

UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE PATENT TRIAL AND APPEAL BOARD

KOHLER CO.
Petitioner,
v.
DELTA FAUCET CO.,
Patent Owner.

U.S. Patent No. 10,393,363 B2
Case No. IPR2024-00700

DECLARATION OF J. CHRIS COOK

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I, J. Chris Cook declare as follows:

I. INTRODUCTION

1. I have been retained Kohler, Co. (“Kohler”) as an independent expert consultant in this proceeding before the United States Patent and Trademark Office (“PTO”). I am not an employee of Kohler or any affiliate or subsidiary of Kohler.

2. I have been asked to consider whether certain references teach or suggest the features recited in certain claims of U.S. Patent No. 10,393,363, which I refer to herein as the ’363 patent.

3. My opinions and the bases for my opinions are set forth below.

4. I am being compensated at my ordinary and customary rate of \$200 per hour for my work, plus reimbursement for any reasonable expenses. My compensation is based solely on the amount of time that I devote to activity related to this case and is in no way contingent on the nature of my findings, the presentation of my findings in testimony, or the outcome of this or any other proceeding. I have no other financial interest in this proceeding.

II. EDUCATION BACKGROUND, PROFESSIONAL EXPERIENCE, AND OTHER QUALIFICATIONS

5. My curriculum vitae (“CV”) is attached hereto as Attachment A and provides an accurate identification of my background and experience.

6. I am a mechanical engineering consultant with a background in the areas of mechanical design and analysis, sheet metal design, digital prototyping,

injection molding design, tolerance analysis, project management, design for manufacturability, failure analysis, quality assurance, finite element analysis, and computational fluid dynamics analysis.

7. I have a Bachelor of Science in Mechanical Engineering from Texas A&M University and a Master of Science in Engineering Management from Southern Methodist University. I am currently an independent consultant, focusing on mechanical design and analysis of client products. I have worked in this capacity from November 2021 to the present.

8. As set forth in more detail in my curriculum vitae (Appendix A), I have substantial experience in the areas of mechanical engineering, product design, product development, quality assurance, and mechanical testing. Prior to working as an independent contractor, I served as the Director of Engineering for CommScope in Dallas/Fort Worth, Texas from June 2018 to October 2021. My responsibilities included leading teams of mechanical engineers, designers, and change coordinators to design and release the latest concealment solutions for mmWave and sub6GHz small cells, power cabinets, cable management accessories, and tower/pole/rooftop macro structural mounts. During this time I also worked to define requirements with clients and project managers to incorporate new innovations and designed and launched several product families to increase revenue from \$8M to \$24M in two years.

9. Prior to my serving as the Director of Engineering at CommScope, I served as a Senior Engineering Manager from June 2013 to June 2017. During these four years I managed cross functional teams of 10-22 FTEs each, consisting of mechanical and product engineers, tech writers, CAD specialists, and electrical/reliability labs while overseeing a \$3.2M annual budget. I further developed and qualified multiple new product introductions, addressed key quality issues, and developed full documentation sets for product release.

10. Prior to working as a Senior Engineering Manager at CommScope, I served as a Principal Mechanical Engineer from May 2011 to June 2013. In this capacity I led a team of three engineers and designers, from concept to manufacturing, for all aspects of system and mechanical design for indoor DAS system, conducting thermal analysis and testing of all system components while coordinating with EE and supply chain teams for design and manufacturing. I further scheduled design activities, prototype builds, and physical testing for program with eight major products and dozens of accessories.

11. Prior to my employment at CommScope, I was the president and director of Delta EOC, LLC d/b/a CalidiTech, a mechanical engineering consulting firm, from September 2009 to May 2018. During my time at CalidiTech, I provided mechanical design, structural/thermal analysis and project management consulting services to clients using cloud hosted Ansys packages, and reduced time to market

by eliminating design iterations required to release products thereby meeting customer needs. Core clients included Raytheon, CommScope, JMA, and Optimal Electronics.

12. Prior to founding CalidiTech, I worked at Texas Instruments (TI) as an Application Engineer and Project Manager from February 2005 to January 2009. At TI, I supported RFID product line in the U.S. valued at \$30M annually, and identified and fixed product problems in collaboration with production machine vendors.

13. I am a named inventor on U.S. Patent Nos. 11,165,161, 11,121,459, and 10,798,819 and have applied for several other patents. I have been through multiple training sessions on intellectual property and patent processes. As Director of Engineering at CommScope, I was on the team of reviewers for all patent applications and renewals for the business units I served. Therein, I worked closely with the patent attorneys to determine patentability, claim writing, and valuation of each patent for which my team applied. In thirty years of professional experience, I have worked on over a hundred product design project as both a corporate employee and independent consultant.

14. I also have specific experience designing and working with plumbing fixtures. This includes: (A) designing a heating and flow control medical device for a client company in 2010; (B) designing restaurant equipment with drain systems in

2023; (C) using equipment for thermal and reliability testing that controlled water and air flow from 1995~2021; (D) I spent a year reviewing and approving natural gas pipeline systems for residential and large transmission projects; (E) I also perform most of my own plumbing work on the properties I own; (F) I have designed my own check valve system to route wastewater from dual dishwashers into the drain line; and (G) I have installed dozens of faucets, toilets, hose bibs, dishwashers, clothes washing machines, and irrigation system components.

15. I am familiar with the subject matter of this case, and consider myself an expert in, among other things, intelligent transportation systems, vehicle information and communications systems, and navigation systems

III. ASSIGNMENT AND MATERIALS CONSIDERED

16. I have been asked to provide analysis and explain the subject matter of the '363 patent, including the state of the art when the '363 patent application was filed. I have also been asked to consider, analyze, and explain certain prior art to the '363 patent including how that art relates to the challenged claims of the '363 patent and to provide my opinions regarding whether that art invalidates the claimed subject matter.

17. The opinions expressed in this declaration are not exhaustive of opinions I may offer in the future regarding the unpatentability of the claims of the '363 patent. Therefore, the fact that I do not address a particular point should

not be understood to indicate an agreement on my part that any claim complies with the requirements of any applicable patent or other rule.

18. I reserve the right to amend and supplement this declaration in light of additional evidence, arguments, or testimony presented during this IPR or related proceedings on the '363 patent.

19. In forming the opinions set forth in this declaration, I have considered and relied upon my education, knowledge of the relevant field, knowledge of scientific and engineering principles, and my experience. I have also reviewed and considered the '363 patent (Exhibit 1001), its prosecution history (Exhibit 1002), and the following additional materials:

Exhibit	Description
1004	U.S. Pub 2015/0354186 A1 to Tseng et al.
1005	WO 2009/000109 A1 to Tse et al.
1006	U.S. Pub. 2010/0046199 A1 to Carter
1007	JP 2003027537A to Mizuno et al.
1008	Translation of JP 2003027537A to Mizuno et al. and associated translator's declaration
1009	U.S. Pub. 2015/0221206 A1 to Schneider, II et al.
1010	U.S. Pub. 2005/0264529 to Morgan et al.
1011	U.S. Pub. 2015/0208897 A1 to Kangas et al.
1012	U.S. Design Patent D540,424 S

1013	U.S. Patent No. 9,199,252 B2 to Schorn et al.
1014	U.S. Pub. 2013/0299608 A1 to Spangler et al.

IV. UNDERSTANDING OF THE LAW

20. I am not an attorney, but have been instructed in and applied the law as described in this section.

21. I understand that the first step in comparing an asserted claim to the prior art is for the claim to be properly construed. I address how a person of ordinary skill in the art (POSITA) would have understood the claims of the alleged invention in Section VIII below.

22. I have been further instructed and understand that a patent claim is unpatentable and invalid as obvious if the subject matter of the claim as a whole would have been obvious to a POSITA of the claimed subject matter as of the time of the invention at issue. I understand that when assessing the obviousness of claimed subject matter, the following factors are evaluated: (1) the scope and content of the prior art; (2) the difference or differences between each claim of the patent and the prior art; and (3) the level of ordinary skill in the art at the time the patent was filed.

23. I understand that claimed subject matter may be obvious in view of more than one item of prior art. I understand, however, that it is not enough to show simply that all the limitations of the claimed subject matter are spread throughout

the prior art. Instead, for claimed subject matter to be obvious over multiple references, there must be some reason or motivation for a POSITA to combine the prior art references to arrive at the claimed subject matter.

24. I have been informed that, in seeking to determine whether an invention that is a combination of known elements would have been obvious to a POSITA at the time of the invention, one must consider the references in their entirety to ascertain whether the disclosures in those references render the combination obvious to such a person.

25. I have been informed and understand that, while not required, the prior art references themselves may provide a teaching, suggestion, motivation, or reason to combine, but other times the motivation linking two or more prior art references is common sense to a POSITA at the time of the invention.

26. I understand that a particular combination may be proven obvious by showing that it was obvious to try the combination. I have been informed that, if a technique has been used to improve one device, and a POSITA would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill.

27. I further understand that an obviousness analysis recognizes that market demand, rather than scientific literature, often drives innovation, and that a motivation to combine references also may be supplied by the direction of the

marketplace. For example, when there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a POSITA has good reason to pursue the known options within his or her technical grasp because the result is likely the product not of innovation but of ordinary skill and common sense.

28. I have been informed that the combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results. Thus, where all of the elements of a claim are used in substantially the same manner, in devices in the same field of endeavor, the claim is likely obvious.

29. Additionally, I understand that a patent is likely to be invalid for obviousness if a POSITA can implement a predictable variation or if there existed at the time of the invention a known problem for which there was an obvious solution encompassed by the patent's claims. Therefore, when a work is available in one field of endeavor, design incentives and other market forces can prompt variations of it, either in the same field or a different one.

30. I further understand that combining embodiments related to each other in a single prior art reference would not ordinarily require a leap of inventiveness.

31. I also understand that a POSITA must have had a reasonable expectation of success when combining references for claimed subject matter to be obvious.

32. I have been informed and I understand that factors referred to as “objective indicia of non-obviousness” or “secondary considerations” are also to be considered when assessing obviousness when such evidence is available. I understand that these factors can include: (1) commercial success; (2) long-felt but unresolved needs; (3) copying of the invention by others in the field; (4) initial expressions of disbelief by experts in the field; (5) failure of others to solve the problem the claimed subject matter solved; and (6) unexpected results.

33. I also understand that evidence of objective indicia of non-obviousness must be commensurate in scope with the claimed subject matter. I further understand that there must be a relationship, sometimes referred to as a “nexus,” between any such secondary indicia and the claimed invention.

34. Finally, I have been informed that one cannot use hindsight to determine that an invention was obvious.

35. I provide my opinions in this declaration based on the guidelines set forth above.

V. LEVEL OF SKILL IN THE ART

36. I have been informed and understand that the level of ordinary skill in the relevant art at the time of the invention is relevant to inquiries such as the meaning of claim terms, the meaning of disclosures found in the prior art, and the reasons a POSITA may have for combining references.

37. I have been informed and understand that factors that may be considered in determining the level of ordinary skill include: (1) the education of the inventor; (2) the type of problems encountered in the art; (3) prior art solutions to those problems; (4) rapidity with which innovations are made; (5) sophistication of the technology; and (6) education level of active workers in the relevant field. I have been further informed and understand that a person of ordinary skill in the art (POSITA) is also a person of ordinary creativity.

38. In my opinion, a POSITA in the field of the '363 patent would have had a degree in industrial design or an equivalent field, along with 2 years of professional experience working with kitchen, bath, or other plumbing fixtures (or similar products), or an equivalent level of skill, knowledge, and experience. This POSITA would have been aware of and generally knowledgeable about the standard features and functionality of kitchen, bath, and other plumbing fixtures (or similar products).

39. Based on my education, training, and professional experience in the field of the claimed invention, as discussed in Section II, I was a person of more than the ordinary level of skill in the art as of April 2017.

40. In forming my opinion, I have drawn on my academic background and professional experience, including experience hiring and managing engineers engaged in development projects applying the technologies and applications described in the '363 patent. My opinions herein, however, were formed taking into account the perspective of an ordinarily skilled artisan.

VI. THE '363 PATENT

A. Effective Filing Date

41. I understand that the application leading to the '363 patent was filed on April 20, 2018. The patent also references an April 25, 2017 provisional filing on its face. I have been instructed to assume that the patent is entitled to the benefit of this April 2017 date.

42. My opinions in this declaration were formed from the perspective of a POSITA as of April 25, 2017, including both the knowledge of a POSITA at that time as well as how a POSITA would have understood the prior art. My opinions, however, would be the same even if the patent is only entitled to a later April 20, 2018 filing date.

B. Overview

43. The '363 patent states that it relates to an “illumination device” for the “sprayhead” of a “fluid delivery device[.]” (Ex. 1001, 1:16-18.)

44. The patent notes that “[i]llumination devices associated with fluid delivery devices are known.” (*Id.*, 1:19-20.) This includes “nightlights” or “indicator lights” providing “a visual indication of” the status or condition of “water flowing from the fluid delivery device.” (*Id.*, 1:20-24.)

45. The patent goes on to explain that these existing “illumination devices typically include a single light source” or a “plurality of light sources” that result only in “discrete areas of illumination (i.e. ‘hot spots’).” (*Id.*, 1:24-27.)

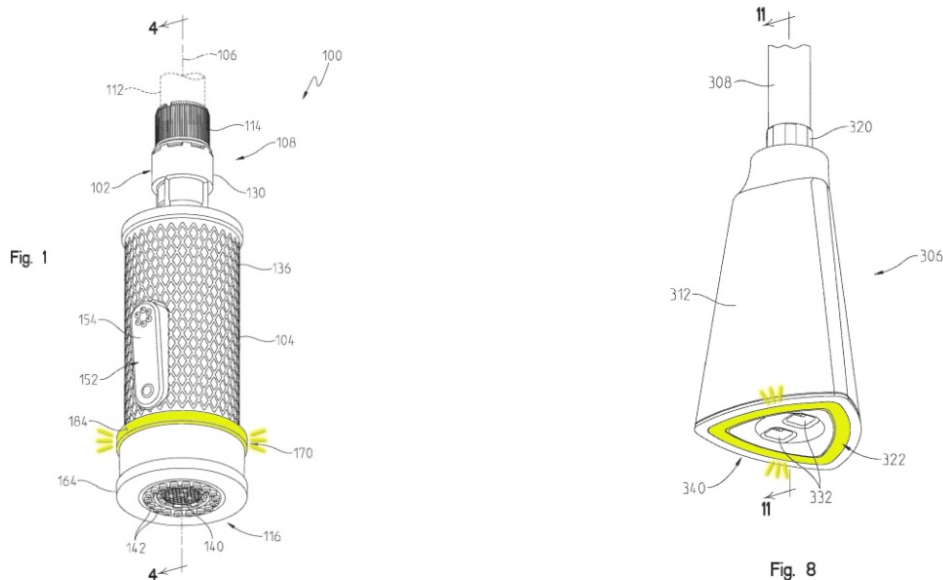
46. The patent then proposes an “illumination device” that employs “a light pipe illuminated by at least one light emitter.” (*Id.*, 1:27-29.)

47. The '363 patent explains that such a light pipe may be employed by a “pull down sprayhead” of a “faucet[.]” or “a pendant showerhead configured to be suspended downwardly from a ceiling.” (*Id.*, 1:29-34.)

48. Examples of these applications are shown in the '363 patent's figures.

49. Figure 1 (left below) shows the pull-down sprayhead. Light is emitted “radially outwardly” from a “light pipe 176” arranged circumferentially around the sprayhead like a belt or band. (*Id.*, 3:52-58.) Figure 8 (right below) shows the pendant showerhead. Light is emitted downward from a “light pipe” in the

showerhead's “sprayface 322.” (*Id.*, 6:1-15.). The illuminated light pipe—along with some exemplary emitted light—is shown in yellow in both figures for emphasis:



(*Id.*, Figs. 1, 8 (annotated).)

50. The '363 patent also provides exploded and cross-sectional views of its illumination device. These figures have been reproduced and annotated below. Note that all color has been added to these and the other figures throughout this declaration for emphasis purposes

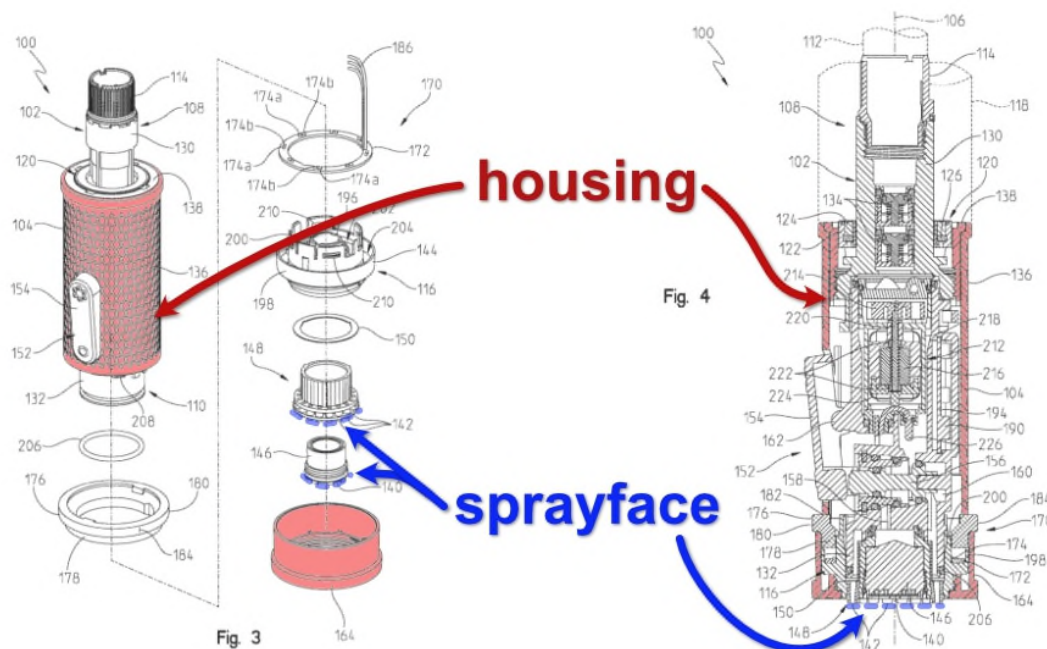
51. Figures 3 and 4 show the '363 patent's pull-down sprayhead. Figure 3 provides an exploded view, while Figure 4 is a cross-section.

52. The sprayhead's body is defined by an “outer shell or housing 104” and “cap 164” (red below). (*Id.*, 2:55-59; 3:45-56.)

53. A “waterway 102” is located within the housing. (*Id.*, 2:55-57.)

54. The waterway delivers water to a “sprayface 116” (blue below) with a “stream outlet 140” and “spray outlet 142.” (*Id.*, 3:26-32.)

55. A “rocker arm 154” (not highlighted, but shown in the side of the housing) allows a user to select which of the two outlets emits water. (*Id.*, 3:33-44.)



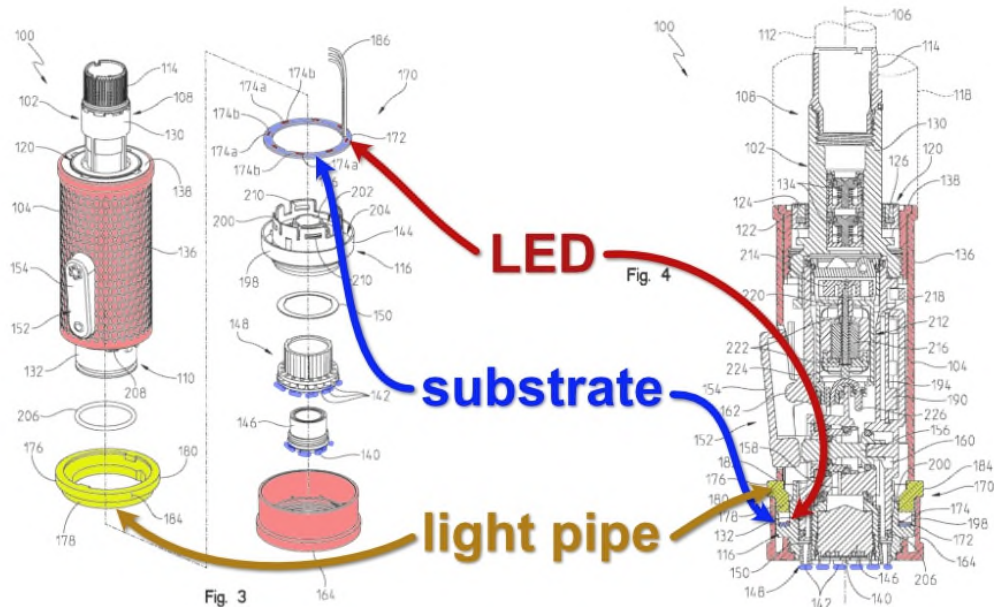
(*Id.*, Figs. 3-4 (annotated).)

56. The pull-down sprayhead’s “light assembly or illumination device 170” is “supported” within the “housing 104.” (*Id.*, 3:52-54.)

57. The “illumination device 170” includes a “substrate 172” (blue below) that supports “a plurality of light emitters 174” (red below). (*Id.*, 3:54-56.)

58. The “light emitters” can be “light emitting diodes (LEDs)....” (*Id.*, 4:10-12.)

59. “A translucent light pipe or diffuser 176” (yellow below) shaped as a “closed loop” “diffuse[s] light outwardly from the light emitters 174” from within the housing to the outside. (*Id.*, 3:56-58.)

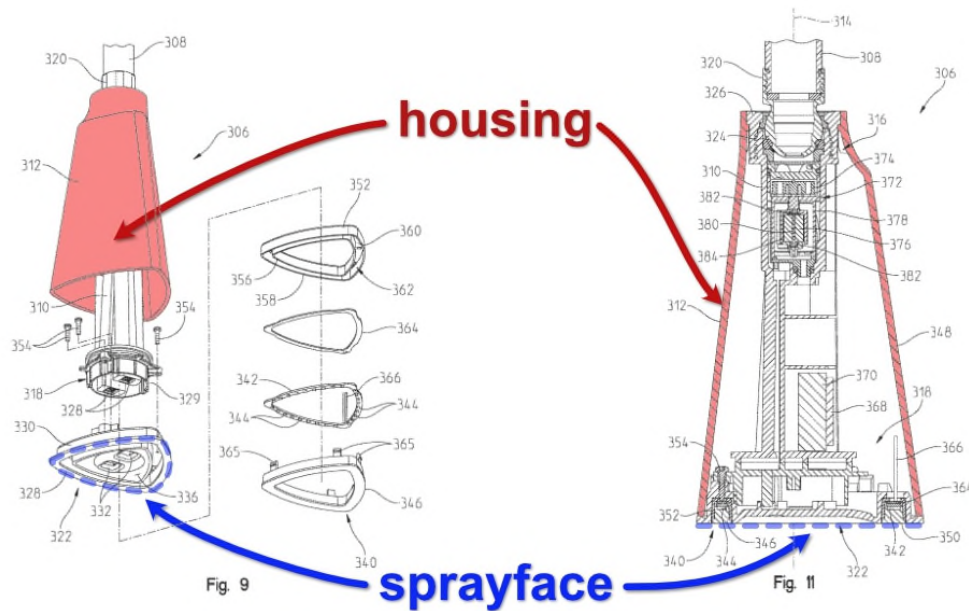


(*Id.*, Figs. 3-4 (annotated).)

60. Figures 9 and 11 show the pendant showerhead. Figure 9 provides an exploded view, while Figure 11 is a cross-section.

61. This showerhead includes an “outer housing or shell 312” (red below) with an inner “waterway 310.” (*Id.*, 5:34-39.)

62. Water is emitted from “water outlet openings 332” in a “sprayface 322” (blue below). (*Id.*, 5:49-52.)



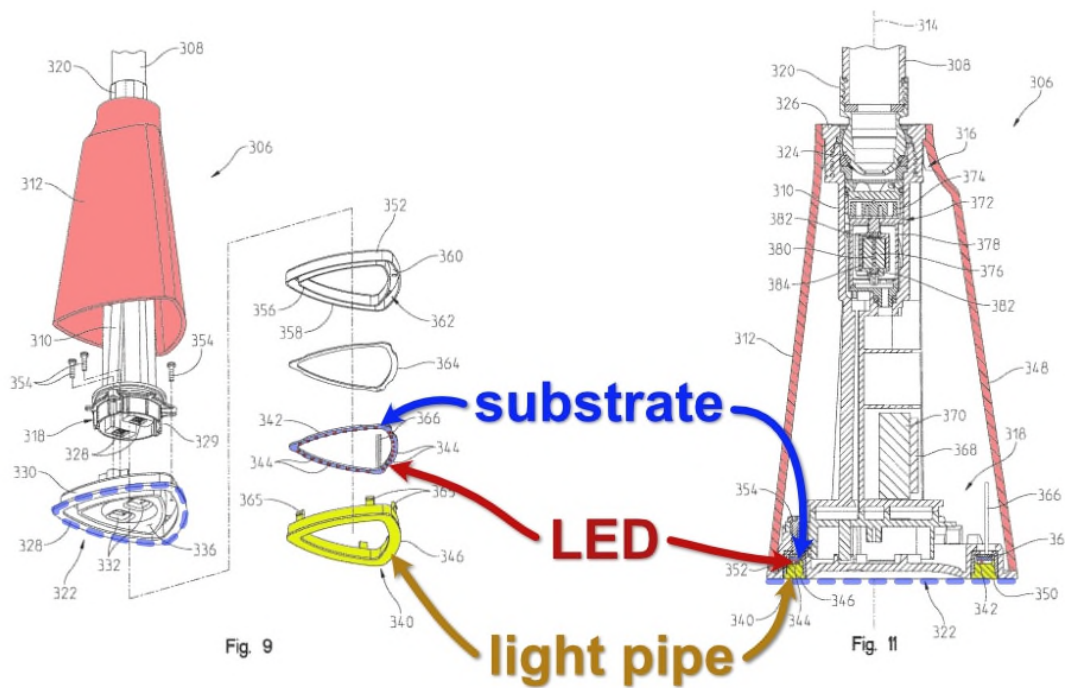
(*Id.*, Figs. 9, 11 (annotated).)

63. The pendant showerhead’s “light assembly or illumination device 340” is “supported by the sprayface 322.” (*Id.*, 5:65-67.)

64. The “illumination device” includes a “substrate 342” (blue below) that holds LEDs 344 (red below). (*Id.*, 6:1-2.)

65. While differently located from the light pipe of Figures 3-4, these figures’ “translucent light pipe or diffuser 346” (yellow below) is similarly formed as a “closed loop.” (*Id.*, 6:2-8.) It is also “supported within the sprayface” and covers the substrate and LEDs. (*Id.*)

66. According to the ’363 patent, light from the LEDs is “transmit[ted] ... outwardly” through the light pipe. (*Id.*, 6:10-15.)



(*Id.*, Figs. 9-11 (annotated).)

67. The '363 patent also discusses a series of other, minor design features that can be included in its sprayhead or showerhead.

68. For instance, a “hydro-generator” can be used to power the illumination device. (*See id.*, 1:43-45.)

69. Next, a “temperature sensor” can be used to control the color of emitted light. (*Id.*, 5:5-22.)

70. Further, the water outlets can be “multi-dimensional fluid dispensers.” (*Id.*, 5:54-64.)

C. Prosecution History

71. As noted above, I have reviewed the '363 patent's prosecution history.

72. The '363 patent was not rejected over any prior art references during prosecution. (*See generally* Ex. 1002.)

73. Instead, the Examiner simply allowed the claims without pointing to or discussing any prior art. (*See id.* at 1032-36.)

D. Claims

74. For reference, claims 1-24 of the '363 patent are reproduced below. Of these, claims 1, 10, and 19 are independent.

75. Claim 10 is directed to a “pull-down sprayhead” like that shown in Figures 1, 3, and 4 of the '363 patent and discussed above.

76. Claim 19 is directed to a “pendant showerhead” like that shown in Figures 8, 9, and 11 and also discussed above.

77. Claim 1 appears to be more broadly directed to both a “pull-down sprayhead” and the “pendant showerhead.”

1. A sprayhead comprising:

a housing defining a longitudinal axis;

a waterway received within the housing;

a sprayface fluidly coupled to the waterway and supporting a water outlet; and

an illumination device supported by the housing, the illumination device including a substrate, a plurality of light emitters supported by the substrate, and a translucent light pipe defining a closed loop to

diffuse light from the light emitters outwardly away from the housing.

2. The sprayhead of claim 1, wherein the sprayhead comprises a pull-down sprayhead configured to be releasably coupled to a delivery spout of a faucet.

3. The sprayhead of claim 2, wherein the light pipe includes an annular ring configured to transmit light radially outwardly from the longitudinal axis.

4. The sprayhead of claim 3, wherein the light emitters comprise a plurality of circumferentially spaced light emitting diodes.

5. The sprayhead of claim 3, further comprising a diverter valve assembly fluidly coupled to the waterway, wherein the sprayface includes a stream outlet and a spray outlet, the diverter valve assembly configured to divert water between the stream outlet and the spray outlet.

6. The sprayhead of claim 1, wherein the sprayhead comprises a pendant showerhead configured to be suspended downwardly from a ceiling.

7. The sprayhead of claim 6, further comprising a pendant arm and a coupler fluidly coupling the waterway to the pendant arm, the coupler including a ball joint such that the housing is supported for rotation about at least two orthogonal axes.

8. The sprayhead of claim 6, wherein the housing includes an outer housing wall, and the light pipe is supported within the spray face laterally intermediate the water outlet and the housing wall.

9. The sprayhead of claim 1, further comprising a hydro-generator fluidly coupled to the waterway and in electrical communication with the illumination device.

10. A pull-down sprayhead for a faucet, the sprayhead comprising:

a housing defining a longitudinal axis extending between a proximal end and a distal end;

a waterway received within the housing;

a sprayface fluidly coupled to the waterway and defining a water outlet; and

an illumination device supported by the housing, the illumination device including a substrate, a plurality of light emitters supported by the substrate, and a translucent light pipe including an outer illumination surface extending perpendicular to the longitudinal axis of the housing, the translucent light pipe defining a closed loop to diffuse light from the light emitters outwardly to the outer illumination surface.

11. The sprayhead of claim **10**, further comprising a hydro-generator fluidly coupled to the waterway and in electrical communication with the illumination device.

12. The sprayhead of claim **10**, wherein the light pipe includes an annular ring configured to transmit light radially outwardly.

13. The sprayhead of claim **12**, wherein the annular ring includes a distal portion extending parallel to the longitudinal axis and configured to transmit light from the light emitters in an axial direction, and a proximal portion extending radially outwardly from the distal portion and configured to transmit light toward the outer illumination surface.

14. The sprayhead of claim **12**, wherein the light emitters comprise a plurality of circumferentially spaced light emitting diodes.

15. The sprayhead of claim **10**, further comprising a diverter valve assembly fluidly coupled to the waterway, wherein the sprayface includes a stream outlet and a spray outlet, the diverter valve assembly configured to divert water between the stream outlet and the spray outlet.

16. The sprayhead of claim **10**, further comprising a coupler configured to releasably couple the housing to a delivery spout of a faucet.

17. The sprayhead of claim **10**, further comprising:

- a temperature sensor configured to detect the temperature of water within the waterway; and
- a controller in electrical communication with the temperature sensor, the controller configured to change the color of light emitted by the light emitters in response to the temperature detected by the temperature sensor.

18. The sprayhead of claim **17**, wherein the plurality of light emitters include a first light emitter configured to generate light of a first color when the signal from the temperature sensor detects a first water temperature, a second light emitter configured to generate light of a second color when the signal from the temperature sensor detects a second water temperature greater than the first water temperature, and the first and second light emitters blend the light of the first color and the light of the second color and generate light of a third color when the signal from the temperature sensor detects a third water temperature between the first water temperature and the second water temperature.

19. A pendant showerhead comprising:

- a housing defining a longitudinal axis;
- a waterway received within the housing;

a sprayface fluidly coupled to the waterway and including a water outlet; and

an illumination device supported by the sprayface, the illumination device including a substrate, a plurality of light emitters supported by the substrate, and a translucent light pipe defining a closed loop surrounding the water outlet to diffuse light from the light emitters outwardly in a direction parallel to the longitudinal axis.

20. The showerhead of claim **19**, further comprising a pendant arm and a coupler fluidly coupling the waterway to the pendant arm, the coupler including a ball joint such that the housing is supported for rotation about at least two orthogonal axes.

21. The showerhead of claim **19**, further comprising a hydro-generator fluidly coupled to the waterway and in electrical communication with the illumination device.

22. The showerhead of claim **19**, wherein the housing includes an outer housing wall, and the light pipe is supported within the spray face laterally intermediate the water outlet and the housing wall.

23. The showerhead of claim **22**, wherein the translucent light pipe includes an outer illumination

surface extending parallel to an outer surface of the sprayface.

24. The showerhead of claim 19, further comprising a multi-dimensional fluidic device received within the water outlet.

VII. CLAIM CONSTRUCTION

78. I am not a legal expert or an attorney and offer no opinions on the law. I understand that claim construction is a matter of law. However, I have been informed by counsel of the legal standards that apply to claim construction in an *inter partes* review, and I have applied them in forming my opinions. I understand that during an *inter partes* review, the same claim construction standard used in federal district court is applied when addressing the meaning of claim terms.

79. I have been informed that the words of a claim are generally given the ordinary and customary meaning that the term or phrase would have to POSITA at the time of the invention in view of the surrounding claim language, the specification and the file history (collectively, the “intrinsic evidence” or “intrinsic record”).

80. I also understand that courts may consider extrinsic evidence, such as expert and inventor testimony, dictionaries, and learned treatises (collectively, the “extrinsic evidence” or the “extrinsic record”), but that such extrinsic evidence should be given less weight than the intrinsic evidence.

81. In my opinion, the terms of the '363 patent's claims do not require further construction and can be afforded their plain and ordinary meaning for purposes of the analysis of the prior art that I am conducting in this declaration.

VIII. UNPATENTABILITY ANALYSIS

82. For the reasons I explain in greater detail below, it is my opinion that as of the effective filing date of the '363 patent, a POSITA would have considered claims 1-24 of the '363 patent to be unpatentable as obvious over the prior art discussed in this declaration.

A. Overview of the Prior Art

83. The following paragraphs provide an overview of the main prior art references I discuss throughout this declaration.

1. Tseng

84. Tseng indicates on its face that it published December 10, 2015. (*See* Ex. 1004, Cover.) In view of this date of publication, which pre-dates the '363 patent's April 2017 filing, I understand that Tseng is prior art under AIA § 102(a)(1).

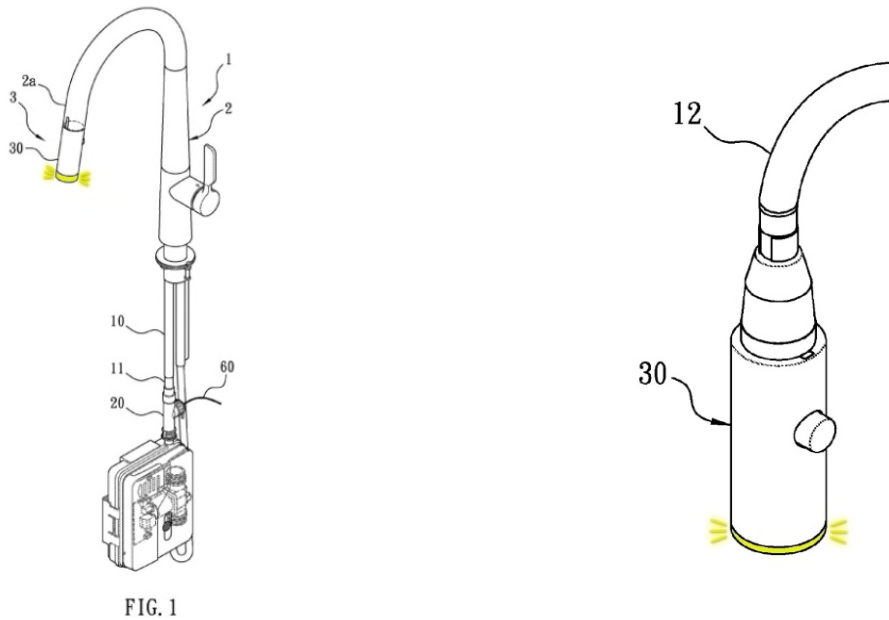
85. Tseng is not cited by the '363 patent and was not considered during prosecution. (*See generally* Exs. 1001, 1002.)

86. Tseng is directed to a “pull-out faucet” with “illuminat[ing] lights” very similar to the '363 patent. (*Id.*, ¶ [0001].)

87. According to Tseng, a “spray head 30” can be “pulled outwardly” from the rest of its faucet. (*Id.*, ¶ [0068].)

88. Figure 1 (reproduced below) provides an overview of the entire faucet. Figure 3 (reproduced in cropped form below) shows just the pulled-out spray head. (*Id.*, ¶¶ [0031], [0033].)

89. As shown, the spray head 30 is illuminated by a circumferential band of light (highlighted in yellow for emphasis):



(*Id.*, Fig. 1 (annotated); Fig. 3 (cropped and annotated).)

90. Tseng includes three embodiments with slightly different internal structures. Figures 5, 27, and 32 respectively provide cross-sectional views of these embodiments. (*Id.*, ¶¶ [0035], [0057], [0062].)

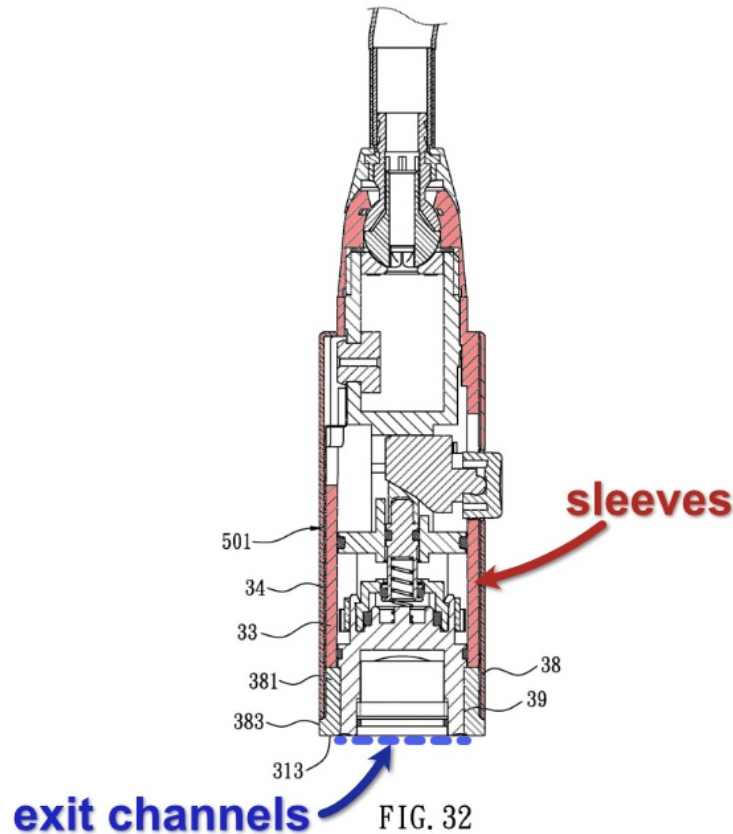
91. In the first embodiment—shown in Figure 5—a light emitting element is integrated with the spray head’s water outlets. In contrast, the second and third

embodiments—respectively shown in Figures 27 and 32—include a light element that is separate from the water outlets. (*See, e.g.*, ¶¶ [0090], [0096]-[0097].)

92. This declaration focuses on the second and third embodiments of Figures 27 and 32. But, because Tseng’s three embodiments are overlapping and have numerous common structural features—many of which are discussed only in the context of the first embodiment—this declaration also cites to certain first embodiment passages. In my opinion a POSITA would understand Tseng’s discussion of the features in the first embodiment to apply equally to the same or analogous features when present in the second and third embodiments.

93. As shown in Figure 32 below, Tseng’s “spray head 30” includes an “internal sleeve 33” and “external sleeve 34” (red below) that together house the spray head’s internal components and define its outer shape. (*Id.*, ¶ [0073].)

94. Per Tseng, “water is guided” through a “conduit member 32” within these sleeves, and exits from either a single “central channel 316” or multiple “peripheral channels 317” (blue dashed line below) at the end of the spray head. (*Id.*, ¶ [0076].)



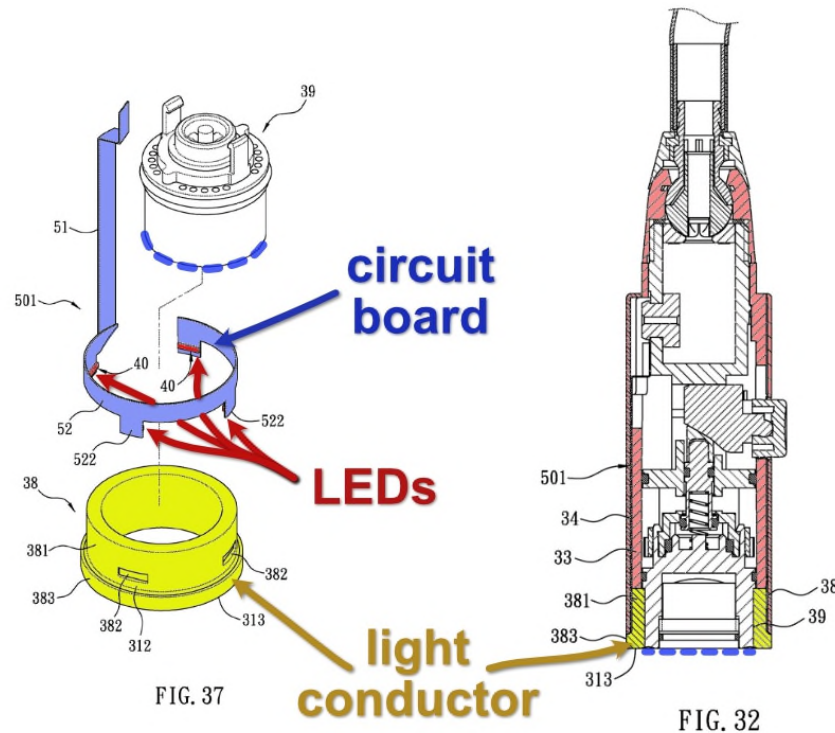
(*Id.*, Fig. 32 (annotated).)

95. To illuminate the spray head, Tseng employs a “plurality of LED elements 40” (red below) attached to “circuit board 50” (blue below). (*Id.*, ¶ [0068].) A “light conductor” (yellow below) “made of translucent material” is used “to guide light[]” from the LEDs. (*Id.*, ¶ [0070].)

96. Figure 37 below provides an example of one such light conductor with a “sleeve” shape. (*Id.*, ¶¶ [0097]-[0099].)

97. Light from LEDs arranged in “indentations 382” is directed to “input face[s] 311.” (*Id.*) The light is then transmitted through the “light conductor 38” to

both an “output face 313” and an “annular protrusion 383” to “enhance light transmission” out of the spray head. (*Id.*, ¶¶ [0097]-[0098].)



(*Id.*, Figs. 32, 37 (annotated).)

98. Tseng’s second embodiment is similar to the third embodiment, except it uses a light conductor with a slightly different structure.

99. In particular, as shown in Figure 30 below, the second embodiment’s light conductor includes a series of “light columns 372” and lower “circular rib 371.” (*Id.*, ¶¶ [0091], [0097]-[0098].)

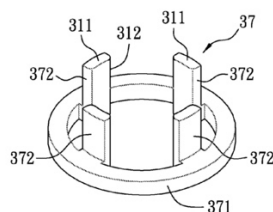


FIG. 30

(*Id.*, Fig. 30.)

2. Tse

100. Tse indicates on its face that it published December 31, 2008. (Ex. 1005, Cover.) In view of this date of publication, which predates the '363 patent's April 2017 filing, I understand that Tse is prior art under AIA § 102(a)(1).

101. Tse is not cited by the '363 patent and was not considered during prosecution. (*See generally* Exs. 1001, 1002.)

102. Tse is directed to a “shower head with a light emitting means.” (*Id.*, 1:4-5.)

103. As exemplified by Figure 1, reproduced below, light is emitted from the face of the shower head in the same direction as exiting water. Yellow has again been employed to show the light-emitting element:

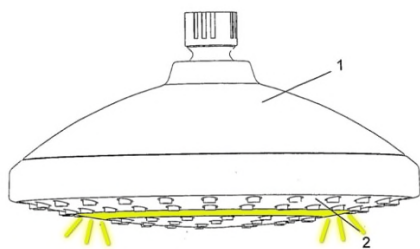


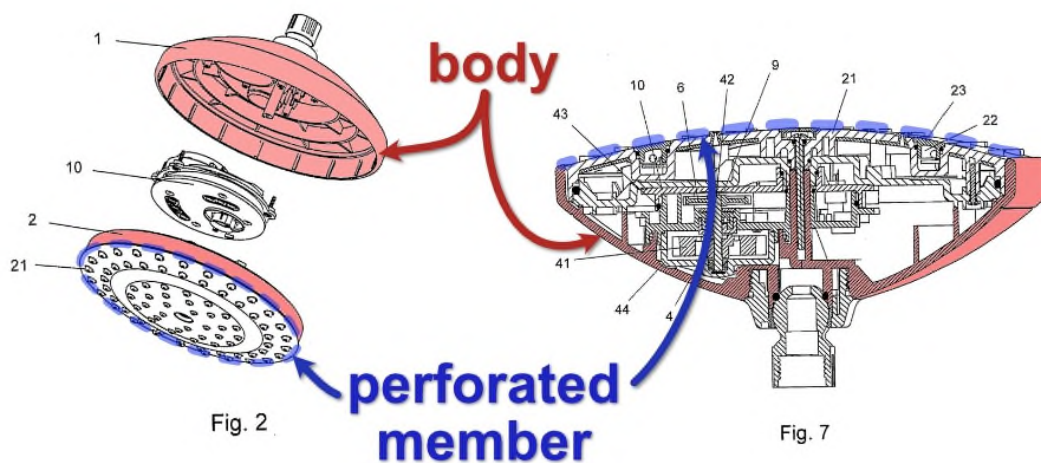
Fig. 1

(*Id.*, Fig. 1 (annotated).)

104. Other figures in Tse provide details of the shower head's structure. For instance, Figure 2 provides an exploded view, while Figure 7 provides a cross-sectional view. These figures have been reproduced in annotated form below.

105. According to Tse, the shower head's outer shape is defined by a "shower head body" (red below) with a "rear portion 1" and "a front portion 2...." (*Id.*, 5:13-16.)

106. Water "flows through the shower head body" and exits via a "perforated member 21" (blue dashes below) in "the form of a spray...." (*Id.*, 3:28-29, 5:16-18.)

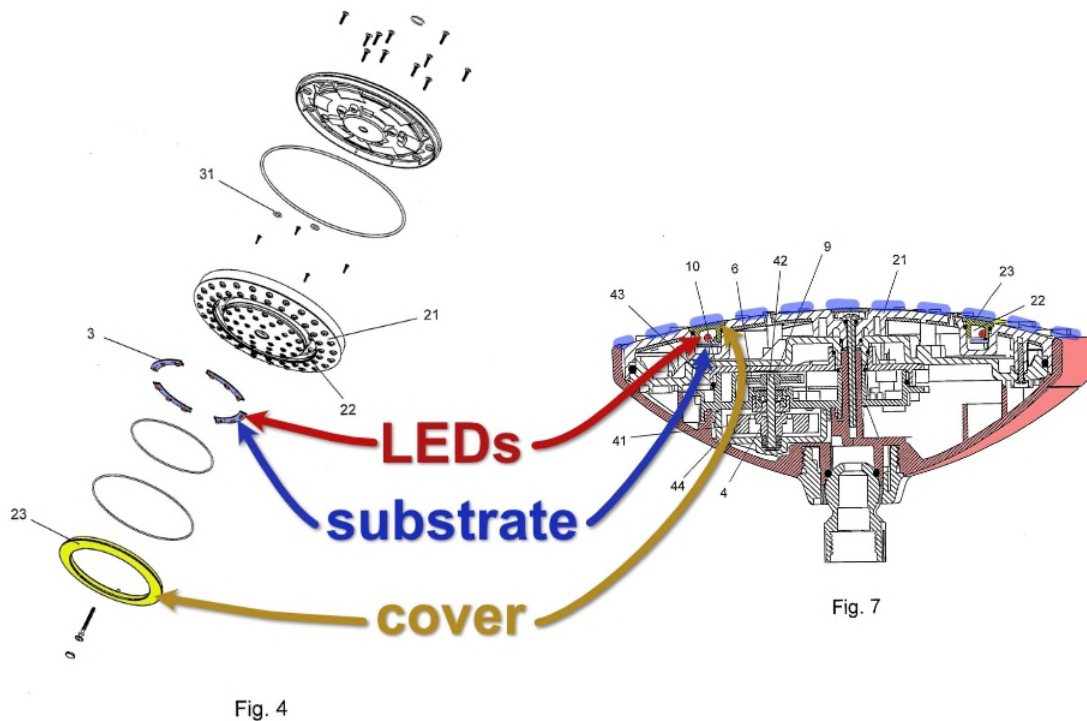


(*Id.*, Figs. 2, 7 (annotated).)

107. Next, to generate light, Tse includes a "light emitting means 3" with "four sets each of three light emitting diodes" (red below) mounted on a substrate (blue below). (*Id.*, 7:1-2; *see also id.*, 3:6.) The LEDs and substrate are "disposed

in the groove 22 of the perforated member 21” “sealed by” a “transparent” “cover 23” (yellow below). (*Id.*, 3:3-5, 6:23-24.)

108. The cover allows the light emitted by the LEDs to be “seen,” and “makes the water coming out of the perforated member 21 hav[e] the same color.” (*Id.*, 3:3-5, 8:20-23.)



(*Id.*, Fig. 4, 7 (annotated).)

109. Tse also explains that its LEDs can be powered by a “hydroelectric generator.” (*Id.*, 1:17-20.)

3. Carter

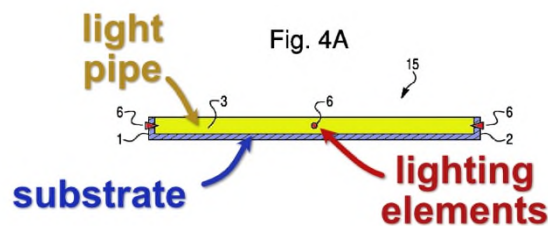
110. Carter indicates on its face that it published February 25, 2010. (See Ex. 1006, Cover.) In view of this date of publication, which pre-dates the '363 patent's April 2017 filing, I understand that Carter is prior art under AIA § 102(a)(1).

111. Carter is not cited by the '363 patent and was not considered during prosecution. (See *generally* Exs. 1001, 1002.)

112. Carter relates to “illuminated plumbing fixtures” with “a molded in place integrated light pipe feature....” (Ex. 1006, ¶ [0003].)

113. As shown in Figure 4A below, a series of “lighting elements 6” (red) are mounted on a “substrate ... 1” (blue). (*Id.*, ¶¶ [0018]-[0019].)

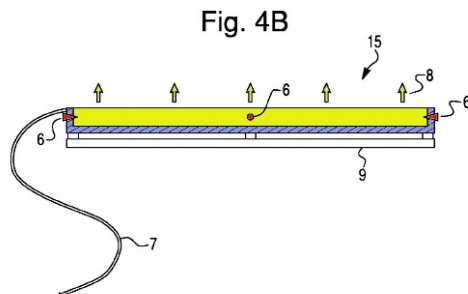
114. Then, a “light piping feature 3” (yellow) is applied over the lighting elements/substrate. (*Id.*, ¶ [0019].)



(*Id.*, Fig. 4A (annotated).)

115. According to Carter, this combined structure allows light from relatively small number of LEDs to be uniformly “disbursed.” (*Id.*, ¶¶ [0019], [0025].) Carter depicts this functionality by including arrows representing locations

of light emission—which are both proximate to and away from the light emitting elements—in Figure 4B:



(*Id.*, Fig. 4B (annotated).)

4. Mizuno

116. Mizuno indicates on its face that it published January 29, 2003. (*See* Ex. 1008, Cover.) In view of this date of publication, which pre-dates the '363 patent's April 2017 filing, I understand that Mizuno is prior art under AIA § 102(a)(1).

117. Mizuno relates to a “faucet with an LED illumination lamp” powered by “a hydroelectric generator.” (*Id.*, ¶ [0001].)

118. The generator is mounted within the “spout head” of the faucet. (*Id.*, ¶¶ [0018], [0022].) Use of the generator eliminates the need for separate wiring or batteries. (*See id.*, ¶¶ [0005]-[0006].)

5. Schneider

119. Schneider indicates on its face that it published August 6, 2015. (*See* Ex. 1009, Cover.) In view of this date of publication, which pre-dates the '363

patent’s April 2017 filing, I understand that Schneider is prior art under AIA § 102(a)(1).

120. Schneider teaches a “kitchen ... faucet and/or a sprayer” with a “display unit with a variable backlight which changes in response to a change in water temperature.” (Ex. 1009, ¶¶ [0002]-[0003].)

121. The temperature of the water being output by the faucet is measured with a “temperature sensor.” (*Id.*, ¶ [0006].)

122. A “controller” is used to change the color of the display by activating/deactivating different colored LEDs. (*Id.*, ¶¶ [0036], [0040]-[0041].)

6. Spangler

123. Spangler indicates on its face that it published November 14, 2013. (See Ex. 1014, Cover.) In view of this date of publication, which pre-dates the ’363 patent’s April 2017 filing, I understand that Spangler is prior art under AIA § 102(a)(1).

124. Spangler teaches a variety of different “multi-dimensional fluid dispensers” for “showerheads.” (*Id.*, ¶ [0001].)

B. Obviousness Over Tseng’s Pull-Out Faucet

125. In my opinion, Tseng’s spray head for a pull-out faucet—which includes a band a light around its housing—renders independent claims 1 and 10 and many of the ’363 patent’s dependent claims obvious.

1. Ground 1: Claims 1-5, 10, and 12-16 Are Obvious Over Tseng’s Pull-Out Faucet

126. In my opinion, a POSITA would have considered Tseng to be within the scope of the prior art and highly relevant to the patentability of the ’363 patent’s claims.

127. In my opinion, moreover, when viewed and considered in light of the knowledge possessed by a POSITA, Tseng discloses all the limitations of and renders claims 1-5, 10, and 12-16 of the ’363 patent obvious.

a. Claims 1 and 10

128. Due to their similarity—and because they embrace overlapping subject matter—I will analyze claims 1 and 10 together.

129. I have used the following formatting conventions when identifying the claim language at issue. First, language that is present in only claim 1 is underlined. Second, language that is present only in claim 10 is [bracketed]. Claim language that is neither underlined nor bracketed is shared by both claims.

[1-p]/[10-p] “A [pull-down sprayhead for a faucet, the] sprayhead comprising:”

130. In my opinion, to the extent this preamble language is limiting it is taught by Tseng.

131. In particular, Tseng teaches a “pull-out faucet....” (Ex. 1004, ¶ [0001].)

132. Tseng’s faucet includes a “spray head 30.” (*Id.*, ¶ [0068].)

133. This “spray head” can be “pulled outwardly[,]” and then “retract[s] back to an outlet 2a” in “the body 2” of the faucet. (*Id.*)

134. Figure 1, reproduced below, provides an example. Spray head 30 is highlighted red, while the direction this head can be pulled is shown with an arrow.

135. As shown, the spray head is intended to be grasped and pulled down and away from the rest of the fixture. This is a standard design present in many kitchen and other fixtures from many vendors to allow at sink to be cleared, or oversized items to be rinsed or filled with water:

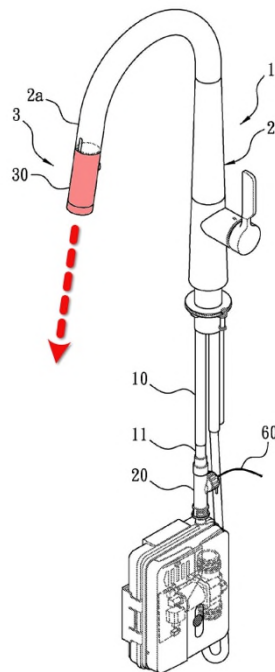


FIG. 1

(*Id.*, Fig. 1 (annotated).)

[1-1]/[10-1] “a housing defining a longitudinal axis [extending between a proximal end and a distal end];”

136. This, in my opinion, is taught by Tseng.

137. Tseng’s spray head includes the claimed “**housing**.” Figures 27 and 32 both provide “cross sectional view[s]” of Tseng’s sprayhead. (*E.g.*, Ex. 1004, ¶ [0034]-[0035]; Figs. 27, 32.)

138. In all cases, “spray head 30” includes both an “internal sleeve 33” and “external sleeve 34.” (*Id.*, ¶¶ [0073].) The sleeves together define the external shape of the sprayhead and surround, contain, and house its other components. (*See id.*, Figs. 27, 32.)

139. Moreover, Tseng’s “spray head” includes a “central axis X” within the sleeves/housing. (*Id.*, ¶¶ [0013], [0017], [0071].)

140. This is shown in the below annotated version of Figure 32 below. As shown, the spray head includes a central “**longitudinal**” (blue arrow) axis that proceeds along the length the “**housing**” formed by sleeves 33/34 (red highlighting). The axis proceeds from the spray head’s “**proximal end**” (the end adjacent to the rest of the fixture) to its “**distal end**” (the terminal end that emits water):

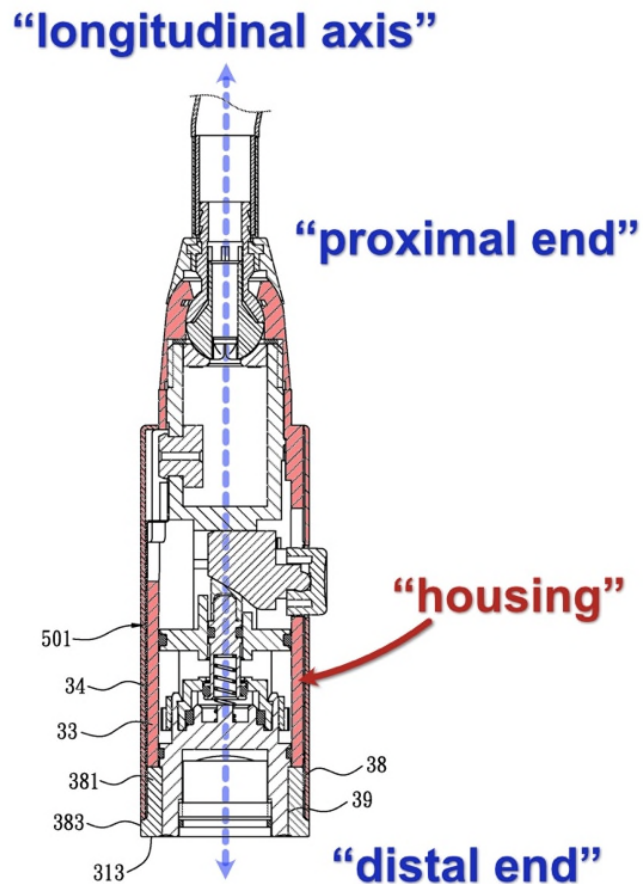


FIG. 32

(*Id.*, Fig. 32 (annotated).)

[1-2]/[10-2] “a waterway received within the housing;”

141. This, in my opinion, is taught by Tseng.

142. According to Tseng, its faucet includes a “flexible pipe 10” with an “outlet segment 12” to “flow water” into spray head 30. (Ex. 1004, ¶ [0068].)

143. The spray head includes an internal “conduit member 32” connected to outlet segment 12 of the previously mentioned flexible pipe 10. (*Id.*, ¶ [0077].)

144. Thus, during operation water will flow through the flexible pipe 10, out of the pipe's outlet segment 12, and into the spray head 30. From there, "water is guided to flow out" of either the spray head's "central channel 316" or its "peripheral channels 317 via the conduit member 32." (*Id.*, ¶ [0076].) A POSITA would understand this is the same mechanism as the "diverter valve assembly" in the '363 patent.

145. Figure 5 provides an example of the internal conduit (shown generally with blue highlighting below) within Tseng's "**housing**" (red highlighted sleeves 33, 34). Note that while the waterway is not shown to be fully connected along the length of the spray head, this is only the result of the particular cross-sectional view provided by this figure. A POSITA would have understood that the required interconnections are nonetheless present (just behind or in front of the particular cross-sectional view of the figure).

146. In my opinion, this conduit, which is also present in the embodiments of Figures 27 and 32 (*see id.*, Figs. 27, 32), is the claimed "**waterway**":

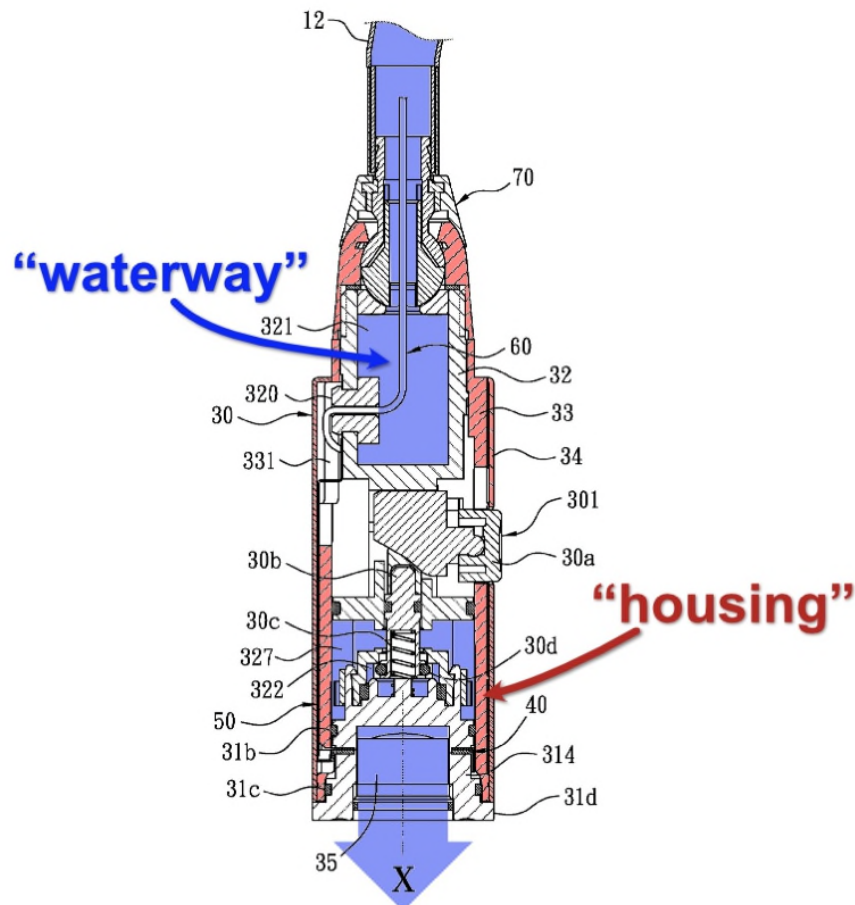


FIG. 5

(*Id.*, Fig. 5 (annotated).)

[1-3]/[10-3] “a sprayface fluidly coupled to the waterway and supporting [defining] a water outlet; and;”

147. This, in my opinion, is taught by Tseng.

148. Like all faucets, Tseng’s pull-out faucet is designed for “flowing or spraying water” out its lower end. (Ex. 1004, ¶ [0002].)

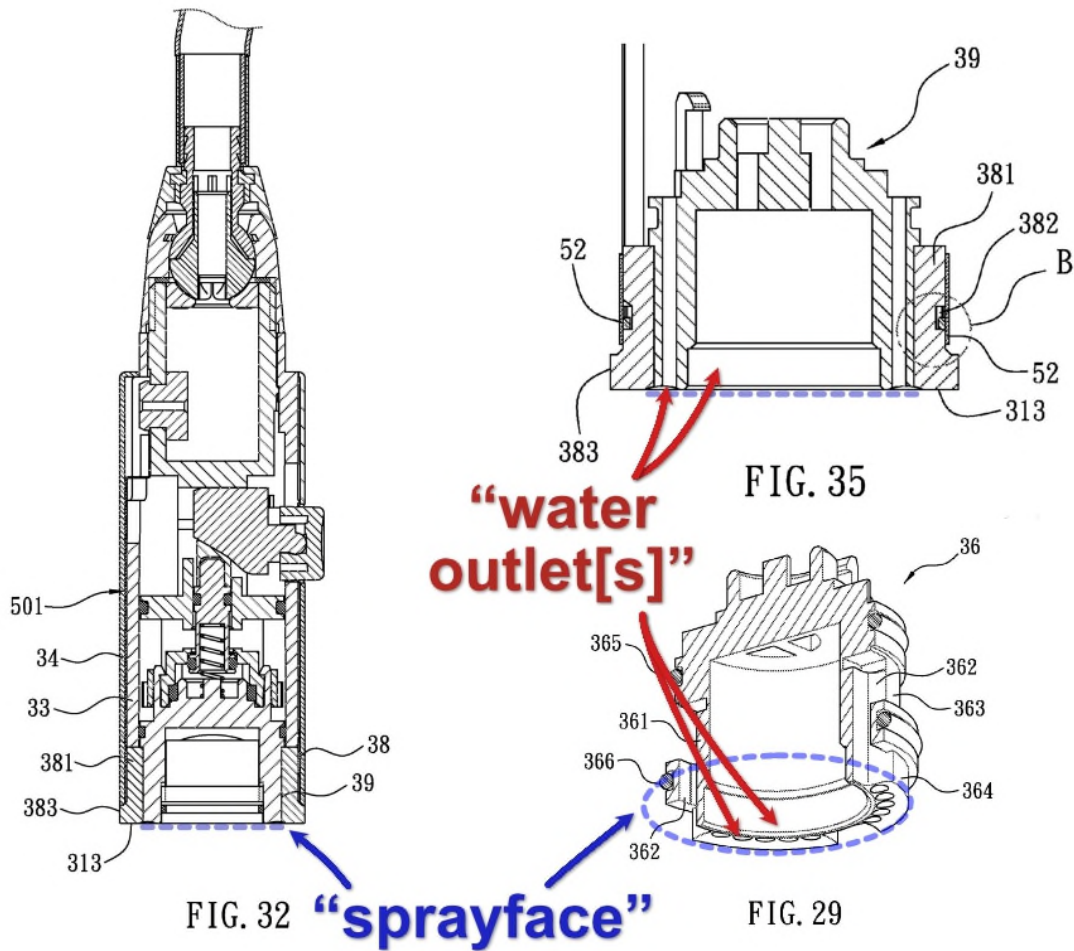
149. To provide this functionality, Tseng’s spray head 30 includes both a “central channel 316” and “plural peripheral channels 317” that are connected to the “internal conduit 32.” (Ex. 1004, ¶ [0076].)

150. According to Tseng, a “switch device” diverts the water flow to either the central or the peripheral channels. (*Id.*, ¶¶ [0015]-[0016], [0076].) A POSITA would understand this to be the same type of mechanism as the “rocker arm 154” in the ’363 patent.

151. In my opinion, a POSITA would have considered the lower surface of Tseng’s spray head—the portion of the spray head that emits water when in use—to be the claimed “**sprayface**.”

152. Next, as this claim limitation requires, this “**sprayface**” includes “**water outlet[s]**.” In particular, there are channels 316/317 in the lower surface of Tseng’s spray head that allows water to exit or spray out of the spray head. These channels 316/317 are present in all of Tseng’s embodiments.

153. Figures 29, 32, and 35 provide various views of the “**sprayface**” and “**water outlet[s]**.” Figure 32 shows the entire spray head. Figure 35 provides a zoomed cross-sectional view. Figure 29 provides a partial bottom view showing the “**outlet[s]**” 316/317 (red annotations) through the “**sprayface**” (blue-dashed line):



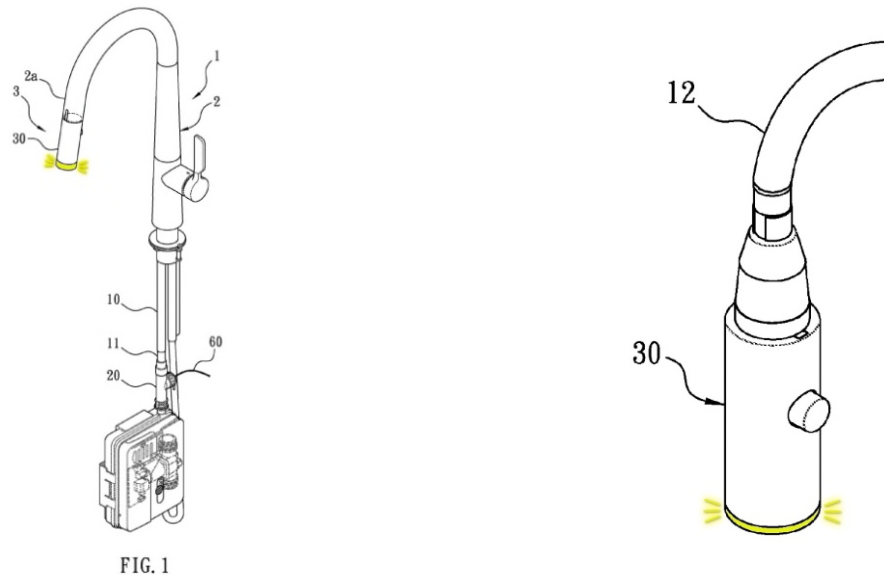
(*Id.*, Figs. 29, 32, 35 (annotated and cropped).)

[1-4]/[10-4] “an illumination device supported by the housing, the illumination device including a substrate, a plurality of light emitters supported by the substrate, and a translucent light pipe [including an outer illumination surface extending perpendicular to the longitudinal axis of the housing, the translucent light pipe] defining a closed loop to diffuse light from the light emitters outwardly away from the housing [to the outer illumination surface].

154. This, in my opinion, is all taught by Tseng.

155. Tseng’s “spray head 30” provides “brilliant illumination.” (Ex. 1004, ¶ [0102]. To accomplish this, the “pull-out faucet[’s]” “shower assembly” “illuminate[s]” integrated “lights.” (*Id.*, ¶ [0001].)

156. An example of this is shown in Figures 1 and 3 below. As shown by the yellow annotating and exemplary light rays, the end of Tseng’s pull-out spray head emits a band of light:



(*Id.*, Fig. 1 (annotated); Fig. 3 (cropped and annotated).)

157. Moreover, in my opinion, a POSITA would have understood that Tseng emits this light using the same elements this limitation requires: an “**illumination device**” with a “**plurality of light emitters**” (multiple LED elements), a “**substrate**” (a circuit board), and a “**translucent light pipe**” (a light conductor). (*Id.*, ¶¶ [0010]-[0011].)

158. More particularly, Tseng’s spray head includes a “plurality of LED elements 40” attached to “circuit board 50.” (*Id.*, ¶ [0068].) The “circuit board 50” is “a flexible printed circuit (FPC)” and includes, among other elements, “a C-shaped ring 52” with “plural extensions 53” supporting the LEDs. (*Id.*, ¶ [0071].)

159. An example of this is shown in Figure 11, with circuit board 50 highlighted blue, and the LED elements 40 highlighted red:

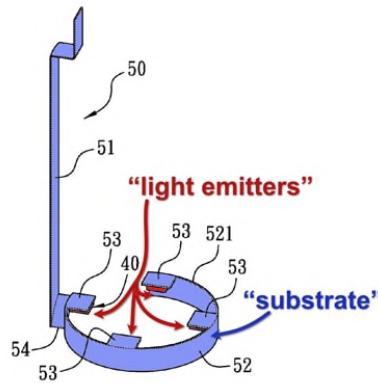


FIG. 11

(*Id.*, Fig. 11 (annotated).)

160. The LED elements 40 are Tseng’s “*plurality of light emitters*”: they generate the light that is used to illuminate and emanate light from Tseng’s spray head.

161. The circuit board 50 is the claimed “*substrate*”: it supports and holds the LED elements in the proper position within Tseng’s housing.

162. All of Tseng’s spray head designs include these elements. (*See, e.g.*, Ex. 1004, Figs. 31, 37.)

163. Next, Tseng explains that its “light conductor” is “made of translucent material to guide lights...” (Ex. 1004, ¶ [0070].) Similarly, Tseng explains that its “light conductor” functions as a light “guiding member.” (*Id.*, ¶ [0072].)

164. Figures 30 and 37, both reproduced below, provide two examples of how this “light conductor” can be structured:

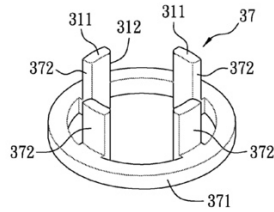


FIG. 30

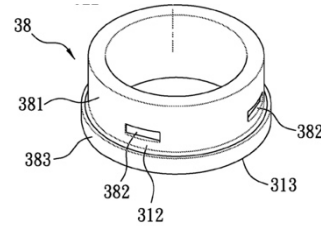


FIG. 37

(*Id.*, Figs. 30, 37 (excerpted).)

165. As shown, the light conductor depicted in Figure 30 includes a series of “light columns 372” with “input face[s] 311” and a lower “circular rib 371.” (*Id.*, ¶ [0091].) The LED elements are located adjacent to and emanate light into the light input faces. (*Id.*, ¶ [0094].) Light travels through the columns and out the “circular rib” “to enhance light transmission and illumination.” (*Id.*)

166. The light conductor of Figure 37 similarly includes “indentations 382” with light “input face[s] 311” that align with the LED elements for purposes of receiving emanated light. (*Id.*, ¶ [0097].) This conductor also includes a lower “light transmission portion 312” a light “output face 313” and an “annular protrusion 383” that—like the rib of Figure 30—“enhance[s] light transmission” out of the light conductor (*Id.*, ¶¶ [0097]-[0098].)

167. Tseng does not use the phrase “**light pipe.**” Regardless, in my opinion a POSITA would understand Tseng’s “light conductor” to correspond to this claim element.

168. First, Tseng’s “light conductor” it is made from translucent material. (*Id.*, ¶ [0070].)

169. Second, it is not flat and instead has significant dimension. More particularly, it includes a “circular rib” or other pipe-like elements like protrusion 383 in Figure 37. (*See, e.g.*, ¶¶ [0024], Figs. 30, 37.) In my opinion, a POSITA would have clearly understood this to be an annular ring like that discussed in the ’363 patent.

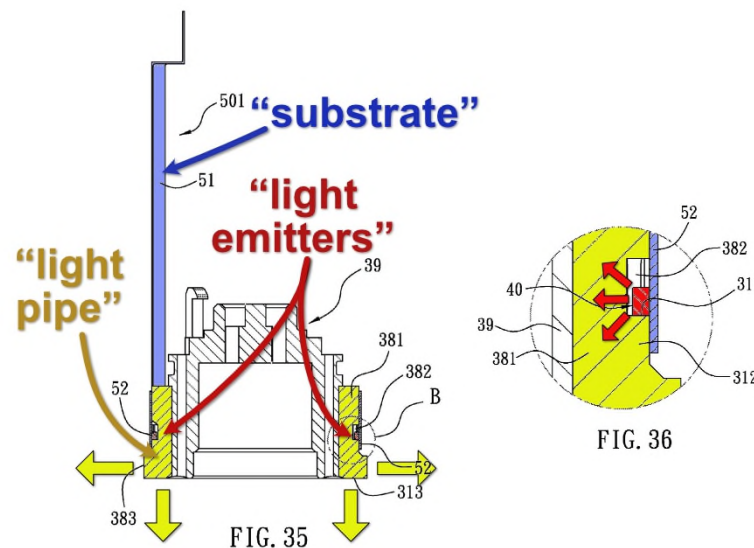
170. Third, as Tseng itself explains, the light conductor operates to transmit and uniformly diffuse light from Tseng’s four internal LED elements to a different location on the exterior of spray head 30.

171. In this regard, Tseng explains that “light conductor” “transmit[s]” and “output[s]” light. (*Id.*, ¶ [0011]; *see also id.*, ¶ [0024] (“light conductor” engages in light “transmission”).) Likewise, per Tseng, the “light conductor” is structured to “enhance [the] illumination effect” “outside” the spray head. (*Id.*, ¶ [0079]; *see also id.*, ¶¶ [0094] (“light conductor” “enhance[s] light transmission and illumination”); [0098] (similar).)

172. Put another way, light does not simply pass through the light conductor. Instead, the conductor operates to both transmit light from the interior of the housing and diffuse that light for purposes of enhancing the overall illumination outside of the housing. A POSITA would have understood that this is how all commercially available light pipes work.

173. The relative positioning of LED elements within Tseng's housing and the light output faces emphasizes this operation.

174. For example, as shown in Figures 35 and 36, LEDs 40 face inward and emit light towards the center of the spray head (red arrows). Faces 313 and 383, however, emit light outwards (yellow arrows). In this regard, Tseng explains that "face 313" is an "output" face, and that "protrusion 383" "enhance[s] light transmission." (*Id.*, ¶¶ [0097], [0098].)



(*Id.*, Figs. 35, 36 (annotated).)

175. In my opinion, because faces 313 and 383 are oriented in different directions than LEDs 40, a POSITA would have understood that Tseng's light conductor engages in internal light diffusion and reflection to transmit the light emitted from the LEDs through (and eventually out of) the conductor. Because this occurs, the light conductor both conducts light (its intended purpose) and operates to enhance light transmission and illumination as Tseng teaches.

176. The "light pipe" in the '363 patent is similarly structured and operates in the same way. In particular, per the '363 patent, "light pipe 176" is "formed of a translucent material," "is positioned longitudinally" within a sprayhead's "housing," and "transmit[s] light radially outward." (*See, e.g.*, Ex. 1001, 3:59-65.)

177. In my opinion, a POSITA would also have generally understood that any structure able to transmit light along its length constitutes a "light pipe."

178. Showing this, one prior art reference explains that "[a] light pipe is a solid transparent plastic rod for transmitting light lengthwise." (Ex. 1010, ¶ [0018].)

179. Another reference similarly explains that a "light pipe can include an optical fiber or a solid transparent plastic rod for transmitting light lengthwise." (Ex. 1011, ¶ [0075].)

180. In my opinion, a POSITA would have recognized that Tseng's light conductor is constructed and operates in just this way. In particular, it is solid and transparent, and functions to transmit light from the LEDs from one location to

another (from inside the housing where the LEDs are located to the outer surfaces of the light conductor).

181. Next, Tseng’s “light conductor” **“defin[es] a closed loop.”** Transmission portion 312 and protrusion 383 in Figure 37 are structured as an unbroken circle. (Ex. 1004, Fig. 37.) So is rib 371 in Figure 30: it forms a complete, unbroken circle. (See *id.*, Fig. 30.)

182. Consistent with this, Tseng explains that its “light conductor” has a “circular” or “sleeve shape.” (*Id.*, ¶¶ [0024], [0026].)

183. Next, Tseng’s **“illumination device”** (this, as I have explained, is the combination of Tseng’s board 50, LEDs 40, and light conductor 38) is also **“supported by the housing.”**

184. Figure 37 shows how the LED elements, circuit board, and light conductor integrate.

185. Tseng’s **“substrate”** (circuit board 50, blue) supports its **“light emitters”** (LEDs 40, red). The circuit board wraps around Tseng’s **“light pipe”** (light conductor 38, yellow) such that the LEDs align with indentations 382. Member 39—which includes channels 316/317 and forms Tseng’s **“sprayface”** (blue dashed line)—is then mounted in the center of light conductor 38. (Ex. 1004, ¶¶ [0096]-[0101].)

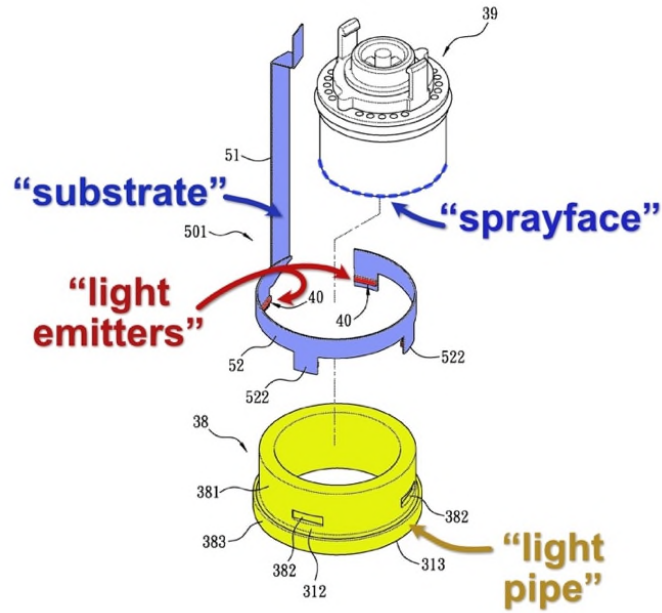


FIG. 37

(*Id.*, Fig. 37 (annotated).)

186. Figure 32 below depicts these elements within spray head 30:

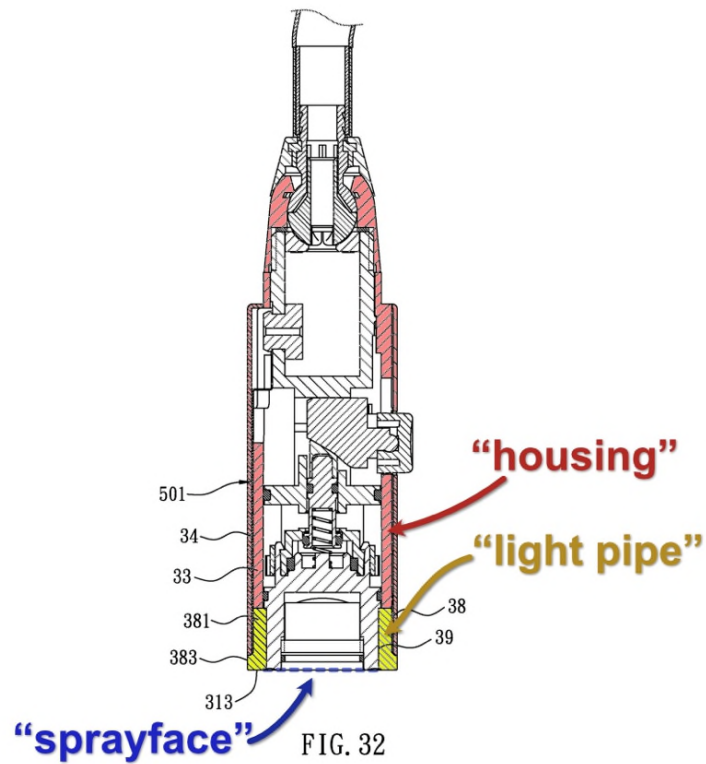


FIG. 32

(Id., Fig. 32 (annotated).)

187. As shown, “light conductor 38 is accommodated among a lower side of the internal sleeve 33, an outer wall of the guiding member 39 and an inner wall of the external sleeve 34.” (*Id.*, ¶ [0099].)

188. In other words, Tseng’s “**light pipe**” (light conductor 38, yellow) is sandwiched between, contained within, and held in place by the spray head’s internal elements and the outer “**housing**” (sleeves 33/34, red). (*Id.*) Thus, they are supported by the housing as this claim limitation requires.

189. The board 50 and LEDs 40 are also contained within the housing. (*See id.*, ¶ [0101]; Figs. 32-37.)

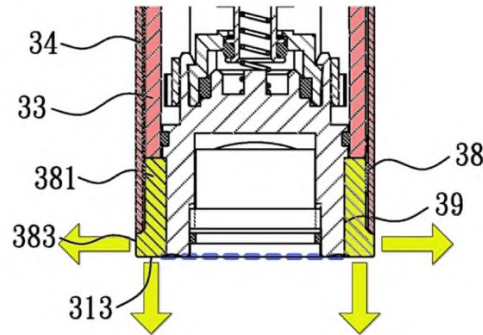
190. In my opinion, Tseng’s “**light pipe**” (its light conductor 38) operates to diffuse light in the way claims 1 and 10 require.

191. More particularly, claim 1 requires light diffusion “**outwardly away from the housing.**” This is exactly what the Tseng’s light pipe does.

192. According to Tseng, its “light conductor 38” includes both a lower light “output face 313” and an “annular protrusion 383” to “enhance light transmission.” (Ex. 1004, ¶¶ [0097], [0098].)

193. Again, as I have explained, this light conductor structure results in the emission of light in at least two directions: downward from face 313 and laterally out of the spray head’s sides via protrusion 383.

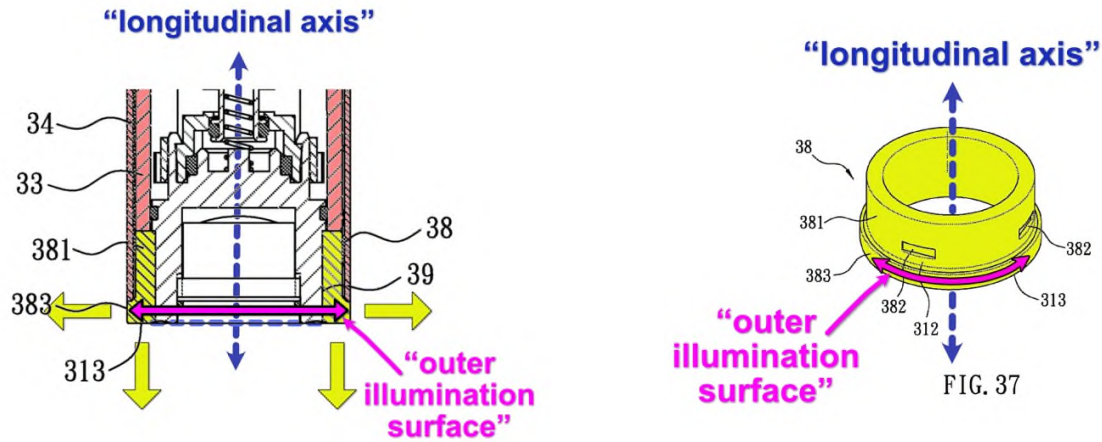
194. This is shown by the yellow arrows applied to the below excerpted portion of Figure 32. Light emanates both from face 313 and from circumferential protrusion 383:



(Ex. 1004, Fig. 32 (excerpted and annotated).)

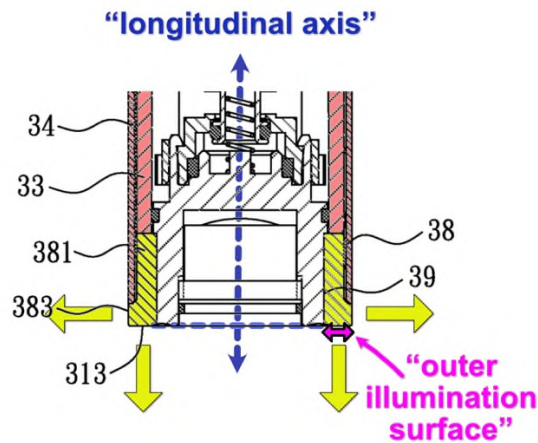
195. Claim 10 similarly requires light diffusion towards an ***“outer illumination surface extending perpendicular to the longitudinal axis of the housing.”*** Tseng, in my opinion, includes two such surfaces.

196. First, light emitting protrusion 383 forms an outer surface that proceeds circumferentially around the spray head like a belt. This surface’s direction of ***“exten[sion]”*** (around the housing) is ***“perpendicular”*** to the housing’s ***“longitudinal axis”*** as shown by the purple arrow below:



(Id., Figs. 32, 37 (excerpted, annotated).)

197. Second, light conductor 38 also has another light emitting lower surface 313 with a direction of “*exten[sion]*” (a width) that is similarly “*perpendicular*” to the housing’s “*longitudinal axis*.” Again, this is shown with a purple arrow:



(Id., Fig. 32 (annotated).)

198. Once again, both of these faces receive and emit light from the LEDs 40 for purposes of illuminating the spraying end of Tseng’s spray head. (See *id.*, ¶¶ [0097]-[0098].)

199. In my opinion, a POSITA would also understand that the light emitted from Tseng’s light conductor would be substantially uniform and would not have the type of “hot spots” referenced in the ’363 patent. (*E.g.*, Ex. 1001, 1:24-30). Commercially available pipes are designed to provide uniform illumination for functional and aesthetic considerations.

200. Again, Tseng explains that its light conductor is designed to “enhance light transmission” and provide “brilliant illumination.” (Ex. 1004, ¶¶ [0098], [0102].)

201. In my opinion, a POSITA would have understood that uniform, non-spotty light emission produces these results and furthers these expressed goals. Uniform light emission—as opposed to localized light spots—will result in both enhanced light transmission out of the spray head and improved illumination.

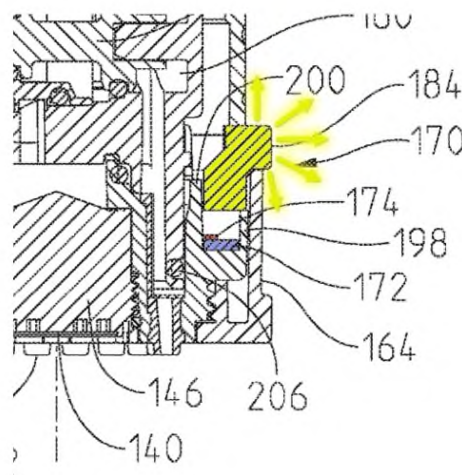
202. Moreover, as I also explain above, a POSITA would have understood that light entering Tseng’s light conductor will be substantially diffused as it is transmitted towards protrusion 383 and face 313. This in turn will lead to near uniform emission of light out of the light conductor upon arrival at these surfaces. Indeed, this is one of the design purposes of the light conductor: to not only transmit light from a relatively small number of light sources out of the housing, but to do so in a way that enhances illumination.

203. Finally, the fact that Tseng’s light conductor emits light from both protrusion 383 and face 313 is of no moment.

204. In my opinion, a POSITA would not interpret the claims as requiring **all** the light emitted by the LEDs to be “diffuse[ed] ... outwardly” in the same direction from the housing. Instead, the claims require only that **some** “light from the light emitters” be diffused in this manner. (See Ex. 1001, claims 1, 10.) In fact, a POSITA would have understood that no commercially available light pipe is capable of perfectly transmitting all light from the source to the output surface.

205. Showing this, a POSITA would have recognized that even in the ’363 patent, some fraction of the light emitted by the LEDs will remain within the showerhead housing, while light making its way to the light pipe will be emitted in pattern covering almost a full 180°.

206. Figure 4 below—which has been annotated yellow to depict some light emission—provides an example of this:



(Ex. 1001, Fig. 4 (cropped and annotated).)

b. Claims 2 and 16

207. Claims 2 and 16 respectively depend on claims 1 and 10 and further require:

“a pull-down sprayhead configured to be releasably coupled to a delivery spout of a faucet” [Claim 2]

“a coupler configured to releasably couple the housing to a delivery spout of a faucet” [Claim 16]

208. As I have explained, Tseng teaches everything claims 1 and 10 require. It also teaches the additional limitations of claims 2 and 16.

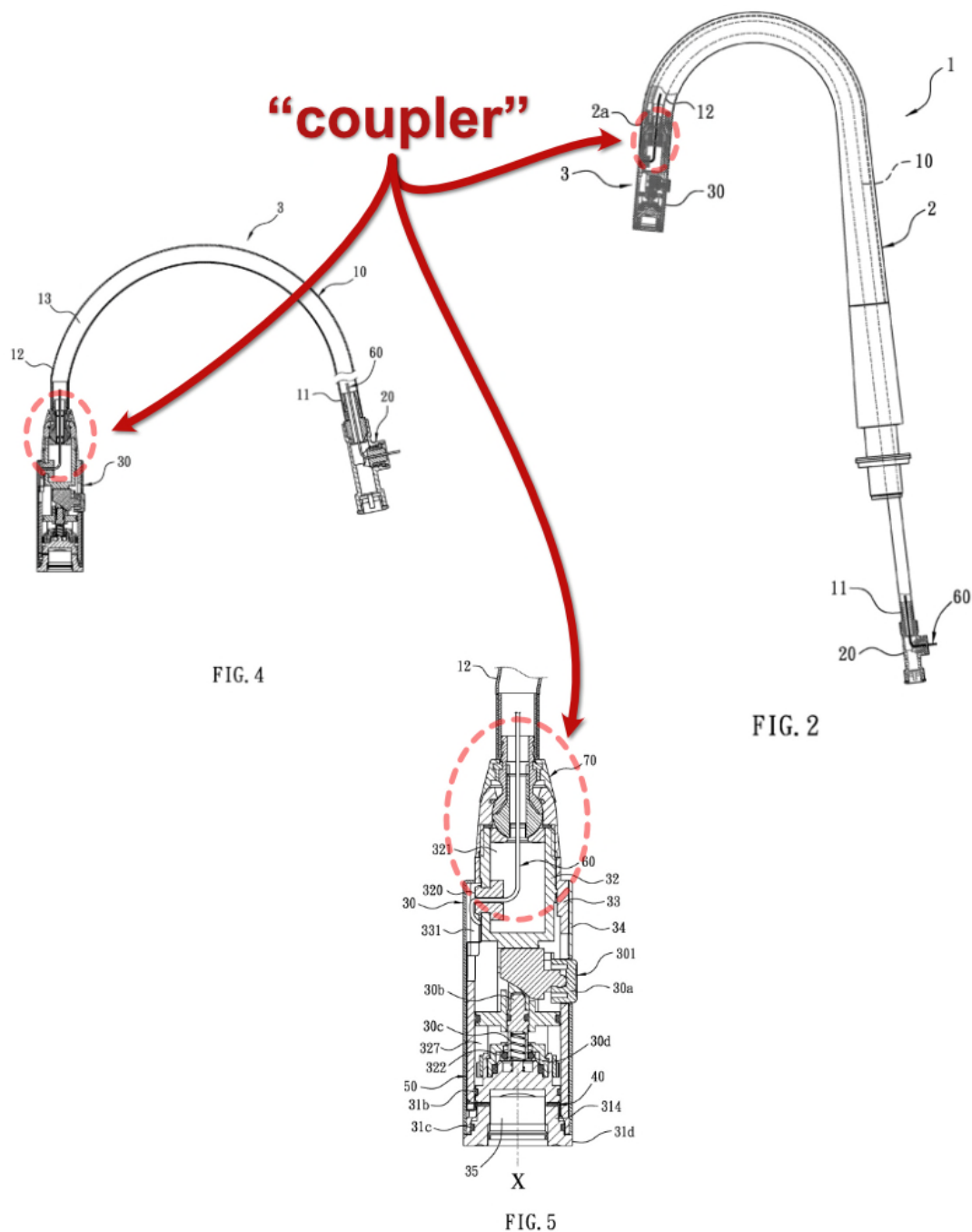
209. Tseng teaches a “pull-out faucet....” (Ex. 1004, ¶ [0001].)

210. Per Tseng, its faucet’s “spray head 30” can be “pulled outwardly” from and “retracts” back to an “outlet 2a” in the faucet’s “body 2.” (*Id.*, ¶ [0068]; *see also id.*, Fig. 2.)

211. A “flexible pipe 10” passes through the faucet body’s outlet to deliver water to the pullable spray head. (*Id.*)

212. The upper end of the pullable spray head includes a “coupling member 70” that contacts and is held in the faucet body’s outlet when the spray head is retracted. (*Id.*, ¶¶ [0082]; Figs. 2, 4, 5.)

213. This coupling member is shown in multiple figures, including Figures 2, 4, and 5 (it is labeled in Figure 5). The contact between the coupling member and the outlet of the faucet body is shown in Figure 2 below. In this figure, the spray



(*Id.*, Figs. 2, 4, 5 (annotated).)

214. In my opinion, this is what this claim requires. More particularly, Tseng includes a **“pull-down sprayhead”** (spray head 30) that is **“releasably coupled”** to a **“delivery spout”** via a **“coupler”** (the upper portion of the spray head that includes coupling member 70 that retracts into and can be pulled out of the outlet 2a of the faucet’s body).

c. Claims 3, 12, and 13

215. Claims 3 and 12 respectively depend on claims 2 and 10 and further require:

“wherein the light pipe includes an annular ring configured to transmit light radially outwardly [from the longitudinal axis]”

216. As I have explained, Tseng teaches everything claims 2 and 10 require. It also teaches the additional limitations of claims 3 and 12.

217. In my opinion, Tseng’s **“light pipe”** includes an **“annular ring configured to transmit light radially outwardly.”**

218. In this regard, the “light conductor” of Figure 30 includes a “circular rib 371” that “exposes outside” the spray head’s housing “to enhance light transmission and illumination.” (Ex. 1004, ¶ [0094].)

219. Similarly, the “light conductor” of Figure 37 has a “sleeve shape” with a “light transmission portion” and an “annular protrusion 383” that “enhance[s] light transmission.” (Ex. 1004, ¶¶ [0097]-[0098].)

220. Claim 13 depends on claim 12 and further requires:

“wherein the annular ring includes a distal portion extending parallel to the longitudinal axis and configured to transmit light from the light emitters in an axial direction, and a proximal portion extending radially outwardly from the distal portion and configured to transmit light toward the outer illumination surface”

221. This, in my opinion, is also taught by Tseng.

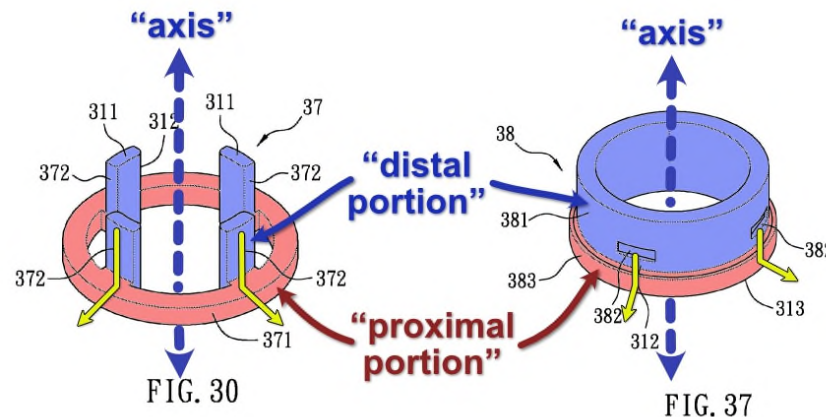
222. The light conductor of Figure 30 includes both “plural light columns 372” that extend in a direction proceeding along the spray head’s length and a “circular rib 371.” (Ex. 1004, ¶ [0091].) Light from the LEDs 40 is input into the tops of columns via input faces 311, proceeds along the length of the columns, and is output from the rib. (*See id.*)

223. Similarly, the light conductor of Figure 37 includes both an “outer cliff 381” extending in a direction proceeding along the spray head’s length, and an “annular protrusion 383 extending outwardly” from the bottom of the cliff. (*Id.*, ¶¶ [0097]-[0098].) Light from the LEDs 40 is inputted into the cliff via indentions 382, proceeds along the length of the cliff, and is output from the protrusion. (*Id.*)

224. In my opinion, the columns of Figure 30 and cliff of Figure 37 (blue below) both constitute a **“distal portion extending parallel to the longitudinal axis”** (both extend in a direction that follows the spray head’s longitudinal axis) that **“transmits light ... in an axial direction”** (first part of yellow arrow).

225. The rib of Figure 30 and annular protrusion of Figure 37 (red below) are the claimed **“proximal portion extending radially outward”** (both extend in a

direction that proceeds generally from within the spray head's housing to outside that housing) that transmits light to ***“the outer illumination surface”*** (second part of yellow arrow):



(*Id.*, Figs. 30, 37 (annotated).)

d. Claims 4 and 14

226. Claims 4 and 14 respectively depend on claims 3 and 12 and further require:

“wherein the light emitters comprise a plurality of circumferentially spaced light emitting diodes”

227. As I have explained, Tseng teaches everything claims 3 and 12 require. It also teaches the additional limitations of claims 4 and 14.

228. In my opinion, Tseng employs the claimed ***“light emitting diodes.”***

229. In particular, it uses “a plurality of LED elements 40” to generate light.

(Ex. 1004, ¶ [0101].)

230. Further, as shown in Figure 37, four “LED Elements 40” are mounted on “tabs 522” equally spaced around a “C-shaped ring 52” of a circuit board. (*Id.*)

231. In my opinion, the mounting of the LEDs 40 on a ring with equal spacing causes them to be “*circumferentially spaced*” around the periphery of Tseng’s sleeve-like light conductor 38. This is exemplified by the annotated version of Figure 37 below:

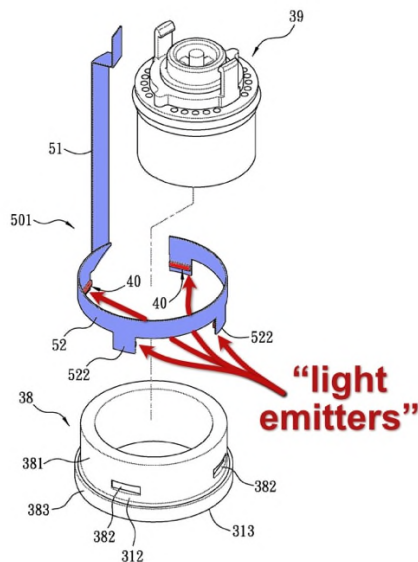


FIG. 37

(*Id.*, Fig. 37 (annotated).)

e. Claims 5 and 15

232. Claims 5 and 15 respectively depend on claims 1 and 10 and further require:

“a diverter valve assembly fluidly coupled to the waterway, wherein the sprayface includes a stream outlet and a spray outlet, the diverter valve assembly configured to divert water between the stream outlet and the spray outlet”

233. As I have explained, Tseng teaches everything claims 1 and 10 require. It also teaches the additional limitations of claims 5 and 15.

234. Tseng's spray head "includes a switch device 301" that can be "manually operated by a user to control the water flow out of the central channel 316 or the plural peripheral channels 317." (Ex. 1004, ¶ [0075].)

235. According to Tseng, the switch controls a "valve core 30b mounted" within Tseng's "conduit member 32" that selectively "guide[s] the flow" of water to produce the desired output. (*Id.*)

236. In my opinion, this valve core is the claimed **"diverter valve assembly fluidly coupled to the waterway."** This is because it operates it diverts water flowing through the spray head's conduit to either channel 316 or channels 317.

237. Further, the single central channel 316 produces a single, thicker **"stream"** of water. And, the many peripheral channels 317 produce a **"spray"** composed of many, smaller streams of water.

238. A POSITA would have recognized that this is standard operation provided by many known and available plumbing fixtures: Tseng's fixture, like these known fixtures, includes a toggle switch that operates a valve causing water to either exit in a stream or a spray.

2. Ground 2: Claims 9 and 11 are Obvious Over Tseng and Mizuno

239. As explained above, in my opinion, Tseng renders independent claims 1 and 10 obvious.

240. Dependent claims 9 and 11 narrow claims 1 and 10 by further requiring that the claimed illumination device include ***“a hydro-generator fluidly coupled to the waterway and in electrical communication with the illumination device.”***

241. While Tseng does not itself reference a “hydro-generator,” Mizuno (Ex. 1008) does. In my opinion, claims 9 and 11 are obvious when Mizuno’s teachings are applied to Tseng’s pull-out faucet.

242. Mizuno relates to a “faucet with an LED illumination lamp” powered by “a hydroelectric generator.” (*Id.*, ¶ [0001].)

243. In Mizuno a “spout head in a faucet” incorporates “a plurality ... of LED illuminating lamps 12.” (*Id.*, ¶ [0018].)

244. To provide the electrical power required by the LEDs, a “generator unit 32” is mounted within the spout head’s “body 14.” (*Id.*, ¶ [0022].) Water flowing through the internal “water passage” of the spout head and generator causes the generator to produce electrical “power.” (*Id.*, ¶ [0023].) The electrical power is then supplied to the “LED illumination lamps 12.” (*Id.*)

245. This, in my opinion, is what claims 9 and 11 require: a ***“hydro-generator”*** (Mizuno’s generator unit 32) is ***“coupled to the waterway”*** (the water

passage through Mizuno’s spout head) and is in “***electrical communication with the illumination device***” (Mizuno’s LEDs).

246. In my opinion, a POSITA would have been motivated to apply Mizuno’s hydro-generator to Tseng.

247. According to Mizuno, in some prior art faucets an “external power source” often used to power light in faucet. (Ex. 1008, ¶ [0004].) A POSITA would have recognized that Tseng provides an example of this, teaching an external power source for its lights.

248. This is problematic, according to Mizuno, because it requires either “electrical wiring” or “mount[ing] a battery in the faucet.” (*Id.*)

249. The need to include wiring from an external power supply is both problematic (as there is the potential for short circuit or other hazards) and time consuming (electrical interconnection work is required) (*Id.*, ¶¶ [0005]-[0006].)

250. Mizuno also explains that use of a battery also gives rise to problems. In particular, the area around the water discharge port must be made undesirably “large” to accommodate the battery (or batteries), and the battery must be routinely changed for the device to remain functional. (*Id.*)

251. In my opinion, a POSITA would have recognized that Tseng is subject to these problems.

252. In particular, an “electric wire 60” is routed through Tseng’s “pull-out faucet” to supply the power needed by the LEDs. (Ex. 1004, ¶ [0068]; Figs. 1-5.)

253. A POSITA would have recognized that this wire must be interconnected with an external power supply (like an outlet, junction box, or the like). This complicates installation and adds expense. Electrical work is required to interconnect the wire with nearby electrical wiring. Moreover, because Tseng’s shower head is designed to be pulled-out, the wire will be subject to stress and strain which could lead to its failure over time. Further, the electrical interconnection itself could be improperly installed leading to short circuits or other hazardous conditions.

254. A POSITA would have recognized that use of Mizuno’s generator unit avoids these issues.

255. By using a “hydraulic power generator” that “generat[es] power” from water flow, the need for an external power supply or battery is eliminated. (Ex. 1008, ¶ [0006].) Power is instead generated within the spray head itself.

256. This in turn reduces installation costs (separate electrical work would no longer be required), avoids the need for periodic battery replacement (as all needed power is generated by the spray head itself), and eliminates the potential of a wiring failure and the development of hazardous conditions (as there is no separate wiring needed to interconnect to a nearby electrical system).

257. In my opinion, this would have provided a strong motivation to apply Mizuno’s teachings to Tseng.

258. Again, because a hydro-generator would be located within Tseng’s faucet, wire 60 could be eliminated. This would make Tseng’s faucet easier to install: only plumbing work is required. It is no longer necessary for the installer to also make an electrical connection.

259. As an additional benefit, Tseng’s fixture would also be less expensive to operate as it would now generate its own power. Batteries or use of external electrical power would no longer be required.

260. Moreover, wire 60 (which again is subject to strain when the spray head is pulled) is eliminated as a point of possible failure. This would in turn improve the reliability of Tseng’s fixture and further motivate the application of Mizuno’s generator to Tseng.

261. In my opinion, a POSITA would also have been motivated to employ Mizuno’s generator—instead of other prior art generators—as it includes several beneficial design features.

262. For example, Mizuno’s hydro-generator includes various features to avoid damage to both the generator itself and the LED lights. This includes a voltage stabilizer to ensure proper electrical supply to LEDs. (Ex. 1008, ¶ [0009].) Mizuno’s generator also includes cooling component to “promote heat dissipatoin,”

and “relief valve” to stabilize the water flow and avoid damage to electrical components. (*Id.*, ¶¶ [0009]-[0013].)

263. In my opinion, this would also have not only motivated application of Mizuno to Tseng, but also motivated the use of Mizuno’s generator instead of another, different generator.

264. A POSITA would have recognized that Mizuno’s hydro-generator is specifically designed to provide a consistent and reliable source of power that is unlikely to itself fail (or cause the connected LEDs to fail) over time due to voltage fluctuations, excessive heat, or the generation of excessive electrical power.

265. In my opinion, a POSITA would also have had a reasonable expectation of success.

266. Mizuno’s hydro-generator is specifically meant for use with fixtures like “faucets” for “kitchens and washrooms.” (Ex. 1008, ¶ [0002].)

267. Moreover, it is intended to be integrated into the faucet’s shower head, and is designed to reliably power multiple LED lights contained within the head. (*Id.*, ¶ [0001].)

268. Because of this, in my opinion a POSITA would have recognized that this makes Mizuno’s hydro-generator particularly suitable for use with Tseng.

269. Tseng similarly teaches a faucet that includes LED lights within the faucet’s shower head. (*See generally* Ex. 1004, ¶ [0001].) These LEDs require

electrical power, and a POSITA would have recognized that Mizuno's generator is specifically designed to provide this required power.

270. Moreover, a POSITA would have recognized that the large internal "chamber 321" within Tseng's shower head could be readily adapted to accommodate and fit Mizuno's hydro-generator without significantly impacting the spray head's water flow.

3. Ground 3: Claims 17 and 18 are Obvious Over Tseng and Schneider

271. As I explained above, Tseng renders independent claim 10 obvious.

272. Claims 17 and 18 depend on claim 10 and narrow it by requiring control of light color in view of water temperature measurements made by a temperature sensor.

273. In my opinion, this all would have been obvious in view of Schneider (Ex. 1009).

274. Schneider teaches a faucet that is able to change emitted light color based on sensed water temperature.

275. In my opinion, applying this to Tseng's illuminated pull-out faucet results in what the claims require.

276. Again, claim 17 further requires:

"a temperature sensor configured to detect the temperature of water within the waterway; and"

“a controller in electrical communication with the temperature sensor, the controller configured to change the color of light emitted by the light emitters in response to the temperature detected by the temperature sensor”

277. This, in my opinion, is all taught by Schneider. In particular, Schneider teaches the claimed **“temperature sensor”** and **“controller”** for changing light color of its **“light emitters”** **“in response to”** the **“detected” “temperature.”**

278. Schneider relates to a “fluid delivery device”—like a “kitchen ... faucet and/or a sprayer”—with a “display unit with a variable backlight which changes in response to a change in water temperature.” (Ex. 1009, ¶¶ [0002]-[0003].)

279. Figure 4 provides an example of one such lighted display 20 arranged on a kitchen faucet. The lighted display is annotated yellow for emphasis:

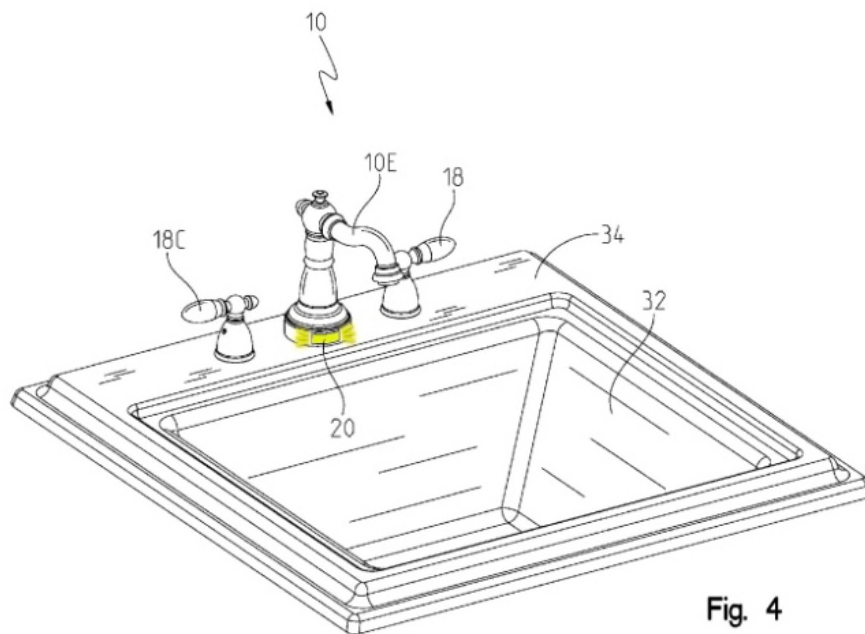


Fig. 4

(*Id.*, Fig. 4 (annotated).)

280. Per Schneider, a “temperature sensor” is used to “detect[]” the “temperature of the” faucet’s “output water.” (*Id.*, ¶ [0006].) This “temperature sensor 22” can be a “thermistor.” (*Id.*, ¶ [0026].)

281. Schneider’s device also includes a “controller 24” that is “electrically coupled with the temperature sensor 22....” (*Id.*, ¶ [0026].)

282. During operation, Schneider’s “temperature sensor 22 will measure the temperature of the water” passing through the faucet “and send a signal to controller 24.” (*Id.*, ¶¶ [0040]-[0041].)

283. The “controller 24” then uses the temperature signal “to adjust the color” of the faucet’s display. (*Id.*)

284. This can be accomplished by, for instance, selectively activating one or more “light emitting diode[s]” like a “blue LED” or a “red LED.” (*Id.*, ¶ [0036].)

285. Again, in my opinion, applying these teachings to Tseng results in a faucet with a sprayhead satisfying the claims.

286. In particular, Tseng’s sprayhead would include a “**temperature sensor**” (Schneider’s sensor 22) that measures the temperature of water passing through the sprayhead’s internal “**waterway.**”

287. It would also include a “**controller**” (Schneider’s controller 24) that receives a signal from the temperature sensor and uses it to control the color of Tseng’s LEDs.

288. Claim 18 depends on claim 17 and further requires:

“wherein the plurality of light emitters include a first light emitter configured to generate light of a first color when the signal from the temperature sensor detects a first water temperature, a second light emitter configured to generate light of a second color when the signal from the temperature sensor detects a second water temperature greater than the first water temperature, and the first and second light emitters blend the light of the first color and the light of the second color and generate light of a third color when the signal from the temperature sensor detects a third water temperature between the first water temperature and the second water temperature”

289. This, in my opinion, is also taught by Schneider.

290. Schneider explains that its temperature sensor and controller can be used to control and change the color emitted by a “blue LED” and a “red LED.” (Ex. 1009, ¶ [0036].) The two LEDs allows for three colors: blue, red, and an intermediate color.

291. In one example, when the sensed “water temperature” is “less than approximately 80° F.” only a “first light” (the blue LED) may be activated resulting in “blue” light. (*Id.*, ¶ [0040].)

292. When the “temperature of the water” increases to “greater than 80° F. and less than 110° F. ...” both the “first” and “second lights” (the blue and red LEDs) are activated to produce a “combination of blue and red colors” like “purple” or “magenta[.]” (*Id.*, ¶ [0041].)

293. If the water temperature exceeds “approximately 110° F.” only the “second light” (the red LED) is activated resulting in “red” light. (*Id.*, ¶ [0042].)

294. This process of producing “*first*,” “*second*,” and “*third*” “*color[s]*” (red, blue, and purple) at different temperatures using a “*first*” and “*second*” “*light emitter*” (red and blue LEDs) is shown in Figure 14. Different color light is generated at steps 68, 72, and 74 depending on the temperature detected at prior steps 64, 66, and 70:

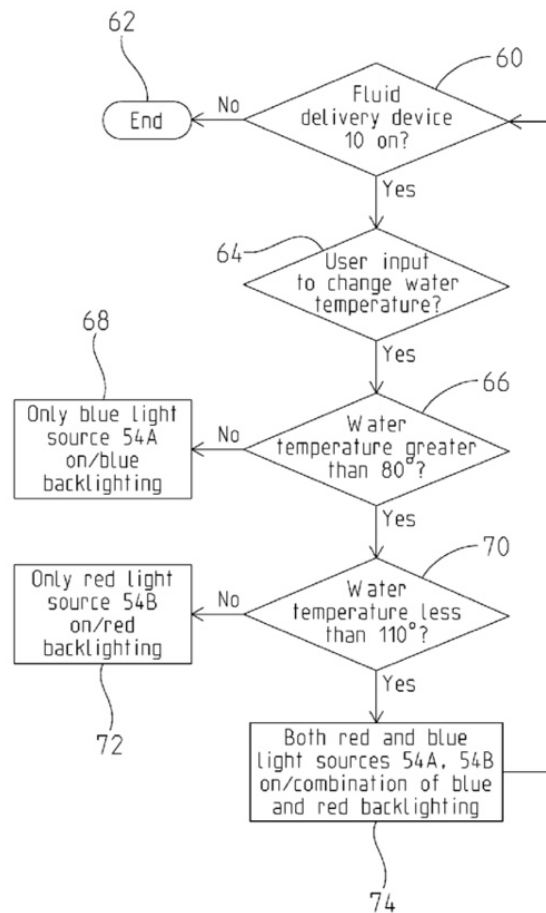


Fig. 14

(*Id.*, Fig. 14.)

295. In my opinion, a POSITA would have understood that Tseng could be readily adapted to include the same functionality.

296. Tseng’s spray head already includes a “plurality of LED elements 40.” (Ex. 1004, ¶ [0068].)

297. Half of these would be configured to emit red light, and half would be configured to emit blue light, allowing for the production of at least three colors (red, blue, and purple) at different sensed temperatures. Alternatively, both a red and blue light could be positioned at each LED location if a greater volume light sources was desired.

298. In my opinion, a POSITA would have been motivated to apply Schneider’s teachings to Tseng.

299. A POSITA would have recognized that doing so would have improved Tseng in a number of ways.

300. For example, employing Schneider’s red and blue LEDs, temperature sensor, and controller, Tseng’s pull-out faucet would not only illuminate, but would also convey information to the faucet user regarding water temperature

301. This would in turn produce a number of benefits. For instance, the faucet could emit color alerting the user to the fact that the water is hot such that care should be exercised.

302. Additionally, the faucet could also notify a user when water reaches a desired temperature range.

303. In my opinion, a POSITA would have recognized that this functionality would have allowed for safer and more convenient operation of Tseng's faucet: a user would be informed when the water coming out of the faucet is dangerously hot, uncomfortably cold, or just right.

304. Next, I understand that when a patent simply arranges old elements with each performing the same function it had been known to perform and yields no more than one would expect from such an arrangement, the combination is obvious.

305. In my opinion, this is all claims 17 and 18 do here.

306. Tseng teaches a faucet with LEDs that emit light.

307. Schneider teaches a faucet that uses a temperature sensor and controller to change LED light color.

308. The combined faucet of Tseng and Schneider would continue to provide all this very same functionality. As a result, claims 17 and 18 are nothing more than the routine combination of these two, known prior art faucet features.

309. Next, in my opinion, a POSITA would also have had a reasonable expectation of success.

310. Again, as I have explained, Schneider's temperature sensor and controller is specifically designed for use with a faucet. (*See, e.g.*, 1009, ¶¶ [0002]-[0003]; Fig. 4.)

311. It also allows for the control of LEDs within that faucet. (*See id.*, ¶ [0036].)

312. Tseng similarly teaches a faucet that employs LEDs for illumination. (*See* Ex. 1004, ¶ [0068].)

313. Given this similarity of subject matter and application, in my opinion a POSITA would have every reason to believe that Schneider could (and would) be successfully integrated into Tseng.

C. Obviousness over Tse’s Shower Head

314. In my opinion, Tse teaches a shower head, which emits light from a circular structure its spray face, renders independent claims 1 and 19 and many of the ‘363 patent’s dependent claims obvious.

1. *Ground 4: Claims 1, 6-9, and 19-23 Are Obvious Over Tse*

315. In my opinion, a POSITA would have considered Tse to be within the scope of the prior art and highly relevant to the patentability of the ‘363 patent’s claims.

316. In my opinion, moreover, when viewed and considered in light of the knowledge possessed by a POSITA, Tse discloses all the limitations of and renders claims 1, 6-9, and 19-23 obvious.

a. *Claims 1 and 19*

317. Due to their similarity—and because they embrace overlapping subject matter—I will analyze claims 1 and 19 together.

318. I have used formatting conventions similar to those already used in connection with Tseng in this Tse ground. First, language that is present in only claim 1 is underlined. Second, language that is present only in claim 19 is [bracketed]. Claim language that is neither underlined nor bracketed is shared by both claims.

[1-p]/[19-p] “A sprayhead [pendant showerhead] comprising:”

319. To the extent this preamble language is limiting, it is taught by Tse.

320. In particular, Tse teaches a “***sprayhead.***”

321. It is directed to a “shower head with a light emitting means.” (Ex. 1005, 1:4-5.) The shower head “discharge[s] water in the form of a spray.” (*Id.*, 1:24-27.)

322. A POSITA would also have understood that Tse’s shower head could obviously be a “***pendant showerhead.***”

323. Tse explains that its shower head can be configured in various ways. For instance, it can be “fixed on the wall” or formed as a “hand-held” unit connected to a “shower hose.” (*Id.*, 3:20-22; *see also id.*, 7:16-19.)

324. Further, Figure 1 depicts the shower head orientated such that water enters from its top and then is sprayed directly down:

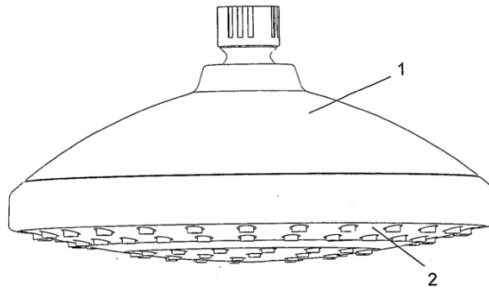


Fig. 1

(*Id.*, Fig. 1.)

325. This is the same way a pendant shower head mounted to a ceiling is oriented and operates. Thus, a POSITA would have understood that one of the ways Tse discloses (or at least obviously teaches) that its shower head can be configured is as a pendant suspended from a ceiling.

326. Moreover, in my opinion, a POSITA would have considered configuring Tse's shower head as a pendant to amount to nothing more than a routine design choice and among the various shower fixture design options that were known and available in the prior art.

327. When the '363 patent was filed, it was well-known that shower heads could be readily configured as handheld units, attached to a wall, or suspended from a ceiling.

328. For instance, one prior art reference shows the same "showerhead" configured as a pendant and wall-mounted shower head. (*E.g.*, Ex. 1012, Figs. 1, 6.)

329. Another prior art reference teaches the same: the same “shower device” can be configured as a “hand-held shower device, an overhead shower device or also a side shower device.” (Ex. 1013, 1:59-62.)

330. As these were all known, recognized, and routinely used and available shower fixture design options, a POSITA would have understood that Tse’s shower head would obviously be able to be configured as a wall-mounted shower, a hand held shower, or a ceiling pendant shower.

[1-1]/[19-1] “a housing defining a longitudinal axis;”

331. This, in my opinion, is taught by Tse.

332. Tse’s shower head includes a **“housing.”**

333. In particular, the shower head is formed from a “shower head body having a rear portion 1” and “a front portion 2....” (Ex. 1005, 5:13-16; *see also id.*, 3:24-25 (referencing the same “shower head body”).)

334. As shown in Figures 1 and 2, the “shower head body” (red) has a circular shape, resulting in a central **“longitudinal axis”** (blue dashed line):

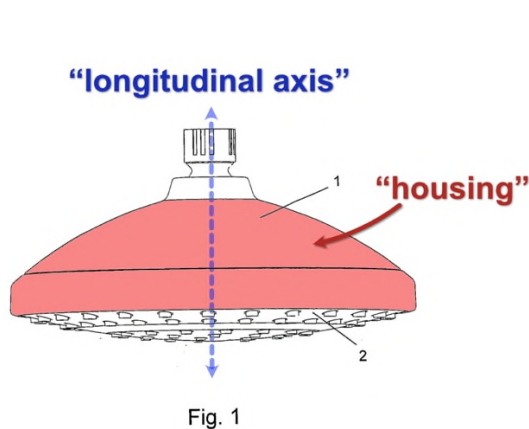


Fig. 1

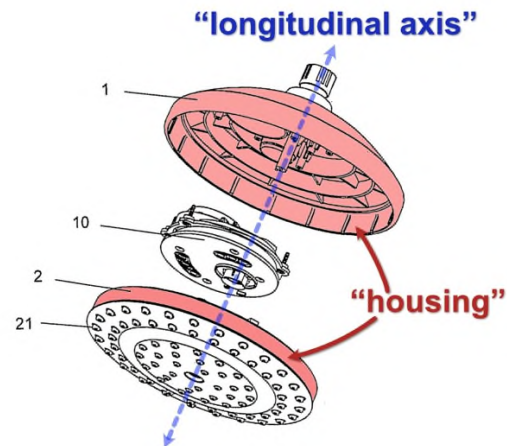


Fig. 2

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

[1-2]/[19-2] “a waterway received within the housing;”

335. This, in my opinion, is taught by Tse.

336. According to Tse, water is “supp[lied]” to one side of its “shower head body” and “discharge[d] ... in the form of a spray” from the body’s other side. (Ex. 1005, 1:24-27; *see also id.*, 3:25-28, 5:13-17.)

337. The “incoming water flows through the shower head body” before exiting. (*Id.*, 3:28-29). Thus, “water from the water supply flows from the top inlet of the rear portion 1 ... into the shower head body and then comes out from ... the front portion 2.” (*Id.*, 7:28-8:2.)

338. The internal pathway through Tse’s shower head body through which water flows before exiting the front portion is the claimed “**waterway.**”

339. This is shown generally in Figure 7 below, with blue arrows showing the general direction of water flow. Note that while the waterway is not shown to

be fully connected along the length of the spray head, this is only the result of the particular cross-sectional view provided by this figure. A POSITA would have understood that the required interconnections are nonetheless present (just behind or in front of the particular cross-sectional view of the figure).

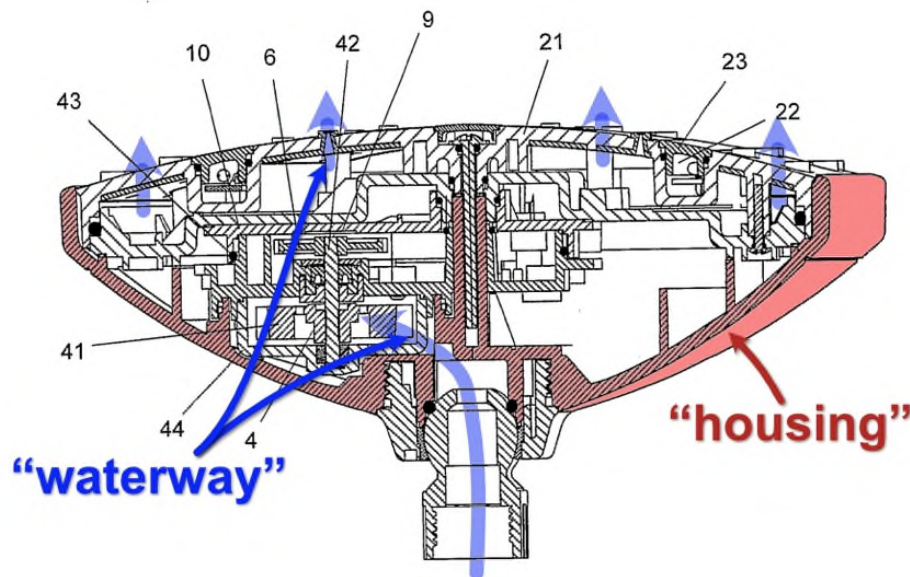


Fig. 7

(*Id.*, Fig. 7 (annotated).)

[1-3]/[19-3] “a sprayface fluidly coupled to the waterway and supporting [including] a water outlet; and;”

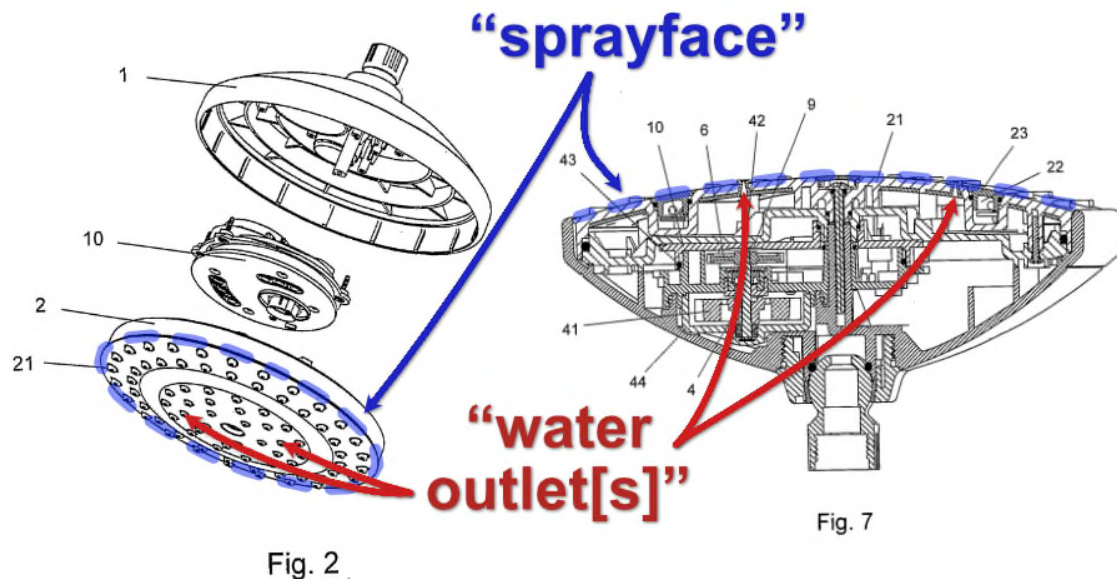
340. This, in my opinion, is taught by Tse.

341. Tse includes a “*sprayface*” with “*water outlet[s]*” “*coupled*” to its “*waterway.*”

342. Tse’s shower head includes a “perforated member 21 adapted to discharge water in the form of a spray....” (Ex. 1005, 5:16-18.) Water supplied to

the shower head flows through the “shower head body and then comes out from the perforated member 21....” (*Id.*, 8:1-3.)

343. In my opinion, and as shown in Figures 2 and 7 below, the perforated member is the claimed “*sprayface*” (blue dashed outline), while the water spraying perforations or holes through the central portion of this member are the claimed “*water outlet*” (red annotations):



(*Id.*, Figs. 2, 7 (annotated).) Note also that Figure 3 provides a plan view of perforated member 21. (See *id.*, Fig. 3.)

[1-4]/[19-4] “an illumination device supported by the housing [sprayface], the illumination device including a substrate, a plurality of light emitters supported by the substrate, and a translucent light pipe defining a closed loop [surrounding the water outlet] to diffuse light from the light emitters outwardly away from the housing [in a direction parallel to the longitudinal axis].

344. This, in my opinion, is taught by Tse: Tse teaches an “**illumination device**” with the components this limitation requires.

345. Tse’s “invention generally comprises a shower head body having ... a power source and a light emitting means....” (Ex. 1005, 1:24-27.)

346. As shown below, light is emitted from the face of Tse’s show head. The area where light is emitted (along with a few exemplary light rays) are shown in yellow:

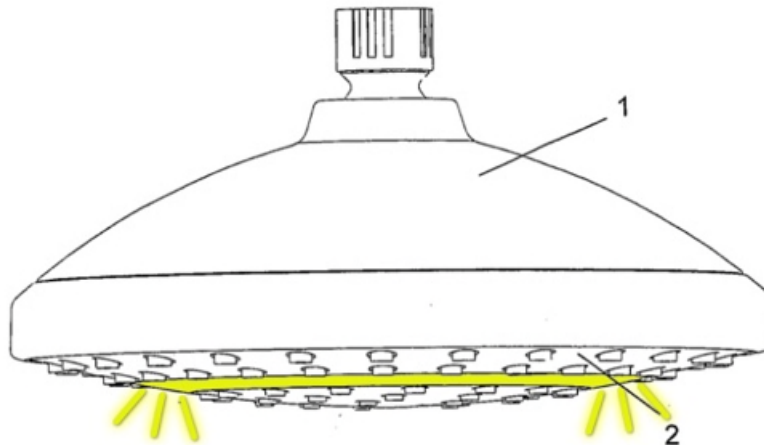


Fig. 1

(*Id.*, Fig. 1 (annotated).)

347. Tse’s “light emitting means 3 comprises four sets each of three light emitting diodes.” (*Id.*, 7:1-2; *see also id.*, 3:6.)

348. As shown in Figure 4 below, Tse’s “**light emitters**” (the light emitting diodes, red below) are mounted on and supported by a semicircular piece of material (blue below). This is the claimed “**substrate**”:

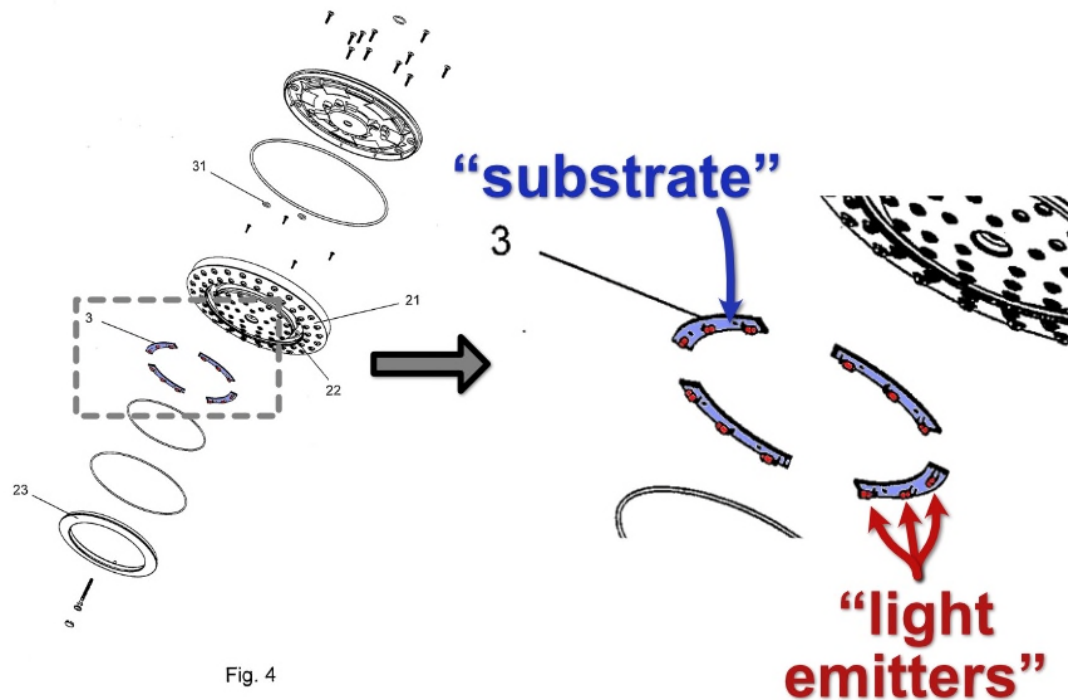


Fig. 4

(*Id.*, Fig. 4 (annotated, and expanded to right).)

349. While Tse does not indicate what the material supporting its light emitting diodes is made from, elsewhere it discusses use of a “printed circuit board ... laminated with molten plastics to make it watertight.” (*Id.*, 2:24-25.)

350. In my opinion, a POSITA would understand that Tse’s LEDs are (or could obviously be) mounted on a similar structure.

351. According to Tse, the LEDs are “arranged in serial.” (Ex. 1005, 7:25-26.)

352. Mounting the LEDs to a printed circuit board would facilitate the serial interconnection of the LEDs without the need for separate wiring.

353. Moreover, physical support is required to keep the LEDs in place within the shower head's housing. A POSITA would have understood that this would be best accomplished by mounting the LEDs on a substrate.

354. Tse also explains that its “light emitting means 3 is disposed in the groove 22 of the perforated member 21 and sealed by the cover 23 of the groove 22.” (Ex. 1005, 6:23-24.) Tse similarly explains that its “light emitting means” includes a “cover” (*id.*, 2:16-17) and this “[c]over 23” is in “sealed engagement with” a “groove 22” in “perforated member 21” (*id.*, 5:21-22).

355. According to Tse, “the cover” over the LEDs “is made of transparent or semi-transparent material so that the light emitted by the light emitting means can be seen.” (*Id.*, 3:3-5; *see also id.*, 6:27-29.)

356. In my opinion, this “cover” is the claimed **“translucent light pipe.”**

357. Tse’s **“light emitters”** (the LEDs, red), **“substrate”** (blue), and **“light pipe”** (translucent cover 23, yellow) are all shown below. As shown, the cover 23 has a circular shape and thus **“defin[es] a closed loop”**:

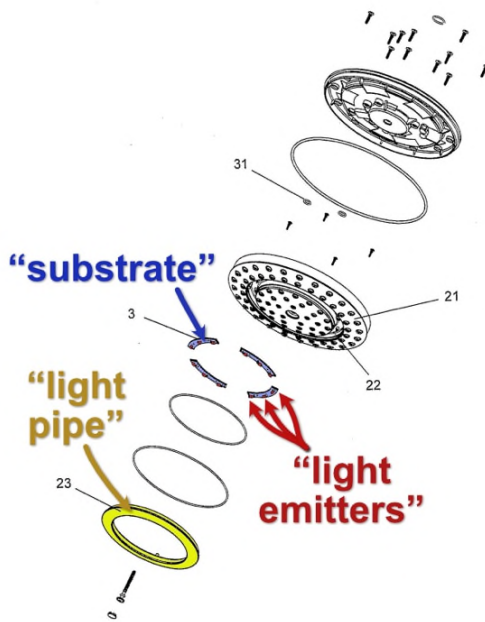


Fig. 4

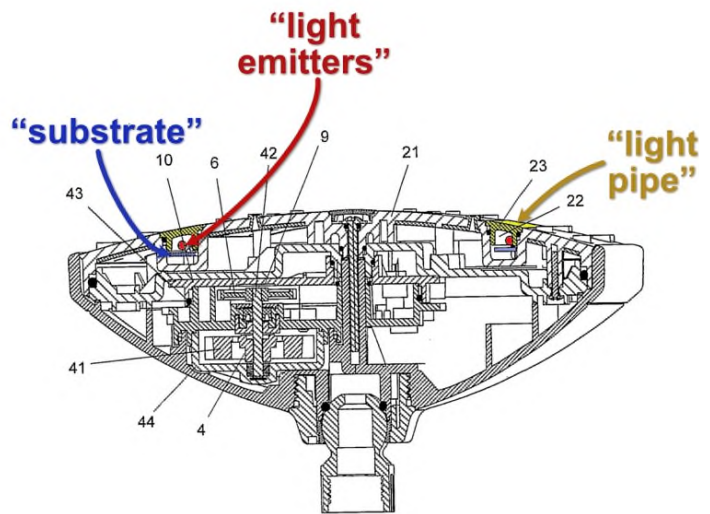


Fig. 7

(Id., Figs. 4, 7 (annotated).)

358. Further, Tse's **"light pipe"** (translucent cover 23, yellow) encircles and **"surround[s]"** the **"water outlet"** (the holes through the central portion of Tse's perforated member):

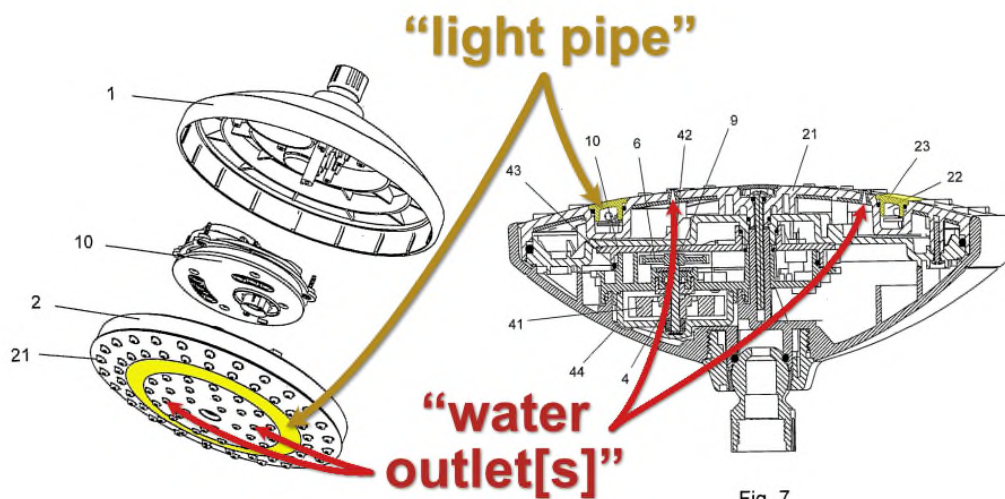


Fig. 2

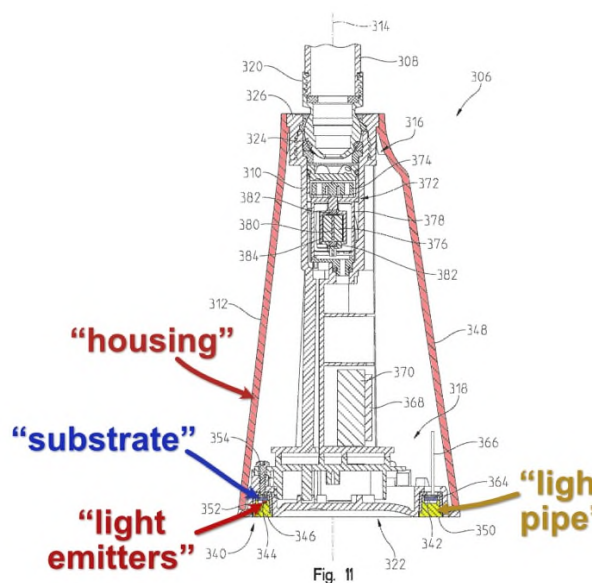
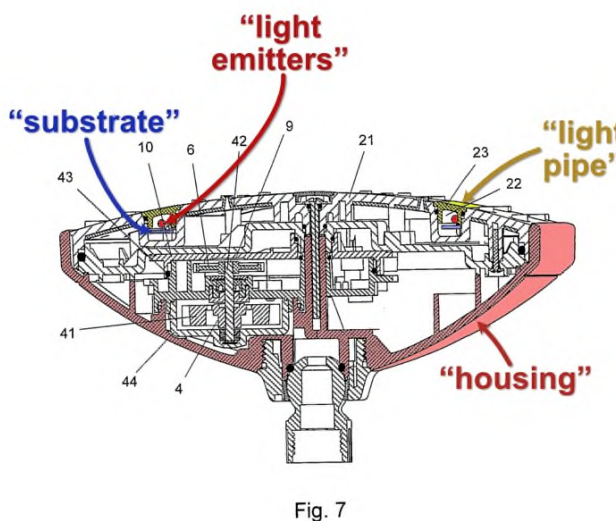
Fig. 7

(Id., Figs. 2, 7 (annotated).)

359. While Tse does not use the term **“light pipe,”** in my opinion a POSITA would nonetheless understand Tse’s cover 23 to be such an element.

360. To begin, Tse’s cover 23 is indistinguishable from “light pipe 346” shown in Figure 11 of the ’363 patent.

361. As shown by the comparison of Figure 7 of Tse with Figure 11 of the ’363 patent below, like Tse’s cover 23, the ’363 patent’s “light pipe 346” is disposed in a “cavity or recess 362” in an “upper housing 352” of a showerhead’s “sprayface 322.” (Ex. 1001, 6:16-24.) The “light pipe 346” seals the “substrate 342” and “light emitters 344” within this cavity/recess. (Id., 6:24-26.)



(Compare Ex. 1005 (Tse), Fig. 7; Ex. 1001 (’363 patent), Fig. 11 (both annotated).)

362. Next, as I have explained, a POSITA would also have understood that any structure that transmits light along its length to be a “light pipe.” (See, e.g., Ex. 1010, ¶ [0018]; Ex. 1011, ¶ [0075].)

363. In my opinion, a POSITA would have understood that Tse’s cover 23 obviously operates in this manner.

364. In particular, given its thickness and other dimensions (including portions or projections that extend out the back of the cover down into the groove to secure the cover in place), at least some light emitted by the LEDs will be internally reflected and transmitted along the interior of the cover before it diffuses out of Tse’s shower head. For example, some light will enter the projections extending out of the back of the cover—as these projections are adjacent to the LEDs—and then proceed along these projections before exiting out of the cover.

365. Next, in my opinion, Tse’s “**illumination device**” is “**supported**” by both the shower head’s “**sprayface**” as claim 19 requires, and the “**housing**” as required by claim 1.

366. According to Tse, “the light emitting means is disposed in” a “groove” formed in its shower head’s “perforated member.” (Ex. 1005, 2:16-17.) Cover 23 also attaches to this groove. (See *id.*, Fig. 7.)

367. Again, Tse’s “**sprayface**” is formed by this perforated member. In particular, Tse explains that “perforated member 21” is “adapted to discharge water

in the form of a spray.” (*Id.*, 5:13-18).) Thus, in Tse, the “**illumination device**” (the light emitting means 3 and cover 23) is directly housed in and “**supported**” by the “**sprayface**”: it is located in an supported by a groove in Tse’s perforated member.

368. Further, as shown below, Tse’s “**sprayface**” (the perforated member) and the “**illumination device**” it contains (the LEDs, substrate, and cover) are secured to Tse’s “**housing**” with a fastener (red dashed circle):

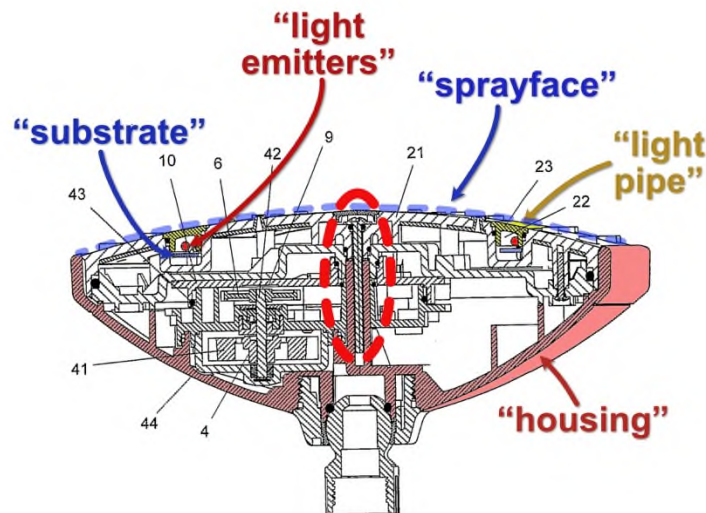


Fig. 7

(Ex. 1005, Fig. 5 (annotated).)

369. Thus, the housing also indirectly “**support[s]**” the “**illumination device**”: the illumination device is secured in a groove in the perforated member, which is itself secured to the housing via a fastener like a screw.

370. In my opinion, nothing about the claim or the ’363 patent requires that housing directly support the illumination device.

371. Showing this, while independent claim 1 provides that “illumination device” be “supported by the housing,” dependent claim 6 further specifies that this support can entail the “illumination device[’s]” “light pipe” being “supported within the spray face.” (See Ex. 1001, claims 1, 6.)

372. This is what Tse teaches: its **“light pipe”** (cover 23) is integrated into its **“sprayface”** (perforated member 21).

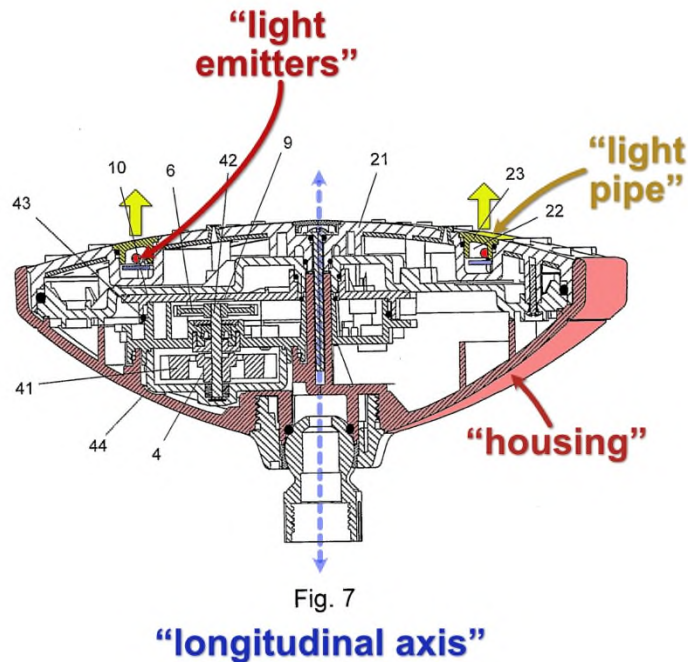
373. Next, in my opinion, a POSITA would have considered it obvious that Tse’s cover 23 operates to **“diffuse light from the light emitters outwardly”** both **“away from the housing”** and **“in a direction parallel to the longitudinal axis.”**

374. In operation, “[t]he light emitting means 3 emits color light” that diffuses through the cover so as to “make[] the water coming out of the perforated member 21 hav[e] the same color. Therefore, a user can have visual enjoyment of the color light while showering.” (*Id.*, 8:20-23; see also *id.*, 4:16-18.)

375. In other words, light is emitted in the same direction as the water spraying out of Tse’s shower head. (*See id.*)

376. Moreover, because the light emitting means are located in a groove, light will diffuse, out of the groove, through the cover 23, and out of the perforated member 21 in a direction away from the shower head’s housing and parallel to both the direction of water flow and the showerhead’s longitudinal axis. (*See id.*)

377. This is shown below with yellow arrows:



(*Id.*, Fig. 7 (annotated).)

378. In my opinion, a POSITA would also have understood that Tse’s cover would obviously have been designed to diffuse the light emitted by its LEDs in a manner that produces even, consistent illumination and avoids hot spots.

379. Again, Tse’s goal is to give the all the water coming out of its shower head the “same color” for purposes of enhancing user “visual enjoyment.” (Ex. 1005, 8:20-23; *see also id.*, 4:16-18.)

380. Uniform light emission furthers this goal to a greater extent than non-uniform emission. Put another way, limiting light to particular points would only illuminate a fraction of the water coming out of the shower head and produce a less appealing effect. Dispersing the light, however, so that it is evenly emitted across the shower head’s face would improve the effect.

381. Moreover, a POSITA would have understood that the uniformity of the light emitted from Tse's cover is a function of the cover's thickness, shape, and material employed.

382. A thicker cover with curved surfaces formed using a transparent material will produce more light diffusion than a thin, flat cover formed from the same transparent material. This would in turn result in reduced light hot spots and more even illumination. This is dictated by standard light pipe design rules.

383. In my opinion, a POSITA would have considered the use of a thicker, curved cover to be nothing more than a routine design choice.

384. Forming the shower head with such a cover would increase its aesthetic appeal by allowing for more uniform light emission.

385. A thicker cover would also have been considered more durable and less likely to be damaged either during manufacture, assembly, installation, or later use.

b. Claims 6, 7, and 20

386. Claim 6 depends on claim 1 and further requires:

“wherein the sprayhead comprises a pendant showerhead configured to be suspended downwardly from a ceiling”

387. As I have explained, Tse teaches everything claim 1 requires. It also teaches the additional limitations of claim 6.

388. This, in my opinion, is rendered obvious by Tse for the same reasons discussed for the preambles of claims 1 and 19: Tse teaches a shower head that can

be configured in various ways, including as a ceiling pendant. (*See supra* elements [1-p], [19-p].)

389. Claims 7 and 20 respectively depend on claims 6 and 19 and include further limitations relating to the structure of the claimed “pendant showerhead.” In particular, both require:

“a pendant arm and a coupler fluidly coupling the waterway to the pendant arm, the coupler including a ball joint such that the housing is supported for rotation about at least two orthogonal axes”

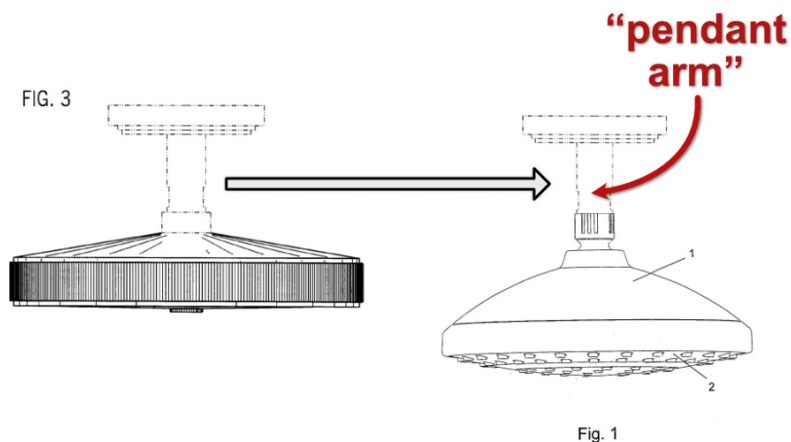
390. As I have explained, Tse teaches everything claims 6 and 19 require. It also teaches the additional limitations of claims 7 and 20.

391. Tse explains that its shower head’s “rear portion [is] adapted to be connected to a water supply.” (Ex. 1005, 1:25; *see also id.*, 5:15.)

392. While not shown in Tse’s figures, a POSITA would have understood that water is supplied (or at the very least would obviously have been supplied) to the shower head by a pipe. All shower heads require a water supply. This is effectuated by connecting the shower head to a pipe.

393. And, when Tse’s shower head is configured as a pendant, this supply pipe will serve as a **“pendant arm”** connecting the shower head to the ceiling.

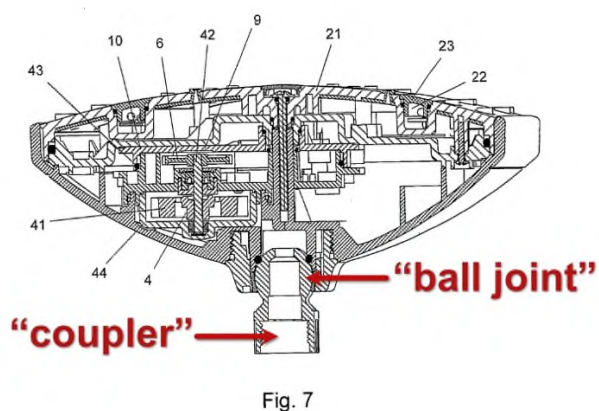
394. The below demonstrative (using the well-known pendant shower head design shown in Ex. 1013) exemplifies this:. The shower head in Figure 1 of Tse is attached to a water supply pipe (or “pendant arm”) extending from a ceiling:



(Ex. 1013, Fig. 3; Ex. 1005, Fig. 1 (modified and annotated).)

395. Tse also includes the claimed ***“coupler fluidly coupling the waterway to the pendant”*** and ***“ball joint.”***

396. As shown in figure 7, the rear end of Tse’s shower head includes a screw element allowing attachment to water supply pipe. And, this screw element is attached to the rest of the shower head with a ball:



(*Id.*, Fig. 7 (annotated); *see also* Fig. 3.)

397. In my opinion, a POSITA would have understood that this ball joint is present to allow movement of the shower head back-and-forth and up-and-down for

purposes of redirecting its water spray. This is a standard feature on most showerheads from all vendors for this reason.

398. Thus, the ball joint permits the shower head to be ***“rotat[ed] about at least two orthogonal axes”*** as this claim limitation requires.

c. Claims 8, 22, and 23

399. Claims 8 and 22 respectively depend on claims 6 and 19 and further require:

“the housing includes an outer housing wall, and the light pipe is supported within the spray face laterally intermediate the water outlet and the housing wall”

400. As I have explained, Tse teaches everything claims 6 and 19 require. It also teaches the additional limitations of claims 8 and 22.

401. As explained above, Tse’s shower head includes a ***“housing”*** (the shower body) and ***“spray face”*** (perforated member 21). (See *supra* limitations [1-1] and [1-3].)

402. Moreover, as shown in annotated Figure 7 below, Tse’s ***“light pipe”*** (cover 23) is located ***“laterally intermediate”*** the housing and the spray face’s ***“water outlet”*** (the holes through the central portion of the perforated member):

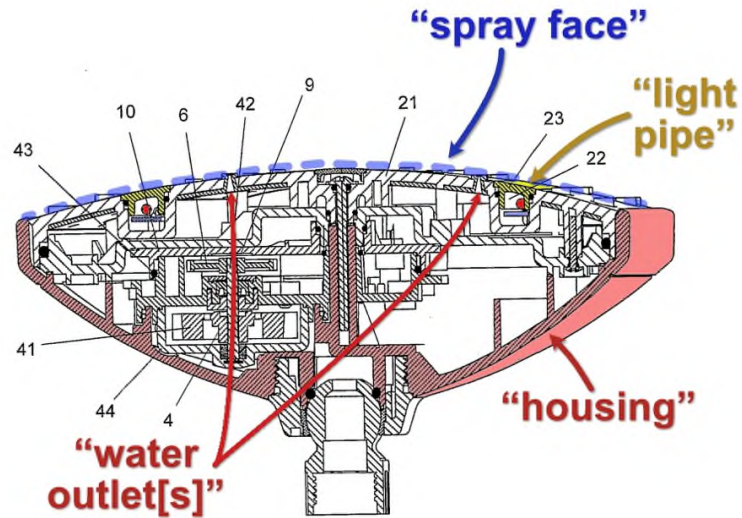


Fig. 7

(*Id.*, Fig. 7 (annotated).)

403. Claim 23 depends on claim 22 and requires that:

“the translucent light pipe includes an outer illumination surface extending parallel to an outer surface of the sprayface”

404. As I have explained, Tse teaches everything claim 22 requires. It also teaches the additional limitation of claim 23.

405. As shown in Tse’s figures, the top surface of Tse’s *“light pipe”* (cover 23) sits flush with the surface of its *“sprayface”* (perforated member 21). (*See Ex. 1005, Figs. 1, 2, 7.*)

406. Because of this, it includes an *“outer illumination surface”* that *“extend[s] parallel”* to an *“outer surface of the sprayface.”* This is exemplified in the below annotated version of Figure 7. As shown, the perforated member (the sprayface) and cover (the light pipe) form a continuous surface and thus are parallel:

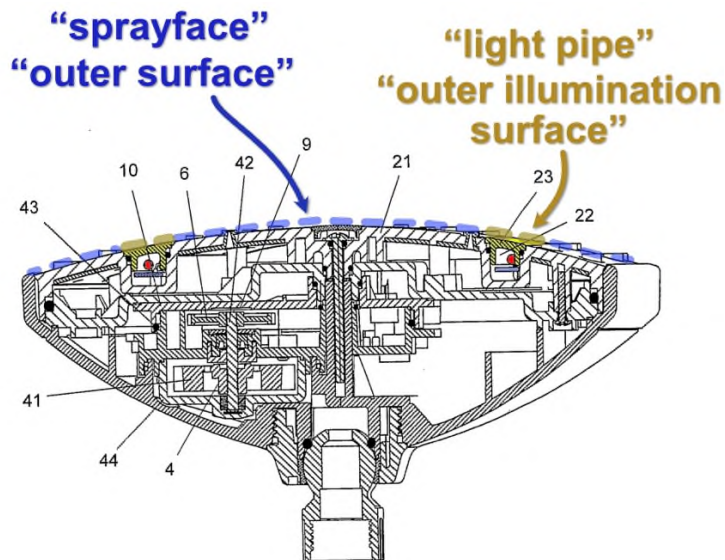


Fig. 7

(*Id.*, Fig. 7.)

d. Claims 9 and 21

407. Claims 9 and 21 depend respectively on claims 1 and 19 and further require:

“a hydro-generator fluidly coupled to the waterway and in electrical communication with the illumination device”

408. As I have explained, Tse teaches everything claims 1 and 19 require. It also teaches the additional limitations of claims 9 and 21.

409. In particular, Tse teaches a **“hydro-generator”** that is in **“electrical communication”** with its **“illumination device.”**

410. Tse’s “shower head” employs a “hydroelectric generator disposed in” its “shower head” to power its “light emitting means” and “avoid [the] extra

requirement of electricity.” (Ex. 1005, 1:17-20; *see also id.*, 8:2-13 (similarly referencing use of a “hydroelectric generator”).)

411. According to Tse, this generator includes “a water turbine” that is “driven by [the] force of water passing through” for purposes driving an “electrical generator for converting mechanical energy into electrical energy.” (*Id.*, 2:1-16; *see also id.*, 5:23-6:27; Fig. 5.)

412. The electrical generator is connected to the “light emitting means” “by an insulated conductive wire.” (*Id.*, 2:10-11, 2:18-20; *see also id.*, 8:15-20.)

2. Ground 5: Claims 1, 6-9, and 19-23 are Obvious Over Tse and Carter

413. As I explained above, Tse (Ex. 1005) itself renders claims 1, 6-9, and 19-23 obvious.

414. While I believe that Tse’s cover 23 constitutes the claimed “light pipe” as all these claims require, if it is for some reason determined that the cover does not itself satisfy this claim limitation, a POSITA would still have considered the claimed subject matter obvious when Carter’s (Ex. 1006) teachings are applied to Tse.

415. Carter relates to “illuminated plumbing fixtures” that include “a molded in place integrated light pipe feature....” (Ex. 1006, ¶ [0003].)

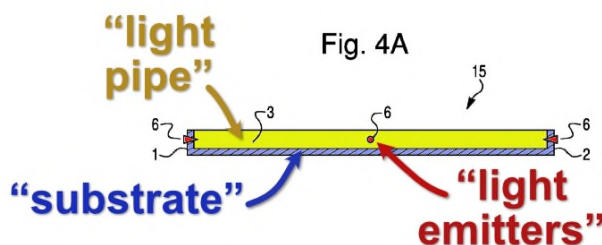
416. In Carter an “[i]ntegrated light pipe” is “molded over (or encapsulates) a “substrate” and “lighting element” (like a “L.E.D.”). (*Id.*, ¶¶ [0008]-[0009].)

417. “[V]arious forms for injection molding” such as “multi-shot molding or pre-mold/over-mold molding” can be employed. (*Id.*, ¶ [0008].)

418. According to Carder, the light pipe is “transparent.” (*Id.*, Abstract, ¶ [0026].)

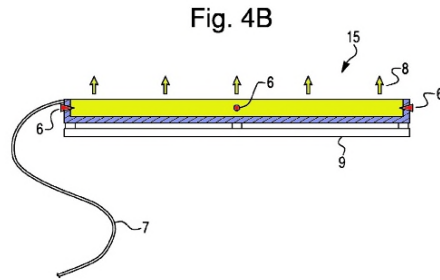
419. Figure 4A provides an example of a “unidirectional lighting element array 15.” (*Id.*, ¶ [0019].)

420. A series of “lighting elements 6” (red) are mounted on a “substrate ... 1” (blue). (*Id.*, ¶¶ [0018]-[0019].) Then, a “light piping feature 3” (yellow) is applied over the lighting elements/substrate. (*Id.*, ¶ [0019].)



(*Id.*, Fig. 4A (annotated).)

421. Carter explains that use of the light pipe allows light to be “transmitted up and through the molded in place integrated light pipe 3” such that can be “disbursed across a partial or complete exposed surface area” “as indicated by arrows 8” (yellow). (*Id.*, ¶¶ [0019], [0025].)



(*Id.*, Fig. 4B (annotated).)

422. In my opinion, applying this light pipe to Tse results in the claimed subject matter: cover 23 would be replaced with an integrated, molded light pipe taught by Carter that diffuses light from Tse’s LEDs out of the face of perforated member 21.

423. In my opinion, a POSITA would have considered both Tse and Carter to be within the scope of the prior art and highly relevant to the patentability of the ’363 patent’s claims.

424. In this regard, a POSITA would also have considered these references to be analogous art. Both Tse and Carter relate to plumbing fixtures that are meant to be illuminated. While Carter does provide example lighted fixtures meant for use in a pool, it also repeatedly explains that its teachings can be adapted to any plumbing fixture. (See Ex. 1006, ¶¶ [0003], [0007], [0027].) As a result, a POSITA would have understood that Carter is directed to and meant to be used with lighted plumbing fixtures generally, not just fixtures employed in a pool setting.

425. Next, a POSITA would also have considered Carter’s teachings—in particular, its durable, low cost, customizable, and watertight lighting element—to be reasonably pertinent to problems encounter by lighted plumbing fixtures. As a result, when implementing Tse’s lighted shower head, Carter would have been one of the references a POSITA would have known of and referenced for use.

426. In my opinion, a POSITA would also have been motivated to apply Carter’s teachings to Tse.

427. Carter explains that the “primary shortcoming of prior combinations of plumbing and light has been cost and durability.” (Ex. 1006, ¶ [0006].)

428. Carter also explains that prior art efforts to ensure the “water tight integrity of the light creates cost and complication” while still giving rise to risk of “serious complications” like “inadvertent electrocution.” (*Id.*)

429. Carter seeks to improve on the prior art and avoid these types of problems with an integrated light pipe that is “simpl[e],” “rugged[,]” reliable, and cost-effective. (*Id.*, ¶ [0007].)

430. A POSITA would have recognized that Tse is subject to the cost and durability issues identified by Carter.

431. Tse employs multiple O-rings to create a “sealed engagement” between “groove 22 and “cover 23 ... to prevent water from entering the groove 22.” (Ex. 1005, 5:19-22; *see also id.*, Figs. 4, 7.)

432. A POSITA would have understood that this both increases cost and gives rise to a risk of failure. The use of O-rings necessitates multiple parts and increases the number of manufacturing steps. Further, it creates additional points of failure: improper assembly, O-ring manufacturing defects, or deterioration over time could lead to leakage and eventual failure of Tse's light emitting means 3.

433. In contrast, applying Carter's teachings, a light pipe would be integrated with and molded directly into Tse's groove.

434. This would be accomplished by first molding the perforated member with the groove, inserting the light emitting means 3 into the groove, and then applying the light pipe via a second molding step.

435. The light emitting means 3 would then be fully covered by and encapsulated within the light pipe—and completely watertight—without the need for separate O-rings.

436. A POSITA would have recognized that this integrated structure would have simplified and substantially improved the durability of Tse's shower head. The number of parts would be reduced (as multiple O-rings would no longer be needed). And, the potential points of failure would be limited (as there would only be a single light pipe in place of multiplied O-rings). Direct application of the light pipe to the groove also reduces the possibility of leakage that could otherwise arise from a poorly fitting or assembled O-ring.

437. In my opinion, a POSITA would have recognized that applying Carter’s teachings would also have improved Tse in other ways.

438. Carter explains that use of its molded, integrated light pipe allows for greater control over light direction to “create unique and/or different lighting effects.” (Ex. 1006, ¶ [0026].)

439. Moreover, “design features” can be “molded directly into the integrated light pipe” to further increase its functionality and appeal. (*Id.*)

440. In my opinion, a POSITA would have recognized that these benefits would have translated to Tse.

441. Replacing its simple cover with a customized, molded light pipe would have resulted in a better, more customizable dispersion of light.

442. A POSITA would have had a more than reasonable expectation of success.

443. As I have already explained, while Carter does state that its “plumbing fixture” is “primarily intended for the spa or pool industry,” it also states that it is “adapt[able] to all forms of recreational and/or non-recreational water applications.” (*Id.*, ¶ [0027].) Similarly, Carter characterizes its “invention” as “relat[ing] generally to the field of illuminated plumbing fixtures.” (*Id.*, ¶ [0003].) And, rather than being limited to just pool applications, Carter teaches that its light pipe is meant to be “adapt[ed] to a variety of plumbing features.” (*Id.*, ¶ [0007].)

444. In my opinion, a POSITA would have understood that a shower head like that taught by Tse is one such application.

445. A lighting element in a showerhead is subject to the very same types of environmental conditions, including water exposure, that Carter’s invention is designed to protect against.

446. Relatedly, a POSITA would have understood that an illuminated plumbing fixture that is sufficiently watertight and “rugged[]” to be used below the waterline in a chlorinated and heated pool or spa—as Carter’s light pipe is (*see, e.g.*, Ex. 1006, ¶¶ [0006]-[0007])—would have been more than capable of dealing with the less demanding environment of a shower.

447. Next, Carter also allows for the formation of a “light piping element” with “any shape complementary to ... a fixture.” (*Id.*, ¶ [0020].) And, it employs existing, well-known molding techniques, and allows for the use of various “commodity and/or engineered plastic resins.” (*Id.*, ¶ [0026].)

448. Given this expressed flexibility, a POSITA would have every reason to believe that a light pipe could be successfully applied to Tse’s shower head (and integrated into its existing groove) following Carter’s teachings.

3. Ground 6: Claim 24 Is Obvious Over Tse (or Tse and Carter) and Spangler

449. As explained above, in my opinion claim 19 is either obvious of Tse itself (Ground 4), or obvious over the combination of Tse and Carter (Ground 5).

450. Claim 24 depends on claim 19 and further requires: ***“a multi-dimensional fluidic device received within the water outlet.”***

451. In my opinion, the additional limitation required by this claim is taught by Spangler (Ex. 1014). Thus, claim 24 is obvious over either Tse and Spangler, or Tse, Carter and Spangler.

452. Spangler relates to “showerheads including multi-dimensional fluid dispensers.” (*Id.*, ¶ [0001].)

453. One example of such a dispenser is a “two-dimensional (2D) fluidic device” that is able to produce “a fan of water within a plane by oscillating a water stream about a center axis.” (*Id.*, ¶ [0003]; *see also id.*, Fig. 12.)

454. Another example is a “three-dimensional (3D) fluidic device[]” that “produce[s] a plurality of fans of water within diverging planes.” (*Id.*, ¶ [0003]; *see also id.*, Fig. 13.)

455. To produce these types of water streams, the “fluidic devices” are fitted into the outlets of a “spray face ... in fluid communication” with a “waterway.” (*Id.*, ¶ [0005].)

456. The multi-dimensional fluidic devices can be used by a “showerhead” attached to a “wall,” or a “handheld wand or handshower.” (*Id.*, ¶ [0043].)

457. In my opinion, a POSITA would have considered Tse, Carter, and Spangler to be within the scope of the prior art and highly relevant to the patentability

of the '363 patent's claims. A POSITA would also have considered these references to be analogous art: all the references relate to various improved aspects of plumbing fixtures.

458. A POSITA would have been motivated to use Spangler's multi-dimensional fluidic devices with Tse.

459. To begin, a POSITA would have considered this nothing more than a simple, straightforward design choice.

460. Spangler's fluidic devices were a known, existing option available for use with shower heads if spray pattern variation was desired. A POSITA would have considered using both simple holes and the use of a multi-dimensional fluidic devices like that taught by Spangler when implementing Tse's shower head.

461. Further, a POSITA would have understood that using Spangler's devices with Tse would have improved Tse by increasing the coverage and uniformity of water emitted by the shower head.

462. Rather than emitting simple streams, by applying Spangler's teachings, Tse's shower head would be able to emit fans of water in multiple dimensions enhancing the shower experience.

463. Next, as explained, I understand that claims that simply arrange old elements with each performing the same function it had been known to perform yielding no more than one would expect from such an arrangement are obvious.

464. This, in my opinion, is the case here. Tse teaches a shower head that emits water and can be illuminated. Spangler teaches a fluidic device that allows for an improved shower spray pattern. Claim 24 is nothing more than the combination of these two shower features. The combined shower head of Tse and Spangler would continue to provide the same functionality these references currently provide.

465. In my opinion, a POSITA would also have had a reasonable expectation of success.

466. Spangler explains that its multi-dimensional fluidic devices are specifically designed and meant for use with shower heads like that taught by Tse. (*See, e.g.*, Ex. 1014, ¶ [0043].)

467. Further, Spangler teaches that the devices can be readily applied to a shower head's sprayface via press fitting or other well-known processes. (*See id.*, ¶ [0050].)

468. This would have given a POSITA every reason to believe that the multi-dimensional fluidic devices could have been successfully used with Tse.

D. Secondary Considerations of Non-Obviousness

469. Based on my review of the '363 patent's prosecution history, I note that no secondary considerations of non-obviousness were identified in connection with the patent's claims.

470. I am not separately aware of any evidence of commercial success, skepticism, failure of others, industry praise, unexpected results, or the like. Instead, as discussed above, it is my opinion that the subject matter embraced by the '363 patent's claims was known in the art and would have been expected to function as a working illuminated faucet and shower heads.

IX. CONCLUSION

471. The '363 patent covers an illuminated faucet head in both a pull-down sink faucet and a static pendant style shower head. All of the claims share certain basic features, including the use of a light pipe. The dependent claims add certain other concepts:

- A: Light emitters circumferentially mounted to a flexible circuit inside the body of the faucet head (Claims 4, 14)
- B: A light pipe formed as an annular ring, present in specific locations, or that emits light in particular directions (Claims 3, 8, 12, 13, 22, 23).
- C: Electrical power is supplied by an embedded hydro generator. (Claims 9, 11, 21).
- D: A controller can also be embedded with a temperature sensor to display different colors based on the water temperature (Claims 17, 18).
- E: A diverter is incorporated to change the shape of the water spray, or a multi-dimensional water outlet (Claims 5, 15, 24)

472. Specific to the sink faucet:

- F: Pull down and releasable sprayhead (Claims 2, 10, and 16).

473. Specific to Showerhead

- G: A pendant shower head (Claims 6, 19).
- H: Showerhead is on a ball joint to direct the spray of water (Claims 7, 20)

474. The prior art discussed in this declaration (Tseng, Tse, Mizuno, and Spangler) teach all of the elements of the '363 patent. As discussed, it would have been obvious to a POSITA to combine them into one device. While I do not intend this to be a comprehensive listing of these references' teachings, the below provides some basic overview information:

- Tseng (2015) teaches an embodiment of a pull-down sink faucet spray head with an embedded, flexible circuit board with light emitters and a light pipe illuminating a ring around the faucet very close the embodiment described in the '363 patent. While obvious in view of other art, the main difference between Tseng and the '363 patent's embodiment is that in Tseng power comes from an external power source rather than generated internally. Among other things, Tseng specifically teaches points A, B, E, and F above.

- Tse (2008) teaches an illuminated showerhead mounted with a ball joint and powered by an hydro-generator in the faucet head. Among other things, this teaches concepts C, G, and H above.
- Mizuno (2003) also teaches placing a hydro generator in the faucet spray head to power “LED illumination lamps.” This is concept C.
- Schneider (2015) teaches embedding a controller and temperature sensor in a sprayhead to indicate water temperature to a user. The controller block diagram is similar to the one shown in ‘363 and covers concept D above.
- Spangler (2013) teaches using multiple fluid paths, nozzle types, and diverter mechanisms to create multi-dimensional spray patterns in a single device, i.e., concept E above.
- Carter (2010) teaches integrating light pipes with lighting elements in plumbing fixtures. This is related to concept B above.

475. Product designers and engineers frequently combine concepts, designs and available components to reduce part count and or cost and any POSITA will look for ways to when designing products. In my opinion, the ’363 patent combines elements of the prior art patents in an obvious manner that any POSITA would utilize for such a product. This, in my opinion, provides yet another reason why the claims would have been considered obvious.

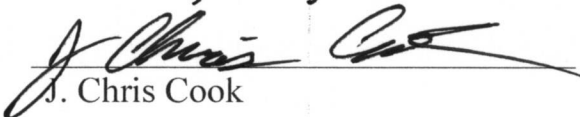
476. In my opinion, many of the claim elements, such as the ball joint mount, pull-out spray head, diverter and multi-dimensional spray patterns are reusing concepts and designs that have been used for decades in plumbing designs and by many different vendors.

477. In my opinion, combining the hyrdo-generator, light pipe, and temperature sensor into a faucet head or shower head is an obvious combination of components.

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 willfully false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1101 of Title 18 of the United States Code.

Date: March 18, 2024

Location: Allen, TX, USA

Signature: 
J. Chris Cook

ATTACHMENT A

J. Chris Cook

Allen, Texas 75002

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PROFESSIONAL EXPERIENCE

Delta EOC, LLC- www.delta-eoc.com

Owner/Consultant

NOV 2021-PRESENT

- Mechanical Design and Analysis of client products
- Engineering process definition
- CAD, PDM, PLM, and ERP setup
- Project Management
- Expert Witness services

COMMSCOPE (Dallas/Fort Worth, TX)

MAY 2011 – Oct 2021

Director of Engineering

Jun 2018 – Oct 2022

- Led teams of Mechanical Engineers, Designers, and Change Coordinators to design and release the latest concealment solutions for mmWave and sub-6GHz small cells, power cabinets, cable management accessories, and tower/pole/rooftop macro structural mounts
- Defined requirements with clients and project managers to incorporate new innovations
- Streamlined processes and expenses for best engineering processes to improve time to market and quality
- Hired 11 Engineers, Designers, and ERP Admins over a 12 month period using direct and contract-to-hire models, growing Engineering teams from six FTEs to 20 FTEs in 18 months
- Designed and launched several product families to increase revenue from \$8M to \$24M in two years
- Leadership team for enterprise-wide ERP and PDM tools upgrade
- Patent review team member where we evaluated new internal applications and renewals and competitive patents

Senior Engineering Manager

Jun 2013 - Jun 2017

- Managed cross functional teams of 10-22 FTEs each, consisting of mechanical and product engineers, tech writers, CAD specialists, and electrical/reliability labs while overseeing a \$3.2M annual budget
- Developed and qualified multiple NPI (New Product Introductions), addressed key quality issues, and developed full documentation sets for product release
- Facilitated and process improvement initiatives to include: statistical analysis, drawing checking process, Lessons Learned database, and general improvements to project management practices
- Negotiated software licensing for multiple business units for simulation tools

Principal Mechanical Engineer

May 2011 - Jun 2013

- Led team of three engineers and designers, from concept to manufacturing, for all aspects of system and mechanical design for indoor DAS system, conducting thermal analysis and testing of all system components while coordinating with EE and supply chain teams for design and manufacturing
- Scheduled design activities, prototype builds, and physical testing for program with eight major products and dozens of accessories
- Selected and mentored summer interns and junior rotational engineers
- Organized thermal design community group of engineers across all business units with regular meetings and central SharePoint site for shared collaboration

CALIDITECH (Dallas/Fort Worth, TX)

SEP 2009 - MAY 2018

Owner/Consultant

- Provided mechanical design, structural/thermal analysis and project management consulting services to clients using cloud hosted Ansys packages
- Reduced time to market by eliminating design iterations required to release products meeting customer needs
- Improved project management methods for privately held software company and managed customer implementation for \$100K project
- Implemented quick-turn thermal analysis for customer in under two weeks, requiring new software tool, requirements gathering and completed report
- Clients included: Raytheon, Commscope, JMA, and Optimal Electronics

TEXAS INSTRUMENTS (Dallas/Fort Worth, TX)

FEB 2005 - JAN 2009

Application Engineer and Project Manager

- Supported RFID product line in the U.S. valued at \$30M annually
- Provided technical support and customer service as key marketing differentiator for the Business Unit
- Identified and fixed product problems in collaboration with production machine vendors

EDUCATION & TRAINING

SOUTHERN METHODIST UNIVERSITY (Dallas, TX)

Master of Science (MS) in Engineering Management

TEXAS A&M UNIVERSITY (College Station, TX)

Bachelor of Science (BS) in Mechanical Engineering