecting Rod Hinged with Sliding Sleeve**

153. Claim 2 further recites that “an outer end of said second eave pipe and an outer end of said second connecting rod are hinged with said sliding sleeve.” Tsai discloses, or at least suggests, this limitation.

154. Tsai discloses that each of its scissors-type linkages “is pivotally secured to . . . one of the poles 1” including through a connection with “sliding connectors 6.” Ex. 1005 (Tsai), 7:4-20. Thus, Tsai discloses that one of the two

eave pipes (e.g., a second eave pipe) is hinged to the sliding connector 6 (e.g., the sliding sleeve).

155. Tsai further discloses that “linking rods 4” (e.g., the second connecting rods) “are pivotally secured to respective sliding connectors 6.” Ex. 1005 (Tsai), 7:4-20. Thus, Tsai also discloses that the second connecting rod is hinged with the sliding sleeve. These connections are shown in Figure 2:



Id., Fig. 2. Thus, Tsai discloses this limitation.

156. A person of ordinary skill in the art would have been motivated to combine Tsai with Rousselle, and would have had a reasonable expectation of success in doing so, for the reasons discussed above. ¶¶72-78, 86-93, 101-108, above. Thus, Rousselle and Tsai disclose, or at least suggest, each of the limitations

of claim 2, and claim 2 would have been obvious as a whole to a person of ordinary skill in the art in view of those references.

3. Claim 4

157. Claim 4 depends from claim 1 and recites several additional limitations, each of which is disclosed by the prior art.

a. Locking Piece Capable of Radial Movement

158. Claim 4 recites that the central lock comprises “a locking piece capable of moving back and forth along a radial direction of said center pole, wherein said locking piece is received in said center bottom cap.” Rousselle discloses, or at least suggests, this limitation.

159. Rousselle discloses that its locking mechanism includes a “ring 730” and attached “pin 731” which are pushed rightwardly in Figure 2(A) by “spring SP.” Ex. 1003 (Rousselle), 7:20-31, Fig. 2(A).

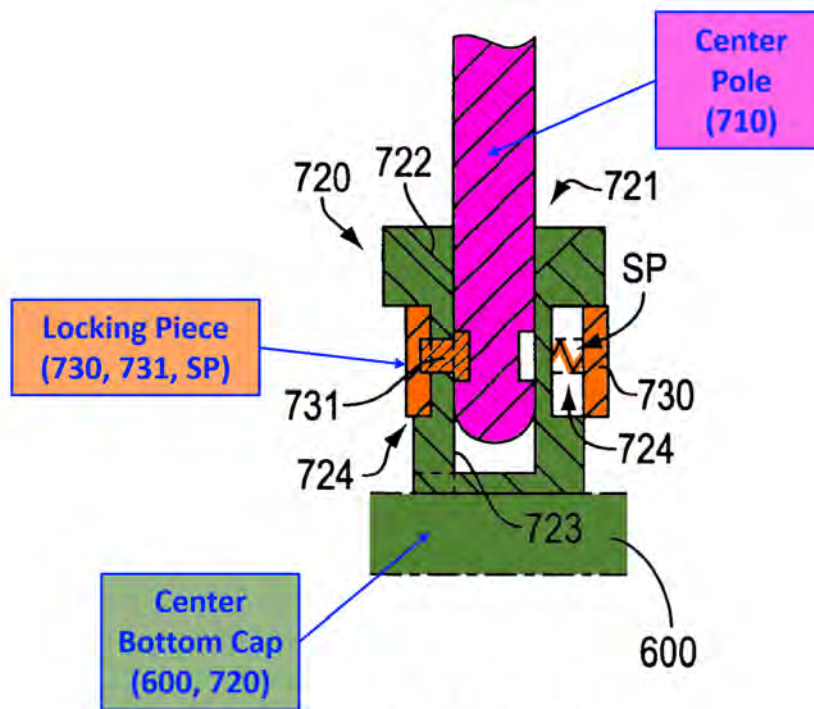


FIG. 2(A)

Id., Fig. 2(A). Thus, Rousselle discloses a locking piece (ring 730 and pin 731, as biased by spring SP) that moves back and forth in a radial direction of the center pole 710. Rousselle discloses that the locking piece is part of, and received in, socket 720 (part of the center bottom cap). *Id.*, 7:1-31, Fig. 2(A). For example, the locking piece is received in the center bottom cap because pin 731 (part of the locking piece) extends through a hole in the wall of socket 720 (part of the center bottom cap). *Id.*, Fig. 2(A). Furthermore, Rousselle's ring 730 (part of the locking piece) is received in annular recess 724 of socket 720 (part of the center bottom cap). *Id.* Accordingly, Rousselle discloses, or at least suggests, this limitation.

b. First Through Hole

160. Claim 4 further recites “a first through hole through which said center pole can pass through is provided in said locking piece.” Rousselle discloses, or at least suggests, this limitation.

161. Rousselle’s ring 730 and pin 731, when combined, comprise a first through hole: the interior space of the ring 730, as modified by the protrusion of the pin 731. Ex. 1003 (Rousselle), Fig. 2(A). A person of ordinary skill in the art would have understood this to be a through hole at least because the center pole (pin 710) is inserted through that space, as shown in Figure 2(A).

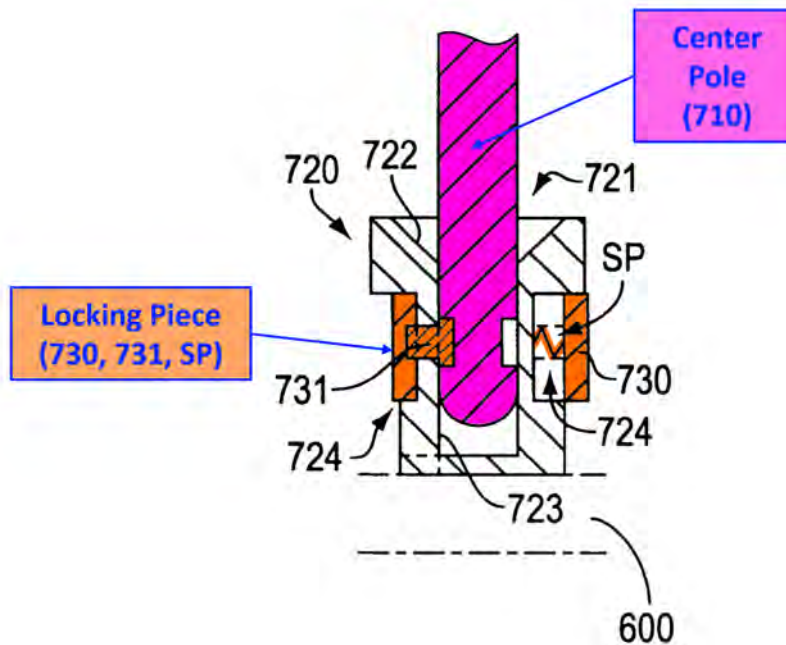


FIG. 2(A)

Id., Fig. 2(A). I note that nothing in the claim limits the through hole from also allowing other structures to pass through it, such as Rousselle's socket 720. Thus, Rousselle discloses, or at least suggests, this limitation.

c. Clamping Groove

162. Claim 4 further recites that “an end portion of said center pole is provided with a clamping groove.” Rousselle discloses this limitation.

163. The '738 patent explains that “the end part of the center pole 2 is provided with a clamping groove 21.” Ex. 1001 ('738 patent), 3:45-47. When the center lock is locked, the spring loaded locking piece “is clamped with the clamping groove 21” to lock the center pole 2 to the center bottom cap 3, holding the center lock in the locked state. *Id.*, 3:47-55. Figure 6 of the '738 patent shows one embodiment of such a center pole including a clamping groove:

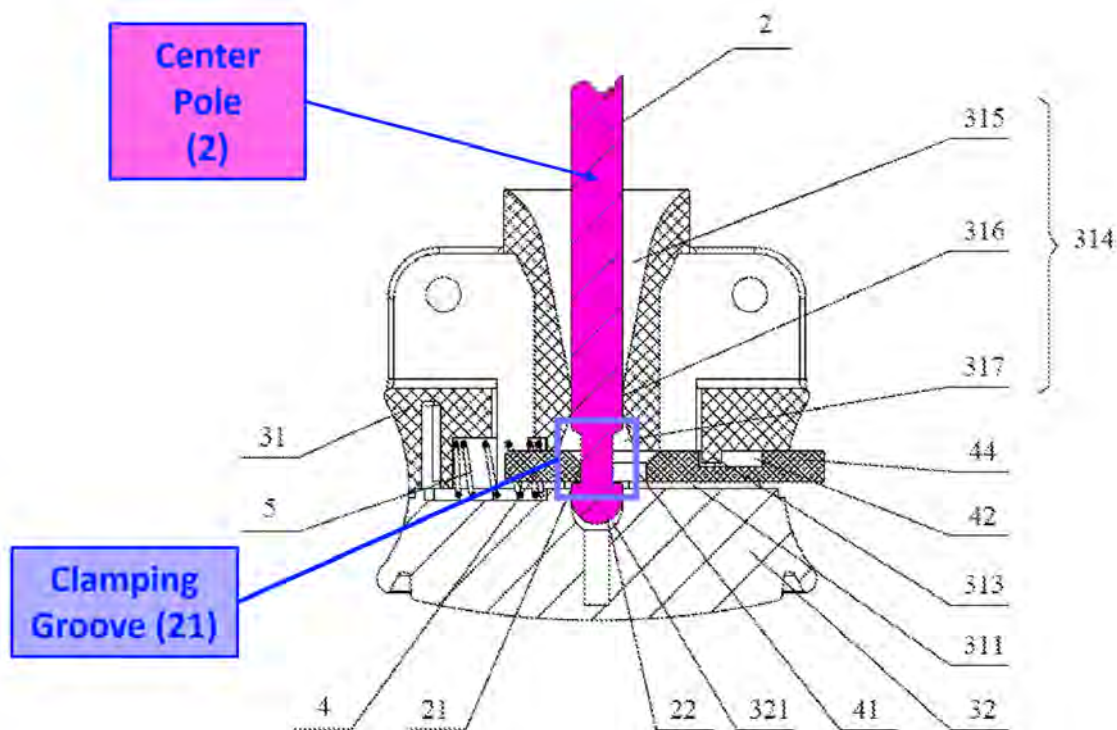
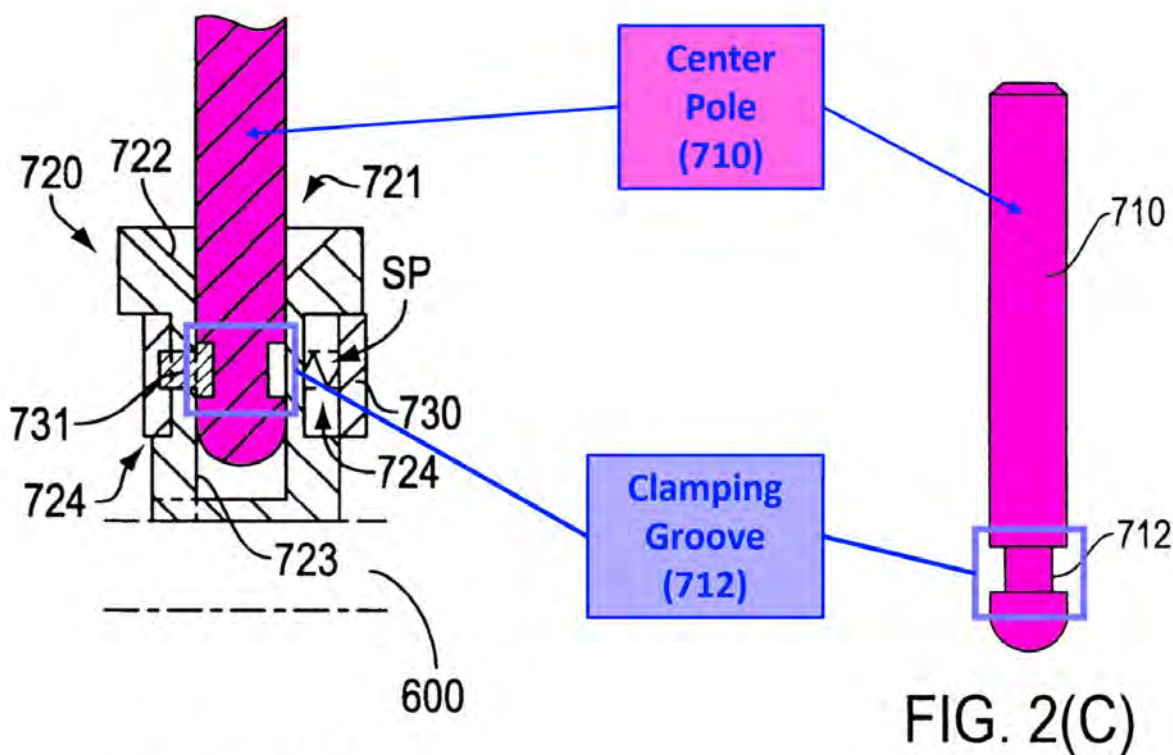


FIG. 6

Id., Fig. 6.

164. Rousselle discloses that its pin 710 includes a “groove 712” that is clamped by the pin 731 to engage the locking mechanism. Ex. 1003 (Rousselle), 7:20-35, Figs. 2(A)-2(C). Groove 712 is a clamping groove that functions in the same way as the ’738 patent’s clamping groove. *Id.*



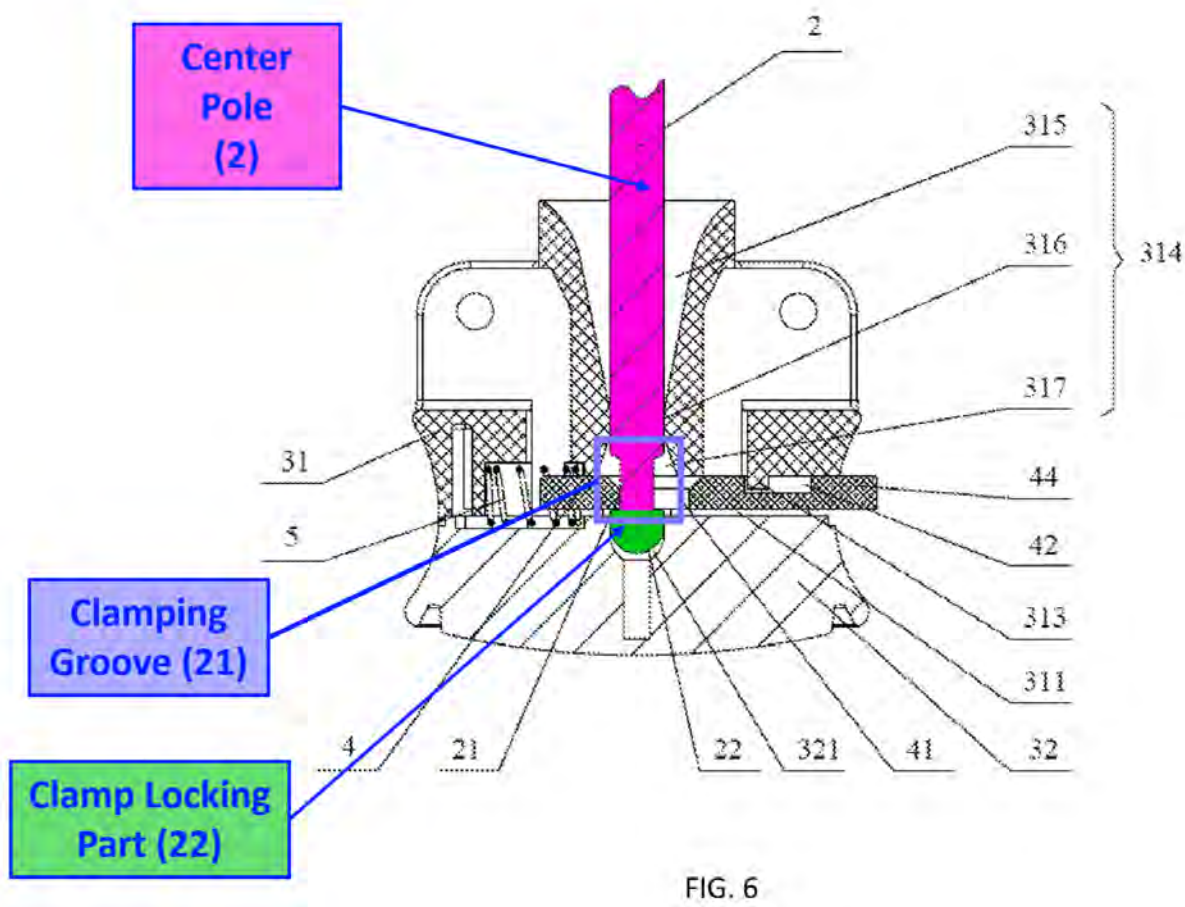
Id., Figs. 2(A), 2(C). Accordingly, Rousselle discloses, or at least suggests, this limitation.

d. Clamp Locking Part

165. Claim 4 recites that “an end portion of said center pole is provided with . . . a clamp locking part located at the lower end of said clamping groove.” Rousselle discloses, or at least suggests, this limitation.

166. The '738 patent explains that when the spring loaded locking piece is engaged with the clamping groove, “an upper end surface of the clamp locking part 22 abuts again[st] a lower end surface of the locking piece 4,” thereby preventing

the center pole from being detached from the center bottom cap, and keeping the center lock in a locked state. Ex. 1001 ('738 patent), 3:47-55. Figure 6 of the '738 patent shows one embodiment of such a center pole including a clamp locking part:



Id., Fig. 6.

167. Rousselle's pin 710 includes a rounded, widened area (clamp locking part) located at the lower end of groove 712. See Ex. 1003 (Rousselle), 7:20-35, Figs. 2(A)-2(C). Rousselle's clamp locking part functions in the same way as the '738 patent's clamp locking part. *Id.*

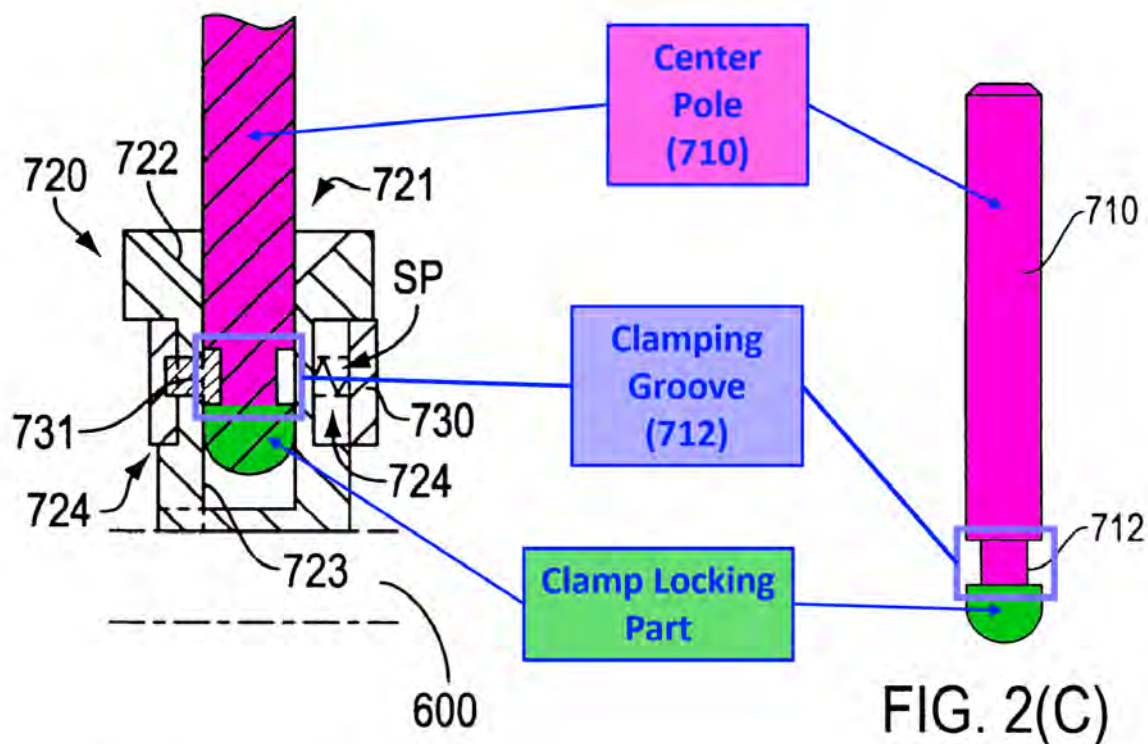


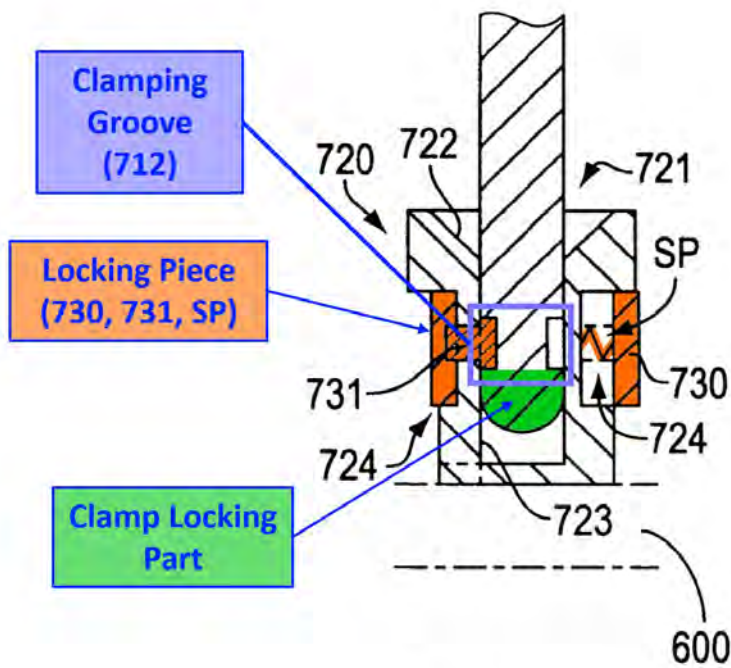
FIG. 2(A)

Id., Figs. 2(A), 2(C). Accordingly, Rousselle discloses, or at least suggests, this limitation.

e. Locked State

168. Claim 4 further recites that “when said central lock is in a locked state, part of an inner wall of said first through hole of said locking piece is clamped with said clamping groove of said center pole, and an upper end surface of said clamp locking part abuts against a lower end surface of said locking piece.” Rousselle discloses this limitation.

169. Rousselle's Figure 2(A) shows the central lock in the locked state. See Ex. 1003 (Rousselle), 4:7-8, 7:20-35, Fig. 2(A).



Id., Fig. 2(A). In the locked state, the end of pin 731 (part of the inner wall of the through hole of the locking piece) “extends . . . into a groove 712 in the center pin 710” and thus is clamped with the clamping groove (groove 712). *Id.*, 7:20-31, Fig. 2(A).

170. Furthermore, as shown in Figure 2(A), an upper end surface of the clamp locking part is adjacent to a lower end surface of the locking piece (e.g., the lower surface of the pin 731). Ex. 1003 (Rousselle), 7:20-31, Fig. 2(A). A person of ordinary skill in the art would have understood Rousselle to disclose that the parts

touch, and therefore abut. A person of ordinary skill in the art would have understood that, just as in the '738 patent, Rousselle's clamp locking part and locking piece would be in contact when the lock was in a locked state because Rousselle's lock experiences the same forces the '738 patent's lock does. Thus, Rousselle discloses, or at least suggests, this limitation.

f. Unlocked State

171. Claim 4 recites that “when said central lock is in said unlocked state, said inner wall of said first through hole of said locking piece is separated from said clamping groove and said clamp locking part can pass through said first through hole.” Rousselle discloses, or at least suggests, this limitation.

172. Rousselle discloses that to unlock the central lock, “the ring 730 can be moved laterally . . . against the force of the spring SP to disengage the pin 731 from the groove 712 in the center pin 710.” Ex. 1003 (Rousselle), 7:32-35. Thus, Rousselle discloses that when the central lock is in the unlocked state, the end of the pin 731 (e.g., part of the inner wall of the first through hole of the locking piece) is separated from the clamping groove 712. *Id.* Furthermore, this allows the user to “unlock the vertical pin 710 from the socket 720 mounted on the lower clevis 600.” *Id.*, 14:44-50. A person of ordinary skill in the art would have understood that once the pin 710 is unlocked from the socket 720, the pin 731 is no longer engaging or retaining the pin 710, and thus the pin 710 (center pole, including the clamp locking

part) can pass through the through hole of the locking piece. Thus, Rousselle discloses, or at least suggests, this limitation.

173. Accordingly, Rousselle and Tsai disclose, or at least suggest, each of the limitations of claim 4, and claim 4 would have been obvious as a whole to a person of ordinary skill in the art in view of those references.

4. Claim 14

174. Claim 14 depends from claim 4 and recites additional limitations, each of which is disclosed by the prior art.

a. Annular Groove

175. Claim 14 recites that “said clamping groove is an annular groove.” Rousselle discloses, or at least suggests, this limitation.

176. Rousselle discloses (or, at least, a person of ordinary skill in the art would have understood from Rousselle’s disclosure) that groove 712 (e.g., the clamping groove) is an annular groove because it extends around the circumference of the pin 710 and is thus ring-shaped. Ex. 1003 (Rousselle), Figs. 2(A)-2(C).

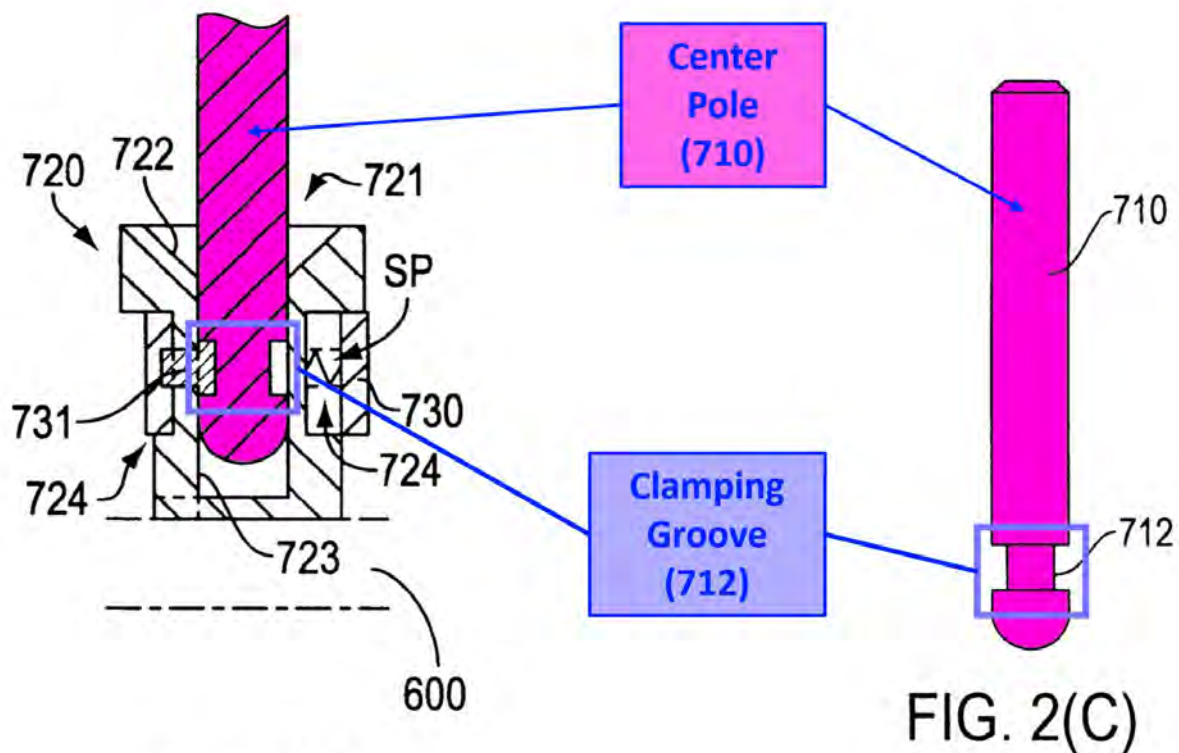


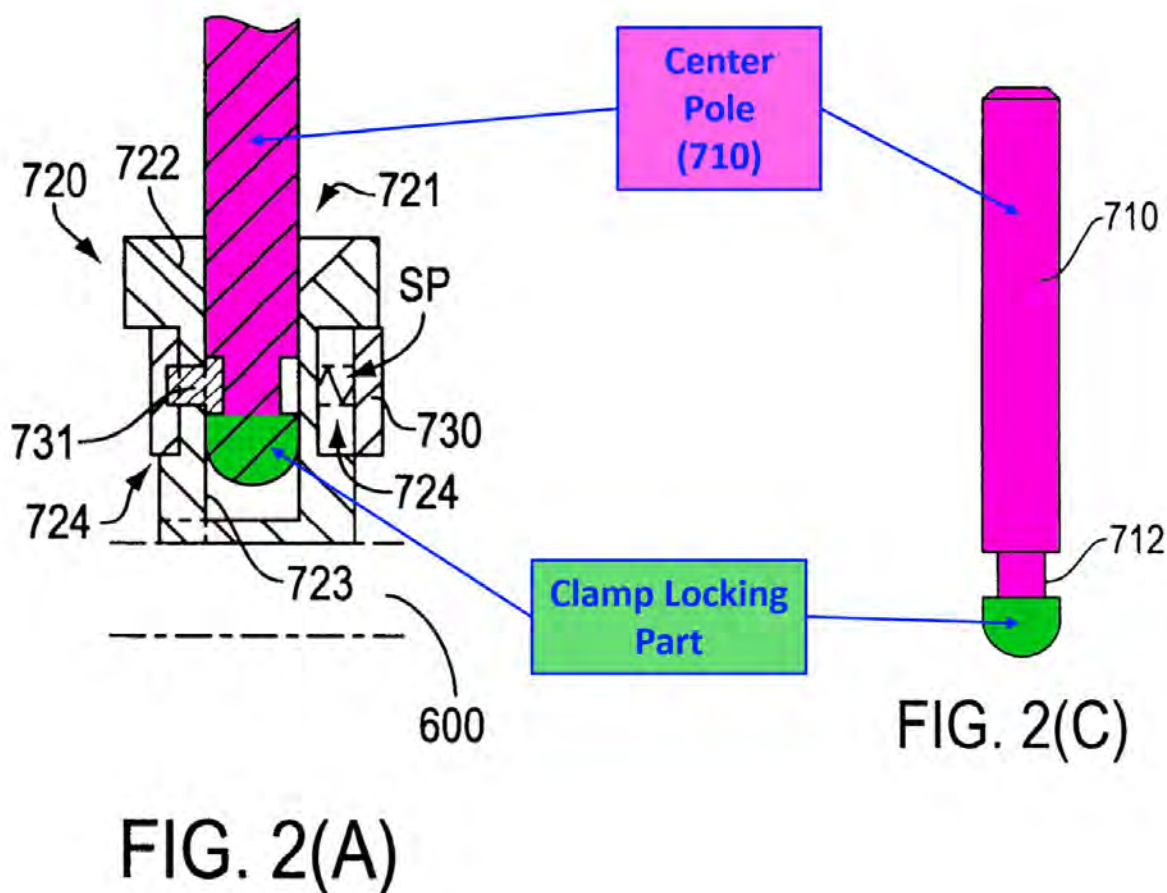
FIG. 2(A)

Id. Thus, Rousselle discloses, or at least suggests, this limitation.

b. Guide Part

177. Claim 14 further recites that “an end portion of said clamp locking part is provided with a guide part of a semispherical shape or a conical shape with a gradually decreased diameter.” Rousselle discloses, or at least suggests, this limitation.

178. Rousselle discloses that the end of its clamp locking part is a guide part that has a semispherical shape. Ex. 1003 (Rousselle), Figs. 2(A)-2(C).



Id. Thus, Rousselle discloses, or at least suggests, this limitation.

179. Accordingly, Rousselle and Tsai disclose, or at least suggest, each of the limitations of claim 14, and claim 14 would have been obvious as a whole to a person of ordinary skill in the art in view of those references.

B. Claims 4, 13, and 14 Would Have Been Obvious over Rousselle, Tsai and Ohnishi

1. Claim 4

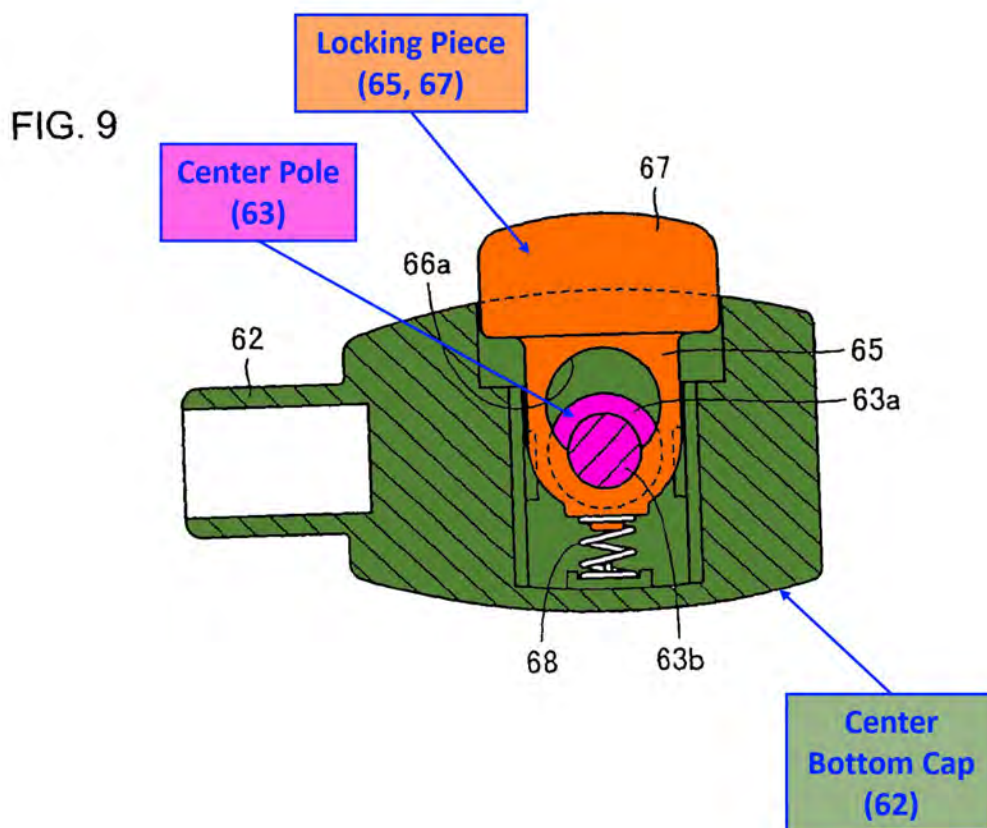
180. As I discuss above, Rousselle and Tsai render claim 4 obvious. ¶¶157-173, above. I incorporate here the discussion of Rousselle and Tsai above.

However, as I discuss below, Rousselle's locking piece may also be replaced with Ohnishi's. To avoid repetition, I only address here the limitations for which Ohnishi is relevant.

a. Locking Piece Capable of Radial Movement

181. Claim 4 recites that the central lock comprises “a locking piece capable of moving back and forth along a radial direction of said center pole, wherein said locking piece is received in said center bottom cap.” Ohnishi discloses, or at least suggests, this limitation.

182. Ohnishi's central lock includes “lock member 65.” Ex. 1006 (Ohnishi), 7:51-60. “[O]peration member 67 is fixed to an upper end of the lock member 65” and allows the user to press against and move lock member 65. *Id.* When the user presses operation member 67, both operation member 67 and lock member 65 move along a radial direction of Ohnishi's center pole (fixed shaft 63):



Id., Fig. 9; *id.*, 7:40-8:19. Together, lock member 65 and operation member 67 form a locking piece capable of moving back and forth along a radial direction of the center pole (fixed shaft 63) when pressed by a user or acted on by spring 68. Furthermore, Ohnishi's lock member 65 is "located within the shaft receiving space 64 of the second handle arm 62" and is thus received in Ohnishi's second handle arm 62 (Ohnishi's center bottom cap). *Id.*, 7:51-60.

183. As I discuss below, a person of ordinary skill in the art would have understood that Ohnishi's locking piece would function exactly the same way (e.g., would move back and forth along a radial direction of Rousselle's center pole and

would be received in Rousselle's center bottom cap) when combined with Rousselle's central lock. See ¶198, below. Accordingly, Ohnishi discloses, or at least suggests, this limitation.

b. First Through Hole

184. Claim 4 further recites "a first through hole through which said center pole can pass through is provided in said locking piece." Ohnishi discloses, or at least suggests, this limitation.

185. Ohnishi's locking piece (which includes lock member 65) comprises "through hole 66" which includes "large-diameter hole 66a" and "small-diameter hole 66b formed so as to overlap" with large-diameter hole 66a, forming a contiguous through hole. Ex. 1006 (Ohnishi), 7:40-50; *id.* 7:61-8:29, Figs. 9-12. Ohnishi discloses that "the head portion 63a of the fixed shaft 63" (e.g., part of the center pole) "passes through the large-diameter hole 66a of the lock member 65" (e.g., part of the first through hole). *Id.*, 7:61-8:19. Ohnishi's through hole is shown in Figures 9 and 10:

FIG. 10

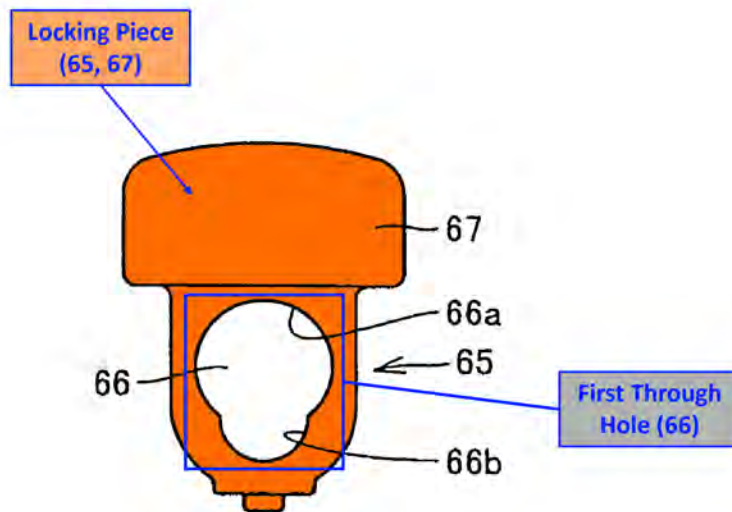
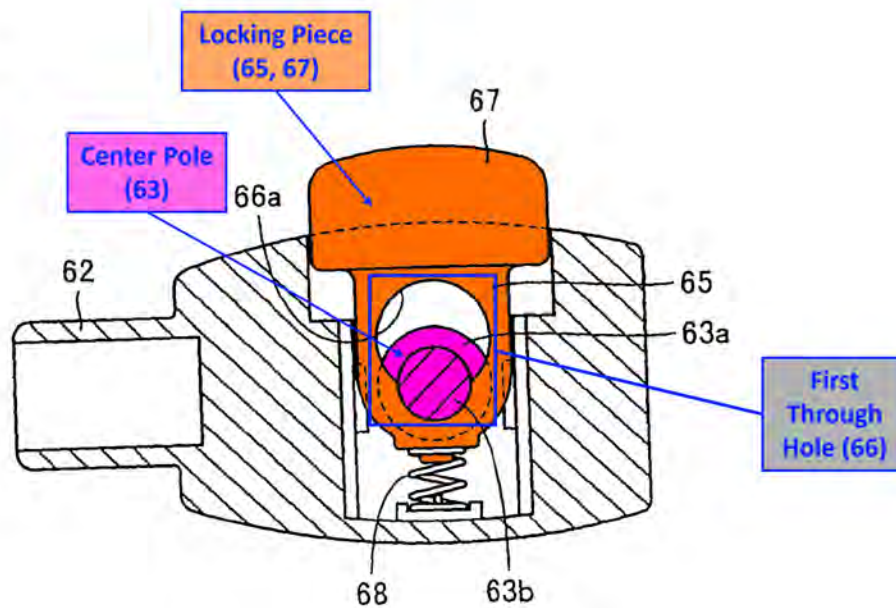


FIG. 9



Id., Figs. 9, 10.

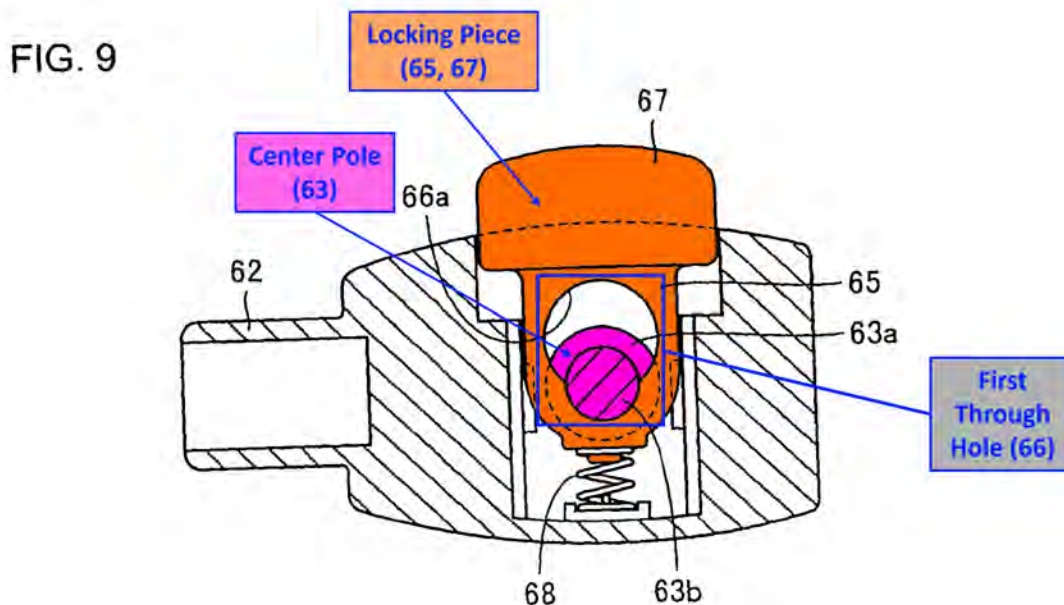
186. As I discuss below, a person of ordinary skill in the art would have understood that Ohnishi's locking piece would function exactly the same way (e.g., would allow Rousselle's center pole to pass through the first through hole) when

combined with Rousselle's central lock. *See* ¶198, below. Accordingly, Ohnishi discloses, or at least suggests, this limitation.

c. Locked State

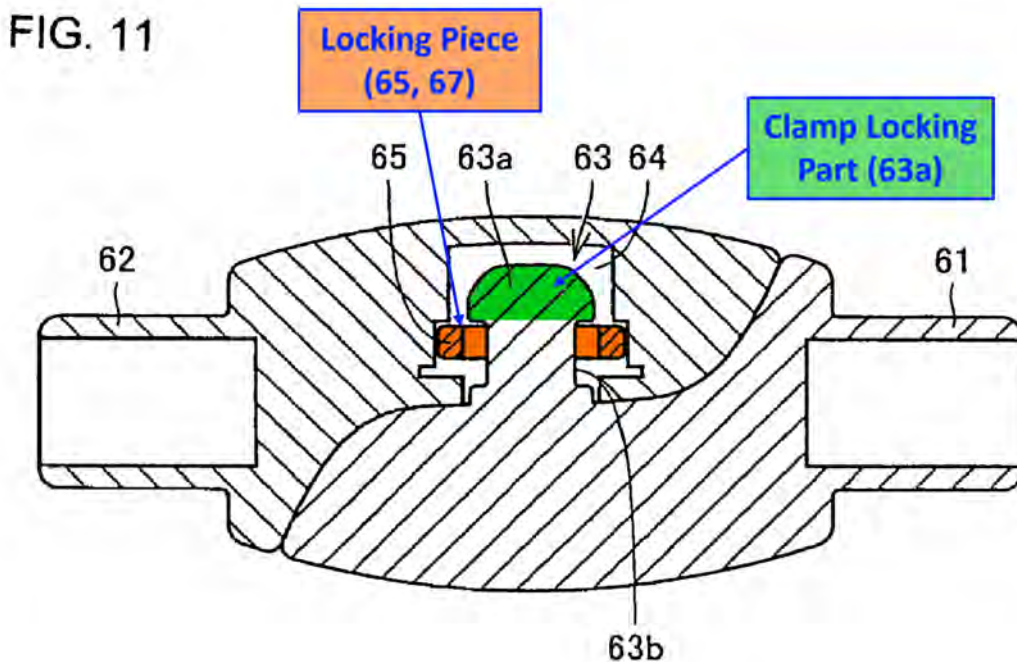
187. Claim 4 further recites that “when said central lock is in a locked state, part of an inner wall of said first through hole of said locking piece is clamped with said clamping groove of said center pole, and an upper end surface of said clamp locking part abuts against a lower end surface of said locking piece.” Ohnishi discloses, or at least suggests, this limitation.

188. When Ohnishi's central lock (connection mechanism) is “in a fixedly connected state” (e.g., locked), “the neck portion 63b of the fixed shaft 63 . . . fits in the small-diameter hole 66b of the lock member 65[.]” Ex. 1006 (Ohnishi), 7:61-8:3. Thus, in the locked state, part of Ohnishi's first through hole (small-diameter hole 66b) is clamped with the clamping groove (neck portion 63b) of the center pole. This is shown in Figure 9:



Id., Fig. 9.

189. Furthermore, in the locked state, Ohnishi's "lock member 65 is interposed between the head portion 63a of the fixed shaft 63 and the first handle arm 61." *Id.*, 7:61-8:3. Thus, in the locked state, an upper end surface of Ohnishi's clamp locking part (head portion 63a) abuts a lower end surface of the locking piece (which includes lock member 65). Figure 11 shows this:



Ex. 1008, Fig. 11. A person of ordinary skill in the art would have understood Ohnishi to disclose that the two parts touch, and therefore abut. Additionally, a person of ordinary skill would have understood that, when combined, Rousselle's clamp locking part and Ohnishi's locking piece would be in contact when the lock was in a locked state because the combined lock experiences the same forces the '738 patent's lock does. Accordingly, Ohnishi discloses, or at least suggests, this limitation.

d. Unlocked State

190. Claim 4 further recites that “when said central lock is in said unlocked state, said inner wall of said first through hole of said locking piece is separated from

said clamping groove and said clamp locking part can pass through said first through hole.” Ohnishi discloses, or at least suggests, this limitation.

191. To unlock Ohnishi’s central lock, “the operation member 67 is pressed down to move the lock member 65 In this position, the large-diameter hole 66a of the lock member 65 is aligned with the head portion 63a of the fixed shaft 63. Accordingly . . . the head portion 63a of the fixed shaft 63 passes through the large-diameter hole 66a of the lock member 65[.]” Ex. 1006 (Ohnishi), 8:4-14. Thus, in an unlocked state, Ohnishi’s lock member 65 is moved from its locked position and is instead aligned with the head portion 63a of the fixed shaft 63, which a person of ordinary skill in the art would have understood to mean that the inner wall of the first through hole (through hole 66) is separated from the clamping groove (neck portion 63b). Furthermore, Ohnishi’s clamp locking part (head portion 63a) passes through the first through hole (through hole 66).

192. As I discuss below, a person of ordinary skill in the art would have understood that Ohnishi’s locking piece would function exactly the same way (e.g., would allow Rousselle’s clamp locking part to pass through the first through hole) when combined with Rousselle’s central lock. See ¶198, below. Accordingly, Ohnishi discloses, or at least suggests, this limitation.

e. Motivation to Combine

193. A person of ordinary skill in the art would have been motivated to combine Ohnishi's locking piece with Rousselle's lock (thereby replacing Rousselle's locking piece) for several reasons.

194. First, Ohnishi's locking piece was known in the art, and interacts with a center pole essentially identical to Rousselle's, leading a person of ordinary skill in the art to reasonably expect success in the combination. *See, e.g.*, Ex. 1006 (Ohnishi), Figs. 9-11; Ex. 1003 (Rousselle), Figs. 2(A)-2(C).

195. Second, the combination represents nothing more than the simple addition of one known element (Ohnishi's locking piece) to another known element (Rousselle's lock) to obtain predictable results (a lock as in Rousselle with a locking piece as in Ohnishi).

196. Third, the combination represents the use of a known technique (using a locking piece as in Ohnishi) to improve a similar device and method (Rousselle's lock) in the same way.

197. Fourth, the combination applies a known technique (including a locking piece as in Ohnishi) to a known device and method (Rousselle's lock) that is ready for improvement and yields predictable results (a lock that utilizes a locking piece as in Ohnishi).

198. A person of ordinary skill in the art would have understood that when combining Rousselle's lock with Ohnishi's locking piece, Ohnishi's locking piece would, or could easily be modified to, engage the clamping groove of Rousselle's center pole because Ohnishi's center pole is of the same design and essentially identical. Ohnishi's locking piece would engage Rousselle's clamping groove in exactly the same way; it would have been received in Rousselle's center bottom cap in exactly the same way; it would have moved along a radial direction of Rousselle's center pole in the same way; and it would allow Rousselle's center pole to pass through its through hole in exactly the same way. Furthermore, Rousselle's lock would continue to work exactly the same way as before; for example, an upper end surface of Rousselle's clamp locking part and a lower end surface of Ohnishi's locking piece would be in contact (e.g., abut) when the lock is in a locked state because the combined lock experiences the same forces Rousselle's original lock (and the '738 patent's lock) does.

199. Accordingly, Rousselle, Tsai, and Ohnishi disclose, or at least suggest, each of the limitations of claim 4, and claim 4 would have been obvious as a whole to a person of ordinary skill in the art in view of those references.

2. Claim 13

200. Claim 13 depends from claim 4 and further recites that "said first through hole comprises a clamping hole part and a through hole part arranged side

by side, said clamping hole part has a diameter not smaller than that of said clamping groove, and said through hole part has a diameter greater than that of said clamp locking part.” Each of these limitations is disclosed by the prior art.

a. Clamping Hole Part

201. Claim 13 recites that “said first through hole comprises a clamping hole part” that “has a diameter not smaller than that of said clamping groove.” Ohnishi discloses, or at least suggests, this limitation.

202. Ohnishi discloses that its first through hole (through hole 66) includes “a small-diameter hole 66b” which has a diameter “slightly larger than that of the neck portion 63b” (the clamping groove). Ex. 1006 (Ohnishi), 7:40-50; *id.*, 7:61-8:29, Figs. 9-10. Thus, Ohnishi’s first through hole (through hole 66) comprises a clamping hole part (small-diameter hole 66b) which has a diameter not smaller than (e.g., slightly larger than) the clamping groove (neck portion 63b). *Id.* Figures 9 and 10 show Ohnishi’s clamping hole part:

FIG. 10

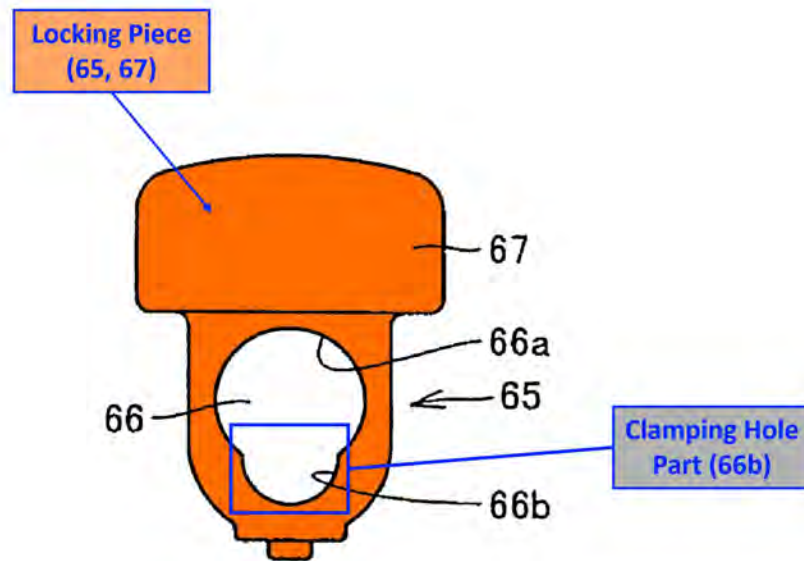
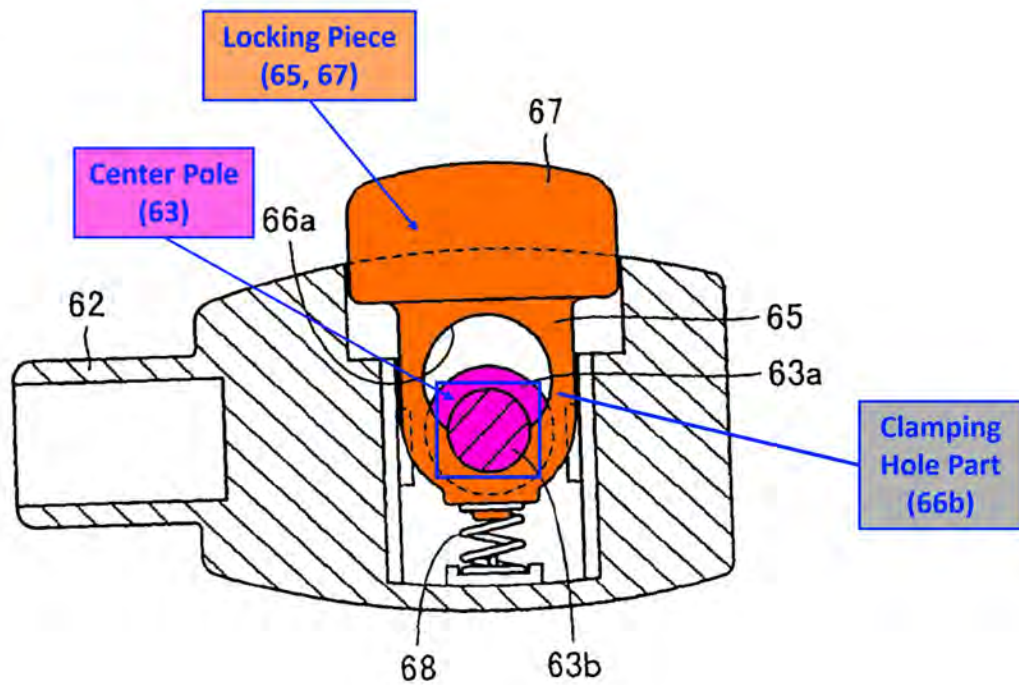


FIG. 9



Ex. 1006 (Ohnishi), Figs. 9-10.

203. A person of ordinary skill in the art would have understood that Ohnishi's locking piece would function exactly the same way (e.g., would have a

clamping hole part with a diameter not smaller than that of Rousselle's clamping groove) when combined with Rousselle's central lock. Accordingly, Ohnishi discloses, or at least suggests, this limitation.

b. Through Hole Part

204. Claim 13 recites that "said first through hole comprises . . . a through hole part arranged side by side [with the clamping hole part]" where "said through hole part has a diameter greater than that of said clamp locking part." Ohnishi discloses, or at least suggests, this limitation.

205. Ohnishi discloses that its first through hole (through hole 66) includes "a large-diameter hole 66a" which has a diameter "larger than that of the head portion 63a of the fixed shaft 63" (the clamp locking part). Ex. 1006 (Ohnishi), 7:40-50; *id.*, 7:61-8:29, Figs. 9-10. Figures 9 and 10 show Ohnishi's through hole part:

FIG. 9

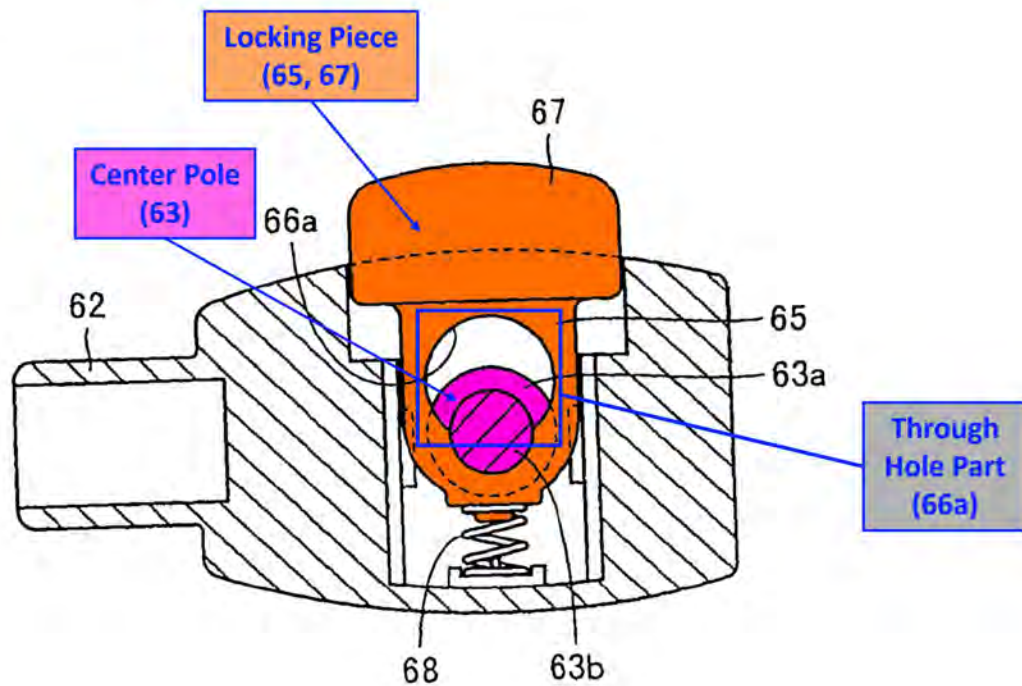
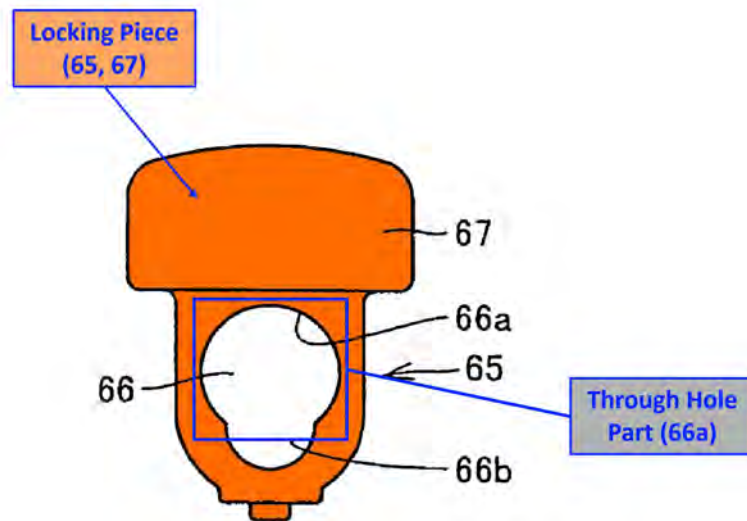


FIG. 10



Id., Figs. 9-10.

206. As shown in Figures 9 and 10, Ohnishi discloses that the clamping hole part (small-diameter hole 66b) and the through hole part (large-diameter hole 66a)

are arranged side by side. Ex. 1006 (Ohnishi), 7:40-50 (“small-diameter hole 66b” is “formed so as to overlap a . . . part of the large-diameter hole 66a”), Figs. 9-10.

207. A person of ordinary skill in the art would have understood that Ohnishi’s locking piece would function exactly the same way (e.g., would have a through hole part with a diameter greater than that of Rousselle’s clamp locking part) when combined with Rousselle’s central lock. Accordingly, Ohnishi discloses, or at least suggests, this limitation.

208. Accordingly, Rousselle, Tsai, and Ohnishi disclose, or at least suggest, each of the limitations of claim 13, and claim 13 would have been obvious as a whole to a person of ordinary skill in the art in view of those references.

3. Claim 14

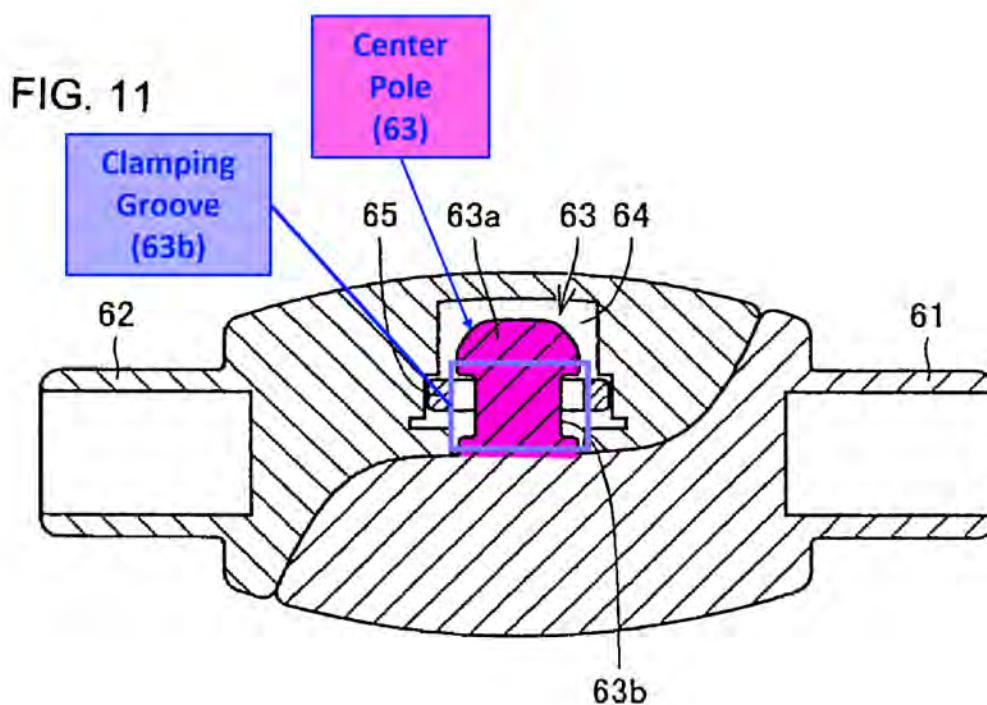
209. Claim 14 depends from claim 4 and recites additional limitations, each of which is disclosed by the prior art.

a. Annular Groove

210. Claim 14 recites that “said clamping groove is an annular groove.” This limitation is obvious in view of Rousselle and Tsai for the reasons I discuss above. ¶¶174-176, above.

211. Additionally, this limitation would have been obvious in view of Ohnishi, which discloses a center pole with an annular clamping groove. Ohnishi discloses (or, at least, a person of ordinary skill in the art would have understood

from Ohnishi’s disclosure) that its “fixed shaft 63,” which is a center pole, includes a “neck portion 63b having a smaller diameter” (e.g., a clamping groove). Ex. 1006 (Ohnishi), 7:33-39; *id.*, 7:40-50, 7:61-8:29, Figs. 9, 11-12. Ohnishi shows that the neck portion 63b is an annular groove because it extends around the circumference of the shaft 63 and is thus ring-shaped. *Id.*

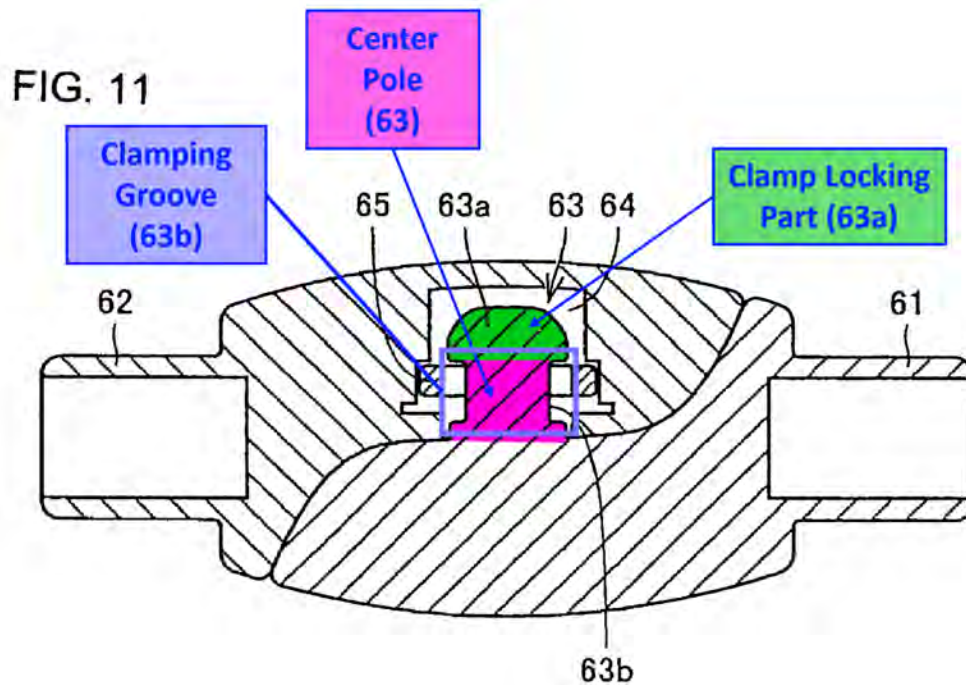


Id., Fig. 11. To the extent Rousselle's center pole did not have an annular groove, a person of ordinary skill in the art would have been motivated to replace Rousselle's center pole with Ohnishi's, or at least to include an annular groove in Rousselle's center pole, because such a design was intended to work with Ohnishi's locking piece. Thus, Ohnishi discloses, or at least suggests, this limitation.

b. Guide Part

212. Claim 14 further recites that “an end portion of said clamp locking part is provided with a guide part of a semispherical shape or a conical shape with a gradually decreased diameter.” This limitation is obvious in view of Rousselle and Tsai for the reasons I discuss above. ¶¶177-178, above.

213. Additionally, Ohnishi discloses that the end of its center pole includes a clamp locking part with a semispherical shape. Ohnishi discloses that its center pole (fixed shaft 63) includes a “head portion 63a having a larger diameter” (e.g., a clamp locking part). Ex. 1006 (Ohnishi), 7:33-39; *id.*, 7:40-50, 7:61-8:29, Figs. 9, 11-12. As shown in Figure 11, the head portion 63a includes a guide part with a semispherical shape:



Id., Fig. 11. To the extent Rousselle's clamp locking part did not have a guide part with a semispherical shape, a person of ordinary skill in the art would have been motivated to replace Rousselle's center pole (including its clamp locking part) with Ohnishi's, or at least to include a guide part with a semispherical shape in Rousselle's clamp locking part, because such a design was intended to work with Ohnishi's locking piece. Thus, Ohnishi discloses, or at least suggests, this limitation.

214. Accordingly, Rousselle, Tsai, and/or Ohnishi disclose, or at least suggest, each of the limitations of claim 14, and claim 14 would have been obvious as a whole to a person of ordinary skill in the art in view of those references.

VI. CONCLUSION

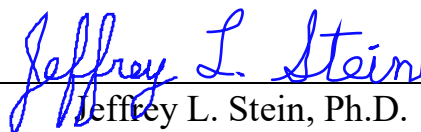
215. For the foregoing reasons, it is my opinion that claims 1, 2, 4, 13, and 14 of the '738 patent would have been obvious in view of the prior art discussed above and the knowledge of one of ordinary skill in the art at the time of the alleged invention.

216. I reserve the right to supplement my opinions in the future to respond to any arguments or positions that the patent owner may raise, taking account of new information as it becomes available to me.

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

Dated: February 9, 2023

By: _____


Jeffrey L. Stein, Ph.D.