

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SHARKNINJA, INC.,
SHARKNINJA OPERATING LLC,
SHARKNINJA MANAGEMENT LLC, AND
SHARKNINJA SALES COMPANY,
Petitioners,

v.

DYSON TECHNOLOGY LIMITED
Patent Owner.

Case No. IPR2023-01324

U.S. Patent No. 9,414,662

**DECLARATION OF BREIGH NONTÉ ROSZELLE, PH.D.
IN SUPPORT OF PATENT OWNER'S RESPONSE
AND CONTINGENT MOTION TO AMEND**

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I, Breigh Nonte Roszelle, Ph.D., declare as follows:

1. My name is Dr. Breigh Nonte Roszelle. I have been retained by Patent Owner to offer technical opinions related to U.S. Patent No. 9,414,662 (“the ’662 Patent,” EX-1001).

2. I understand Petitioners have filed a petition for *inter partes* review of the ’662 Patent with the Patent Trial and Appeal Board arguing that claims 26-28 (“Challenged Claims” of the ’662 Patent are unpatentable as either anticipated by or rendered obvious by certain references.

3. In this Declaration, I give my opinions as to whether the Challenged Claims are unpatentable on the grounds presented by Petitioners in the Petition and in the declaration of their expert, Dr. Daniel M. Nosenchuck (EX-1003). In addition, I have provided my opinion on various topics related to a contingent amendment being proposed by Patent Owner. I provide technical bases for these opinions as appropriate.

4. This Declaration contains statements of my opinions formed to date and the bases and reasons for those opinions. I may offer additional opinions based on further review of materials in this case, including opinions and/or testimony of other expert witnesses. I make this Declaration based upon my own personal knowledge and, if called upon to testify, would testify competently to the matters contained herein.

I. BACKGROUND

A. Qualifications

5. I am over the age of 18 and am competent to write this Declaration. I have personal knowledge of, or have developed personal knowledge of, the relevant technologies based upon education, training, or experience of the matters set forth herein. This Section contains a summary of my educational background, career history, publications, and other relevant qualifications. My full *curriculum vitae* is attached as Appendix A to this Declaration.

6. I believe I am well qualified to serve as a technical expert in this matter based on my educational and work experience. As discussed below, in my career, I have both industry and academic experience in fluid mechanics and heat transfer, as well as appliances for blowing air.

7. I received my Bachelor of Science degree in mechanical engineering in 2006 from Colorado State University where I was a University Honors Scholar. I then obtained both my Masters degree and my Ph.D. in bioengineering from The Pennsylvania State University in 2008 and 2010, respectively. As part of that program, I performed NIH funded research on the fluid mechanics of medical devices such as ventricular assist devices and mechanical heart valves. This research included several years of obtaining data from fluid mechanics

experiments, which included the use of pneumatic pumps and mock circulatory flow loops.

8. After obtaining my Ph.D., I was a postdoctoral researcher at the Image Processing Applications Lab at Arizona State University. I held this position from May of 2011 through December 2012. While there, I continued researching the fluid mechanics of medical devices, specifically performing in vitro experiments with interventional devices used to treat cerebral aneurysms and comparing these to computational fluid mechanic solutions.

9. At the same time that I was doing my postdoctoral research, I was also a Senior Engineer at Interactive Flow Studies Corporation. During my time there, I developed and tested educational benchtop experimental devices with the purpose of teaching students about fluid mechanics and heat transfer with hands-on experiences. These devices allowed for visualization of fluid and heat transfer phenomena using both air and water.

10. Since January of 2013, I have been employed by the University of Denver. I began as a Teaching Assistant Professor (formerly known as a Lecturer) in the Mechanical and Materials Engineering Department. In 2018, I was promoted to a Teaching Associate Professor and in 2022 I was made a Teaching Professor. In 2023, I was appointed Interim Chair of the Mechanical and Materials Engineering Department.

11. During my time at the University of Denver, I have taught many courses, including Introduction to Mechanical Systems with CAD, Introduction to CAD, Introduction to Engineering Design, Thermodynamics I and II, Fluid Mechanics I and II, Heat Transfer I and II, and Physiological Biofluids. I use hair dryer design as a tool for students to understand thermodynamics.

12. I also have a number of journal publications and conference publications, including a conference publication entitled, “Hair Dryer Design as a Synergistic Tool for Combining Thermodynamics and the Importance of Diversity in Design Team Composition” that was presented at the Annual American Society for Engineering Education (“ASEE”) Conference.

13. Since 2019 I have also been the Associate Dean of Undergraduate Students for the Ritchie School of Engineering and Computer Science at the University of Denver.

14. During my time at the University of Denver I have also served as a committee member for several masters and PhD students with research related to fluid mechanics and heat transfer. Additionally, I have served as a project mentor for the fluid mechanics and heat transfer aspects of several senior level capstone design projects which come directly from industry partners.

B. Compensation

15. For my efforts in connection with this Declaration, I have been compensated at my standard rate for this type of consulting activity of \$250 per hour. My compensation is in no way contingent on the results of this or any other proceeding relating to the '662 Patent.

16. I have considered information from various sources in forming my opinions. I have reviewed and considered all of the documents listed in Appendix B, as well as any documents referred to in this Declaration, in forming my opinions.

II. UNDERSTANDING OF THE RELEVANT LEGAL PRINCIPLES

17. I am not a lawyer, and I will not provide legal opinions. Although I am not a lawyer, I have been advised certain legal standards are to be applied by technical experts in forming opinions regarding the meaning and validity of patent claims.

18. I understand that a patent claim is invalid if it is anticipated or obvious in view of the prior art, and that a claim can be unpatentable even if all of the requirements of the claim cannot be found in a single prior art reference. I further understand that invalidity of a claim requires that the claim be anticipated or obvious from the perspective of a person of ordinary skill in the art ("POSITA") at the time the invention was made.

19. I understand that a claim is anticipated if all of its limitations are found in a single prior art reference arranged as in the claim. The identical invention must be shown in as complete detail as is contained in the patent claim.

20. A prior art reference can disclose a limitation that is not expressly disclosed in the reference if it is “inherently present” in the reference. I further understand that to be “inherently present,” the missing disclosure must necessarily be present in the element or process described in the reference. It is my understand that a limitation is not disclosed by inherency if the missing limitation is only probably present or if there is merely a possibility that it is present.

21. I have been informed that a patent claim is invalid if it would have been obvious to a POSITA. In analyzing obviousness of a claim, I understand the following factors may be taken into account: (1) the scope and content of the prior art; (2) the differences between the prior art and the claims; (3) the level of ordinary skill in the art; and (4) any secondary considerations of non-obviousness if they are present.

22. I understand that to prove that a prior art or combination of prior art renders a patent obvious, it is necessary to:

- a. Identify the particular references that, singly or in combination, make the patent obvious;

- b. Specifically identify which elements of the patent claim appear in each of the asserted references; and
- c. Explain why a POSITA would have combined the references and how they would have done so to create the inventions claimed in the patent. I further understand that exemplary rationales that may support a conclusion of obviousness include:
 - i. Combining prior art elements according to known methods to yield predictable results;
 - ii. Simple substitution of one known element for another to obtain predictable results;
 - iii. Use of known technique(s) to improve similar devices (methods or products) in the same way;
 - iv. Applying a known technique to a known device (method or product) ready for improvement to yield predictable results;
 - v. “Obvious to try” – choosing from a finite number of identified, predictable solutions with a reasonable expectation of success;
 - vi. Known work in one field of endeavor may prompt variations of the work for use in either the same field for a different field based on design incentives or other market forces if the variations are predictable to a POSITA; and

- vii. Some teaching, suggestion, or motivation in the prior art that

would have led a POSITA to modify the prior art reference or

to combine the prior art reference teachings to arrive at the

claimed invention.

23. I have been informed and understand that secondary considerations of non-obviousness may include:

- a. Whether the invention proceeded in a direction contrary to accepted wisdom in the field;
- b. Whether there was a long felt but unresolved need in the art that was satisfied by the invention;
- c. Whether others tried but failed to make the invention;
- d. Whether others copied the invention;
- e. Whether the invention was praised by others;
- f. Whether others have taken licenses to use the invention;
- g. Whether experts or those skilled in the art at the making of the invention expressed surprise or disbelief regarding the invention;
- h. Whether products incorporating the invention have achieved commercial success that is attributable to the invention; and

- i. Whether or not others having ordinary skill in the field independently made the claimed invention at or about the same time the inventor made the invention.

24. I also understand that there must a relationship, or nexus, between any such secondary indicia and the invention.

25. I have been further informed that I must weigh secondary considerations evidence with the other obviousness factors if a case of obviousness has been established.

26. I have been informed that, in considering obviousness, hindsight reasoning derived from the patent-at-issue may not be used.

III. SUMMARY OF THE '662 PATENT

27. The '662 Patent is directed to “a hand held appliance, in particular a hair care appliance such as a hairdryer or hot styling brush.” EX-1001 at 1:11-13. The '662 Patent notes that in general, such hand held appliances include motors and fans, though “[t]he motor is susceptible to damage from foreign objects.” EX-1001 at 1:22-27.

28. One way the '662 Patent attempts to protect the internal components from damage is by having two distinct walls of the handle: an inner wall that defines the primary fluid flow path, and an outer wall that is “an external surface of the appliance.” EX-1001 at 1:35-44. Having the two distinct walls also allows for

a layer of insulation between the walls for further protection and to provide other benefits, such as to reduce the noise of the appliance. EX-1001 at 1:35-49, 12:35-44.

29. The two distinct walls for the handle also allow for the inner wall of the handle and the outer wall of the body to be “formed as a single unit.” EX-1001 at 2:10-11; *see also id.* at 11:61-63. The ’662 Patent recognizes that this “has a number of advantages,” including making access to some of the internal components more difficult and making the product “visually cleaner.” EX-1001 at 2:12-23.

30. As to the structure of the inner wall and outer wall, the ’662 Patent discloses that “inner wall 220 is a duct which surrounds and defines a primary fluid flow path 400 through the hairdryer.” EX-1001 at 12:31-33. Further, “it is not essential that the outer wall extends over the entire length of the inner wall [2]20.” EX-1001 at 12:55-56.

IV. LEVEL OF ORDINARY SKILL IN THE ART

31. I understand that certain issues related the validity of the Challenged Claims must be judged from the perspective of a POSTIA, as I have discussed below. I have been asked to consider Dr. Nosenchuck’s and Petitioners’ definition of the level of skill that someone would have had at the time of the invention was made, which I understand here is July 5, 2013. In deciding the level of ordinary

skill, I have considered the following factors, which I have been informed are relevant to the determination of the level of ordinary skill in the art:

- a. The levels of education and experience of persons working in the field;
- b. The types of problems encountered in the art;
- c. The prior art solutions to these problems;
- d. The rapidity with which innovations are made; and
- e. The sophistication of the technology.

32. In my opinion, Dr. Nosenchuck's definition seems reasonable. Thus, in rendering my opinions, I have considered a POSITA in the field of hair dryer technology around July 2013 that had a Bachelor's degree or comparable technical degree in Mechanical and/or Aerospace Engineering or an equivalent engineering or design-related field that involved exposure to introductory fluid mechanics and heat transfer at a level roughly equivalent to that of a second-year engineering student, and that had the equivalent of at least one year's worth of experience in research, design, and/or development related to appliances for blowing air such as hair dryers (or other comparable industrial design). Additional education could substitute for experience and vice versa.

33. Based on my education, training, and professional experience in the field of the invention, I am familiar with the level and abilities of a POSITA in July

2013. Additionally, I met at least these minimum qualifications of a POSITA at least as of July 5, 2013.

V. OPINIONS RELATED TO PATENT OWNER RESPONSE

34. Based on my review of the Petition and Dr. Nosenchuck's declaration, as well as the other materials cited herein, in view of my experience and knowledge, in my opinion, the Challenged Claims are not invalid as anticipated in view of the grounds provided by Petitioners and Dr. Nosenchuck. The reasons for my conclusions are explained more fully below.

A. Claim Construction

35. I understand that in determining whether claims are unpatentable, the Board applies the claim construction standard used in district courts that seeks to give claim terms their plain and ordinary meaning to a POSITA at the time of the invention. I understand that in making this determination, the Board considers the specification and file history. I also understand that if a patent applicant gave a term a special meaning in the specification or during prosecution, then the special meaning should be used.

36. In my opinion, a POSITA at the time of the invention would have interpreted the term "inner wall . . . defines a primary fluid flow path that extends from a primary fluid inlet into the appliance" of Claim 26 to mean "inner wall . . . defines a primary fluid flow path that extends from a primary fluid inlet, through

the handle, and into the appliance” in light of the claim language, specification, and prosecution history.

37. Claim 26 states that the “inner wall . . . defines a primary fluid flow path that extends from a primary fluid inlet into the appliance.” EX-1001 at 20:6-8. Petitioners and Dr. Nosenchuck assert that this limitation is met as long as there is a fluid flow path from the outside of the appliance into *any* portion of the appliance, including a fluid flow path that extends through only a portion of the handle. *See, e.g.*, Pet. at 31-34 (citing EX-1003 ¶¶ 80-81) (arguing that the air flow into Jeong’s housing 10 and through the motor housing 18, which extends along only a part of the handle, meets this limitation), 55-57 (citing EX-1003 ¶¶ 104-107) (arguing that air flow into Yoshida’s housing 1 and through the cylindrical wind tunnel, which extends along only a part of the handle, meets this limitation), 79-81 (citing EX-1003 ¶¶ 144-145) (arguing that flow into and through Jeffs’ high pressure air inlet channel 35, which extends along only a part of the handle, meets this limitation). However, this would mean that *any* fluid entering into *any* fluid inlet would create a flow path from outside the appliance into the appliance.

38. Similarly, if the portion of the appliance in which the air initially enters through the fluid inlet reads on the “the appliance,” then *any* fluid inlet through which fluid enters would create a fluid flow path from outside the appliance into the appliance. Such a claim interpretation renders the phrase “inner

wall . . . defines a primary fluid flow path that extends from a primary fluid inlet *into the appliance*” meaningless because the fluid inlet itself meets Petitioners’ and Dr. Nosenchuck’s interpretation that the claimed “inner wall” is met by any wall that provides a fluid flow path from the outside of the appliance into *any* portion of the appliance. Thus, “inner wall . . . defines a primary fluid flow path that extends from a primary fluid inlet into the appliance” in Claim 26 must require the claimed “inner wall” to define more than just a fluid flow path from the outside of the appliance into *any* portion of the appliance.

39. Additionally, the phrase “into the appliance” must mean some portion of the hair care appliance that is not within the handle. The handle is one of the elements of the hair care appliance in Claim 26. However, the phrase “into the appliance” has no meaning if the scope of “into the appliance” includes “into the handle” for the same reasons stated above. Otherwise, there is no difference between the scope of the phrase “from a primary fluid inlet” and the scope of the phrase “from a primary fluid inlet into the appliance” because if the handle counts as the claimed “appliance” in this limitation, then once the primary fluid flow extends from a primary fluid inlet it is already in the appliance. Accordingly, for the phrase “into the appliance” to have any meaning it must at least require the primary fluid flow path to exit the handle portion of the appliance. Thus, a POSITA would have understood that the “primary fluid flow path” defined by “the

inner wall” recited in Claim 26 must extend from a claimed “primary fluid inlet,” through the claimed “handle,” and “into the appliance.”

40. The specification and drawings also support my construction because they consistently require the “inner wall” to extend the entirety of the handle from the primary fluid inlet to the body of the appliance in order to define “a primary fluid flow path that extends from a primary fluid inlet into the appliance.” All of the figures illustrating the handle show that inner wall 220 extends the full length of the handle from the primary fluid inlet to the body and forms a duct for the primary fluid flow path from the primary fluid inlet 40 to the body 30. *See* EX-1001 at Figs. 3, 4b, 5, 6, 7. For example, annotated Figures 3 and 4b below show that the inner wall 220 extends the full length of handle 200 from the primary fluid inlet 40 to body 30:

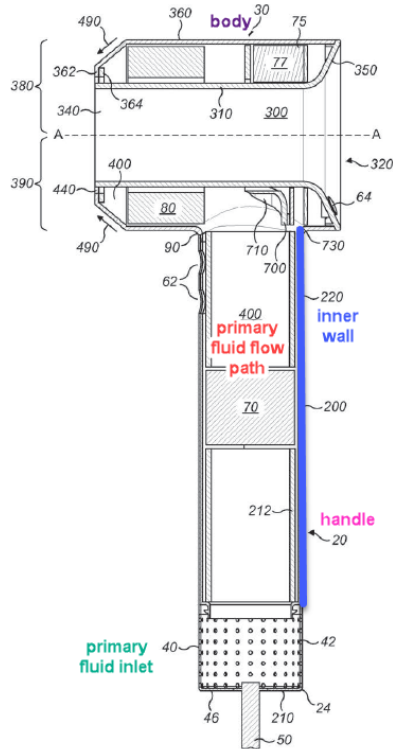


FIG. 3

EX-1001 Fig. 3 (annotated)

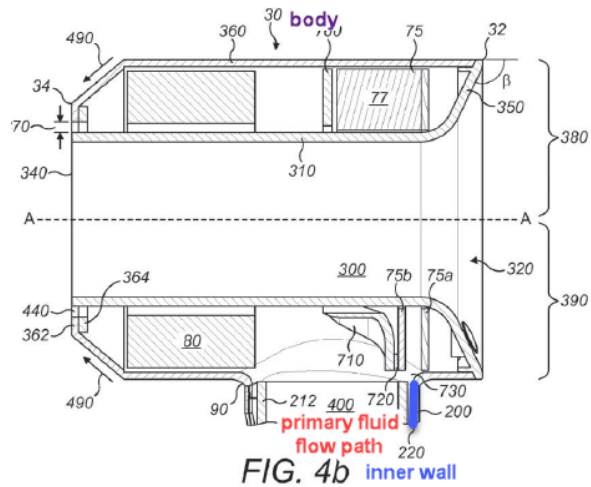
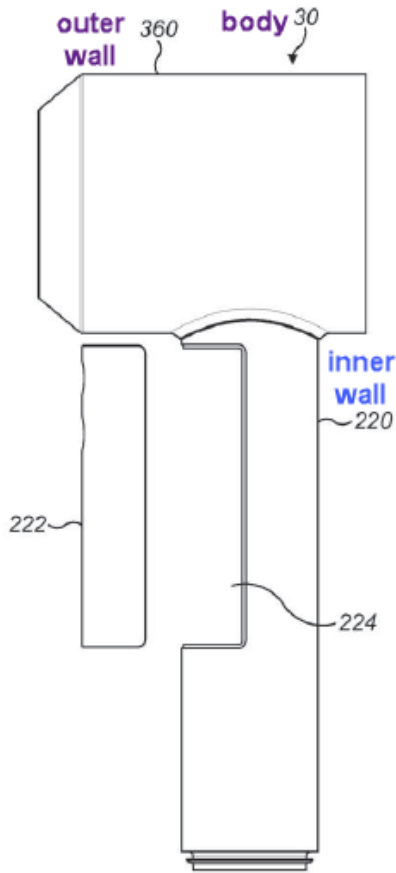


FIG. 4b

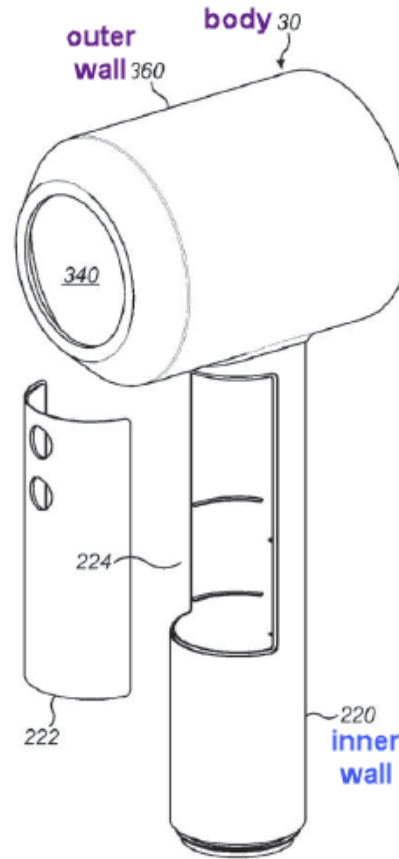
EX-1001 Fig. 4b (annotated)

41. The specification also discloses, “[t]he inner wall 220 is a duct which surrounds and defines a primary fluid flow path 400 *through* the hairdryer.” EX-1001 at 12:31-33 (emphasis added). This indicates that the claimed primary fluid flow path must pass through the inner wall in the entirety of the handle, which is consistent with my construction.

42. Additionally, the specification discloses that the outer wall 360 of the body 30 and the inner wall 220 of the handle 20 is a single piece. EX-1001 at 11:49-51, 11:61-63. This is illustrated by Figures 5 and 6 as annotated below:



EX-1001 Fig. 5 (annotated)



EX-1001 Fig. 6 (annotated)

43. The specification further discloses that the outer wall 200 of the handle 20 does not have to extend over the entire length of the inner wall 220 implying that inner wall 220 must extend the full length of the handle from the primary fluid inlet 40 to body 30. EX-1001 at 12:54-65.

44. By specifying in my construction that the claimed “inner wall” defines a primary fluid flow path that extends from a primary fluid inlet *into the appliance*, rather than *into the body*, the scope of Claim 26 does not preclude another element from defining some part of the “primary fluid flow path” between the handle and the body. However, by specifying that the claimed “inner wall” of

the handle, as opposed to the claimed “outer wall” of the handle, defines the primary fluid flow path from a primary fluid inlet into the appliance, Claim 26 does preclude a handle in which the inner wall fails to define the entirety of the primary fluid flow path within the handle.

45. Thus, in my opinion a POSITA at the time of the invention reading the claim language and the specification would have interpreted “inner wall . . . defines a primary fluid flow path that extends from a primary fluid inlet into the appliance” to mean “inner wall . . . defines a primary fluid flow path that extends from a primary fluid inlet, through the handle, and into the appliance.”

46. In my opinion, the remaining claim terms can be given their plain and ordinary meaning, and I have applied the plain and ordinary meaning to a POSITA in view of the specification to the remaining terms of the Challenged Claims.

B. Specific Grounds of Alleged Patentability

47. In my opinion, Petitioners and Dr. Nosenchuck have not shown that any of the Challenged Claims are unpatentable. None of the art to which Petitioners and Dr. Nosenchuck cite show the claimed “inner wall . . . defines a primary fluid flow path that extends from a primary fluid inlet into the appliance.” Petitioners and Dr. Nosenchuck also fail to show that the art meets the additional limitations of the dependent claims. Thus, Petitioners and Dr. Nosenchuck have

not shown that the Challenged Claims are unpatentable as anticipated and/or obvious.

1. GROUND 1: U.S. Patent Application Publication No. US 2013/0111777 (“Jeong”) does not anticipate the Challenged Claims

a. Jeong does not disclose the claimed “inner wall . . . defines a primary fluid flow path that extends from a primary fluid inlet into the appliance” present in all Challenged Claims

48. In my opinion, Jeong fails to disclose the claimed “inner wall . . . defines a primary fluid flow path that extends from a primary fluid inlet into the appliance,” that is the “inner wall . . . defines a primary fluid flow path that extends from a primary fluid inlet, through the handle, and into the appliance.”

49. Petitioners and Dr. Nosenchuck assert that Jeong’s discharge nozzle 30 is the claimed “body” and that Jeong’s housing 10 is the claimed “handle.” Pet. at 24-25; EX-1003 ¶ 70.

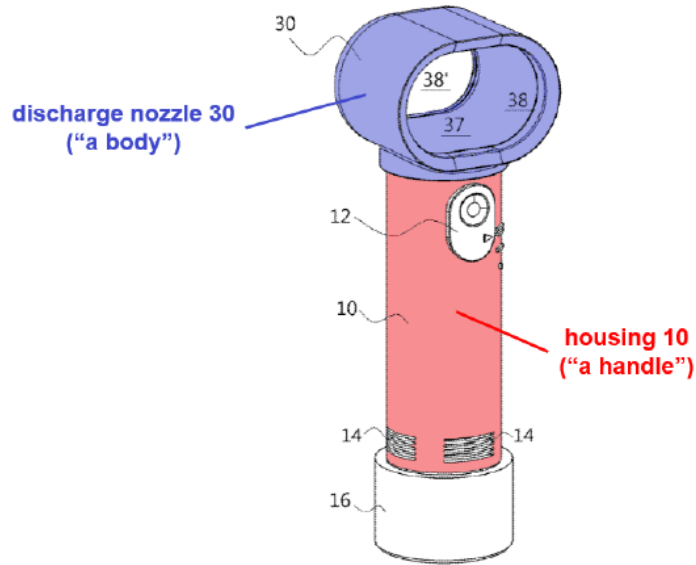


FIG. 1

Pet. at 25; EX-1003 ¶ 70

50. Petitioners and Dr. Nosenchuck then assert that Jeong’s housing 10 is the claimed “outer wall,” Jeong’s motor housing 18 is the claimed “inner wall,” and Jeong’s plurality of inflow slots 14 are the claimed “primary fluid inlet.” Pet. at 27-29, 31; EX-1003 ¶ 77.

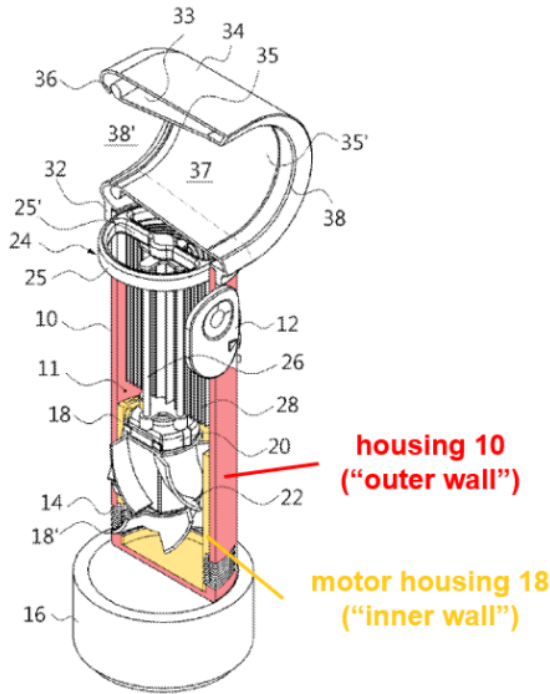


FIG. 2

Pet. at 28; EX-1003 ¶ 77

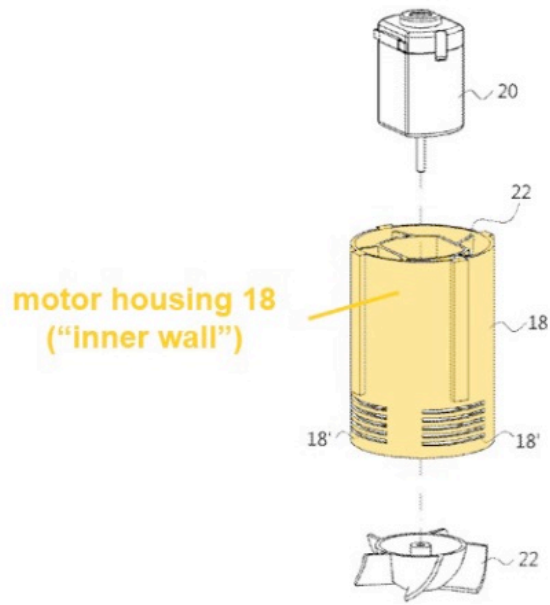


FIG. 3

Pet. at 29; EX-1003 ¶ 77

51. However, Petitioners' and Dr. Nosenchuck's own illustrations show that Jeong's motor housing 18 does not extend from the plurality of inflow slots 14 through the handle to the discharge nozzle 30 or to an exit from the handle. Instead, Jeong's motor housing 18 that Petitioners and Dr. Nosenchuck assert is the claimed "inner wall" only extends from the plurality of inflow slots 14 about half-way up housing 10, which Petitioners and Dr. Nosenchuck assert is the claimed "handle," and does not extend through the handle into the appliance as required by the Challenged Claims. By contrast, in Jeong, the primary fluid flow path through the handle to the appliance is defined by housing 10, which Petitioners and Dr.

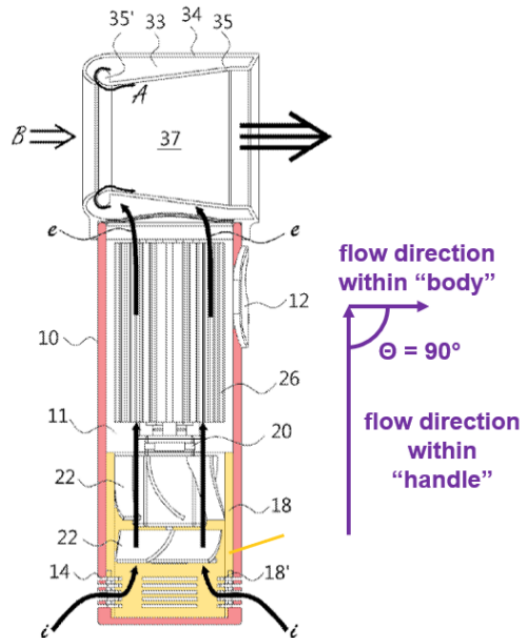
Nosenchuck allege corresponds to the outer wall, not the motor housing 18, which Petitioners and Dr. Nosenchusk allege correspond to the inner wall.

52. For those reasons, in my opinion, Jeong fails to disclose the claimed “inner wall . . . defines a primary fluid flow path that extends from a primary fluid inlet into the appliance.”

b. Jeong does not disclose the additional limitation of Claim 28

53. In my opinion, Jeong also fails to disclose that “the primary fluid flow in the body is substantially orthogonal to the primary fluid flow in the handle” as recited in Claim 28.

54. Petitioners and Dr. Nosenchuck assert that Jeong’s primary fluid flow path is the airflow path that flows through housing 10 and motor housing 18, to discharge slit 36, and then to discharge hole 38. Pet. at 46-48; EX-1003 ¶¶ 90-92. Petitioners and Dr. Nosenchuck then state, without any basis, that the airflow changes by approximately 90 degrees. Pet. at 46-48; EX-1003 ¶¶ 91-92.



Pet. at 47; EX-1003 ¶ 91

55. Petitioners’ and Dr. Nosenchuck’s analysis lacks any explanation as to the direction of the primary fluid flow path *in the body*, which is fatal given that Claim 28 requires that “the *primary fluid flow in the body* is substantially orthogonal to the *primary fluid flow in the handle*.” EX-1001 at 20:16-18 (emphasis added).

56. Claim 26, on which Claim 28 depends, recites “wherein the primary fluid flow path from the primary fluid inlet to a primary fluid outlet from the body is non linear.” The ’662 Patent describes two different fluid flows. An example of the claimed “primary fluid flow” illustrated below in red as it enters through the primary inlet 40 through fluid flow path 400 and exits at the primary fluid outlet 440 in the body. EX-1001 at 10:24-34. The ’662 Patent also discloses a secondary

fluid flow illustrated below in blue that flows exclusively within the body through fluid flow path 300 extending from fluid inlet 320 to fluid outlet 340. EX-1001 at 10:40-45, 50-25.

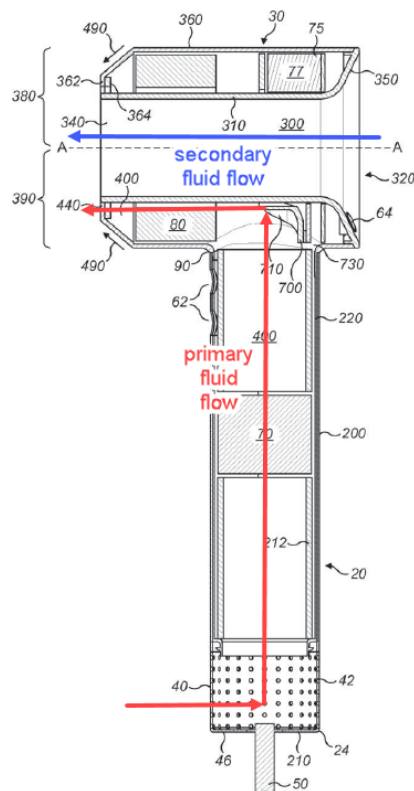


FIG. 3

EX-1001 Fig. 3 (annotated)

57. Thus, the primary fluid flow and the secondary fluid flow are two different flow paths that may merge at their respective outlets. EX-1001 at 10:59-63. However, only the primary fluid flow is recited in the Challenged Claims, and it is that flow that in the body must be orthogonal to the flow in the handle. EX-1001 at 20:16-18 (emphasis added).

58. Similarly, as illustrated in Figures 2 and 5, Jeong discloses two separate fluid flows. Jeong discloses a fluid flow from inflow slot 14 and inner inflow slot 18' as illustrated by arrow i through the handle to discharge slit 36 as shown by arrow A. EX-1004 ¶¶ [0052]-[0055], Fig. 5. Jeong also discloses a second fluid flow that never flows through the handle represented by arrow B that flows from secondary inflow hole 38' through central passage part 37 and discharged through discharge hole 38. EX-1004 ¶¶ [0055]-[0056]¹, Figs. 2, 5. The air from the two fluid flows may be mixed in central passage part 37 and be discharged together through discharge hole 38. EX-1004 ¶ [0056].

¹ In paragraphs [0055] and [0056], Jeong mistakenly refers to the secondary inflow hole as 38, the central part passage as 32, and the discharge hole as 39. However, as identified elsewhere in Jeong and consistent with the figures, the secondary inflow hole is actually 38', the central passage part is actually 37, and the discharge hole is actually 38. EX-1004 ¶¶ [0045]-[0046], [0051], Figs. 2, 5.

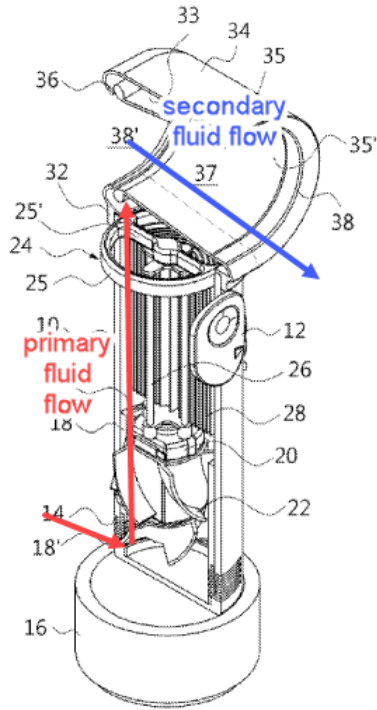


FIG. 2

EX-1004 Fig. 2 (annotated)

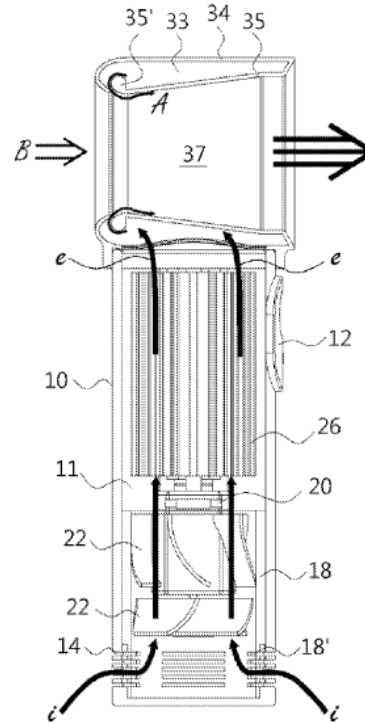


FIG. 5

EX-1004 Fig. 5

59. Accordingly, in both the '662 Patent and Jeong, the features allegedly responding to the claimed “primary fluid outlet” is where the fluid flow that flows through the handle, a requirement of the the claimed “primary fluid flow,” is discharged, as opposed to the outlet that includes the fluid flow that never flows through the handle.

60. Petitioners and Dr. Nosenchuck erroneously allege that the claimed “primary fluid flow in the body” goes through discharge slit 36 to discharge hole 38. Pet. at 46-47; EX-1003 ¶ 91; ID at 31. Petitioners and Dr. Nosenchuck then allege that it is this flow in central passage 37 that is substantially orthogonal to the

claimed “primary fluid flow in the handle,” disclosing the additional limitation of

Claim 28. Pet. at 46-58; EX-1003 ¶¶ 90-93; ID at 31.

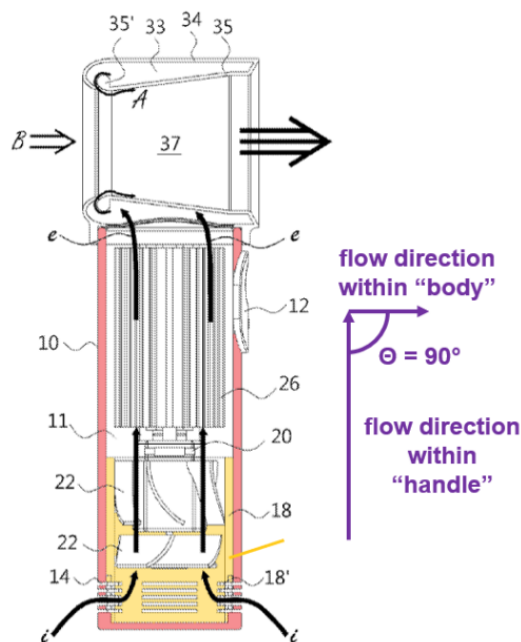


FIG. 5

Pet. at 47; EX-1003 ¶ 91

61. In my opinion, Petitioners’ and Dr. Nosenchuck’s arguments are incorrect for two reasons. **First**, Petitioners’ and Dr. Nosenchuk have not shown that the fluid flow “in the body” is orthogonal to the fluid flow in the handle, as required by Claim 28. As discussed above, it appears that Petitioners and Dr. Nosenchuck are asserting that the fluid flow in central passage 37 is the claimed flow “in the body,” though neither specifies exactly what fluid flow they are asserting is the claimed flow. Pet. at 46-47; EX-1003 ¶¶ 90-92. However, by Petitioners’ and Dr. Nosenchuck’s own admissions, central passage 37 is not part of the claimed “body,” as illustrated below.

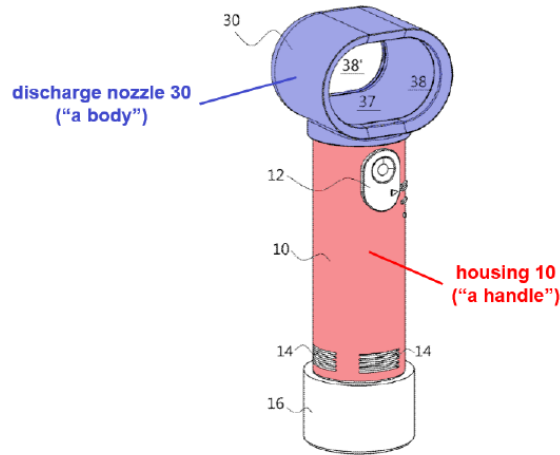
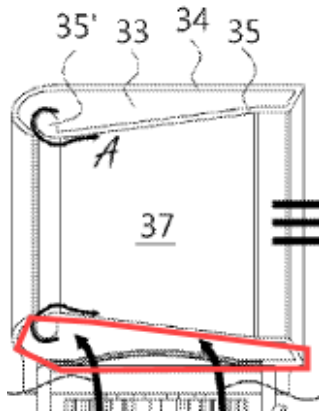


FIG. 1

Pet. at 25; EX-1003 ¶ 70

62. **Second**, even if the flow in central passage 37 is “in the body,” in my opinion, Petitioners’ and Dr. Nosenchuck’s allegations are still incorrect because they have not shown that the fluid flow in central passage 37 is the claimed “primary fluid flow.” As described above, the claimed “primary fluid outlet” equates to discharge slit 36 in Jeong, *i.e.*, where the fluid flow that flowed through the handle exits the body.

63. As outlined in red below, the claimed “primary fluid flow” in Jeong flows from the handle into the body and flows around the annular space between the inner wall 35 and outer wall 34 of discharge nozzle 30 (the claimed “body”) before exiting through discharge slit 36. EX-1004 Fig. 5.



EX-1004 Fig. 5 (excerpted and annotated)

64. There is no disclosure that the annular space between the inner wall 35 and outer wall 34 is configured to redirect the claimed “primary fluid flow” from housing 10 (alleged claimed “handle”) in a direction substantially perpendicular to the flow within housing 10 before exiting through discharge slit 36 (the claimed “primary fluid outlet from the body”).

65. Thus, in my opinion, Jeong fails to disclose the additional limitation of Claim 28 reciting “wherein the primary fluid flow in the body is substantially orthogonal to the primary fluid flow in the handle.”

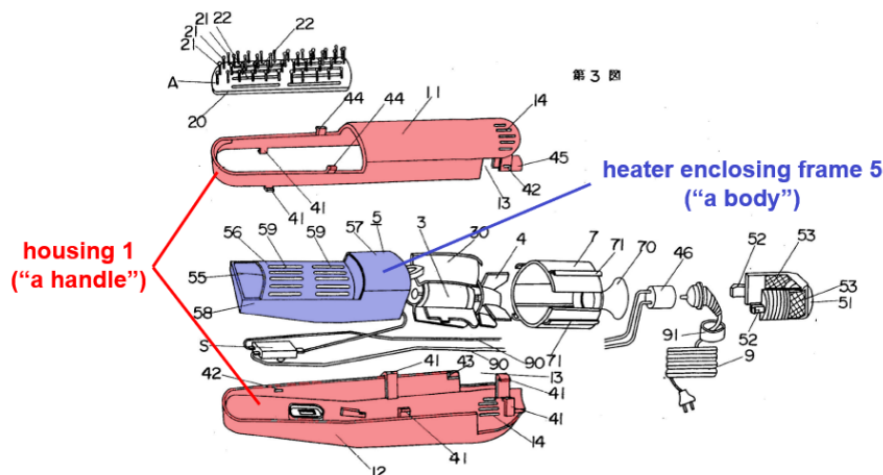
2. GROUND 2: Japanese Patent Application Publication No. JP S 60-249907 (“Yoshida”) does not anticipate the Challenged Claims

a. Yoshida does not disclose the claimed “inner wall . . . defines a primary fluid flow path that extends from a primary fluid inlet into the appliance” present in all Challenged Claims

66. In my opinion, Yoshida fails to disclose the claimed “inner wall . . . defines a primary fluid flow path that extends from a primary fluid inlet into the

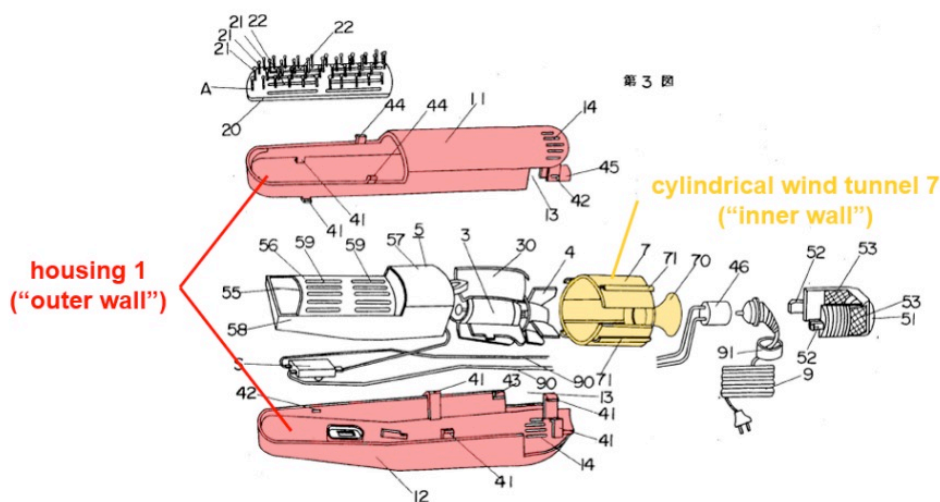
appliance,” that is “inner wall . . . defines a primary fluid flow path that extends from a primary fluid inlet, through the handle, and into the appliance.”

67. Petitioners and Dr. Nosenchuck assert that Yoshida’s housing 1 is the claimed “handle,” Yoshida’s heater enclosing frame 5 is the claimed “body,” and that Yoshida’s cylindrical wind tunnel 7 is the claimed “inner wall.” Pet. at 50-51, 56-57; EX-1003 ¶¶ 96-98, 105-107.



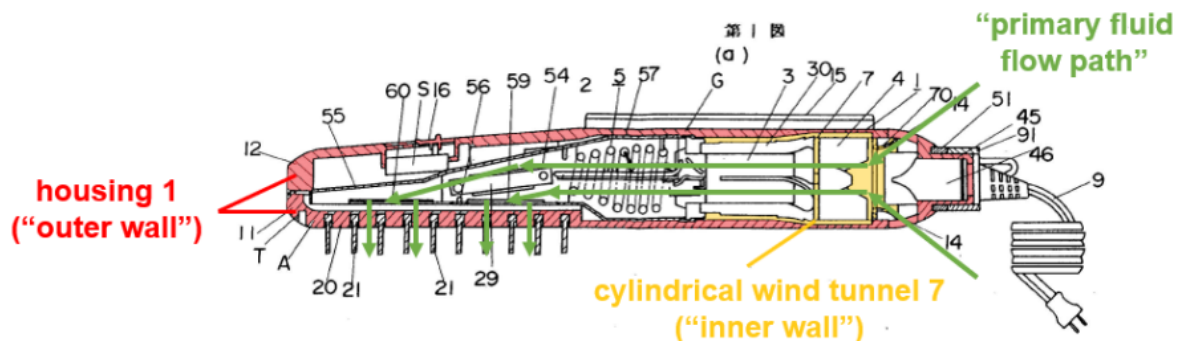
Pet. at 51; EX-1003 ¶ 97

68.



Pet. at 56; EX-1003 ¶ 105

69. Petitioners and Dr. Nosenchuck then assert that the claimed “primary fluid flow path” originates at Yoshida’s suction ports 13 and 14, which Petitioners and Dr. Nosenchuck assert are the claimed “primary fluid inlet,” travels through Yoshida’s cylindrical wind tunnel 7 (asserted claimed “inner wall”) through Yoshida’s heater enclosing frame 5 (asserted claimed “body”), and exits through discharge ports 59, which Petitioners and Dr. Nosenchuck assert are the claimed “primary fluid outlet from the body.” Pet. at 60-62; EX-1003 ¶¶ 110-111.



Pet. at 62; EX-1003 ¶ 111

70. However, Petitioners’ and Dr. Nosenchuck’s own illustrations show that Yoshida’s cylindrical wind tunnel 7 does not extend from the suction ports 13 and 14 through the housing 1 (the alleged claimed “handle”) to discharge ports 59, which are the outlets from housing 1. Because discharge ports 59 are the outlets for both housing 1 and heater enclosing frame 5, the cylindrical wind tunnel 7 does not define a primary fluid flow path that extends from a primary fluid inlet, through the handle, and into the appliance. Instead, Yoshida’s cylindrical wind

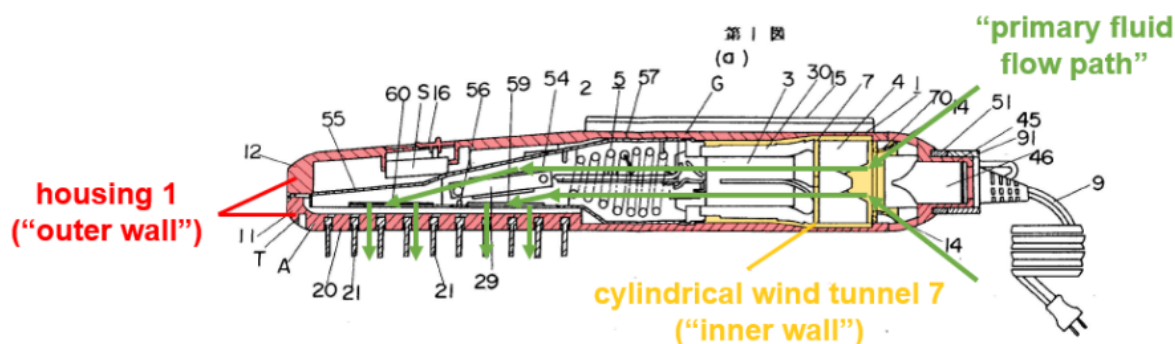
tunnel 7 that Petitioners and Dr. Nosenchuck assert is the claimed “inner wall” extends from the suction ports 13 and 14 only about half-way up housing 1, which Petitioners and Dr. Nosenchuck assert is the claimed “handle.”

71. For those reasons, in my opinion, Yoshida does not disclose the claimed “inner wall . . . defines a primary fluid flow path that extends from a primary fluid inlet into the appliance.”

b. Yoshida does not disclose the additional limitations of Claims 27 and 28.

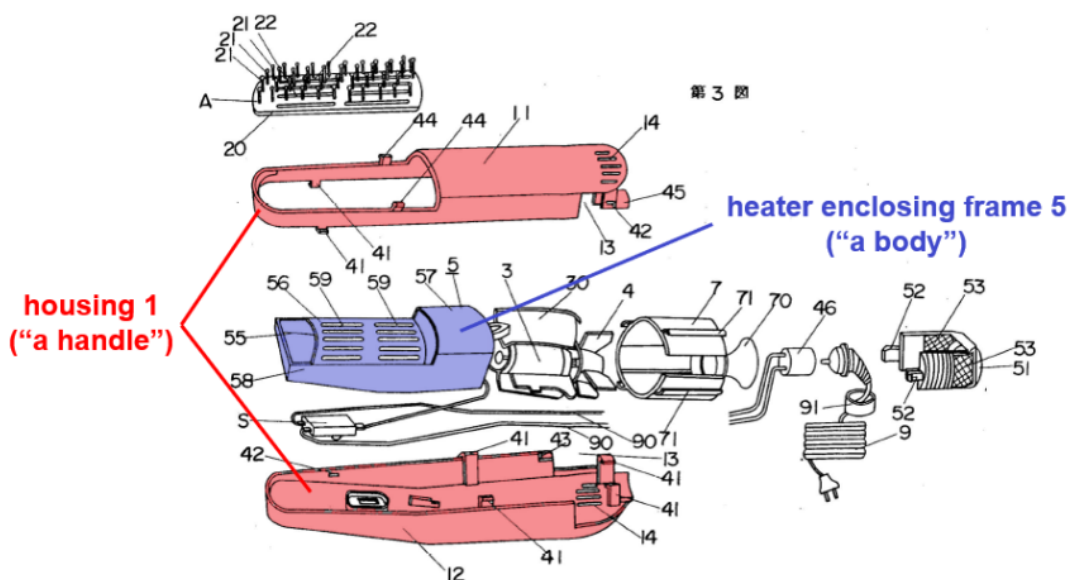
72. In my opinion, Yoshida does not disclose that “the primary fluid flows within the handle in a first direction and within the body in a second direction,” as required by Claim 27, or that “the primary fluid flow in the body is substantially orthogonal to the primary fluid flow in the handle,” as required by Claim 28.

73. Petitioners and Dr. Nosenchuck assert that the claimed “primary fluid flow path” originates at Yoshida’s suction ports 13 and 14, which Petitioners and Dr. Nosenchuck assert are the claimed “primary fluid inlet,” travels through Yoshida’s cylindrical wind tunnel 7 (asserted claimed “inner wall”) and through Yoshida’s heater enclosing frame 5 (asserted claimed “body”), and exits through outlet 59, which Petitioners and Dr. Nosenchuck assert is the claimed “primary fluid outlet from the body.” Pet. at 60-62; EX-1003 ¶ 111.



Pet. at 62; EX-1003 ¶ 111

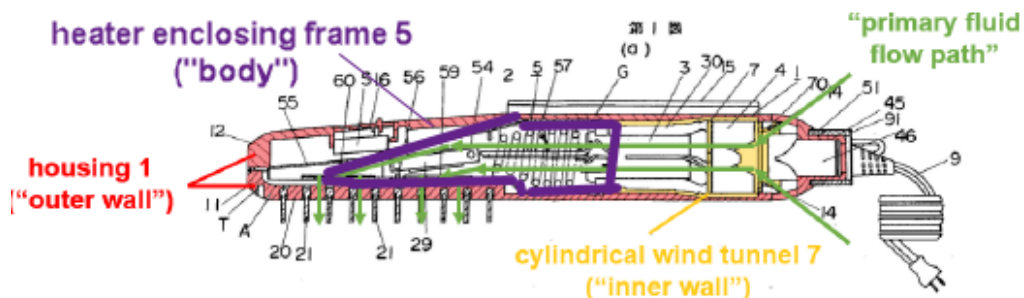
74. However, Petitioners and Dr. Nosenchuck also assert that Yoshida’s housing 1 is the claimed “handle” and that Yoshida’s heater enclosing frame 5 is the claimed “body.” Pet. at 50-51, EX-1003 ¶ 97. As illustrated below, the alleged “handle” encompasses the alleged “body”:



Pet. at 51; EX-1003 ¶ 97

75. As illustrated by the purple lines below outlining the heater enclosing frame 5, which Petitioners and Dr. Nosenchuck assert is the claimed “body,” the

asserted claimed “handle” encompasses the asserted claimed “body” and the asserted claimed “primary fluid flow” that occurs in the asserted claimed “body” also necessarily occurs in the asserted claimed “handle” (which Petitioners and Dr. Nosenchuck also assert is the claimed “outer wall”).



Pet. at 62; EX-1003 ¶ 111 (further annotated)

76. Further, as illustrated above, Petitioners and Dr. Nosenchuck admit that the primary fluid flow that occurs in housing 1 (asserted claimed “handle” and “outer wall”) prior to entering the heater enclosing frame 5 (asserted claimed “body”) is in the same direction as the direction of the asserted claimed “primary fluid flow” entering the heater enclosing frame 5. Pet. at 62-63 (Petitioners asserting that the only change in direction in the primary fluid flow occurs in the asserted claimed “body”); EX-1003 ¶ 112 (same). However, because the asserted claimed “primary fluid flow” in the asserted claimed “body” is coextensive with that in the asserted claimed “handle,” any fluid flow in the asserted claimed “body” also occurs in the asserted claimed “handle.” Additionally, the fluid flow that occurs exclusively in the asserted claimed “handle” is in the same direction (*i.e.*,

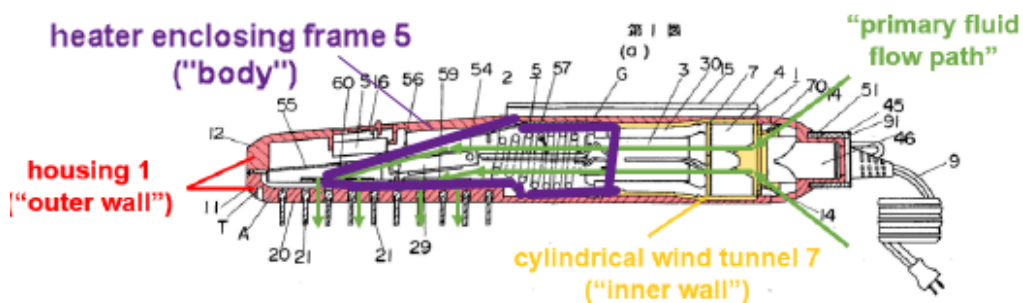
substantially parallel) as the asserted claimed “primary fluid flow” that occurs in the asserted claimed “body.” Thus, Petitioners and Dr. Nosenchuck have not shown a “second direction” of fluid flow within the asserted claimed “body” from the flow within the asserted claimed “handle” or how the fluid flow in the asserted claimed “body” can be substantially orthogonal to the fluid flow in the asserted claimed “handle” when the fluid flow in the asserted claimed “body” is the same fluid flow as found in the asserted claimed “handle.”

77. Thus, in my opinion, Yoshida fails to disclose “the primary fluid flows within the handle in a first direction and within the body in a second direction,” as required by Claim 27, or that “the primary fluid flow in the body is substantially orthogonal to the primary fluid flow in the handle,” as required by Claim 28.

78. Further, as to Claim 28, in my opinion, Yoshida does not disclose that “the primary fluid flow in the body is substantially orthogonal to the primary fluid flow in the handle” because the fluid flow *in the body* is not substantially orthogonal to that in the handle.

79. As discussed above, Petitioners and Dr. Nosenchuck assert that the claimed “primary fluid flow path” originates at Yoshida’s suction ports 13 and 14, which Petitioners and Dr. Nosenchuck assert are the claimed “primary fluid inlet,” travels through Yoshida’s cylindrical wind tunnel 7 (asserted claimed “inner wall”)

and through Yoshida's heater enclosing frame 5 (asserted claimed "body"), and exits through discharge ports 59, which Petitioners and Dr. Nosenchuck assert are the claimed "primary fluid outlet from the body." Pet. at 60-62; EX-1003 ¶¶ 105-106. Notably, Petitioners and Dr. Nosenchuck only allege that the claimed "primary fluid flow path" (annotated in green below by Petitioners and Dr. Nosenchuck) changes by 90 degrees once it *exits* through Yoshida's discharge ports 59, which is after it exits heater enclosing frame 5 (asserted claimed "body"):



Pet. at 62; EX-1003 ¶ 107 (further annotated)

80. Additionally, the frame enclosing the body includes a sharp change in the cross-sectional area perpendicular to the fluid path prior to the fluid's exit through discharge ports 59. As noted by Dr. Nosenchuck, Yoshida explains that "the air flowing into the housing 1 from the suction ports 13 and 14" is "guided by the partition plate 55 of the heater enclosing frame 5." EX-1003 ¶ 112. This disregards the abrupt change in cross-sectional area prior to the angled wall of frame 5, which would increase the velocity of the fluid, especially near the wall containing the discharge ports 59. This, combined with the fact that the angle from

frame 5 is very slight, indicates that most of the flow would remain in the same direction through the “body” of the device and would not substantially change direction until it exits discharge ports 59.

81. Thus, at most, Petitioners and Dr. Nosenchuck have alleged that the fluid flow of the air *exiting* the asserted claimed “body” is substantially orthogonal to the fluid flow in housing 1 (asserted claimed “handle”). However, Petitioners have not shown that the fluid flow *in the body* is substantially orthogonal to the fluid flow in the claimed handle, as required by Claim 28. In fact, as shown by the green lines annotated by Petitioners and Dr. Nosenchuck in the illustration above, the asserted claimed “primary fluid flow” in Yoshida never turns approximately 90 degrees until it exits the hair dryer through discharge ports 59.

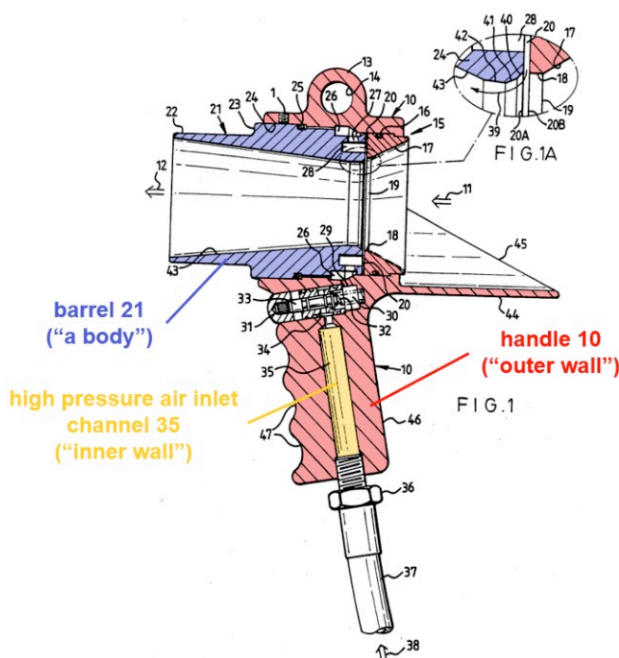
82. Thus, for this additional reason, in my opinion, Yoshida does not disclose “the primary fluid flow in the body is substantially orthogonal to the primary fluid flow in the handle,” as required by Claim 28.

3. GROUNDS 3-5: U.S. Patent No. 5,407,135 (“Jeffs”) does not anticipate the Challenged Claims and neither Jeffs in view of Jeong nor Yoshida rendered obvious the Challenged Claims

a. Jeffs does not disclose all of the limitations recited in the Challenged Claims

83. In my opinion, Jeffs does not disclose all of the limitations recited in the Challenged claims for two distinct reasons.

84. **First**, in my opinion, Jeffs does not include both an “outer wall” and a distinct “inner wall” as recited in Claim 26. Petitioners and Dr. Nosenchuk assert that Jeffs’ handle 10 is the claimed “outer wall” and the high pressure air inlet channel 35 within handle 10 is the claimed “inner wall.” Pet. at 76-78; EX-1003 ¶¶ 138-141.



Pet. at 77; EX-1003 ¶ 139

85. However, Petitioners and Dr. Nosenchuck have not shown that Jeffs’ high pressure air inlet channel 35 forms a separate wall that is distinct from handle 10.

86. The ’662 Patent is clear that the claimed “inner wall” includes a wall that is distinct from the claimed “outer wall.” For example, the specification notes that the handle 20 has both an outer wall 200 and an inner wall 220, and that “inner

wall 220 is *a duct* which surrounds and defines a primary fluid flow path 400 through the hairdryer.” EX-1001 at 12:30-33 (emphasis added). This is confirmed by Claim 26 itself, which also requires a distinct inner wall and outer wall and that the inner wall “defines a primary fluid flow path.” *Id.* at 20:5-8.

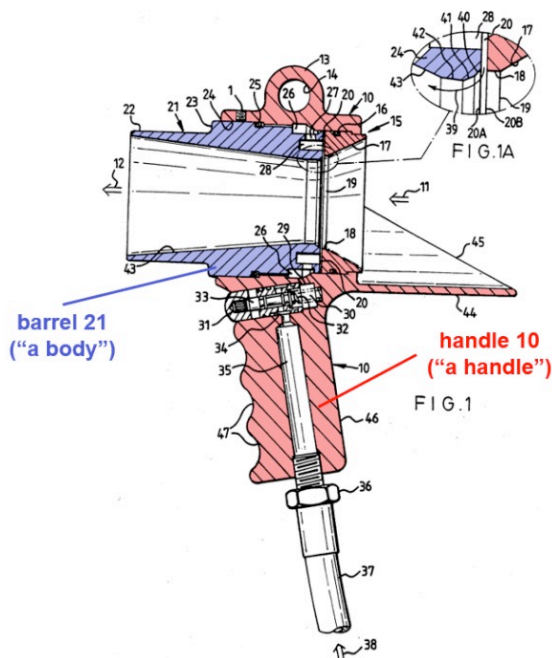
87. Jeffs does not provide any description of high pressure air inlet channel 35 indicating that it is comprised of a wall separate and distinct from handle 10. Instead, high pressure air inlet channel 35 appears to be merely a hollow portion of handle 10 such that only a single wall is formed with an inner surface forming the high pressure air inlet channel 35 and the outer surface forming the portion of the handle gripped by the user. Further, Petitioners’ and Dr. Nosenchuck’s only justification for their assertion that high pressure air inlet channel 35 is the claimed “inner wall” is merely because the channel is “disposed within the handle 10,” Pet. at 77-78; EX-1003 ¶ 141, while ignoring whether high pressure air inlet channel 35 is merely a hollow portion of the handle 10.

88. For these reasons, in my opinion, Jeffs does not disclose the claimed “inner wall” distinct from the claimed “outer wall.” I note that this wall does not require an adoption of my construction of “inner wall . . . defines a primary fluid flow path that extends from a primary fluid inlet into the appliance.”

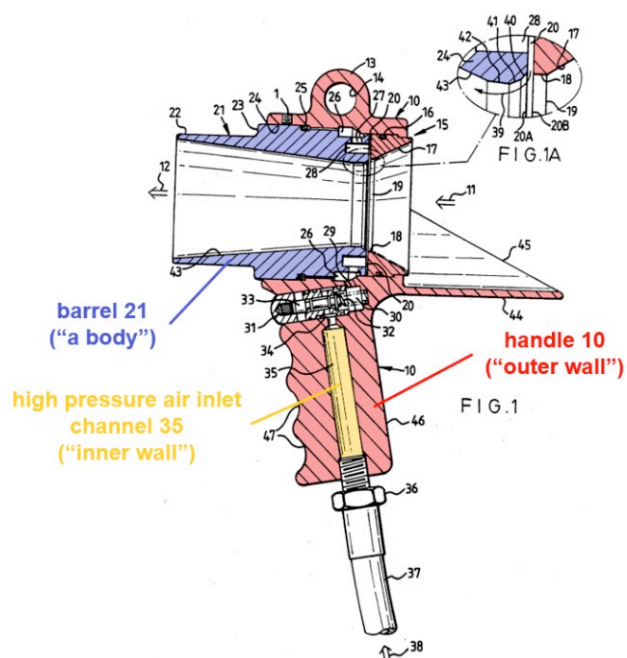
89. ***Second***, in my opinion, Jeffs does not disclose the claimed “inner wall . . . defines a primary fluid flow path that extends from a primary fluid inlet into

the appliance,” that is “inner wall . . . defines a primary fluid flow path that extends from a primary fluid inlet, through the handle, and into the appliance.”

90. Petitioners and Dr. Nosenchuck assert that Jeffs’ handle 10 is the claimed “handle,” Jeffs’ barrel 21 is the claimed “body,” and Jeffs’ high pressure air inlet channel 35 is the claimed “inner wall.” Pet. at 74-78; EX-1003 ¶¶ 134-141.

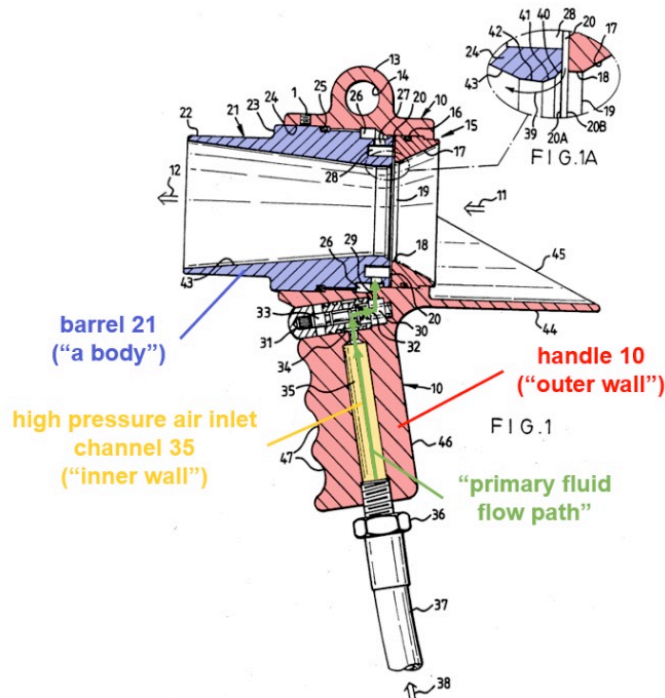


Pet. at 75; EX-1003 ¶ 135



Pet. at 77; EX-1003 ¶ 139

91. Petitioners and Dr. Nosenchuck further assert that Jeffs’ union 36 is the claimed “primary fluid inlet.” Pet. at 79-81; EX-1003 ¶¶ 144-145.



Pet. at 81; EX-1003 ¶ 145

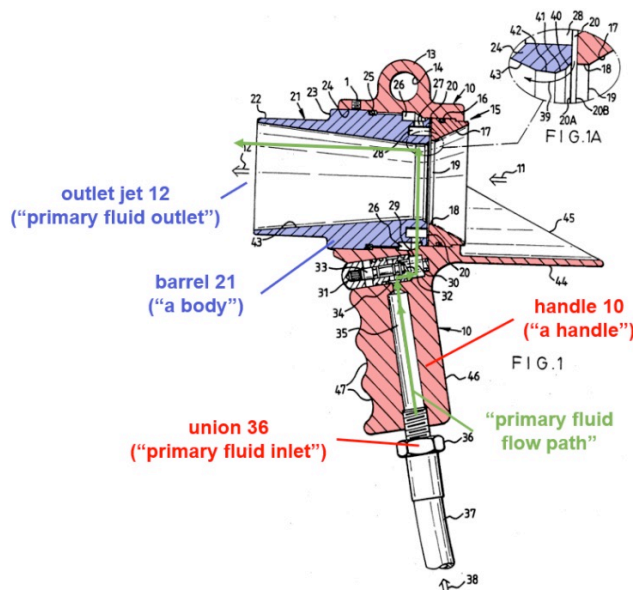
92. However, Petitioners' and Dr. Nosenchuck's own illustrations show that Jeffs' high pressure air inlet channel 35 (the asserted claimed "inner wall") does not extend from union 36 (the asserted claimed "primary fluid inlet") through handle 10 (the asserted claimed "handle"). Instead, Jeffs' high pressure air inlet channel 35 that Petitioners assert is the claimed "inner wall" only extends from union 36 about half-way up handle 10, which Petitioners assert is the claimed "handle."

93. Thus, in my opinion, Jeffs does not disclose the claimed "inner wall . . . defines a primary fluid flow path that extends from a primary fluid inlet into the appliance."

b. Jeffs does not disclose the additional limitation of Claim 28

94. In my opinion, Jeffs does not disclose “the primary fluid flow in the body is substantially orthogonal to the primary fluid flow in the handle,” as required by Claim 28.

95. Petitioners and Dr. Nosenchuck assert that the claimed “primary fluid flow path” begins at union 36 (asserted claimed “primary fluid inlet”), travels through high pressure air inlet channel 35 (asserted claimed “inner wall”) through valve assembly 30, 32, 33 to barrel 21 (asserted claimed “body”) and exits through inlet 20 to outlet jet 12 (asserted claimed “primary fluid outlet”). Pet. at 83-87; EX-1003 ¶¶ 148-154. Petitioners and Dr. Nosenchuck assert that outlet jet 12 flows at a right angle from inlet 20 and that this causes the asserted claimed “primary fluid flow in the body” to be substantially orthogonal to the asserted claimed “primary fluid flow in the handle,” as required by Claim 28. Pet. at 89-90; EX-1003 ¶¶ 158-59.



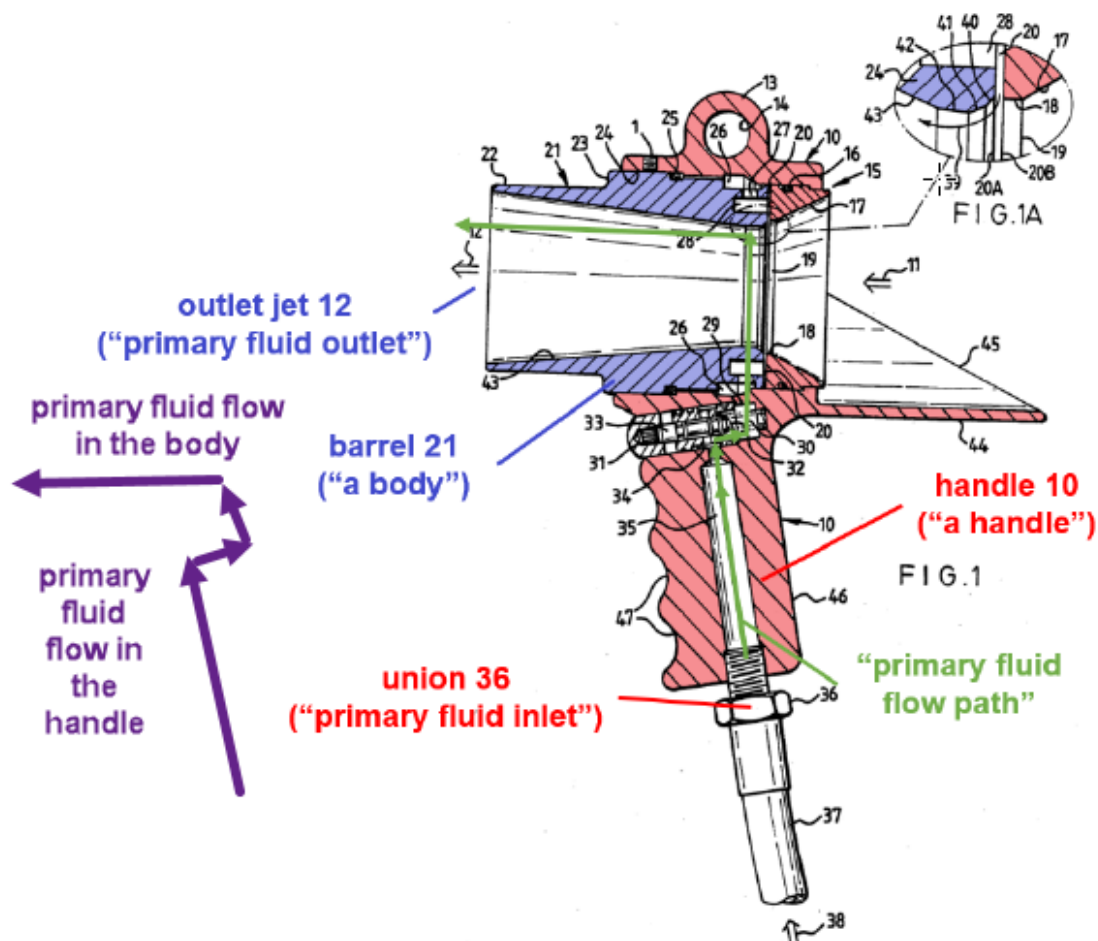
Pet. at 90; EX-1003 ¶ 152

96. Petitioners’ and Dr. Nosenchuck’s arguments are incorrect for two reasons.

97. **First**, Petitioners and Dr. Nosenchuck do not show that the air in outlet jet 12 that they allege is the claimed primary fluid flow that is orthogonal to the primary fluid flow in the handle is “*in* the body” as required by Claim 28. As illustrated above, Petitioners and Dr. Nosenchuck allege that barrel 21 (colored in purple) is the claimed “body” and that the green arrow is the claimed “primary fluid flow path.” Pet. at 89-90; EX-1003 ¶¶ 157-159. However, as illustrated, Petitioners’ and Dr. Nosenchuck’s asserted “primary fluid flow path” turns at 90 degrees **after** it leaves barrel 21 (asserted claimed “body”) and enters the throat of the barrel, which Petitioners and Dr. Nosenchuck do not contend is part of the claimed “body.”

98. Thus, in my opinion, Jeffs does not disclose that “primary fluid flow *in the body* is substantially orthogonal to the primary fluid flow in the handle,” as required by Claim 28.

99. **Second**, even if the alleged claimed “primary fluid flow path” that changes approximately 90 degrees is considered to be “*in the body*,” in my opinion, Jeffs still does not disclose that “the primary fluid flow in the body is substantially orthogonal to the primary fluid flow in the handle,” as required by Claim 28 because, air inlet 20 is after fluid flow left handle 10. Thus, fluid flow in air inlet 20 is in the body and thus does not provide any teaching related to fluid flow in handle. As shown in the Figure above from page 90 of the Petition, Petitioners and Dr. Nosenchuck indicate that barrel chambers 26 and 28 are in the body. Thus, the fluid flow leaves handle 10 when entering barrel chamber 26, which is before the fluid enters air inlet 20. Further, as illustrated below by the dark purple annotations, Petitioners’ and Dr. Nosenchuck’s asserted claimed “primary fluid flow in the handle” is not perpendicular to the air flow in inlet 20:



Pet. at 90; EX-1003 ¶ 158 (further annotations)

100. In Jeffs, the fluid flows within the handle 10 by passing through channel 35 and a valve assembly 30, 32, 33 until it exits the handle through channel 29 to barrel chambers 26 and 28, which are not in handle 10. EX-1006 at 4:17-34. Petitioners and Dr. Nosenchuck do not provide any explanation for why the green arrow correctly represents fluid flow from inner chamber 30 through channel 29 to barrel chamber 26, nor do they point to any other portion of the alleged fluid flow through handle 10 that is substantially orthogonal to fluid flow in barrel 21.

101. Thus, within the “primary fluid flow path” asserted by Petitioners and Dr. Nosenchuck, there is no point when the primary fluid flow in the handle is at a 90-degree angle, or substantially orthogonal, to the primary fluid flow in the body.

102. For the reasons above, in my opinion, Jeffs does not disclose the additional limitation of Claim 28.

VI. OPINIONS RELATED TO MOTION TO AMEND

103. While it is my opinion, as stated above, that the Challenged Claims are not unpatentable, I have reviewed Patent Owner’s substitute claims 40-42 and am of the opinion that they are patentable over Jeong, Yoshida, and Jeffs, alone, and Jeffs in combination with Jeong or Yoshida.

A. Substitute Claims 40-42

104. I understand that Patent Owner is proposing that if Claim 26 is found unpatentable, the ’662 Patent be amended to add Substitute Claim 40:

A hair care appliance comprising a body and a handle, the handle having a first end proximal to the body and a second end distal from the body and comprising an inner wall and an outer wall, wherein the inner wall is disposed radially inwardly from the outer wall, defines a primary fluid flow path that extends from a primary fluid inlet into the appliance, and extends from the primary fluid inlet to the first end of the handle, wherein the outer wall is an external surface of the handle,

and wherein the primary fluid flow path from the primary fluid inlet to a primary fluid outlet from the body is non linear.

105. Substitute Claim 40 differs from Challenged Claim 26 in that it requires that (i) the handle has a first end proximal to the body and a second end distal from the body; and (2) the inner wall extends from the primary fluid inlet to the first end of the handle.

106. I understand that Patent Owner is also proposing that if Claims 27 and 28 are found unpatentable, the '662 Patent be amended to add Substitute Claims 41 and 42, respectively. I understand that the only difference between Substitute Claims 41 and 42 and Challenged Claims 27 and 28 is that Claims 27 and 28 depend from Challenged Claim 26 whereas Substitute Claims 41 and 42 depend from Substitute Claim 40.

B. Claim Construction

107. I understand that in reviewing whether the substitute claims are patentable in a motion to amend, the Board gives the claims their broadest reasonable interpretation in light of the specification as it would have been interpreted by a POSITA at the time of the invention.

108. In reviewing whether Substitute Claims 40-42 are patentable, I have applied the broadest reasonable interpretation to a POSITA in view of the specification to each of the terms in Substitute Claims 40-42.

C. Substitute Claims 40-42 are patentable over Petitioners' grounds

109. In my opinion, none of Jeong, Jeffs, or Yoshida discloses or renders obvious the newly amended limitation “the handle having a first end proximal to the body and a second end distal from the body and comprising an inner wall . . . [that] extends from the primary fluid inlet to the first end of the handle” for at least the reasons below.

1. GROUND 1: Jeong fails to anticipate or render obvious the Substitute Claims

110. In my opinion, Jeong does not disclose “the inner wall . . . extends from the primary fluid inlet to the first end of the handle” of the Substitute Claims.

111. Petitioners and Dr. Nosenchuck assert that Jeong's discharge nozzle 30 is the claimed “body” and that Jeong's housing 10 is the claimed “handle.” Pet. at 24-25; EX-1003 ¶ 70.

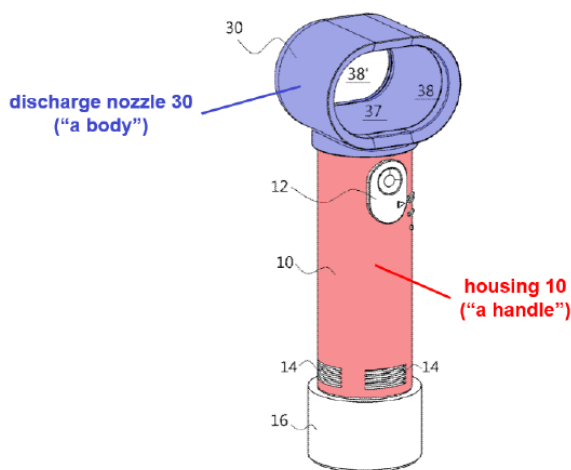


FIG. 1

Pet. at 25; EX-1003 ¶ 70

112. Petitioners and Dr. Nosenchuck then assert that Jeong's housing 10 is the claimed "outer wall," Jeong's motor housing 18 is the claimed "inner wall," and Jeong's plurality of inflow slots 14 are the claimed "primary fluid inlet." *Id.* at 27-29, 31; EX-1003 ¶ 77.

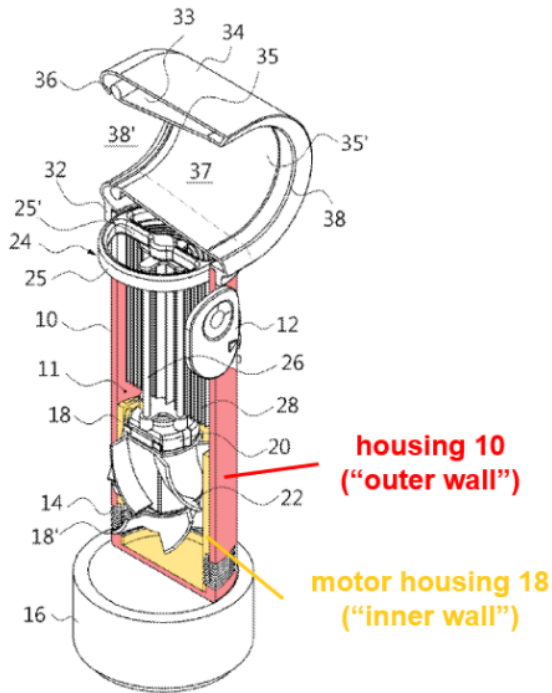


FIG. 2

Pet. at 28; EX-1003 ¶ 77

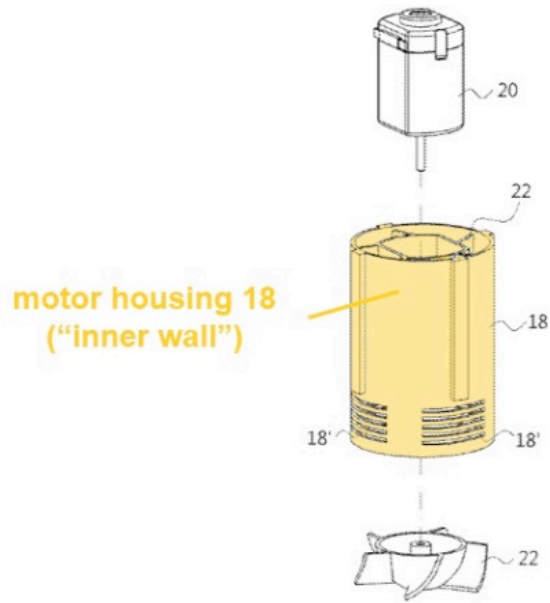


FIG. 3

Pet. at 29; EX-1003 ¶ 77

113. However, Petitioners' and Dr. Nosenchuck's own illustrations show that Jeong's motor housing 18 does not extend from the plurality of inflow slots 14 to the end of housing 10 that is proximal to the discharge nozzle 30. Instead, Jeong's motor housing 18 that Petitioners and Dr. Nosenchuck assert is the claimed "inner wall" only extends from the plurality of inflow slots 14 about half-way up housing 10, which Petitioners and Dr. Nosenchuck assert is the claimed "handle,"

and does not extend to the first end of the handle proximal to the body as required by the Substitute Claims.

114. Thus, in my opinion, Jeong fails to disclose the added limitation to the Substitute Claims “the inner wall . . . extends from the primary fluid inlet to the first end of the handle.”

115. In addition, in my opinion, a POSITA would have not been motivated to modify Jeong to extend motor housing 18 the length of housing 10 because such extension would likely increase material cost when motor house 18 is already accomplishing its purpose of housing the motor without such an extension. EX-1004 ¶¶ [0033]-[0034].

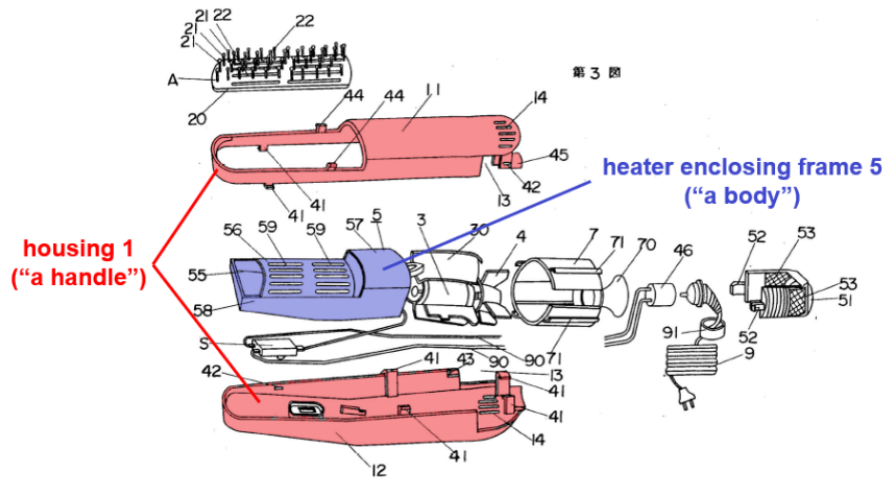
116. For the foregoing reasons, in my opinion, Jeong fails to anticipate or render the Substitute Claims obvious.

117. In addition, as discussed in Section V.B.1.b. above, it is also my opinion that Jeong fails to disclose the additional limitation of Challenged Claim 28, “the primary fluid flow in the body is substantially orthogonal to the primary fluid flow in the handle.” Because that limitation also exists in Substitute Claim 42, in my opinion, Jeong also fails to anticipate Substitute Claim 42 for the same reason.

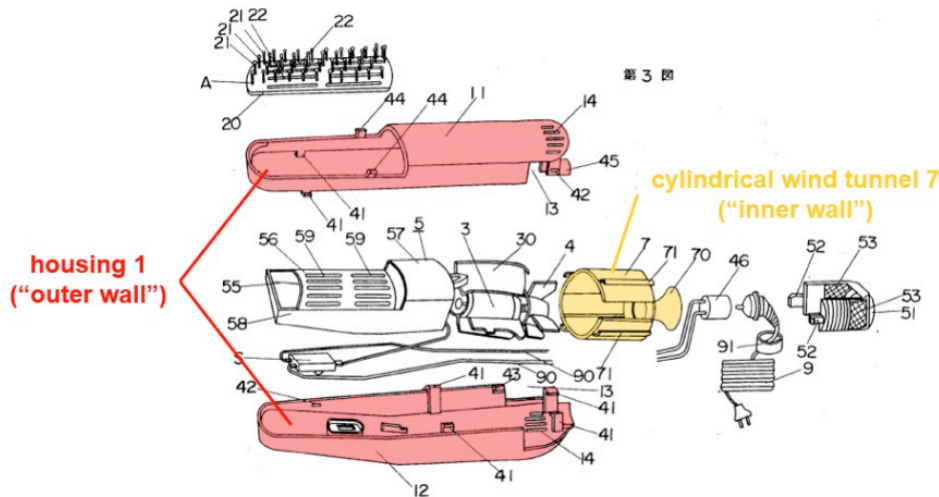
2. GROUND 2: Yoshida fails to anticipate or render obvious the Substitute Claims

118. In my opinion, Yoshida does not disclose “the inner wall . . . extends from the primary fluid inlet to the first end of the handle” of the Substitute Claims.

119. Petitioners and Dr. Nosenchuck assert that Yoshida’s housing 1 is the claimed “outer wall,” Yoshida’s heater enclosing frame 5 is the claimed “body,” and that Yoshida’s cylindrical wind tunnel 7 is the claimed “inner wall.” Pet. at 50-51, 56-57; EX-1003 ¶¶ 96-98, 105-107.

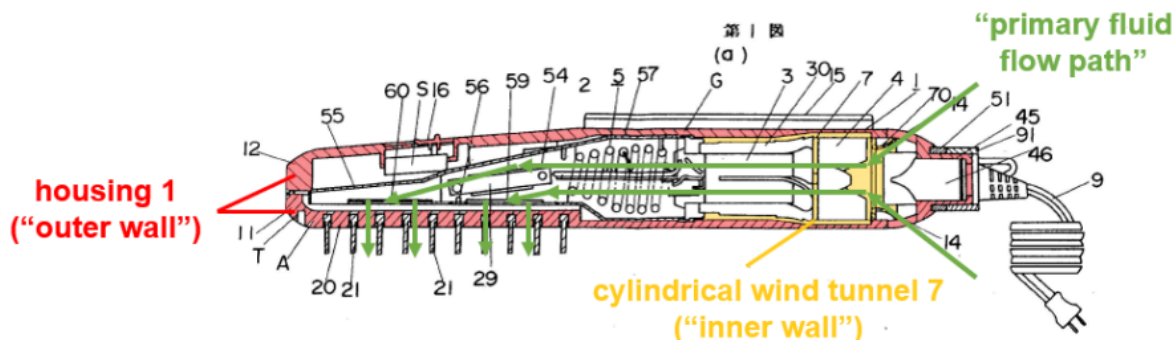


Pet. at 51; EX-1003 ¶ 97
120.



Pet. at 56; EX-1003 ¶ 105

121. Petitioners and Dr. Nosenchuck then assert that the claimed “primary fluid flow path” originates at Yoshida’s suction ports 13 and 14, which Petitioners and Dr. Nosenchuck assert are the claimed “primary fluid inlet,” travels through Yoshida’s cylindrical wind tunnel 7 (asserted claimed “inner wall”) through Yoshida’s heater enclosing frame 5 (asserted claimed “body”), and exits through discharge ports 59, which Petitioners and Dr. Nosenchuck assert are the claimed “primary fluid outlet from the body.” Pet. at 60-62; EX-1003 ¶¶ 110-111.



Pet. at 62; EX-1003 ¶ 111

122. However, Petitioners’ and Dr. Nosenchuck’s own illustrations show that Yoshida’s cylindrical wind tunnel 7 does not extend from the suction ports 13 and 14 to the end of housing 1 (the alleged claimed “handle”) that is proximal to heater enclosing frame 5 (the alleged claimed “body”). Instead, Yoshida’s cylindrical wind tunnel 7 that Petitioners and Dr. Nosenchuck assert is the claimed “inner wall” extends from the suction ports 13 and 14 only about half-way up housing 1, which Petitioners and Dr. Nosenchuck assert is the claimed “handle,” and does not extend to the first end of the handle proximal to the body as required by the Substitute Claims.

123. Thus, in my opinion, Yoshida fails to disclose the added limitation of the Substitute Claims “the inner wall . . . extends from the primary fluid inlet to the first end of the handle.”

124. In addition, in my opinion, a POSITA would have not been motivated to modify Yoshida to extend cylindrical wind tunnel 7 the length of housing 1 because cylindrical wind tunnel 7 is already accomplishing its purpose of housing fan 4 and increasing the air blowing efficiency of fan 4. EX-1005 at 48. In fact, a POSITA would have expected a decrease in air blowing efficiency to the heater inside the heater frame 5 if the cylindrical wind tunnel 7 was extended to have a length coextensive with housing 1 because the cylindrical wind tunnel 7 would no longer maintain the cylindrical shape around the blowing air created by fan 4.

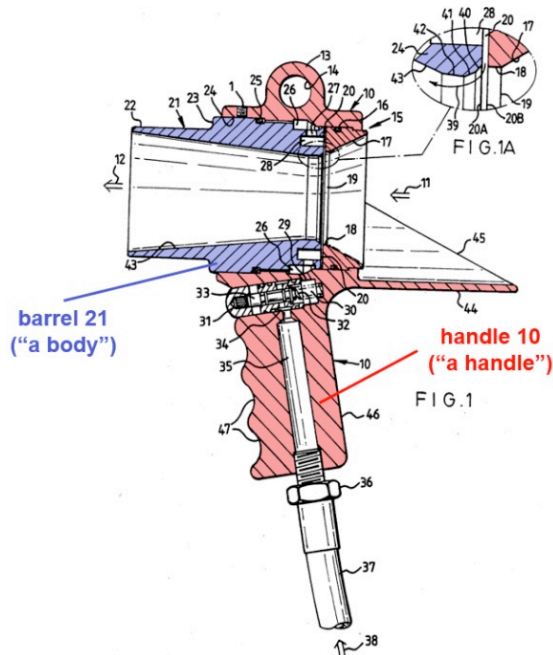
125. For the reasons above, in my opinion, Yoshida fails to anticipate or render the Substitute Claims obvious.

126. In addition, as discussed in Section V.B.2.b. above, it is also my opinion that Yoshida fails to disclose the additional limitations of Challenged Claims 27 and 28, “the primary fluid flows within the handle in a first direction and within the body in a second direction” and “the primary fluid flow in the body is substantially orthogonal to the primary fluid flow in the handle,” respectively. Because those limitations also exists in Substitute Claims 41 and 42, respectively, in my opinion, Yoshida also fails to anticipate Substitute Claims 41 and 42 for the same reasons.

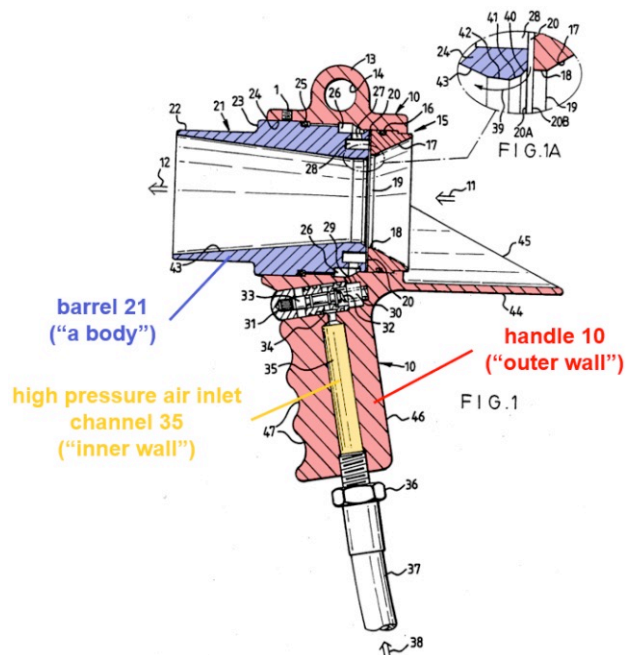
3. GROUND 3: Jeffs fails to anticipate or render obvious the Substitute Claims

127. In my opinion, Jeffs disclose “the inner wall . . . extends from the primary fluid inlet to the first end of the handle” of the Substitute Claims.

128. Petitioners and Dr. Nosenchuck assert that Jeffs’ handle 10 is the claimed “handle,” Jeffs’ barrel 21 is the claimed “body,” and Jeffs’ high pressure air inlet channel 35 is the claimed “inner wall.” Pet. at 74-78; EX-1003 ¶¶ 134-141.

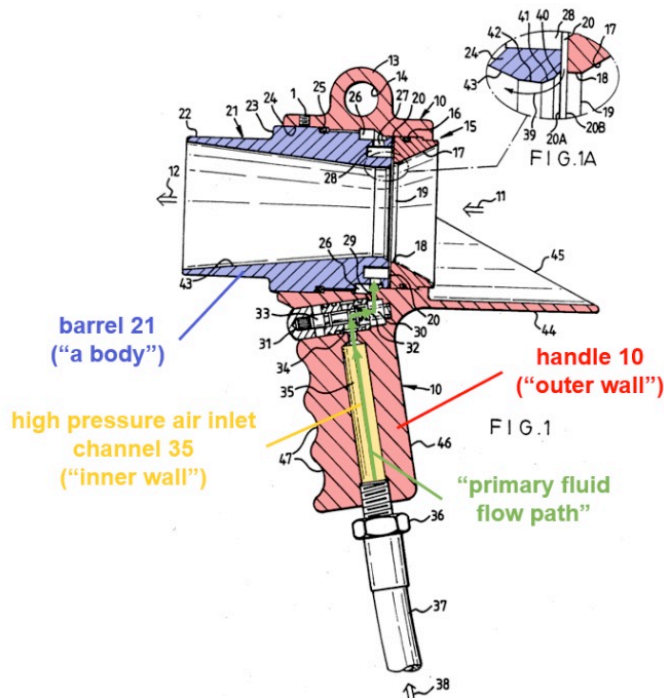


Pet. at 75; EX-1003 ¶ 135



Pet. at 77; EX-1003 ¶ 139

129. Petitioners and Dr. Nosenchuck further assert that Jeffs' union 36 is the claimed "primary fluid inlet." Pet. at 79-81; EX-1003 ¶¶ 144-145.



Pet. at 81; EX-1003 ¶ 145

130. However, Petitioners' and Dr. Nosenchuck's own illustrations show that Jeffs' high pressure air inlet channel 35 (the asserted claimed "inner wall") does not extend from union 36 (the asserted claimed "primary fluid inlet") to the end of handle 10 (the asserted claimed "handle") that is proximal to the barrel 21 (the asserted claimed "body"). Instead, Jeffs' high pressure air inlet channel 35 that Petitioners and Dr. Nosenchuck assert is the claimed "inner wall" only extends from union 36 about half-way up handle 10, which Petitioners and Dr. Nosenchuck assert is the claimed "handle," and does not extend to the first end of the handle proximal to the body as required by the Substitute Claims.

131. Thus, in my opinion, Jeffs does not disclose the additional limitation of the Substitute Claims "the inner wall . . . extends from the primary fluid inlet to the first end of the handle."

132. In addition, in my opinion, a POSITA would have not been motivated to modify Jeffs to extend high pressure air inlet channel 35 the length of handle 10 because high pressure air inlet channel 35 is already accomplishing its purpose of directing compressed air to the high pressure air inlet valve 30, 32, 33, which is inside handle 10. EX-1006 at Fig. 1, 4:25-37.

133. Thus, in my opinion, Jeffs fails to anticipate or render the Substitute Claims obvious.

134. In addition, as discussed above in Section V.3.a., Jeffs does not disclose all of the limitations of the Challenged Claims because it does not disclose a distinct “outer wall” and “inner wall” as required by the Challenged Claims. Because the Substitute Claims also include those limitations, in my opinion, Jeffs also fails to anticipate the Substitute Claims for the same reason.

135. Further, as discussed in Section V.B.3.b. above, it is also my opinion that Jeffs fails to disclose the additional limitation of Challenged Claim 28, “the primary fluid flow in the body is substantially orthogonal to the primary fluid flow in the handle.” Because that limitation also exists in Substitute Claim 42, in my opinion, Jeffs also fails to anticipate Substitute Claim 42 for the same reason.

4. GROUND 4 and 5: Jeffs in combination with either Jeong or Yoshida fails to render obvious the Substitute Claims

136. As explained above in Sections VI.C.1-3., in my opinion, none of Jeffs, Jeong, nor Yoshida discloses or teaches “the inner wall . . . extends from the primary fluid inlet to the first end of the handle” recited in the Substitute Claims.

137. Thus, in my opinion, no combination of Jeffs with Jeong or Yoshida renders obvious the Substitute Claims.

VII. RESERVATION OF RIGHTS

138. My opinions are based on the information that I have considered to date. I reserve the right, however, to supplement my opinions in the future to

respond to any arguments raised by Petitioners or Dr. Nosenchuck and to take into account new information that becomes available to me.

I, Breigh Nonte Roszelle, Ph.D., declare that all statements made herein of my knowledge are true, and all statements made on information and believe are believed to be true, and that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment under Section 1001 of Title 18 of the United States Code.

Executed on May 21, 2024.

By:



Breigh Nonte Roszelle, Ph.D.

APPENDIX A

BREIGH N. ROSZELLE KEMPA

Engineering and Computer Science Building, 285 | 2155 E. Wesley Ave | Denver, CO 80208
breigh.roszelle@du.edu | 303-871-2327

EDUCATION:

PhD – Bioengineering, The Pennsylvania State University, 2010

MS – Bioengineering, The Pennsylvania State University, 2008

BS – Mechanical Engineering (University Honors Scholar), Colorado State University, 2006

EMPLOYMENT:

- 1/2019 – present **Associate Dean of Undergraduate Students**
University of Denver, Ritchie School of Engineering and Computer Science
Overseeing undergraduate academic affairs for RSECS including accreditation, new undergraduate programs, undergraduate student recruitment and retention, high-school and community college outreach, and undergraduate student support.
- 9/2022 – present **Teaching Professor**
University of Denver, Mechanical and Materials Engineering Department
Teaching 2-3 mechanical engineering courses per quarter. Service duties include student advising, curriculum development, and assessment committee. Also involved in inclusive excellence, K-12 and community outreach, and related educational research.
- 7/2023 - present **Interim Chair**
University of Denver, Mechanical and Materials Engineering Department
Oversee the department including oversight of budget, curriculum, course scheduling, academic advising, graduate admissions, and faculty evaluations.
- 9/2018 – 8/2022 **Teaching Associate Professor**
University of Denver, Mechanical and Materials Engineering Department
- 1/2013 – 8/2018 **Teaching Assistant Professor**
University of Denver, Mechanical and Materials Engineering Department
- 6/2011 – 12/2012 **Senior Engineer** – Interactive Flow Studies Corporation
Helped design particle image velocimetry systems for hands-on fluid mechanics education. Wrote processing tools, designed visualization models and performed validation tests of an educational biofluid measurement system.
- 5/2011 – 12/2012 **Postdoctoral Researcher**
Image Processing Applications Lab, Arizona State University.
Performed experimental and computational fluid mechanic research of cerebral aneurysms and endovascular treatments. Taught at the undergrad level and helped develop engineering curriculum.
- 8/2006 – 12/2010 **Graduate Research Assistant**
Artificial Heart Lab, The Pennsylvania State University.
Performed NIH funded research on a pediatric ventricular assist device using in vitro experimental techniques. Served as a teaching assistant when necessary.

ADDITIONAL ROLES:

- 3/2022 – present **Curriculum Development Consultant** – Equity Labs
Developing updated curriculum for Equity Labs which is used by companies to train and educate employees on diversity, equity, and inclusion.
- 5/2019 – present **Workshop Facilitator and Coach** – KEEN
Developing and running faculty development workshops based on “Making with a Purpose” and serving as a workshop coach for national conference workshops.
- 1/2017 – 12/2019 **Office of Diversity and Inclusion Faculty Fellow** – University of Denver
Worked with five other faculty fellows at DU to advance the work of inclusive excellence across the university.
- 1/2016 – 8/2018 **Director, DU Engineering Summer Camp** – University of Denver
Ran weeklong engineering day camps for middle and high school students. Oversaw undergraduate and graduate student workers.
- 8/2013– 12/2013 **Workshop Leader** – College Track
Developed and led a weekly mechanical engineering workshop for high school students who are not on the traditional “college track”

TEACHING EXPERIENCE:

University of Denver (Jan 2013 to Present)

- Instructor – Physiological Biofluids
- Instructor – Introduction to Mechanical Systems w/ CAD
- Instructor – Introduction to CAD
- Instructor – Introduction to Engineering Design
- Instructor – Thermodynamics I
- Instructor – Thermodynamics II
- Instructor – Fluid Mechanics I
- Instructor – Fluid Mechanics II / Heat Transfer I
- Instructor – Heat Transfer II w/ Lab

Arizona State University (2011)

- Co-Instructor –Engineering Design Method
- Co-Instructor – 3D Spatial Modeling

The Pennsylvania State University (2007-2010)

- Teaching Assistant – Biofluid Mechanics
- Teaching Assistant – Artificial Organs
- Teaching Assistant – Biomedical Instrumentation and Measurements Lab

OTHER RESEARCH EXPERIENCE:

Summer Research Opportunities Program (2006)

- Artificial Heart Lab, The Pennsylvania State University

Colorado Institute of Technology Summer Research Program (2005)

- Orthopaedic Bioengineering Research Lab, Colorado State University

SERVICE:

University of Denver Service:

Mechanical and Materials Engineering Assessment Committee Member: Sept 2013 – Present
- Served as Chair from 2016-2019
Society of Women Engineers – DU Chapter, Faculty Advisor – January 2016 - Present
Ritchie School Inclusive Excellence Committee: Mar 2017 – Present
Grand Challenge Scholars Program Committee: Jan 2017 – Present
- Serve as Director – Jan 2019 – Present
Tau Beta Pi – DU Chapter, Faculty Advisor – 2018 – Present
Undergraduate Council – 2019 – Present
Undergraduate Advising Faculty Engagement Group: Jan 2020 - Present
Faculty DEI Working Committee – Feb 2021 – Present
Workload Equity Committee – Oct 2022 - Present
Director of Campus Safety Search Committee – 2021
University COVID-19 Fall Logistics Taskforce – 2020
RSECS COVID-19 Taskforce – 2020/2021
RSECS Dean Search Committee - 2020
Mechanical Engineering Faculty Search Committee – 2015, 2019, 2020, 2021, 2022
Electrical and Computer Engineering Faculty Search Committee – 2020, 2021, 2022
Faculty Career Champions Working Group – October 2018 – June 2020
Ritchie School Strategic Planning Committee: Fall 2016
- Co-Lead of the Undergraduate Excellence Committee
Conduct Review Board Member – University Wide: Sept 2013 – Sept 2016

Outside Community Service:

Epilepsy Foundation of Colorado, End Epilepsy 5K/Walk Committee – Feb 2018 - Present
Kappa Alpha Theta Recruitment Advisor – Beta Iota Chapter: Mar 2013 – Present
Kappa Alpha Theta Advisory Board Chairman – Beta Iota Chapter: Dec 2014 – June 2019
Kappa Alpha Theta Recruitment Advisor – Delta Epsilon Chapter: Jan 2011 – Mar 2013
Volunteer for the MTM Engineering Camp for Girls at Penn State – 2007, 2008, 2009
Kappa Alpha Theta Public Relations Adviser – Beta Phi Chapter: Aug 2006 – Dec 2010

OUTREACH

University of Denver SWE GIRLS with Gadgets Program – 2019 to present
University of Denver VIP Camp Course Instructor – 2019, 2023

HONORS AND AWARDS:

- ASEE Mechanical Division Best Paper - 2023
- KEEN Campus Rising Star Nominee - 2023
- Faculty Career Champion Nominee – 2018, 2019, 2022, 2023
- Kappa Alpha Theta 35 under 35 Award - 2019
- ASEE Mechanical Division Best Poster - 2018
- Teacher of the Year, The Ritchie School, University of Denver, 2015-2016
- Member of Tau Beta Pi Engineering Honor Society
- Member of Pi Tau Sigma Mechanical Engineering Honor Society
- Passed State of Colorado EIT (FE) Exam - 2005
- ARL Exploratory and Foundational Graduate Student Research Fellow – 2006 to 2010

FUNDING

Moreland Information Literacy Grant (2018-2019) - \$2500

Co-PIs: Dr. Breigh Roszelle and Dr. Goncalo Martins

Faculty stipend to increase digital literacy of student through educational programming focused on using the library to appropriately search for and obtain information to be used during 1st year engineering courses.

CCESL - Public Good Grant (2019-2021) - \$15,000

PI: Dr. Breigh Roszelle

One of the largest deterrents for low-income, minority students not deciding to study in the fields of science, technology, engineering, and math (STEM) is a lack of basic knowledge about the fields and the associated career options. The goal of this project is to introduce middle school students to the different STEM fields through engaging, hands-on workshops run by current DU students. Pre and Post-program surveys will also allow for assessment of if/how the students' attitudes about STEM changed after participating in the workshops. Other assessment will also include interviews with math/science faculty at the school and annual surveys to track student interest in STEM and their possible enrollment in continued STEM education. The program will not only impact young students in the local community, but also allow for undergraduate students to develop skills in teaching, communication, and assessment.

KEEN Making Subnet Grant (2020) – \$49,500

Co-PIs: Dr. Breigh Roszelle, Dr. Michael Caston, Dr. Matthew Gordon

Adding 'making' into a classroom environment has proven to improve both initial understanding and knowledge retention, increase student engagement, and give students ownership over their learning. The purpose of this grant is to support faculty in developing "tools" based on making that can be used by faculty to implement making into their classrooms. This is part of a multi-institutional grant which includes three additional universities with cross-collaboration.

KEEN Annual Support Package Grant (2022, 2023) - \$50,000

PI: Dr. Breigh Roszelle

Both engineering departments at the University of Denver are planning to go through a curriculum audit and redesign starting in Fall 2022. Part of this revamp will include a close inspection and development of the "core engineering curriculum" which is taken by all students. This includes the first five quarters of the curriculum, a two-quarter junior design course known as Integration, and the full year senior design course. One of the goals of the curriculum audit is look at different areas of importance that should be thread through this common curriculum. Some proposed areas include ethics, DEI, communication, and Entrepreneurial Mindset. As part of the EM focus, this group of faculty will look at what is being done in EM currently and propose areas of increased engagement with EM.

SKILLS:

Software – SOLIDWORKS, GeoMagic, Fluent, MATLAB, Simulink, Tecplot, Insight 3G, DaVis, GPIV, LabView, Microsoft Office

Instrumentation – Particle Image Velocimetry, Computational Fluid Dynamics, Viscoelastic Measurement Tools, Blood Analog Fluids, Mock Circulatory Loops.
General Thermo-Fluid Laboratory Experiments

REVIEW EXPERIENCE:

- Invited Reviewer CoNECD Conference 2022, 2023, 2024
- Invited Reviewer FYEE 2021 Conference
- Invited Reviewer ASME Journal of Medical Devices
- Invited Reviewer Journal of Neurointerventional Surgery
- Invited Reviewer Journal of Biomechanics
- Invited Reviewer Transactions on Biomedical Engineering
- Invited Reviewer Cardiovascular Engineering and Technology
- Invited Reviewer International Journal for Numerical Methods in Biomedical Engineering
- Invited Reviewer Journal of Biomechanical Engineering
- Invited Abstract Reviewer ASME Summer Bioengineering Conference 2012, 2013, 2015
- Invited Abstract Reviewer BMES Conference 2013

PANEL EXPERIENCE:

- 2022 GirlsTech Women in STEM Panel
- 2017 IECA Conference Panel: STEM in 2020
- 2016 DU Women's Conference Panel: Women in STEM: The Good, the Bad, and the Ugly
- Podium Session Moderator 2010 ASAIO 56th Annual Conference
- Podium Session Moderator 2008 ASAIO 54th Annual Conference

PROFESSIONAL DEVELOPMENT:

- iAspire Leadership Academy, 2021 – 2023
- DU Collaborative Online International Learning – FLC 2021
 - Served as Faculty Lead
- FIIT Training – July 2020 – present
- Academic Leadership Academy, Penn State, 2019
- KEEN ICE Workshop, 2018
- NCWIT Learning Circles, 2018
- Service-Learning Scholars Workshop, 2017
- Olin Collaboratory Summer Institute, 2016
- Design your Process of Becoming a World-Class Engineer Workshop, 2015
- Teacher-Scholar Forum at MSU Denver, 2013

JOURNAL PUBLICATIONS

1. Babiker, M. H., Chun, Y., **Roszelle, B.**, Hafner, W., Farsani, H. Y., Gonzalez, L. F., Albuquerque, F., Kealey, C., Levi, D. S., Carman, G. P., and Frakes, D. H. "In Vitro Investigation of a New Thin Film Nitinol-Based Neurovascular Flow Diverter." *ASME. J. Med. Devices*. December 2016; 10(4): 044506.
2. **Roszelle B.N.**, Nair P., Gonzalez L.F., Babiker M.H., Ryan J., and Frakes D.H. "Comparison among different high porosity stent configurations: hemodynamic effects of treatment in a large cerebral aneurysm." *Journal of Biomechanical Engineering*, 2014, 136 (2):021013.
3. **Roszelle B.N.**, Gonzalez L.F., Babiker M.H., Ryan J., Albuquerque F.C., and Frakes D.H. "Flow diverter effect on cerebral aneurysm hemodynamics: an *in vitro* comparison of telescoping stents and the pipeline." *Neuroradiology*, 2013, 55.6 (2013): 751-758.

4. Babiker M.H., Gonzalez L.F., Albuquerque F., Collins D., Elvikis A., Zwart C., **Roszelle B.**, Frakes D.H. "An in-vitro study of pulsatile fluid dynamics in intracranial aneurysm models treated with embolic coils and flow diverters." *Biomedical Engineering, IEEE Transactions on*, 2013, 60(4), 1150-1159.
5. Stern F., Yoon H., Yarbrough D., Okcay M., Oztekin B.U., **Roszelle B.** "Hands-on integrated CFD educational interface for introductory fluid mechanics." *International Journal of Aerodynamics*, 2012, 2(2/3/4):339-371.
6. **Roszelle B.N.**, Babiker M.H., Hafner W., Gonzalez L.F., Albuquerque F.C., Frakes D.H. "In vitro and in silico study of intracranial stent treatments for cerebral aneurysms: effects on perforating vessel flows." *Journal of Neurointerventional Surgery*, 2012 Jul;10 [Epub ahead of print].
7. **Roszelle B.N.**, Fickes M.G., Deutsch S., Weiss W.J., Manning K.B. "Flow visualization of the Penn State pulsatile pediatric ventricular assist device cannulae and change in outlet valve placement." *Cardiovascular Engineering and Technology*, 2011, 2(4):244-252.
8. **Roszelle B.N.**, Deutsch S., Weiss W.J., Manning K.B., "In vitro flow visualization of a pneumatic pediatric ventricular assist device during weaning using stroke volume reduction." *Annals of Biomedical Engineering*, 2011 Jul;39(7):2046-2058.
9. **Roszelle B.N.**, Deutsch S., Manning K.B., "A parametric study of valve orientation on the flow patterns of the Penn State pulsatile pediatric ventricular assist device." *ASAIO Journal*, 2010 Jul-Aug;56(4):356-363.
10. Cooper B.T., **Roszelle B.N.**, Long T.C., Deutsch S., Manning K.B., "The influence of operational protocol on the fluid dynamics in the 12 cc Penn State pulsatile pediatric ventricular assist device: the effect of end-diastolic delay." *Artificial Organs*, 2010 Apr;34(4):E122-133.
11. **Roszelle B.N.**, Deutsch S., Manning K.B., "A study of three dimensional flow of the 12cc pulsatile pediatric ventricular assist device." *Annals of Biomedical Engineering*, 2010 Feb;38(2):439-455.
12. Cooper B.T., **Roszelle B.N.**, Long T.C., Deutsch S., Manning K.B., "The 12 cc Penn State pulsatile pediatric ventricular assist device: fluid dynamics associated with valve selection." *Journal of Biomechanical Engineering*, 2008 Aug;130(4):041019.
13. **Roszelle B.N.**, Cooper B.T., Long T.C., Deutsch S., Manning K.B., "Penn State 12 cc pulsatile pediatric ventricular assist device: flow field observations at a reduced beat rate with application to weaning". *ASAIO Journal*, 2008 May-Jun;54(3):325-31.

CONFERENCE PUBLICATIONS:

1. **Roszelle B.N. Implementing Mastery Based CAD Activities into an Introduction to Engineering Design Course to Develop Entrepreneurial Mindset.** 131st Annual ASEE Conference, Portland OR, June 23rd-26th 2024 (IN PROGRESS)
2. **Roszelle B.N. and Roney, J. Hair Dryer Design as a Synergistic Tool for Combining Thermodynamics and the Importance of Diversity in Design Team Composition.** 130th Annual ASEE Conference, Baltimore, MD, June 25-28th, 2023.
3. Pedersen B.A., Hensel R.A.M., Ali Raisa S., Atadero R.A., Armati Casper A.M., DeLyser R.R., Griffin C.D., Leutenegger S.T., Morris M.L., Paguyo C.H., Paul J., Park S., Rambo-Hernandez K.E., **Roszelle B.N. Leveraging Changes in Engineering and Computer Science Curricula to Engender Inclusive Professional Identities in Students.** 128th Annual ASEE Conference, Virtual Conference, July 26-29th, 2021.
4. **Roszelle B.N., Martins G., DeLyser, R., and Paguyo, C. Using Classroom Activities to Integrate Concepts of Diverse Thinking and Teambuilding into Engineering Design (Experience)** 127th Annual ASEE Conference, Virtual Conference, Jun 22-26th, 2020.

5. **Roszelle B.N.** *Full Paper: The Development of a First Year Design Project: Focusing on Creativity, Independence, and Design Understanding* 2019 First Year Engineering Experience Conference, University Park, PA, Jul 28th-30th, 2019.
6. **Roszelle B.N.**, Langenberg, K.K., Roney J.A. and Gordon M. *What can DISC and motivation profiles disclose about student retention in engineering?* 125th Annual ASEE Conference, Salt Lake City, UT, Jun 24-27th, 2018.
7. Roney J.A., **Roszelle B.N.**, Gordon M., and Davidson B. *Impact of new FE test availability.* 124th Annual ASEE Conference, Columbus, OH, Jun 25-28th, 2017.
8. **Roszelle B.N.**, Gordon M., Davidson B., and Laz P. *Novel sophomore assessment modeled after the FE exam.* 123rd Annual ASEE Conference, Seattle, WA, Jun 26-29th, 2016.
9. **Roszelle, B.N.** *Implementation of 3D printing design project in first year mechanical engineering course to aid in understanding of engineering design process.* 7th Annual First Year Engineering Experience Conference, Roanoke, VA, Aug 2-4th, 2015.
10. **Roszelle, B.N.**, M. Okcay, B.U. Oztekin, D.H. Frakes. *Hands on particle image velocimetry experience for bioengineering students using the interactive FLOWCOACH™ system to understand aneurysm hemodynamics.* 65th Annual Meeting of the APS Division of Fluid Dynamics, San Diego, CA, Nov 18-20, 2012.
11. **Roszelle, B.N.**, M.H. Babiker, J. Ryan, L.F. Gonzalez, F.C. Albuquerque, and D.H. Frakes. *The pipeline versus telescoping stents: in vitro flows in a treated cerebral aneurysm model.* ASME Summer Bioengineering Conference, Farajado, Puerto Rico, Jun 20-23, 2012.
12. M.H. Babiker, **B.N. Roszelle**, D. Collins, A. Elvikis, L.F. Gonzalez, F.C. Albuquerque, and D.H. Frakes *Comparison of the effects of embolic coils and a low porosity stent on cerebral aneurysm fluid dynamics* ASME Summer Bioengineering Conference, Farajado, Puerto Rico, Jun 20-23, 2012.
13. Stern F., H. Yoon, D. Yarbrough, M. Okcay, B.U. Oztekin, **B. Roszelle.** *Hands-on integrated CFD educational interface and EFD/ePIV/Flowcoach laboratories for introductory fluid mechanics.* 50th AIAA Aerospace Sciences Meeting, Nashville, TN, Jan 9-12, 2012.
14. **Roszelle, B.N.**, B.T. Cooper, T.C. Long, S. Deutsch, and K.B. Manning. *The Penn State pediatric ventricular assist device: a comprehensive fluid mechanics study.* 6th World Congress on Biomechanics, Singapore, Aug 1-6, 2010.
15. Frank D.L., J.C. Nanna, B.T. Cooper, **B.N. Roszelle**, S. Deutsch, and K.B. Manning. *Fluid mechanics of prosthetic heart valves.* 6th World Congress on Biomechanics, Singapore, Singapore, Aug 1-6, 2010.
16. **Roszelle, B.N.**, S. Deutsch, and K.B. Manning. *The effect of stroke volume reduction on the fluid mechanics of the Penn State pediatric ventricular assist device.* Bridges STEM Symposium, University Park, PA, Jun 19, 2010.
17. Perone, M.V., N. Yang, **B.N. Roszelle**, S. Deutsch, and K.B. Manning. *In vitro viscoelastic flow measurements of a pediatric end-to-side anastomosis to the 12cc Penn State ventricular assist device.* ASME Summer Bioengineering Conference, Naples, FL, Jun 16-19, 2010.
18. Nanna, J.C., N. Yang, **B.N. Roszelle**, S. Deutsch, and K.B. Manning. *An improved experimental wall shear estimation within a 50cc Penn State blood pump.* ASAIO 56th Annual Conference, Baltimore, MD, May 27-29, 2010.

19. Fickes M.C., **B.N. Roszelle**, S. Deutsch, and K.B. Manning. *Aortic outlet extension in the 12 cc Penn State pediatric ventricular assist device*. ASAIO 56th Annual Conference, Baltimore, MD, May 27-29, 2010.
20. **Roszelle, B.N.**, S. Deutsch, and K.B. Manning. *In vitro observations inside the Penn State PVAD using blood analogs of varying hematocrits*. ASAIO 56th Annual Conference, Baltimore, MD, May 27-29, 2010.
21. **Roszelle, B.N.**, S. Deutsch, and K.B. Manning. *Using 2D particle image velocimetry for 3D flows: The pulsatile Penn State pediatric ventricular assist device*. The 2009 BMES Annual Fall Meeting, Pittsburgh, PA, Oct 7-10, 2009.
22. Cooper, B.T., **B.N. Roszelle**, T.C. Long, S. Deutsch, and K.B. Manning. *The fluid dynamic effects within the 12cc Penn State pediatric ventricular assist device when altering the end diastolic delay*. ASME Summer Bioengineering Conference, Lake Tahoe, CA, Jun 17-21, 2009.
23. Manning, K.B., V. Reddy, **B.N. Roszelle**, B.T. Cooper, R. Medvitz, S. Deutsch, and E. Paterson. *Integrating in vitro flow experiments and computational fluid dynamics to prevent thrombosis in blood pumps*. NSF/National Heart Lung and Blood Institute Workshop on Computer Methods for Cardiovascular Devices, Rockville, MD, Jun 1-2, 2009.
24. Cooper, B.T., **B.N. Roszelle**, T.C. Long, S. Deutsch, and K.B. Manning. *The influence of end-diastolic timing on the flow within a pulsatile pediatric ventricular assist device*. European Society for Artificial Organs, Geneva, Switzerland, Sept 3-6, 2008.
25. Cooper, B.T., **B.N. Roszelle**, V. Reddy, S. Deutsch, and K.B. Manning. *Development of pulsatile ventricular assist devices: applying in vitro fluid mechanics from adult to pediatric applications*. The XVIth International Conference on Mechanics in Medicine and Biology, Pittsburgh, PA, Jul 23-25, 2008.
26. Valenti, I.E., **B.N. Roszelle**, M.V. Perone, S. Deutsch, and K.B. Manning. *Impact of outlet valve orientation on fluid dynamics of the 12cc Penn State pediatric ventricular assist device*. ASME Summer Bioengineering Conference, Marco Island, FL, Jun 25-29, 2008.
27. **Roszelle, B.N.**, S. Deutsch, and K.B. Manning. *A comprehensive flow study of the 12cc Penn State pulsatile pediatric ventricular assist device*. ASME Summer Bioengineering Conference, Marco Island, FL, Jun 25-29, 2008.
28. **Roszelle, B.N.**, S. Deutsch, and K.B. Manning. *Three dimensional flow patterns within the Penn State pediatric ventricular assist device*. ASAIO 54th Annual Conference, San Francisco, CA, Jun 19-21, 2008.
29. Valenti, I.E., **B.N. Roszelle**, S. Deutsch, and K.B. Manning. *The 12cc Penn State pediatric ventricular assist device: Impact of valve orientation on fluid dynamics*. ASAIO 54th Annual Conference, San Francisco, CA, Jun 19-21, 2008.
30. Cooper, B.T., **B.N. Roszelle**, S. Deutsch, and K.B. Manning. *A particle image velocimetry study of valve type and valve orientation on the fluid dynamics of the 12 cc Penn State pediatric ventricular assist device*. The World Congress on Bioengineering 2007, Bangkok, Thailand, Jul 9-11, 2007.
31. Cooper, B.T., **B.N. Roszelle**, T.C. Long, S. Deutsch, and K.B. Manning. *A fluid dynamics study within the Penn State 12cc pulsatile pediatric ventricular assist device: a comparison of mechanical heart valve types*. ASME Summer Bioengineering Conference, Keystone, CO, Jun 20-24, 2007.

32. Cooper, B.T., **B.N. Roszelle**, T.C. Long, S. Deutsch, and K.B. Manning. *Influence of filling time on the Penn State pediatric ventricular assist device flow field*. ASAIO 53rd Annual Conference, Chicago, IL, Jun 6-10, 2007.
33. **Roszelle, B.N.**, B.T. Cooper, T.C. Long, S. Deutsch, and K.B. Manning. *Penn State Pediatric ventricular assist device: flow field observations at 50 bpm with application to weaning*. ASAIO 53rd Annual Conference, Chicago, IL, Jun 6-10, 2007.
34. **Roszelle, B.N.**, B.T. Cooper, T.C. Long, S. Deutsch, and K.B. Manning. *A study on weaning using particle image velocimetry in the 12cc Penn State pediatric ventricular assist device*. The Third International Conference on Pediatric Mechanical Circulatory Support Systems & Pediatric Cardiopulmonary Perfusion Conference, Hershey, PA, May 17-19, 2007.

APPENDIX B

APPENDIX B – MATERIALS CONSIDERED

Paper	Description
2	Petition for <i>Inter Partes</i> Review of U.S. Patent No. 9,414,662
6	Patent Owner's Preliminary Response
7	Decision Granting Institution of <i>Inter Partes</i> Review

Exhibit	Description
1001	U.S. Patent No. 9,414,662
1002	File History for U.S. Patent No. 9,414,662
1003	Declaration of Dr. Daniel M. Nosenchuck
1004	U.S. Patent Application Pub. No. US 2013/0111777
1005	Japanese Patent Application Pub. No. JP S 60-249907 and Cert. Translation
1006	U.S. Patent No. 5,407,135
1007	U.S. Patent No. 1,564,896
1008	U.S. Patent No. 5,546,674
1009	PCT Pub. No. WO 83/02753
1010	U.S. Patent Application Pub. No. 2010/0065545
1011	Great Britain Patent No. 1,417,052