

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

SECOND DECLARATION OF JEFFREY L. STEIN, PH.D.

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I, Jeffrey L. Stein, Ph.D., declare as follows:

1. I am making this declaration at the request of Global Shade Corp. (“Global Shade”).

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. I do not own any stock in Global Shade and, to my knowledge, I have no financial interest in Global Shade.

3. In preparing this Declaration, I considered the Declaration of Dr. Wendy Reffeor (Ex. 2007, “Reffeor Declaration”), the exhibits cited therein, and all other references identified herein.

4. I understand that my prior declaration was submitted as Exhibit 1002 (“Prior Declaration”), and I refer to certain portions of my Prior Declaration and the exhibits cited therein. I remain unaware of any evidence that would suggest that the challenged claims of the ’738 patent would not have been obvious.

5. I understand that Dr. Reffeor has applied a slightly different definition than I have for a person of ordinary skill in the art. While I maintain that my definition, provided in my Prior Declaration (Ex. 1002 ¶26), is correct, my opinions would not change under Dr. Reffeor’s definition (Ex. 2007 ¶25).

6. In this Declaration, I provide opinions and enumerate ways in which I disagree with Dr. Reffeor and the opinions as stated in the Reffeor Declaration.

However, this Declaration does not enumerate all ways in which I disagree with Dr. Reffeor, and the fact that I do not address some of Dr. Reffeor's statements should not be taken to mean that I agree with them.

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

7. Dr. Reffeor offers the opinions that "a POSITA would not start with Rousselle's umbrella tent and add features from Tsai to create the structure of Claim 1 of the '738 Patent" and that "a POSITA would not start with Tsai and add features from Rousselle's umbrella tent to create the structure of Claim 1 of the '738 Patent." Ex. 2007 ¶¶56, 60. I disagree for at least the following reasons.

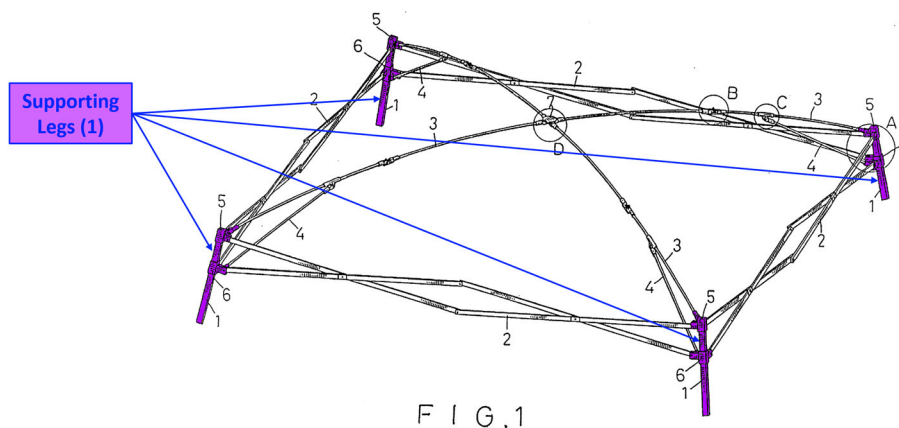
A. Rousselle's Alleged Inversion of the Legs

8. In ¶57, Dr. Reffeor suggests that "a POSITA would see that it is impossible to add the scissoring mechanism from Tsai to the frame of Rousselle" because, in her view, Rousselle requires its canopy legs to rotate "from upward facing to downward facing" and they would not be able to do so when Tsai's outer retractable units are added. Ex. 2007 ¶57. I disagree. First, Rousselle's legs are not required to invert. Rousselle discloses that its canopy legs may invert, as Dr. Reffeor describes, but Rousselle also recognizes that "various leg segments, shapes, etc. can be varied extensively between embodiments, and that the illustrated and described embodiments are merely exemplary designs." Ex. 1003 (Rousselle), 16:14-19. From this alone, a person of ordinary skill would have

understood Rousselle's disclosure to encompass other leg designs that do not invert.

9. Second, even the legs shown in Rousselle's Figure 1(D), which, as shown, are capable of inverting, need not do so—one need only stop folding the canopy just before inverting the legs to be left with a slightly less compact, but still *collapsible*, canopy. See, e.g., Ex. 1003 (Rousselle), Fig. 1(D). A canopy as shown in Rousselle's Figure 1(D), modified to include Tsai's outer retractable units, would still meet each limitation of challenged claim 1 in exactly the way I described in my Prior Declaration if one simply stopped collapsing the canopy frame without inverting the legs.

10. The skilled artisan's understanding that Rousselle's disclosure encompassed non-inverting legs would have been well-founded because such legs were well-known in the art and were commonly used in tents and canopies. For example, I note that Tsai also discloses canopy legs that do not invert:

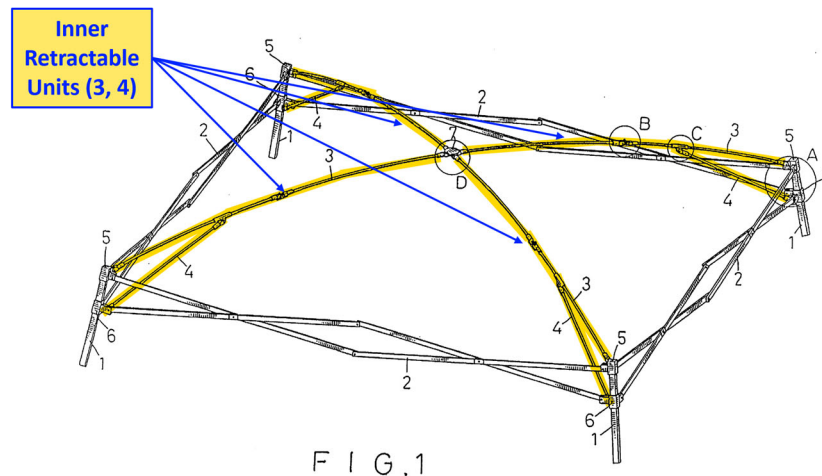


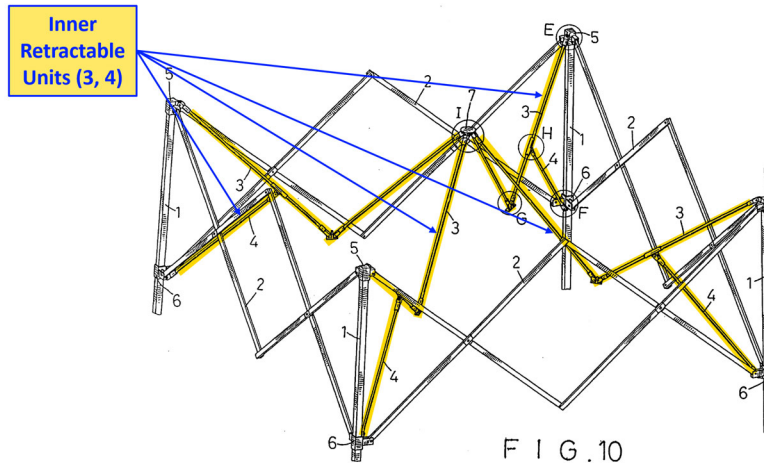
Ex. 1005 (Tsai), Fig. 1; Ex. 1002 ¶62. Accordingly, even if Rousselle did not disclose such legs, a person of ordinary skill would have immediately recognized that any of the numerous well-known canopy leg designs could be used in the proposed combination, including those of Tsai or others that do not invert when the canopy is folded. *E.g.*, Ex. 1005 (Tsai), Fig. 1; Ex. 1007 (Wu), Fig. 3; Ex. 1008 (Byun), Fig. 3; Ex. 1009 (Carter), Fig. 4; Ex. 1010 (Tseng), Fig. 11; Ex. 1012 (Jang), Fig. 3. Furthermore, even if inverting legs offered some benefit, a person of ordinary skill would have understood that in many situations (for example, when a canopy is expected to be used outdoors and subjected to forces from wind) the stability benefits of outer retractable units would outweigh any purported benefit of inverting legs.

11. A person of ordinary skill would have reasonably expected success in using non-inverting legs because Rousselle discloses that nothing about its canopy structure is critical: its central lock “can be used with a variety of other frame structures.” Ex. 1003 (Rousselle), 15:58-63. Thus, Rousselle makes clear that the particular methods of folding shown in its figures are not critical, and certainly not Rousselle’s main principle of operation. *See, e.g., id.*, 16:14-19 (“various leg segments, shapes, etc. can be varied extensively between embodiments, and [] the illustrated and described embodiments are merely exemplary designs”). Instead, Rousselle’s focus is on the central lock (*see* Ex. 1003 (Rousselle), 2:48-50

(invention involves “a collapsible shelter/tent that has an improved means for locking a frame thereof”)), and the combinations I discussed in my Prior Declaration maintain the principle of operation of the central lock exactly.

12. Third, as I discussed in my Prior Declaration, Tsai discloses *inner* retractable units and it would have been obvious to a person of ordinary skill to combine Rousselle’s canopy with Tsai’s inner retractable units. Ex. 1002 ¶¶83-93. As I discussed, Tsai’s inner retractable units comprise a number of pieces that together form a Y-shape; the lower arm of each Y-shape is “pivotally secured to respective sliding connectors 6” which move along the canopy’s leg when folding or unfolding. Ex. 1005 (Tsai), 7:15-8:5. These components in both an unfolded and partially folded state are shown below:





Id., Figs. 1, 10; *see also id.*, Figs. 2, 11 (canopy support rod 3 connected to fixed connector 5), 12 (linking rod 4 connected to sliding connector 6). Thus, when combined with Rousselle, this Y-shaped outer section of Tsai’s inner retractable units would allow the canopy to fold (e.g., the sliding connector would move down the canopy’s leg while attached to the hinged linking rod of the inner retractable unit) and unfold (e.g., the sliding connector would move back up the canopy’s leg) without the need for the canopy’s legs to invert.

B. Rousselle’s Alleged Flexible Elements

13. In ¶58, Dr. Reffeor opines that “a POSITA would not have been motivated to make the combination because the umbrella tent described in Rousselle relies on flexible support elements (leg tubes 310 and band bars 320)” that “could not effectively be combined with the scissoring features of Tsai” because they “could neither support the weight of the scissor elements, nor ... maintain those elements in the unfolded position.” I disagree.

14. While Dr. Reffeor does not cite any disclosure in Rousselle (or anywhere else) in ¶58 to support her opinion, in ¶48 she suggests that “it is clear the leg tubes 310 and band bars 320 are flexible” because “Figures 1(A) through 1(C) and 18(A) ... all show curved band bars 320,” “[a] structure cannot be erected from Figure 1(D), 18(B), 19(A), 19(B), or 19(C) without flexing these members,” and because “Rousselle clearly describes the potential energy caused by flexing the frame.” I disagree with Dr. Reffeor’s apparent conclusion in ¶¶48 and 58 that Rousselle’s leg tubes 310 and band bars 320 must be too flexible to support Tsai’s outer retractable units or maintain Tsai’s outer retractable units in the unfolded position. First, simply because Rousselle depicts band bars 320 as curved does not mean that the band bars are necessarily curved or too flexible. Indeed, Rousselle discloses that “the frame can be locked at a position” which is “closer to the horizontal position of the center tubes 500” than previously possible and that the “corner between a ceiling and a side” may be “at or near a ‘right angle.’” Ex. 1003 (Rousselle), 11:20-32. A person of ordinary skill would have understood that this means that the leg tubes 310 and band bars 320 would be straight, or very close to straight, and would not flex more than a minimal amount. For this reason, at least Figure 1(D)’s structure could be erected without flexing the leg tubes and band bars (e.g., similar to what is shown in Figure 1(A)). *Id.*, Figs. 1(A), 1(D).

15. I also note that Dr. Reffeor's discussion of the potential energy caused by the flexing of the frame is not relevant because that portion of Rousselle is discussing a different embodiment of the canopy, shown in Figure 1(C), which includes a 180 degree angle between the band bars and the leg tubes rather than the 90 degree angle shown in Figure 1(A)¹, and relies instead on flexible components to achieve the 90 degree bend. The embodiment of Figure 1(A), which I relied on in my Prior Declaration, does not include this feature.

16. As a person of ordinary skill would have understood, when Tsai's outer retractable units are combined with Rousselle's canopy, the outer retractable units provide additional support to Rousselle's legs and inner retractable units, reducing the loads that those members experience and reducing the amount that Rousselle's legs and inner retractable units bend and flex. In my experience, a person of ordinary skill knew how to adjust the flexibility and rigidity of structural members like those that make up Rousselle's canopy, for example by varying the thickness, cross section, or materials of those structural members. Accordingly, a

¹ I note that Dr. Reffeor's statement that "the hinges described cannot reach ninety degrees" contradicts Rousselle's express disclosure. Ex. 1003 (Rousselle), 11:4-19 (hinge angle "can be in a broad range between about 180 degrees ... and 90 degrees"), 11:28-32 (hinge angle "is at or near a 'right angle'").

person of ordinary skill would have understood that, to the extent necessary, Rousselle's legs and inner retractable units could be modified in combination with Tsai's outer retractable units to create a functioning canopy. Thus, I disagree with Dr. Reffeor's conclusion that Rousselle's legs and inner retractable units are too flexible to support Tsai's outer retractable units or maintain them in the unfolded position.

17. I also note that Rousselle recognizes that its canopy frame may experience significant forces, as indicated by its teaching that components of its locking mechanism should be "preferably made with strong materials, such as with metals (such as aluminum, stainless steel, or other metals)." Ex. 1003 (Rousselle), 8:52-55. A skilled artisan would have understood that the remainder of Rousselle's canopy, including the legs and band bars, could be made from aluminum or stainless steel as well. Aluminum is a well-known material that is used in a wide array of applications because of its relatively high strength for its weight, as a person of ordinary skill in the art would have known. *See, e.g.*, Ex. 1009 (Carter), 1:41-61 (well known canopies used "lightweight material" for their frames); Ex. 1007 (Wu) ¶[0048] ("As one of ordinary skill in the art will appreciate ... components described above can be fabricated using commonly available materials and machines" so the "weight ... can therefore vary depending on the materials used and/or application desired."). Thus, a person of ordinary skill in the

art would have immediately recognized that a canopy frame with components made of aluminum, or even stainless steel, would have been entirely capable of supporting the weight of Tsai's outer retractable units and maintaining them in an unfolded position.

18. Moreover, Rousselle states that its canopy can support "substantial shelters/tents" including "recreational tent," "ice fishing," "cabana," "or any other desired cover[s]," with "different weights," including both "with or without one or more side," and ranging "in sizes from single person tents ... to large tents having ceiling heights of eight to ten feet or even substantially greater." Ex. 1003 (Rousselle), 8:58-9:13, 12:22-44. A person of ordinary skill in the art would have recognized that such a wide variety of applications would require Rousselle's canopy to be capable of maintaining an unfolded position against significant force. Any additional load to Rousselle's legs and/or inner retractable units caused by the addition of Tsai's outer retractable units would be small compared to the loads created by the kind of wind likely to be experienced by a canopy used for, for example, "ice fishing," as Rousselle suggests. *Id.*; *see also* Ex. 1104 (Choi), 1:12-15. Thus, a person of ordinary skill would not have been concerned about any additional weight added by Tsai's outer retractable units.

19. I also note that Rousselle also discloses that aspects of its canopy, including its central lock, "can be used with a variety of other frame structures"

and is compatible with “multiple or different covers” including canopies “with or without one or more side[s].” Ex. 1003 (Rousselle), 12:22-39, 15:58-63. Accordingly, a person of ordinary skill would have understood that Rousselle’s disclosure was not limited to canopies that rely on sheet material for stability, and would instead have understood that Rousselle’s teachings were more broadly applicable to “a variety of other frame structures,” including canopies with outer retractable units like Tsai’s.

20. Lastly, nothing in Tsai suggests that its outer retractable units weigh a significant amount or that they would impart any significant force that would cause the resulting canopy to be unable to maintain an unfolded position. As discussed above, materials such as aluminum were well known as being strong and lightweight, and a person of ordinary skill in the art would have understood that the canopy’s components, including the outer retractable units, would be made out of aluminum or a similar material. *See, e.g.*, Ex. 1009 (Carter), 1:41-61; Ex. 1007 (Wu) ¶[0048]. Moreover, as I explained in my Prior Declaration, Tsai’s outer retractable units *increase* the stability of the canopy when it is unfolded, rather than pulling the legs back together as Dr. Reffeor seems to suggest in ¶58. *See* Ex. 1002 ¶¶63-78.

21. Even if Dr. Reffeor’s opinion in ¶59 that “nothing in Rousselle implies a need for additional support” between the canopy frame’s legs is correct,

Dr. Reffeor ignores the disclosure in other references such as Tsai that discloses the benefits of outer retractable units, as I discussed in my Prior Declaration. Ex. 1002 ¶73. For the same reason, I disagree with Dr. Reffeor's statement that "such connections [would not] be desirable given the added weight, cost, and complications such connections would introduce for no apparent benefit." Ex. 2007 ¶59. Instead, as discussed above, the added weight would not be significant; as I discussed in my Prior Declaration, the combination would not be complicated (*see* Ex. 1002 ¶¶74-78); and Tsai discloses several benefits of outer retractable units (*Id.* ¶73).

22. Furthermore, I disagree with Dr. Reffeor's statement in ¶59 that "structures such as Rousselle's typically do not have connections between the legs." Rather, the use of supports between canopy legs was well-known. *See, e.g.*, Exs. 1005, 1007-1010, 1012.

C. Tsai's Alleged Teaching Away

23. Dr. Reffeor states in ¶62 that "Tsai clearly locks the unfolded structure in place using leg locks." I note that Tsai is not directed to leg locks and leg locks do not form Tsai's main principle of operation; instead, Tsai is directed to a canopy that "is relatively easy to fold and unfold, stable, and still compact when folded" at least in part by including outer retractable units. Ex. 1005 (Tsai), 3:11-4:10.

24. In ¶62, Dr. Reffeor further states that Tsai “specifically describes a central locking mechanism as inferior.” I disagree because Tsai does not discuss a central locking mechanism at all. *See generally* Ex. 1005 (Tsai). The prior art canopies Tsai discusses included center struts, but Tsai does not suggest that these prior art canopies used the center strut for locking. *Id.*, 1:26-2:22. For this reason, and for the reasons discussed below, there are significant differences between the prior art canopies shown in Tsai’s Figures 16 and 17 and Rousselle’s canopy.

25. Dr. Reffeor also opines in ¶62 that “Tsai teaches that a double clevis, central locking mechanism is inferior for 2 reasons,”² the first of which is that “[i]t often requires a second person to push upward at the center of the structure.” I disagree. Because the prior art canopies shown in Figures 16 and 17 in Tsai included a center strut (not a lock³) as well as leg locks, they would sometimes

² Dr. Reffeor also articulates these two reasons in ¶55; I disagree with Dr. Reffeor’s assertions there for the same reasons as for ¶62.

³ Tsai does not include any suggestion that the canopies it shows in Figures 16 and 17 include a central lock. Ex. 1005 (Tsai), 1:26-2:22. Instead, Tsai suggests that those canopies used leg locks. Tsai discusses U.S. Patent No. 4,607,656 (Ex. 1106) and suggests that its canopy is similar to those of Tsai’s Figures 16 and 17.

require one person to activate the leg locks and another to push up the center strut. *See* Ex. 1005 (Tsai), 1:26-2:22. But this has no relevance to the combinations I discussed in my Prior Declaration, which either (1) merely add Tsai’s inner and/or outer retractable units to Rousselle’s canopy, which does not have leg locks; or (2) *replaces* Tsai’s leg locks with Rousselle’s center lock, removing any need for a person to activate leg locks. In either case, as Rousselle discloses, its lock allows a single user to unfold the canopy and activate the central lock. Ex. 1003 (Rousselle), 3:45-47, 13:59-67.

26. The second reason Dr. Reffeor believes that “Tsai teaches that a double clevis, central locking mechanism is inferior” is that “[i]t reduces head space within the structure.” Ex. 2007 ¶62. However, the canopies Tsai references are of a different design than Rousselle’s or Tsai’s canopy. *Compare, e.g.*, Ex. 1005 (Tsai), Fig. 17 (prior art center-strut canopy) *with* Ex. 1003 (Rousselle), Fig. 1(A); Ex. 1005 (Tsai), Fig. 1. Tsai’s center-strut canopy includes inner units made of large “scissors-type linkage[s]” that are located well below the canopy’s roof. Ex. 1005 (Tsai), 2:14-16, Fig. 17. In contrast, as I discussed in my Prior Declaration, both Tsai and Rousselle disclose inner units that form a roof frame of

Id., 2:26-3:8. The ’656 patent discloses that its canopy uses leg locks. Ex. 1106, 2:58-3:6, Fig. 6.

the canopy, thereby obviating any problem of reduced headroom. Ex. 1002 ¶¶94-98; Ex. 1003 (Rousselle), 6:57-64, Figs. 1A-1C; Ex. 1005 (Tsai), 8:34-9:28, Figs. 1, 20. Thus, the discussion of reduced headroom in Tsai is inapplicable to the combinations I discussed in my Prior Declaration (e.g., the combination of Tsai's outer and/or inner retractable units with Rousselle's canopy and the combination of Rousselle's central lock with Tsai's canopy).

27. For at least these reasons, I disagree with Dr. Reffeor's statements that "Tsai teaches against a central locking mechanism because it indicates that the central locking mechanism is not as effective as leg locks" and that "a POSITA would have no reason to refer to Rousselle for the use of the locking mechanism as Tsai clearly teaches against its use." Ex. 2007 ¶62. Furthermore, as I discussed in my Prior Declaration, Rousselle discloses the benefits of central locks. Ex. 1002 ¶¶102-03. A person of ordinary skill would have understood that these benefits outweigh any possible downside of removing Tsai's leg locks.

D. Tsai's Alleged Flexible Elements

28. In ¶63, Dr. Reffeor states that "the flexible canopy support rods 3 used in Tsai would be unable to support locking the frame in position from the center" because "the legs/poles [could] move independently by simply flexing or unflexing the canopy structure and canopy support rods 3 even with the central lock." I disagree. I note that Dr. Reffeor does not cite any disclosure from Tsai (or

elsewhere) in ¶63, but appears to rely on her discussion in ¶53. There, she states that “[t]hroughout [Tsai], this canopy support mechanism can be seen to be composed of flexible elements, including canopy supporting rods 3” because “[a]ll figures ... are shown with arched canopies and canopy supporting rods” and because the canopy supporting rods are circular in cross section. Ex. 2007 ¶53. I disagree with Dr. Reffeor’s conclusion that Tsai’s canopy supporting rods 3 are too flexible to drive the unfolding of the canopy. Indeed, Tsai suggests the opposite. *E.g.*, Ex. 1005 (Tsai), 4:19-22 (inner units “less likely to sag” than prior art canopies). Furthermore, as discussed above, a person of ordinary skill in the art would have understood that the canopy’s components, including the inner retractable units, would be made out of aluminum or a similar lightweight, strong material. *See, e.g.*, Ex. 1009 (Carter), 1:41-61; Ex. 1007 (Wu) ¶[0048]. In my experience, it would have been well within the skill of a person of ordinary skill in the art to select dimensions and materials for Tsai’s inner retractable units that would allow for any needed flexibility while ensuring that the inner retractable units were sufficiently strong to drive unfolding of the canopy.

29. I also disagree that Tsai’s canopy supporting rods 3 are too flexible to drive the unfolding of the canopy because the ’738 patent itself uses a similar structure to Tsai for its inner retractable units:

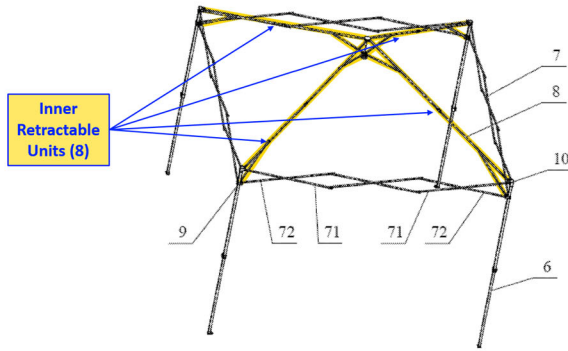


FIG. 16

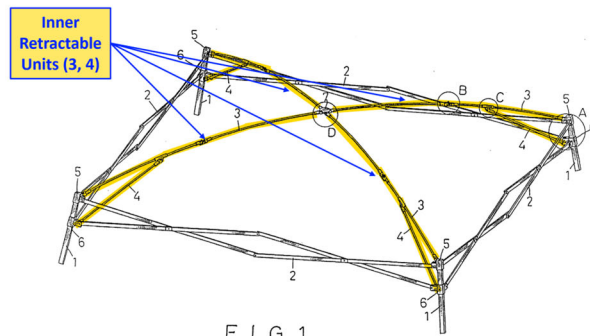


FIG. 1

Compare Ex. 1001 ('738 patent), Fig. 16 with Ex. 1005 (Tsai), Fig. 1. Like Tsai's inner units, the '738 patent's inner units are generally formed from a single, thin rod or other member. The '738 patent asserts that its inner units are capable of driving the unfolding of the canopy and maintaining its stability. *E.g.*, Ex. 1001 ('738 patent), 5:56-66.

30. For the same reasons, I disagree with Dr. Reffeor's statement in ¶64 that "the flexible canopy support rods 3 in Tsai would not allow central deployment/activation as they would be unable to push the scissoring members outward." I further disagree because Tsai contains no disclosure that its outer retractable units are large or heavy or would require significant force to be extended. *See generally* Ex. 1005 (Tsai). However, a skilled artisan would have recognized that it was well known that canopy frames like Tsai's were not heavy or heavy-duty but were instead strong and lightweight, and could easily be unfolded using a central lock as in Rousselle. For example, Carter discloses that prior art canopies "include[] a framework of X-shaped linkages" and "can be

constructed of lightweight material.” Ex. 1009 (Carter), 1:41-61. Carter also discloses that “[a]s such structures have become larger and more lightweight, reinforcing features that contribute to strength, roominess, and ease of use in setting up and taking down such structures have also become increasingly important.” *Id.* Likewise, Wu discloses that its canopy “can be fabricated using commonly available materials and machines. The dimension and weight of a portable collapsible tent of the present invention can therefore vary depending on the materials used and/or application desired.” Ex. 1007 (Wu) ¶[0048].“”

31. I also disagree with Dr. Reffeor’s assertion in ¶64 that Tsai’s disclosure that its canopy is erected by “moving the legs/poles outward until the legs lock” “teaches away from deploying the frame by pushing upward on a central locking mechanism.” Just because Tsai teaches that its canopy may be unfolded by pulling outward on the legs does not discourage a skilled artisan from considering other methods. The disclosure Dr. Reffeor cites in ¶64 contains no indication that Tsai’s canopy could not be unfolded using a central lock like Rousselle’s. Ex. 1005 (Tsai), 10:25-35, 11:1-11.

32. For at least the reasons above, I disagree with Dr. Reffeor’s conclusion in ¶65 that “[e]verything written in Tsai clearly teaches against incorporating a central locking mechanism” and that “one would not use such a central lock to control or drive locking of Tsai’s frame.”

II. THE PROPOSED SUBSTITUTE CLAIMS

33. I understand the Patent Owner has proposed five substitute claims in the event claims 1, 2, 4, 13, and/or 14 are found unpatentable. The substitute claims I understand Patent Owner has proposed are listed below, with the new elements underlined:

15. (substitute for claim 1 if found unpatentable)

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, and

4. a locking piece received in said center bottom cap, wherein said center bottom cap comprises a bottom cap seat and a bottom cap cover that are connected to one another, a receiving chamber is provided in said center bottom cap at a junction between said bottom cap seat and said bottom cap cover, and wherein said locking piece is located within said receiving chamber and between said bottom cap cover and said bottom cap seat;

wherein said collapsible canopy frame is moved to said unfolded state by pushing said center bottom cap upwards to drive said plurality of inner retractable units outwardly, which causes said plurality of outer retractable units and said at least three supporting legs to extend outwards, until said center bottom cap is connected with said center top cap.

16. (substitute for claim 2 if found unpatentable)

The collapsible canopy frame according as in claim [[1]] 15,

wherein each said outer retractable unit comprises three hinged X-shaped rod members, and

wherein: each said supporting leg comprises a sliding sleeve that is moved for moving along a length direction of said respective supporting leg by said pushing of said center bottom cap,

an upper end of each said supporting leg is fixed with a fixed joint,

each said inner retractable unit comprises a first oblique top pipe and a 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 cap of said central lock,

an inner end of said first connecting rod is hinged with a center bottom cap of said central lock, and,

in said unfolded state,

said first connecting rod extends upward from said center bottom cap to said first oblique top pipe to form a Y-shaped member,

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.

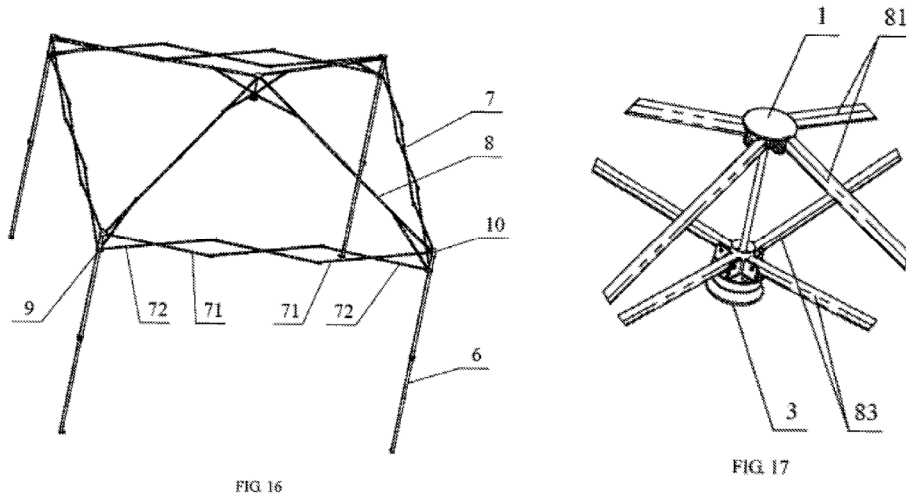
I understand that proposed substitute claims 17-19 merely change their dependency to the corresponding proposed substitute claims (e.g., from claim 1 to claim 15).

A. Proposed Substitute Claim 16 Lacks Written Description Support

34. I understand that, as listed above, the Patent Owner proposes adding the limitation “in said unfolded state, said first connecting rod extends upward from said center bottom cap to said first oblique top pipe to form a Y-shaped member” to substitute claim 16.

35. I understand that in support of this limitation, the Patent Owner relies on a single text citation in the patent application and each of the priority applications, each of which contains the same disclosure. That disclosure states: “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.” Ex. 2013, 7-8. However, that passage does not provide support for the proposed limitation that the “first connecting rod *extends upward* from said center bottom cap” because the passage does not disclose that the first connecting rod extends from the center bottom cap, much less which direction it extends.

36. I understand that the Patent Owner also relies on Figures 16 and 17 of the '738 patent to provide support for the limitation that the “first connecting rod extends upward from said center bottom cap.” Figures 16 and 17 are shown below:



Ex. 1001 ('738 patent), Figs. 16-17. However, neither Figure clearly shows the relevant connecting rod extending upwards. Neither Figure is a direct side view, nor does either Figure identify which direction is “upwards.” Instead, both Figures are from an indeterminate perspective angle, and do not provide sufficient clues for a person of ordinary skill to determine which direction the connecting rods extend—e.g., whether the connecting rods extend slightly upward, horizontally, or slightly downward. Such disclosure is not sufficient to allow a skilled artisan to recognize that the alleged inventor invented, and had possession of, what is claimed.

37. I further understand that the Patent Owner cites Figures 18-19 and 21 as providing support for the proposed limitation broadly (e.g., not specifically for the “extending upwards” portion). However, these Figures do not provide support for the “extending upwards” limitation. Figure 18 depicts the outer corner of the canopy shown in Figure 16 and does not depict the first connecting rod or the center bottom cap at all. Ex. 1001 (’738 patent), Fig. 18. Figure 19 depicts the canopy in a partially folded state, which provides no information about the unfolded state recited in the claim. *Id.*, Fig. 19. And Figure 21 depicts an entirely different embodiment that does not include structures that form a Y-shaped member. *Id.*, Fig. 21.

38. I have reviewed the specification of the ’738 patent. It is completely silent as to whether the connecting rods extend upwards. Even with precise, detailed measurements of the drawings, which would be required to determine whether or not the drawings depict the connecting rods extending horizontally, slightly upwards, or slightly downwards, a person of ordinary skill in the art could not be certain of what is disclosed because there is no indication that the drawings are sufficiently precise or to scale.

B. The Proposed Substitute Claims Would Have Been Obvious

39. Patent Owner’s proposed substitute claims would have been obvious to a person of ordinary skill in the art over the prior art. Because my Prior

Declaration, and the paragraphs above, show how each of the limitations in the original challenged claims are obvious over the prior art, I will address only the new and/or different limitations of the proposed substitute claims.

1. Proposed Substitute Claim 15

40. As I discussed in my Prior Declaration and in the paragraphs above, Rousselle and/or Tsai disclose each limitation of original claim 1. Ex. 1002 ¶¶60-129; ¶¶7-32, above. Rousselle, Tsai, Ohnishi, and Khatchadourian disclose the additional limitations of proposed substitute claim 15.

a. Locking Piece

41. Proposed substitute claim 15 recites “a locking piece received in said center bottom cap.”

42. I explained in my Prior Declaration how the prior art, including Rousselle and Ohnishi discloses this limitation. Ex. 1002 ¶¶158-59, 181-83. In particular, Rousselle and Ohnishi each disclose a locking piece, highlighted in orange:

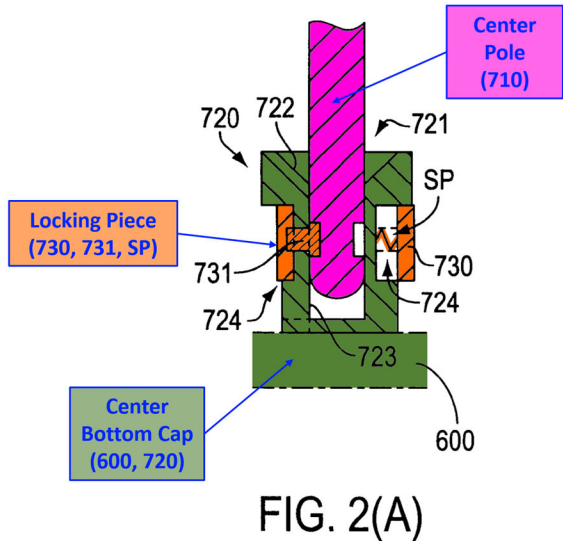
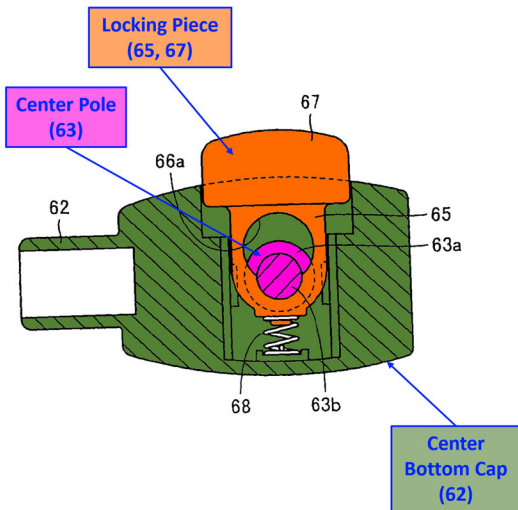


FIG. 9



Ex. 1003 (Rousselle), Fig. 2A; Ex. 1006 (Ohnishi), Fig. 9. Furthermore, as I discussed in my Prior Declaration, each locking piece is received in a center bottom cap. *Id.*; Ex. 1003 (Rousselle), 7:1-31; Ex. 1006 (Ohnishi), 7:51-60; Ex. 1002 ¶¶159, 182.

43. My Prior Declaration also discusses why a person of ordinary skill would have been motivated to combine Ohnishi's locking piece with Rousselle's lock (thereby replacing Rousselle's locking piece) and why a person of ordinary skill would have had a reasonable expectation of success in doing so. Ex. 1002 ¶¶193-98. For example, Ohnishi's locking piece interacts with a center pole that is essentially identical to Rousselle's and would work in exactly the same way when used in Rousselle's center lock. *Id.* Furthermore, Rousselle's lock would continue to work in exactly the same way. *Id.*

44. Thus, Rousselle and Ohnishi each disclose, or at least suggest, this limitation.

b. Bottom Cap Seat & Bottom Cap Cover

45. Proposed substitute claim 15 recites that the “center bottom cap comprises a bottom cap seat and a bottom cap cover that are connected to one another,” “a receiving chamber is provided in said center bottom cap at a junction between said bottom cap seat and said bottom cap cover,” and the “locking piece is located within said receiving chamber and between said bottom cap cover and said bottom cap seat.” A person of ordinary skill combining Rousselle and Ohnishi as I discussed in my Prior Declaration would have been motivated to implement the combination in a way that meets the limitations, at least in view of Khatchadourian.

46. As I discussed in my Prior Declaration, a person of ordinary skill would have been motivated to replace Rousselle’s locking piece with Ohnishi’s. Ex. 1002 ¶¶193-98. In doing so, a person of ordinary skill would have needed to solve practical problems such as how to retain Ohnishi’s locking piece within Rousselle’s structure and would have done so using routine design changes. For example, for ease of manufacturing and maintenance, a skilled artisan would have recognized that it would be advantageous to have easy access to insert and remove the locking piece from the lock.

47. To solve this practical problem, a person of ordinary skill would have understood that there are a handful of known, reliable solutions. One such solution is simply to manufacture the bottom cap in two pieces that meet where the locking piece is to be located. Indeed, Rousselle's bottom cap already consists of at least two pieces (the lower clevis 600 and the lock housing 720). *E.g.*, Ex. 1003 (Rousselle), Fig. 2(A). It would have been a trivial design change for a person of ordinary skill to simply move the boundary between the two pieces such that they meet at the locking piece, forming a bottom cap seat and bottom cap cover:

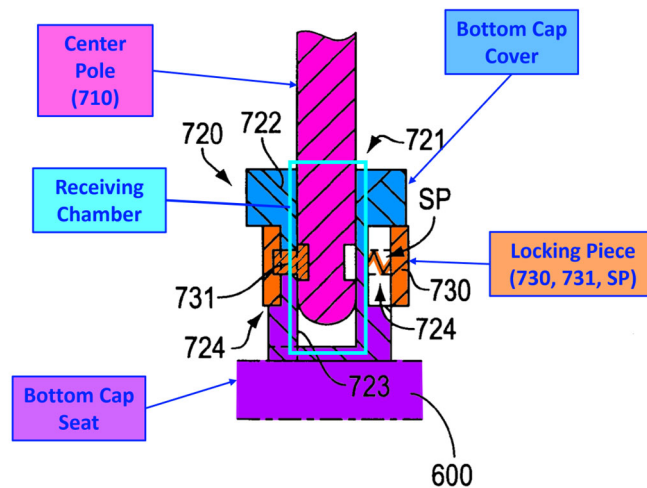


FIG. 2(A)

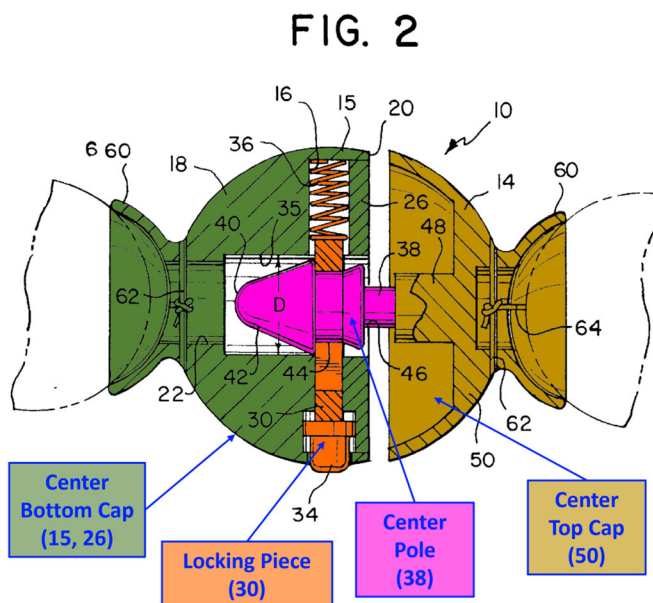
Id. Accordingly, this solution would have been obvious to a person of ordinary skill in the art.

48. A person of ordinary skill would have further been motivated to adopt such a solution, and would have reasonably expected success doing so, because the

solution was known in the prior art. One reference that discloses this solution is Khatchadourian (Ex. 1103).

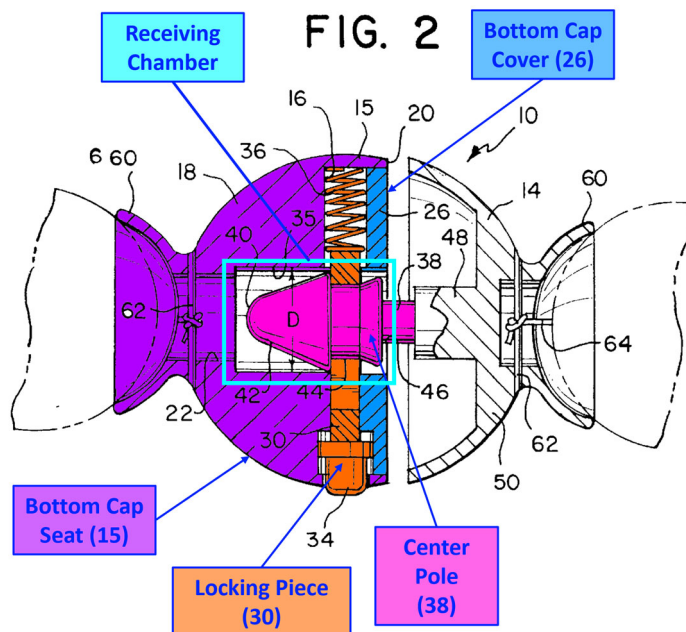
49. Khatchadourian discloses a jewelry clasp with a locking mechanism very similar to Rousselle and Ohnishi's. *E.g.*, Ex. 1103 (Khatchadourian), Abstract, Fig. 2. Thus, Khatchadourian relates to the same type of locking mechanism discussed in the '738 patent. It is also reasonably pertinent to a particular problem addressed by the '738 patent (the need for easy-to-use, reliable locking mechanisms), is in the same field of endeavor (locking mechanisms), and uses similar technology (e.g., locking onto a grooved central pole).

50. Khatchadourian's locking mechanism includes a center top cap (50) and center bottom cap (15, 26), connected by a center pole (38) that is engaged by a locking piece (30):



Ex. 1103 (Khatchadourian), Fig. 2. Khatchadourian's center bottom cap is comprised of two pieces—a “hollow housing 15” (e.g., a bottom cap seat) and a “cap 26” (e.g., a bottom cap cover). *Id.*, 2:20-57, 3:55-65, Figs. 1-4. Furthermore, Khatchadourian discloses that “first opening 22,” which “has a diameter large enough to receive a shaft 38,” comprises a receiving chamber and extends between housing 15 (bottom cap seat) and cap 26 (bottom cap cover). *Id.*, 2:20-35, Figs. 1-4. Thus, Khatchadourian discloses a receiving chamber at a junction between the bottom cap seat and bottom cap cover.

51. Khatchadourian's locking piece 30 is located in the receiving chamber and between the bottom cap seat and bottom cap cover. Ex. 1103 (Khatchadourian), Figs. 1-4.



Id., Fig. 2.

52. Based on Khatchadourian's disclosure and the benefits a skilled artisan would have understood from such an arrangement, such a person would have been motivated to include a bottom cap seat and bottom cap cover in Rousselle's center bottom cap when modifying it to include Ohnishi's locking piece, and would have reasonably expected success doing so. As I discussed above, a person of ordinary skill would have understood that incorporating Ohnishi's locking piece into Rousselle's central lock would necessitate routine design changes. For ease of manufacturing and maintenance, a person of ordinary skill would have recognized that it would be advantageous to have easy access to insert and remove the locking piece from the lock. The arrangement shown in Khatchadourian, where the locking piece sits in a bottom cap seat and is covered by a removable bottom cap cover, provides such easy access to the locking piece. Thus, a person of ordinary skill would have been motivated to incorporate such an arrangement in the combination of Rousselle and Ohnishi. Such an arrangement was known in the art, as evidenced by Khatchadourian, leading a person of ordinary skill to reasonably expect success in the combination.

53. Additionally, the combination represents nothing more than the simple addition of one known element (Khatchadourian's bottom cap seat and cover) to another known element (Rousselle's lock with Ohnishi's locking piece)

to obtain predictable results (a lock as in Rousselle with a locking piece as in Ohnishi, accessible using Khatchadourian's bottom cap seat and cover).

54. The combination also represents the use of a known technique (using a bottom cap seat and cover as in Khatchadourian) to improve a similar device and method (Rousselle's lock with Ohnishi's locking piece) in the same way.

55. Finally, the combination applies a known technique (including a bottom cap seat and cover as in Khatchadourian) to a known device and method (Rousselle's lock with Ohnishi's locking piece) that is ready for improvement and yields predictable results (a lock as in Rousselle with a locking piece as in Ohnishi, accessible using Khatchadourian's bottom cap seat and cover).

56. Thus, Rousselle and Ohnishi, in view of Khatchadourian, disclose, or at least suggest, this limitation.

c. Unfolded State

57. Proposed substitute claim 15 recites that "said collapsible canopy frame is moved to said unfolded state by pushing said center bottom cap upwards to drive said plurality of inner retractable units outwardly, which causes said plurality of outer retractable units and said at least three supporting legs to extend outwards, until said center bottom cap is connected with said center top cap."

58. Rousselle discloses that, during canopy erection, "[o]nce the lower clevis 600 [center bottom cap] has been moved upward a certain distance, the user

can place one hand under the lower clevis 600 and the other hand above the upper clevis 400 [center top cap] and can push the [clevises] together to a point whereat the locking mechanism 700 can lock the clevises together.” Ex. 1003 (Rousselle), 13:22-27. Because Rousselle discloses that bringing the upper and lower clevises (e.g., the center top and bottom caps) together results in the center tubes 500 (e.g., part of the inner retractable units) extending outward, a person of ordinary skill would have understood that the result of Rousselle’s disclosure of pushing the center bottom cap upwards toward the center top cap would be that the inner retractable units extend outwardly, causing the outer retractable units (from the combination with Tsai) and the supporting legs to extend outwardly.⁴ *See id.*, 13:5-29. Similarly, a person of ordinary skill would have understood that if Rousselle’s center lock were combined with Tsai’s canopy in the way discussed in

⁴ My opinion is supported by Rousselle’s disclosure of another embodiment that allows the user to use a pole to push upward on the center bottom cap to unfold the canopy, for example when the canopy is sufficiently large that the user would not ordinarily be able to reach the clevises. Ex. 1003 (Rousselle), 13:42-67, 15:17-37. In such a case, there would be no other force acting on the canopy other than pushing up on the center bottom cap that works to unfold the canopy.

my Prior Declaration (Ex. 1002 ¶¶101-108), pushing Rousselle's center bottom cap upwards would cause Tsai's canopy to unfold in the same way.

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

60. Accordingly, Rousselle, Tsai, and Ohnishi, in view of Khatchadourian, disclose, or at least suggest, the limitations of proposed substitute claim 15, and proposed substitute claim 15 would have been obvious as a whole to a person of ordinary skill in the art.

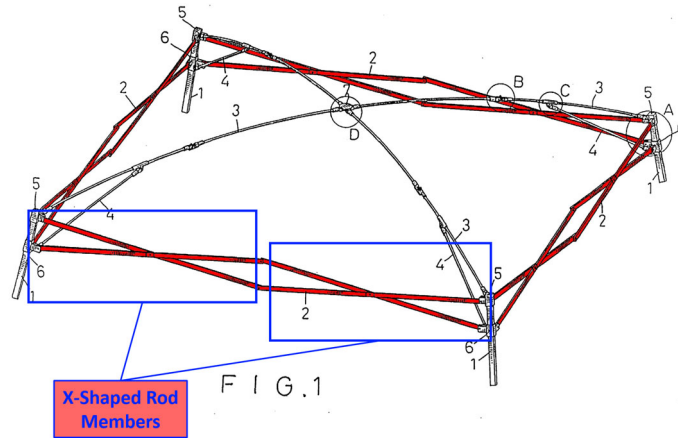
2. Proposed Substitute Claim 16

61. Proposed substitute claim 16 depends from proposed substitute claim 15. As discussed above (¶¶40-60, above), the prior art discloses each limitation of proposed substitute claim 15. Furthermore, as discussed in my Prior Declaration, the prior art discloses each limitation of original claim 2. Ex. 1002 ¶¶130-156. Rousselle, Tsai, Choi, and Lin disclose the new and/or amended limitations of proposed substitute claim 16.

a. X-Shaped Rod Members

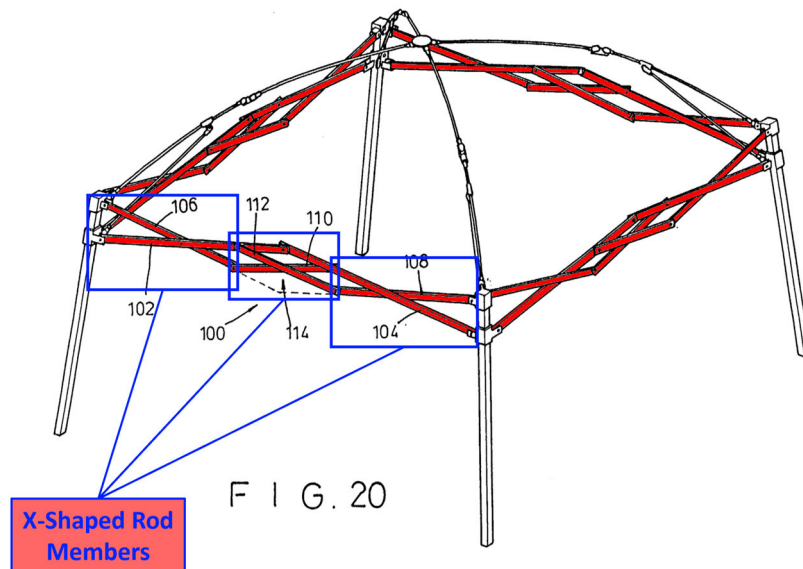
62. Proposed substitute claim 16 recites that "each said outer retractable unit comprises three hinged X-shaped rod members."

63. As I discussed in my Prior Declaration, Tsai discloses a canopy that includes outer retractable units comprising a plurality of hinged X-shaped rod members. Ex. 1002 ¶¶64-71.



Ex. 1005 (Tsai), Fig. 1; *id.*, 7:7-15, Fig. 20; Ex. 1002 ¶68. As shown, each of Tsai’s outer retractable units in this embodiment comprises two hinged X-shaped rod members. *Id.*

64. Tsai discloses another embodiment, shown in Figure 20, that contains outer retractable units comprising three hinged X-shaped rod members:



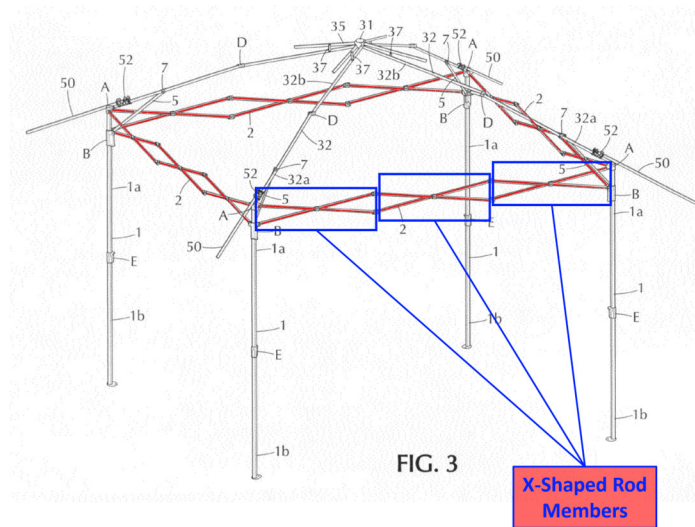
Ex. 1005 (Tsai), Fig. 20; *id.*, 9:29-10:24. Because Tsai discloses that “the scissors-type linkage pairs shown in Figures 1 and 10 may be replaced by” the outer

retractable unit shown in Figure 20, the analysis in my Prior Declaration applies equally to Tsai's embodiment of Figure 20 as it does to Tsai's embodiment of Figure 1. *Id.*, 9:29-32. Thus, Tsai discloses this limitation.

65. Even if Tsai did not disclose this limitation, it would have been obvious to a person of ordinary skill to use three hinged X-shaped rod members instead of two in Tsai's canopy. First, a person of ordinary skill would have used common sense to arrive at a design with three hinged X-shaped rod members instead of two. X-shaped scissoring members such as those in Tsai's outer units are simple technology that provides a solution that has been well-known for decades. *E.g.*, Ex. 1013 (Barber). And, outer units that comprise *two* hinged X-shaped members require only repetition of an existing element to arrive at an outer unit that comprises *three* hinged X-shaped members. Accordingly, it would have been common sense for a person of ordinary skill to arrive at such a design.

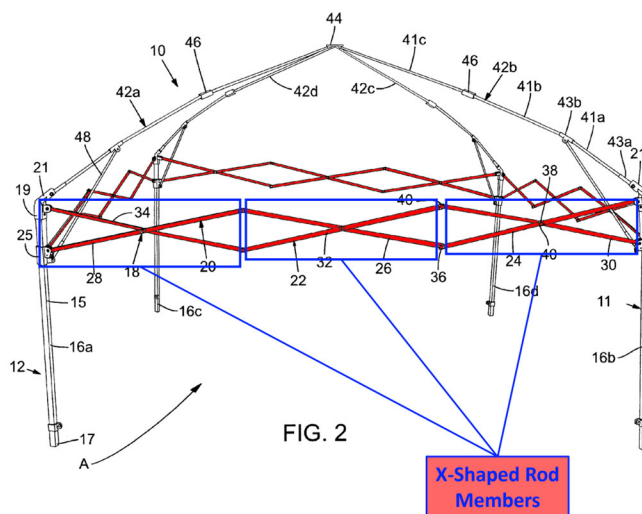
66. A person of ordinary skill would also have been motivated to use three hinged X-shaped rod members, and would have reasonably expected success, because outer retractable units comprising three hinged X-shaped rod members were well known in the art, including in the examples I now provide.

67. In 2013, Choi disclosed a "collapsible tent structure" having outer retractable units comprising three hinged X-shaped rod members:



Ex. 1104 (Choi), Fig. 3; *id.*, Abstract.

68. Similarly, in 2011 Lin disclosed a similar “portable shelter” having outer retractable units comprising three hinged X-shaped rod members:



Ex. 1105 (Lin), Fig. 2; *id.*, Abstract.

69. Thus, collapsible canopies having outer retractable units comprising three hinged X-shaped rod members were commonplace by the time of the '738

patent's earliest possible priority date. It would have been obvious to a skilled artisan to modify Tsai's canopy design to include three X-shaped rod members instead of two for several reasons. First, because such designs were well known, a person of ordinary skill in the art would have reasonably expected success in the combination. *E.g.*, Exs. 1104, 1105 (Choi, Lin).

70. Second, the combination represents a choice from a finite number of identified, predictable solutions. Given the structure disclosed by the prior art, a person of ordinary skill would have had a handful of choices for how many hinged X-shaped rod members to include in each outer retractable unit. Practically, depending on the size of the canopy, a person of ordinary skill would have understood that fewer than two or more than about five hinged X-shaped rod members would be unworkable or unwieldy and render the canopy difficult to manufacture and/or operate. For example, a canopy with more than about five hinged X-shaped rod members would not meaningfully collapse due to the large number of structural pieces needed to make up six or more hinged X-shaped rod members. In addition, for a given distance between the supporting legs, the more X-shaped rod members that are used means the shorter those X-shaped rod members must be, and vice versa. Therefore, a person of ordinary skill would have decided how many X-shaped rod members to use in part based on how long they desired the segments to be. For example, if the X-shaped rod members are too

long, they might be longer than the supporting legs, and this would make the canopy frame awkward in the collapsed state. Thus, using three X-shaped rod members is within a small range of options open to a person of ordinary skill and would have been obvious to try.

71. Third, the combination represents nothing more than the simple addition of one known element (three hinged X-shaped rod members as in Choi or Lin) to another known element (Tsai's outer retractable unit) to obtain predictable results (a canopy with outer retractable units comprising three hinged X-shaped rod members).

72. Fourth, the combination represents the use of a known technique (using three hinged X-shaped rod members as in Choi or Lin) to improve a similar device and method (Tsai's outer retractable unit) in the same way.

73. Fifth, the combination applies a known technique (using three hinged X-shaped rod members as in Choi or Lin) to a known device and method (Tsai's outer retractable unit) that is ready for improvement and yields predictable results (a canopy with outer retractable units comprising three hinged X-shaped rod members).

74. Alternatively, it would have been obvious to a person of ordinary skill to combine Choi or Lin's canopy designs, which include outer retractable units comprising three hinged X-shaped rod members, with Rousselle's center lock, for

the same reasons I discussed in my Prior Declaration with respect to Tsai. Ex. 1002 ¶¶101-108.

75. Thus, Tsai, alone or in view of Choi and/or Lin, discloses, or at least suggests, this limitation.

b. Sliding Sleeve

76. Proposed substitute claim 16 recites that “each said supporting leg comprises a sliding sleeve that is moved along a length direction of said respective supporting leg by said pushing of said center bottom cap.”

77. As I discussed above, Rousselle discloses that pushing upward on the center bottom cap causes the canopy to unfold, including extending the inner retractable units and the supporting legs. ¶¶57-60, above. Furthermore, as I discussed in my Prior Declaration, Tsai discloses that the legs of its canopy include “sliding connectors 6” (e.g., sliding sleeves) “which slide[] along the poles [1]” (e.g., supporting legs) as the canopy is unfolded. Ex. 1005 (Tsai), 7:4-20, Fig .2; Ex. 1002 ¶¶131-133. Thus, when Rousselle is combined with Tsai (for example, by combining Rousselle’s center lock with Tsai’s canopy), the resulting combination includes a sliding sleeve on each leg that is moved along the length direction of the leg when the center bottom cap is pushed upward to unfold the canopy.

78. Thus, Tsai and Rousselle disclose, or at least suggest, this limitation.

c. **Y-Shaped Member**

79. Proposed substitute claim 16 next recites that “in said unfolded state, said first connecting rod extends upward from said center bottom cap to said first oblique top pipe to form a Y-shaped member.”

80. Rousselle discloses this limitation to the same extent that the '738 patent does. For example, Figure 1(A) of Rousselle provides nearly identical disclosure as Figure 16 of the '738 patent with respect to this limitation:

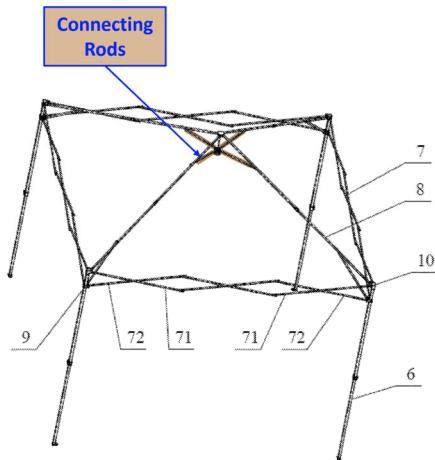


FIG. 16

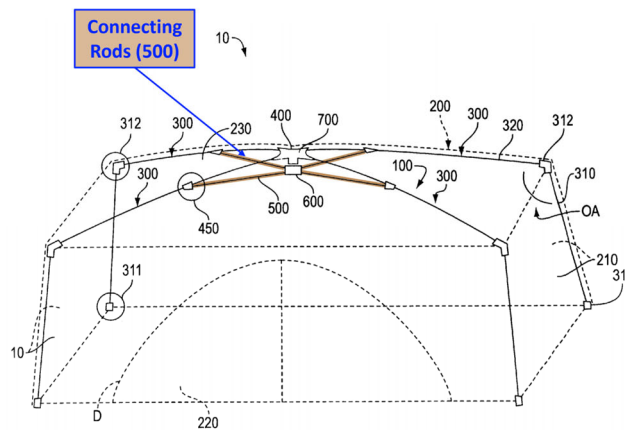


FIG. 1(A)

Compare Ex. 1001 ('738 patent), Fig. 16 *with* Ex. 1003 (Rousselle), Fig. 1(A).

81. Furthermore, to the extent Rousselle does not explicitly disclose the limitation, it suggests it. Rousselle discloses that “[b]ecause the upper and lower [clevises] are securely locked together via the locking mechanism 700, the center tubes 500 [e.g., connecting rods] do not necessarily need to be raised substantially above the horizontal axis,” meaning that the connecting rods do not need to extend downwards. Ex. 1003 (Rousselle), 13:30-33. This disclosure would suggest to a

skilled artisan that the connecting rods could instead extend upwards. Furthermore, Rousselle's disclosure that "it is preferred that the center tubes 500 are raised above the horizontal axis ... to ensure that an upward force is imparted to the lower clevis that further holds the clevis members together" is not to the contrary because it merely expresses a preference. *Id.*, 13:33-36. Rousselle states why this is a preference and not a requirement: "Because the upper and lower devises are securely locked together via the locking mechanism 700, the center tubes 500 do not necessarily need to be raised substantially above the horizontal axis." *Id.*, 13:30-33. A person of ordinary skill would have understood that simply by varying the length of Rousselle's center pole, the distance between Rousselle's upper and lower clevises (e.g., center top and bottom caps) when locked could likewise be varied. This would allow for different angles, including upwardly extending angles, of the connecting rods in the locked and unfolded position.

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

83. Accordingly, Rousselle, Tsai, and Ohnishi, in view of Khatchadourian, Choi, and/or Lin, disclose, or at least suggest, the limitations of proposed substitute claim 16, and proposed substitute claim 16 would have been obvious as a whole to a person of ordinary skill in the art.

3. Proposed Substitute Claims 17-19

84. Because proposed substitute claims 17-19 merely change dependency to proposed substitute claim 15, those claims would have been obvious for the reasons discussed above and in my Prior Declaration. Ex. 1002 ¶¶157-214; ¶¶7-60, above.

III. CONCLUSION

85. For the reasons discussed above and in my Prior Declaration, I disagree with Dr. Reffeor's conclusion in ¶66 that "claim 1 of the '738 Patent would not have been obvious to a POSITA at the time of the invention," that "there would not have been a motivation to combine the references," and that the "resulting device would not function."

86. Furthermore, for the reasons discussed above and in my Prior Declaration, the proposed substitute claims would have been obvious over the prior art.

87. 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: January 30, 2024

By: Jeffrey L. Stein
Jeffrey L. Stein, Ph.D.