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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

FLUIDMASTER, INC.,
Petitioner,

v.

DANCO, INC.
Patent Owner.

Case No. IPR2024-00633
U.S. Patent No. 9,139,993 B1

Declaration of Michael Jobin

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Patent Trial and Appeal Board
US Patent and Trademark Office
PO Box 1450
Alexandria, Virginia 22313-1450

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Table of Exhibits

Exhibit	Description
EX2001	Declaration of Eric G. Maurer in Support of Motion for Admission <i>Pro Hac Vice</i>
EX2002	Definition of Pressure Head
EX2003	Definition of Valve
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EX2005	Annotations to U.S. Patent Pub. No. 2024/0026990 A1 (“Cao”) Fig. 6B
EX2006	Annotations to U.S. Patent No. 8,028,719 (“Johnson”) Fig. 1
EX2007	Annotations to Petitioner’s EX1016 (“Guoxin”)
EX2008	Deposition Transcript of Dr. Kimberly Cameron, Dated Nov. 19-20, 2024
EX2009	Flowmatic Valves (https://www.flomatic.com/assets/pdf_files/literature/Flo-Trol-Literature.pdf) (last accessed Dec. 4, 2024)
EX2010	“What is a Flow Restrictor, and How Does It Work?” (https://www.theleeco.com/insights/what-is-a-flow-restrictor-and-how-does-it-work/) (last accessed Dec. 4, 2024).
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EX2012	U.S. Patent No. 8,028,719 (“Johnson”)
EX2013	Declaration of Michael Jobin
EX2014	Curriculum Vitae of Michael Jobin

Glossary

Abbreviation	Term
'606 Application	U.S. Patent App. No. 10/798,606
'698 Patent	U.S. Patent No. 10,934,698
'904 Application	U.S. Patent App. No. 12/786,904
'993 Patent	U.S. Patent No. 9,139,993
Board	USPTO Patent Trial and Appeal Board
Challenged Claims	Claims 1-20 of the '993 Patent
Danco or Patent Owner	Danco, Inc.
Fluidmaster or Petitioner	Fluidmaster, Inc.
Institution Decision	IPR2024-00633 Paper 19
Integrally Molded Limitations	“wherein the extended portion is integrally molded with the body” (Claims 1 and 14) / “wherein the extended portion is integrally molded with the toilet fill valve” (Claim 8)
Parties	Danco and Fluidmaster, Collectively
Petition	IPR2024-00633 Paper 1
POPR	IPR 2024-00633 Paper 12 (Patent Owner Preliminary Response)
POSITA	Person of Ordinary Skill in the Art
USPTO	United States Patent and Trademark Office

I, Mr. Michael Jobin, do hereby declare under penalty of perjury that the following statements are made based on my personal knowledge and are true and correct:

I. EDUCATION AND WORK EXPERIENCE

1. I have personal knowledge of the facts contained in this Declaration, am of legal age, and am otherwise competent to testify.

2. I am currently the Director of Product Development at 908 Devices in Boston, Massachusetts. I have more than 30 years of experience in product and technology development as a mechanical engineer, consultant and entrepreneur. I have summarized in this section my professional background, educational background, and patents. My full curriculum vitae is attached as EX2014.

3. I received two degrees from the University of Michigan in 1991, a Bachelor of Science, Engineering with a focus on mechanical engineering, and a Bachelor of Fine Arts, Industrial Design with a focus on product development, both cum laude. I was the recipient of the Kiefer Award for excellence in Industrial Design.

A. Career History

4. I have worked in various product development companies throughout my 33 year career and have developed many products that demonstrate knowledge

and experience with the subject matter relevant in this case. I provide below a summary of my work experience and relevant project examples.

5. After my undergraduate degrees, I was hired as a program manager by Design 4 Plastics, Inc. I leveraged my industrial design and engineering education to develop a wide range of products. My projects included a heavy emphasis on plastic part design (including injection molding, rotational molding, vacuum and pressure forming) and sheet metal fabrication (stamping, forming). While there, I designed fluid pumps for laboratory and industrial fluid dispensing applications and a custom impeller pump for insufflation of the abdomen during laparoscopic surgery. I also developed garden hose accessories such as hose reels and sprayers that used quick disconnect fittings and valves.

6. Next, in 1996, I joined Proteus, Inc. as Senior Mechanical Engineer. There, I focused on product design and engineering of products for consumer, medical, and laboratory applications. For example, I developed a disposable cartridge for laboratory analysis of blood samples, which included a quick disconnect fluid manifold for ease of use. For PUR, I developed a faucet mounted water filter with replaceable cartridge and a rotary actuated valve.

7. I founded Boston Innovation in 1998, focusing on developing precision fluidic dispensing instruments for pharmaceutical research applications that leveraged a novel pressure activated valve technology that I invented. In these

instruments, sample fluid was stored in small, sealed reservoirs, and precision low volumes were dispensed by the translation of a needle and application of a rinse fluid and/or air pressure. *See, e.g.*, U.S. Pat. Nos. 6,085,773 and 6,706,538.

8. During this time, I developed and licensed novel valve technology to Delta Faucet. This project was focused on a high flow tub fill valve for residential plumbing use. I also developed a custom pressure activated backflow diverter valve for use in swimming pool plumbing.

9. In 2000, I joined Arthur D. Little, where I led mechanical engineering of a next-generation network storage product, integrating contributions of mechanical, software, hardware and industrial designers.

10. I founded MicroBioSciences in 2001. There, I invented and developed novel disposable fluid handling cartridges for high throughput screening in pharmaceutical research. Precision controlled pressure and vacuum was used to deliver and retrieve samples.

11. Later in 2001, I joined Altitude, Inc., a product development consulting firm, first as Engineering Manager, and then I was promoted to Director of Engineering in 2005. I performed design and engineering activities and led a team of designers and engineers to develop a wide range of consumer products, medical devices and instrumentation, many of which included fluid handling, valves and connectors.

12. I developed coffee makers for Sunbeam and Mr. Coffee.
13. I developed a wide range of home humidifiers for Honeywell, Kaz, and Vicks.
14. I developed a bottled water dispenser for PUR with chilled and heated water and dispensing valves.
15. I developed the first integrated ice shaving and blending frozen drink appliances for home use for Margaritaville. These products included a reservoir for ice, a robust motor and rotary ice shaving blade, a blender, and electronic controls.
16. I developed a wine preservation and dispensing system for home use. The product stored multiple wine bottles at the user-selected optimum temperature using thermoelectric chiller technology, and used valves and air pressure for dispensing, and vacuum for preservation.
17. I developed a handheld eye medication dispenser for Optimyst. This product included a custom disposable fluid reservoir and ultrasonic dispensing technology. *See* U.S. Pat. Nos. D597,206; 8,545,463; 8,012,136.
18. I developed commercial carpet cleaning extraction technology for Tennant Company. This included fluid reservoirs, valves and plumbing connections.
19. I developed novel toilet tank flush mechanisms for American Standard. This project involved the development of a range of concepts, mechanical engineering and prototyping of components and assemblies for evaluation.

20. I developed pressure washers for Briggs and Stratton. These included gas-powered high pressure pumps with quick disconnect hose connectors and a hose end sprayer with pressure boost and adjustable nozzles.

21. I developed a range of safety eyewear for UVEX. These included a range of adjustable features leveraging advanced injection molding techniques such as in-mold assembly. *See, e.g.*, U.S. Pat. Nos. 7,758,789; 7,246,901; 7,237,892; 7,210,777; 7,175,270.

22. In 2008 I founded Aston Technology Advisors and continued with product development and consulting activities. As part of my work with Aston, I developed an instrument that uses sound to measure wind. As part of this instrument, I developed a novel hydronic heating system for melting snow. *See* U.S. Pat. Nos. 8,958,269 and 9,279,821.

23. In 2012, I cofounded 908 Devices Inc. to develop portable chemical detection instrumentation based on mass spectroscopy. While at 908 Devices Inc., I have developed various instruments with applications in pharmaceutical research, forensics and hazardous material identification at the point of need. These instruments include complex fluid handling, fluidic and pneumatic connectors, custom vacuum pumps, pressure regulators and pressure sensors. *See* U.S. Pat. Nos. D703,074; D703,075; 9,093,253; 9,502,226; 9,698,000; 9,978,574; 10,438,787.

24. Throughout my professional career, I have designed products that have won various awards, including: Industrial Designers Society of America (IDSA) IDEA Awards, R&D 100, The Scientist Top 10 Innovations, and The Instrument Business Outlook Industrial Design Gold Award.

B. Patents

25. I am a named inventor on nineteen issued utility patents and six issued design patents, listed below. These patents range in technologies from consumer products to medical devices to instrumentation, and address technical issues like precision fluid handling, injection molding, and compact mass spectroscopy.

- U.S. D932,046 Fluidic cartridge assembly
- U.S. 10,438,787 Integrated mass spectrometry systems
- U.S. 9,978,574 Sample collection in compact mass spectrometry systems
- U.S. 9,698,000 Integrated mass spectrometry systems
- U.S. 9,502,226 Sample collection in compact mass spectrometry systems
- U.S. 9,279,821 Deicing system in sodar systems
- U.S. 9,093,253 High pressure mass spectrometry systems and methods
- U.S. 8,958,269 Transducer for phased array acoustic systems
- U.S. D703,074 Handheld sensor
- U.S. D703,075 Sensor device

- U.S. 8,545,463 Ophthalmic fluid reservoir assembly for use with an ophthalmic fluid delivery device
- U.S. 8,525,111 High pressure mass spectrometry systems and methods
- U.S. 8,012,136 Ophthalmic fluid delivery device and method of operation
- U.S. 7,758,789 Temple bar assembly for eyeglasses
- U.S. D597,206 Ophthalmic misting device
- U.S. 7,246,901 Adjustable length upper frame member for eyeglasses
- U.S. 7,237,892 Temple bar with ball and socket hinge and method of making same
- U.S. 7,210,777 Floating lens brow bar attachment for eyeglasses
- U.S. 7,175,270 Flexible frame assembly for eyeglasses
- U.S. D534,446 Handheld instrument
- U.S. 7,080,904 One-piece spectacle with temple pre-load
- U.S. 6,706,538 Microvolume liquid dispensing array
- U.S. 6,085,773 Automatic fluid switching valve
- U.S. D425,979 Window fan
- U.S. 5,794,897 Transmission line hanger, a method of attaching the hanger and the resulting assembly

II. SCOPE OF ENGAGEMENT

26. I have been retained by Perilla Knox & Hildebrandt LLP on behalf of Danco Inc. (“Danco”) to provide analysis and opinion with Danco’s Patent Owner Response to IPR2024-00633.

27. I understand that the Petition involves U.S. Patent No. 9,139,993 (the “’993 Patent”) (EX1001). I have been asked to provide my opinions as to the validity of Claims 1-20 (the “Challenged Claims”) of the ’993 Patent.

28. I also understand that Petitioner has challenged the validity of two related patents. Specifically, Petitioner has challenged the validity of U.S. Patent No. 9,103,105 in IPR2024-00634 and U.S. Patent No. 10,934,698 in IPR2024-00635. I expect to provide opinions regarding the validity of both the ’105 Patent and the ’698 patent in the respective appropriate proceedings.

29. This Declaration sets forth the opinions that I have formed related to the Challenged Claims based on my personal knowledge, education, research, personal and professional experience, and the information I have reviewed as of the date of this Declaration. In connection with my analysis, I have reviewed the full record of IPR2024-00633, including Fluidmaster’s Petition and all exhibits thereto, the Board’s Institution Decision, the exhibits listed in the above list of exhibits, and all documents referenced herein.

30. I am being compensated at the hourly rate of \$400 for my work in this proceeding, including studying this matter, preparing this declaration, and providing deposition and trial testimony. This is my standard hourly rate for engagements of this nature. My compensation is not contingent upon the outcome of this proceeding or the particular testimony or opinions that I express. I am also being reimbursed for expenses incurred as a result of activities performed as an expert in this matter.

31. Between now and such time that I may be asked to testify, I expect to continue my review, evaluation, and analysis of evidence presented during this proceeding. I expressly reserve the right to amend or supplement this Declaration, as appropriate. I have personal knowledge of the facts stated in the declaration, and I am willing to competently testify to them if and when called to do so. In the event that additional relevant information becomes available to me, I also reserve the right to review and consider that information in further developing or refining my opinions.

III. PERSON OF ORDINARY SKILL IN THE ART

32. I understand that validity of a patent must be analyzed from the perspective of a hypothetical person of ordinary skill in the art. I understand that there are several factors to consider in determining the level of skill of a POSITA, including (i) the educational level of workers in the field, (ii) the types of problems

encountered in the art, (iii) prior-art solutions to these problems, (iv) the rapidity with which innovations are made, and (v) the complexity of the technology.

33. I understand that Patent Owner previously proposed that a POSITA “in the field to which the ’993 Patent is directed would have had at least a Bachelor of Science degree in mechanical engineering or a related field or, as a substitute, at least two years of work or research experience in the design or development of toilet products, parts, and accessories.” Paper 10 (POPR), 16.

34. I further understand that Petitioner’s expert Dr. Cameron previously asserted that a POSITA “with respect to the subject matter of the ’993 [P]atent at the time of the priory date, January 27, 2014, would have had an undergraduate degree in mechanical engineering, or other technical training in product design or equivalent work experience. This person would also possess at least one year of experience in developing and/or evaluating mechanical aspects of fluid systems.” Ex. 1004 (Cameron Decl.), ¶29.

35. I further understand that for purposes of its Institution Decision, the Board “adopt[ed] Patent Owner’s proposed definition of a POSITA, as it is consistent with the ’993 [P]atent and the asserted prior art.” Paper 19 (Institution Decision), 13. The Board further explained that it “see[s] no material difference between the level of skill proposed by Patent Owner and that proposed by Dr. Cameron.” *Id.*

36. I had, and presently have, the capabilities set forth in both Patent Owner's and Dr. Cameron's definitions of a POSITA at the time of the alleged invention as I both (1) met the educational requirements, and (2) had at least one year of experience in developing and evaluating mechanical aspects of fluid systems. *See* Section I ("Education and Work Experience"), above.

37. Finally, I understand that the Parties dispute the proper priority date of the '993 Patent. I understand that Patent Owner contends that the '993 Patent is entitled to its earliest priority date (March 11, 2004), while Dr. Cameron contends the appropriate priority date is January 27, 2014. While I agree with Patent Owner that the '993 Patent is entitled to a priority date of March 11, 2004 for the reasons discussed in Section X.C.1, below, I confirm that I met the qualifications for a POSITA as set forth by both Patent Owner and Dr. Cameron as of both March 11, 2004 and January 27, 2014 (as well as all times in between and since). Moreover, I confirm that my opinions do not change whether the critical date is March 11, 2004 or January 27 2014.

IV. UNDERSTANDING OF APPLICABLE LEGAL PRINCIPLES

38. I use the legal principles below, which I understand from counsel, as a guide in formulating my opinions.

A. Scope of the Proceedings

39. I understand that a Petition must identify in writing and with particularity (1) each claim challenged, (2) the grounds on which the challenge to each claim is based, and (3) the evidence that supports the grounds for the challenge to each claim.

40. I further understand that, with respect to IPR proceedings, the scope of the proceedings is limited to the grounds recited in the Petition. Specifically, I understand that the Petition is required to include a full statement of the reasons for relief requested, including a detailed explanation of the significance of the evidence and all material facts.

41. I further understand that the expedited nature of IPRs bring with it an obligation for petitioners to make their case in their petition to institute. Rather than relying on vague conclusory statements to support unpatentability based on obviousness under 35 U.S.C. §103, Petitioners must provide specific reasoning supported by evidence.

42. Specifically, in order to satisfy its burden of proving obviousness, a petitioner cannot employ mere conclusory statements. Instead, the Petitioner has the burden to submit facts to the record that show whether the prior art discloses a claim limitation, whether a skilled artisan would have been motivated to modify or

combine teachings in the prior art, and whether she would have had a reasonable expectation of success in doing so.

43. If the Petition does not clearly demonstrate how the cited prior art meets each claim element, the Petitioner will fail to meet its burden. Failure to prove the matter as required means that the party with the burden of persuasion loses on that point—thus, if the fact trier of the issue is left uncertain, the party with the burden (the petitioner) loses. Consequently, if the Petition fails to particularly point out how the cited prior art meets each of the claimed elements as construed by the Petitioner, the Petitioner loses, and the IPR should be denied.

B. Claim Interpretation

44. My opinions concern what I believe the person having ordinary skill in the art would have understood the meaning of certain claim terms to be based on the patent documents.

45. I understand that assessing the validity of a patent claim requires a two-step analysis. The first step involves the proper interpretation or construction of the claim language in order to determine its scope and meaning. The second step requires comparing the claim, as properly construed, to the alleged prior art to determine whether the limitations of the claim are met by the prior art.

46. My methodology for determining the meaning of claim phrases involved the following steps. My first step was to study the patent carefully. In

particular, I studied the claims themselves, followed by the background, detailed specification, figures, and other patent content. Next, I reviewed the prosecution history and looked for any clarifications or limitations that might be attached to various claim terms. Finally, in some circumstances, I looked at other documents, such as dictionary definitions and references applied by the patent office.

47. I understand that in an inter partes review, claim terms are to be given their ordinary and customary meaning as understood by persons having ordinary skill in the art in the context of the entire disclosure at the time of the invention. I understand that one must be careful not to read a specific embodiment appearing in the written description into the claim if the claim language is broader than the embodiment. I further understand that any special definition for a claim term must be set forth with reasonable clarity, deliberateness, and precision.

48. I have been informed that this standard is the same as that used in United States district courts, in which claim terms are given their ordinary and customary meaning as would be understood by persons having ordinary skill in the art at the time of the invention having taken into consideration the language of the claims, the specification, and the prosecution history of record under the *Phillips* claim construction standard. *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005).

C. Prior Art

49. I understand that information that satisfies one of the categories of prior art set forth in 35 U.S.C. § 102 (either pre- or post-AIA) may be used in an invalidity analysis under §§ 102 or 103. If information is not properly classified as prior art under one of the subsections of § 102 of the Patent Code, then it may not form the basis of an anticipation or obviousness determination. It is also my understanding that, for inter partes review, applicable prior art is limited to patents and printed publications.

D. Anticipation

50. I understand that a patent claim is invalid due to anticipation under 35 U.S.C. § 102 if each and every element of the patent claim is disclosed in a single asserted prior art reference and that such disclosure may be either explicit or inherent. I also understand that a disclosure of an asserted prior art reference can be “inherent” if the missing element is necessarily present or is the inevitable outcome of the process and/or thing that is explicitly described in the asserted prior art reference.

51. I also understand that in order to anticipate the claimed invention, a prior art reference must disclose all elements of the claim within the four corners of the document, and it must disclose those elements arranged as in the claim. However, a reference can anticipate a claim even if it does not expressly spell out all the

limitations arranged or combined as in the claim, if a person of skill in the art, reading the reference, would at once envisage the claimed arrangement or combination.

E. Obviousness

52. I also understand that a patent claim is invalid under 35 U.S.C. § 103 if the differences between the invention and the prior art are such that the subject matter as a whole would have been obvious at the time of the invention to persons having ordinary skill in the art to which the subject matter pertains. Obviousness, as I understand, is determined based on the scope and content of the prior art; the level of ordinary skill in the art at the time of the alleged invention; differences between the alleged invention and the prior art; and objective evidence of non-obviousness.

53. I further understand that a party seeking to invalidate a patent on obviousness grounds must demonstrate by clear and convincing evidence that a skilled artisan would have been motivated to combine the teachings of the prior art references to achieve the claimed invention, and that the skilled artisan would have had a reasonable expectation of success in doing so.

54. I understand that the pertinence of the prior art reference as a source of solution to the inventor's problem must be recognizable with the foresight of a person of ordinary skill, not with the hindsight of the inventor's successful achievement, and that a factfinder should be aware, of course, of the distortion

caused by hindsight bias and must be cautious of arguments reliant upon ex post reasoning.

F. Written Description and Priority

55. I understand that in order to satisfy the written description requirement, an application must describe the claimed invention in sufficient detail that one skilled in the art can reasonably conclude that the inventor had possession of the claimed invention at the time of filing.

56. I further understand that the function of the written description requirement is to ensure that the inventor had possession of the specific subject matter later claimed as of the filing date of the application relied on; how the specification accomplishes this is not material.

57. I understand that in order to challenge the priority date of the '993 Patent, Petitioner first must raise the issue of entitlement to a claimed priority date by identifying, specifically, the features, claims, and ancestral application or applications allegedly lacking support under 35 U.S.C. § 112 for the claims based on the identified features. The Patent Owner then bears the burden of showing an entitlement to earlier filing date(s), in a manner that is commensurate in scope with the specific points and contentions raised by the Petitioner.

58. I further understand that the patentee is considered to be “in possession” of the claimed subject matter if the priority application describes the invention, with

all its claimed limitations. This is done by such descriptive means as words, structures, figures, diagrams, formulas, etc., that fully set forth the claimed invention. A description that renders obvious the invention for which an earlier filing date is sought is not sufficient.

59. I understand that in the mechanical world, disclosure of a species (such as a bowl fill valve) may convey to one skilled in the art that the inventors had possession of the genus (such as bowl fill restrictions or water flow regulators, categorically).

60. I further understand that if the difference between members of the group is such that the person skilled in the art would not readily discern that other members of the genus would perform similarly to the disclosed members, *i.e.*, if the art is unpredictable, then disclosure of more species is necessary to adequately show possession of the entire genus.

V. PETITIONER'S INVALIDITY CHALLENGES

61. I understand that Petitioner challenges Claims 1-20 of the '993 Patent based on the following five grounds:

- Ground 1: Claims 1, 2, 5, 7-15, and 19-20 are allegedly obvious pursuant to 35 U.S.C. § 103 over Guoxin in view of Ho;

- Ground 2: Claims 3-4, 6, and 16-18 are allegedly obvious pursuant to 35 U.S.C. § 103 over Guoxin in view of Ho, in further view of Bjerke, Calmettes, Hall, and/or Kimber;
- Ground 3: Claims 1, 2, 5, 7-15, and 19-20 are allegedly obvious pursuant to 35 U.S.C. § 103 over Brown in view of Ho;
- Ground 4: Claims 3-4, 6, and 16-18 are allegedly obvious pursuant to 35 U.S.C. § 103 over Brown in view of Ho, in further view of Bjerke, Calmettes, Hall, and/or Kimber; and
- Ground 5: Claims 1-20 are allegedly anticipated pursuant to 35 U.S.C. § 102 over Schuster.

62. Throughout my declaration, I rely on the designation of claim elements as set forth in the Petition for convenience. Pet., 1-4.

63. Petitioner has not met their burden to show that the Challenged Claims are invalid. As such, and for the additional reasons set forth below, in my opinion each of the Challenged Claims are not invalid.

VI. BACKGROUND

64. The '993 Patent teaches that in conventional toilet systems, “the water flowing out of such conventional water outlets to fill a toilet bowl provides much more water than is necessary to fill the average toilet bowl.” EX1001, 1:21-25. As such, “much of the water that flows into a toilet bowl during the average flush cycle

is lost down the drain,” which “translates into a loss of millions of gallons of water each year.” EX1001, 1:25-28. Ultimately, this contributes to overall water wastage in households and commercial buildings.

65. The '993 Patent describes a toilet fill valve system that prevents excessive water waste during toilet flush cycles. EX1001, 2:34-39. Specifically, it discloses a toilet fill valve system configured to restrict and/or regulate the flow of water into the toilet bowl during toilet flush cycles so that no excess water is used. *Id.* The '993 Patent also discloses an optional manual adjustment handle that allows users to adjust flow rate in order to control the amount of water used during a toilet flush cycle. *Id.*

66. Prior art bowl fill valves were typically provided in the middle of a tube, which caused a “pressure head” to form within the tube. EX1001, 4:1-9. The '993 Patent describes a toilet fill valve configuration that ensures that “a pressure head is not created in any portion of the tube 146 and prevents the tube 146 from working its way off of the bowl fill valve outlet 116 over time.” EX1001, 4:1-9. “By virtue of the fact that the bowl fill valve 100 is integrated within the toilet fill valve 100, a pressure head is prevented from being created due to any potential pinching of the tube 146 or other similar adjustment mechanism.” *Id.* at 4:53-56.

VII. OVERVIEW OF THE '993 PATENT

67. The '993 Patent is one among a family of applications and patents filed by Patent Owner. Table I, below, identifies the entire family as of December 4, 2024, with the '993 Patent emphasized in bold.

Patent App. No.	Filing Date	Status	Patent No.
10/798,606	03/11/2004	Patented	6,823,889
10/958,797	10/05/2004	Patented	7,743,436
12/786,904	05/25/2010	Patented	8,104,105
13/346,355	07/09/2012	Patented	8,650,671
14/164,424	01/27/2014	Patented	9,139,993
14/457,697	08/12/2014	Patented	9,103,105
14/856,901	09/17/2015	Patented	10,519,639
16/686,328	11/18/2019	Patented	10,934,698

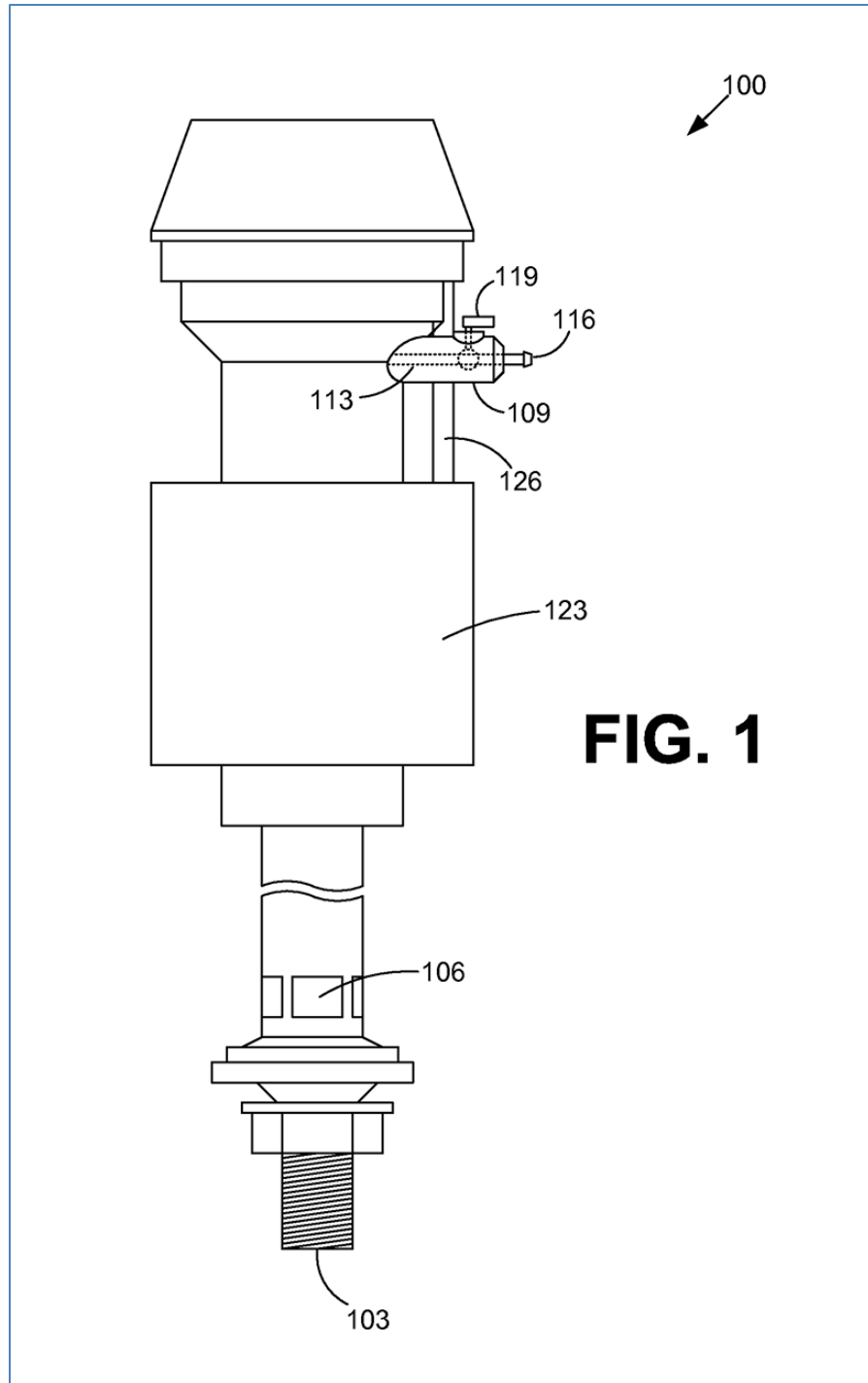
Table I: '993 Patent Family

68. The '993 Patent was filed on January 27, 2014 (EX1001, INID 22), and was filed as a continuation of U.S. Patent No. 8,650,671, which was a continuation of U.S. Patent No. 8,104,105, which was a continuation of U.S. Patent No. 7,743,436 (the "'436 Patent"), which was a continuation-in-part of U.S. Patent No. 6,823,889 (the "'889 Patent"). *Id.* The '993 Patent includes three independent claims, including claims 1, 8, and 14, as discussed in more detail below. *Id.*, 9:61-10:20; 10:44-65; 11:12-25.

A. Subject Matter of the '993 Patent

69. The following description of the '993 Patent is adopted from Patent Owner's Preliminary Response. Paper 10, 10-12. I have reviewed the '993 Patent in its entirety, and the description below is consistent with my understanding of the '993 Patent.

The '993 Patent is entitled "Toilet Fill Valve," and describes a toilet fill valve system designed to efficiently manage water flow during the flush cycle of a toilet. *Id.*, 1:21-28; and 2:40-45. The system includes a toilet fill valve with a body that has an extended portion integrally molded with it, forming a bowl fill outlet port. *Id.*, 2:5-26. The valve is equipped with a water inlet to receive water from a supply source and a tank water outlet to provide a portion of the water to the toilet tank. *Id.*, 2:1-16. Additionally, the system features a water flow regulator in the form of a bowl fill valve 109 that attaches directly to the extended portion of the valve body. *Id.*, 2:10-39. This regulator is designed to receive, regulate, and constrict the flow rate of a second portion of water during the flush cycle. *Id.* ("the flow of water is regulated so that enough water flows out of the bowl fill valve 109 to fill a toilet bowl without wasting any water down a drain.").



The water flow regulator is a single-piece construction that can be locked onto the integrally molded, extended portion of the toilet fill valve body using a protrusion that inserts into a recess in the valve. *Id.*, 2:17-26. This direct attachment method is intended to prevent the

formation of a pressure head within the connecting tube. *Id.*, 4:1-9. Such pressure heads can cause a tube, also part of the system, to become loose, disconnect, or leak over time. *Id.* The tube is designed to attach directly to the regulator and direct the constricted flow of water to the toilet tank's overflow tube. *Id.*, 3:16-23.

The toilet fill valve includes a float and an actuating arm coupled to the float. *Id.*, 2:46-55. The actuating arm extends radially relative to the longitudinal axis of the valve and is angularly offset from the bowl fill valve to prevent interference with the water flow regulator and the translational stem that extends from the float to the actuating arm's free end. *Id.*, 3:24-46.

The '993 Patent also outlines a method of operation for the toilet fill valve system. *See generally id.* It involves receiving water through the water inlet, providing a portion of this water to the toilet tank, and directing another portion to the water flow regulator. *Id.*, 2:1-16. The water flow regulator restricts the flow rate of this second portion of water, which is then provided to a tube that directs it to the toilet tank overflow tube. *Id.*, 2:27-39; 3:16-23. The method ensures that the water level in the toilet bowl reaches a predefined level at the end of the flush cycle, minimizing water wastage. *Id.*, 2:27-39.

The claims of the patent focus on the system's components, including the toilet fill valve with its integrally molded extended portion, the water flow regulator with its locking means, and the tube for directing water to the overflow tube. *See generally id.* The system is designed to prevent water wastage by ensuring that the water level in the toilet bowl

is adequately refilled without excess during the flush cycle, which can save consumers money on water bills or provide additional environment benefits through decreased water usage. *See id.*, 2:27-39. The direct attachment of the water flow regulator to the valve body and the prevention of pressure head formation in the tube are various advantages. *Id.*, 4:2-9.

B. Prosecution History of the '993 Patent

70. I have reviewed the prosecution history of the '993 Patent. EX1002. The '993 Patent was filed as 14/164,424 (the "'424 Application") on January 27, 2014.

71. The '424 Application was initially rejected on January 12, 2015 via a Non-Final Office Action (the "Office Action"). EX1002, 48. Specifically, the examiner rejected Claims 4 and 17 as allegedly failing to comply with the written description requirement because "the original disclosure fail[ed] to support the limitation 'the bowl fill restriction is configured to be clamped to the extended portion of the body' of [original] claim 4" and "the method of 'clamping the bowl fill restriction to the extended portion of [original] claim 17," while alleging these were "considered as new matter." EX1002, 50-51.

72. The examiner also indicated that claims 1-20 as originally filed were rejected under 35 U.S.C. §103 as allegedly being obvious over DeMarco in view of Gish. *Id.*, 51-52. Specifically, the examiner stated that, "DeMarco [is] silent as to the

extended portion [being] integrally molded with the body of the toilet fill valve.” *Id.* The examiner then went on to allege that “Gish ... teaches an analogous toilet fill valve system where the extended portion ... is integrally molded with the toilet fill valve.” *Id.*

73. Finally, the examiner rejected claim 1-20 for double patenting on the basis that claims were indistinct from those claims presented in the 14/457,697 Application. *Id.*, 52-53.

74. In response, Patent Owner successfully argued that claims 4 and 17 satisfied the written description requirement, were definite, and specifically recited portions of the specification in highlighting the same. *Id.*, 35-37. Patent Owner also amended claims 1, 4-10, 12, and 15-19 to replace the term “bowl fill restriction” with “water flow regulator,” and successfully argued that the claims, as amended, are patentable over the art of record. *Id.*, 28-43. In particular, Patent Owner successfully asserted that the amended claims are patentable over the combination of DeMarco and Gish on the basis that neither DeMarco or Gish were configured such that a water flow regulator was inserted into or came into contact with the extended portion of the body. *Id.*, 40-43. Shortly thereafter, Patent Owner filed a terminal disclaimer to address the double patenting rejections. *Id.*, 23-24.

VIII. CLAIM CONSTRUCTION

75. I understand that Petitioner proposed constructions for certain terms. Pet., 13-15. I further understand that Patent Owner set forth (and the Board adopted) certain constructions as part of the POPR. Paper 10 (POPR), 16-19.

A. “integrally molded”

76. I understand that Patent Owner proposed that the term “integrally molded”—as found in Claims 1, 8, and 14 of the ’993 Patent be construed as “molded as a single unit.” Patent Owner’s arguments are reproduced below:

Claims 1, 8, and 14 recite the term “integrally molded,” which means “molded as a single complete unit.” Thus, contrary to the construction for this term advanced by Petitioner, “integrally molded” does not include items created as separate pieces and attached together later.

Here, all independent claims plainly state that “the extended portion is integrally molded with the body” (Claims 1 & 14) or “the extended portion is integrally molded with the toilet fill valve.” (Claim 8). The claim construction advanced by Petitioner, and the interpretation thereof in view of the cited references, would read out the limitation “integrally molded with” from all independent claims, which is improper. *See, e.g., Aspex Eyewear, Inc. v. Marchon Eyewear, Inc.*, 672 F.3d 1335, 1348 (Fed. Cir. 2012) (rejecting district court’s claim construction because it “effectively read[] the term ‘free’ out of the limitation”); *Bicon, Inc. v. Straumann Co.*, 441 F.3d 945, 951 (Fed. Cir. 2006) (“rejecting proposed claim construction because effect ‘would be to read limitations...out of the claim’”).

Notably, courts that have construed the term “integrally molded” have construed this term to mean “molded as one piece.” See, e.g., *Traffix Devices, Inc. v. Bent Mfg. Co.*, No. SACV 03-1569 NS (ANx), 2005 U.S. Dist. LEXIS 51506, at *24 (C.D. Cal. Aug. 23, 2005). For example, in *Traffix Devices*, the district court reasoned that “[t]he telling aspect of this phrase is the use of the word ‘with’ in conjunction with the term ‘integrally molded.’ This combination eliminates the possibility that the handle and the body portion are each wholly but separately molded and makes clear that the Patent Owner intended for the handle to be molded as one piece with the body portion.” *Id.* Here, the claims state that “the extended portion is integrally molded with the body” or “integrally molded with the toilet fill valve.” The proposed construction advanced by Petitioner would read the term “integrally molded with” out of the claims.

Turning to the specification of the ’993 Patent, the language in the specification refers to the bowl fill valve 109 and the toilet fill valve 100 being integral with one another by stating, “the bowl fill valve 109 may be molded as a portion of the toilet fill valve 100 or it may be snapped or clamped into place, or it may be attached to the toilet fill valve 100 in some other manner, etc.” EX1001, 2:17-26. The reference to “snapped or clamped into place” in the ’993 Patent refers to alternative embodiments as compared to the integrally molded embodiments, as readily apparent by use of the word “or.” See, e.g., *Norix Grp., Inc. v. Corr. Techs., Inc.*, No. 17-cv-07914, 2020 U.S. Dist. LEXIS 41000, at *20-21 (N.D. Ill. Mar. 10, 2020) (interpreting

“integrally molded” as not being inclusive of items created as separate pieces and attached later).

Accordingly, the PTAB should construe “integrally molded” to mean “molded as a single complete unit.” Paper 10 (POPR), 16-19.

77. I agree with Patent Owner’s proposed construction of “integrally molded” and the evidence and arguments relied on in support thereof.

78. I understand that the Board construed “integrally molded with” to mean “molded together as a single structure.” Paper 19 (Institution Decision) at 14-15. Specifically, the Board explained that this construction “exclude[s] items created as separate pieces and attached together later” and that it “is consistent with the plain language of the claims, which requires the extended portion be ‘integrally molded with’ the body and not just the extended portion be integral with the body.” Paper 19 (Institution Decision) at 14-15.

79. I further understand that Dr. Cameron does not intend on offering any opinions that are not consistent with the Board’s construction. EX2008, (Cameron Tr.), 160:19-162:7. As such, I understand that the construction of “integrally molded with” is no longer in dispute.

B. “water flow regulator”

80. I understand that Patent Owner proposed that the term “water flow regulator”—as found in Claims 1, 3-9, 11, and 14-20 of the ’993 Patent be construed

as “a device for regulating a flow rate of an amount of water flowing therethrough.”

Patent Owner’s arguments are reproduced below:

The term “water flow regulator” means a device for regulating a flow rate of an amount of water flowing therethrough. “By virtue of the ... setting of ... the bowl fill valve 109, the flow of water through the bowl fill valve 109 is regulated. In this manner, the flow of water is regulated so that enough water flows out of the bowl fill valve 109 to fill a toilet bowl without wasting any water down a drain.” EX1001, 2:36-39.

Accordingly, the PTAB should construe “water flow regulator” to mean “a device for regulating a flow rate of an amount of water flowing therethrough.” Paper 10 (POPR), 18-19.

81. I further understand that the Board determined that it did “not need to construe explicitly any other claim terms to reach [its] decision on whether to institute *inter partes* review.” Paper 19 (Institution Decision) at 15.

IX. THE ALLEGED PRIOR ART

A. Guoxin

82. Guoxin is a Chinese reference disclosing a water supply switching device specifically designed for one-piece toilets¹ that have insufficient water

¹ A one-piece toilet does not have a separate tank and bowl. Instead, the tank and bowl are combined as a single structure.

storage capacity in the tank. EX1016, p. 004; EX2007, 1:1-5. Guoxin's switching device provides sufficient water volume to thoroughly flush the toilet of waste despite the reduced capacity in the tank. EX1016, p. 004; EX2007, 1:5-7. Unlike the '993 Patent (which is directed to **reducing** the amount of water flowing into the toilet bowl), the water supply switching device of Guoxin aims to increase the amount of water flowing into the toilet bowl during the flush cycle in order to address the issue of insufficient water volume in one-piece toilets. *Id.*

83. Specifically, the switching device directs a portion of the water supply straight into the toilet during flushing to compensate for the deficiency in the water volume, thereby ensuring a thorough flush. *Id.* As such, Guoxin is not directed to saving water by regulating or restricting the flow of water in the toilet bowl, but instead is directed to increasing the flow of water.

84. Guoxin is silent on whether the purported "extended portion" of the water inlet device 1 referenced in the Petition is integrally molded with the body of the water inlet device. Guoxin only states that to one side of the water inlet device, there is a switching mechanism 4 that is equipped with a valve seat with a slot to accommodate a switching valve. EX1016, p. 005; EX2007, 2:17-23. This valve seat is designed with an inlet and an outlet for water flow, where the outlet is connected to a water supply pipeline that is directed to the toilet to provide water supply to the toilet. *Id.* The switching valve has upper and lower annular surrounds with a smaller

annular surround therebetween. EX1016, p. 005; EX2007, 2:24-31. When the water in the toilet tank reaches a set level of height, the lower annular surround blocks between the water inlet and outlet, discontinuing the water supply to the toilet through the switching mechanism. EX1016, p. 005; EX2007, 2:31-41.

B. Ho

85. Ho describes a toilet flushing device designed to be installed in a water supply tank. The toilet flushing device includes a diverter valve that directs high-pressure water to the rim flushing conduit of a toilet bowl during the flush cycle. EX1022, Abstract. Like Guoxin, Ho's diverter valve *increases* the amount of water directed to the toilet bowl. The diverter valve includes a valve housing and a valve rod that moves in response to changes in water level in a water supply tank. *Id.*, Abstract.

86. Ho's diverter valve aims to address issues found in prior art, such as the fouling that can occur on the rotation axle of a flap in the diverter valve, which can lead to malfunctions. *Id.*, 2:8-11. The device includes a water supplying pipe connected to an external water source, a float-controlled valve to regulate water flow, a manually operated flush valve for discharging water, and a diverter valve. *Id.*, 2:51-67.

87. The diverter valve has a hollow housing, an inlet pipe, a supply line to the rim flushing conduit, and a float member that moves the valve rod in response to

water level changes, ensuring proper water flow during flushing and tank refilling. *Id.*, 3:12-17, 3:53-61.

C. Brown

88. Brown was considered during prosecution of the '993 Patent. EX1002, 59. Brown discloses a toilet fill valve that aims to diminish the turbulence and noise generated by water flowing through the fill tube into the tank and to minimize the excess water typically diverted through the overflow pipe into the toilet bowl, thereby preventing unnecessary water wastage. EX1021, 1:9-15; 1-41-49.

89. To accomplish this, Brown discloses a series of flexible, elongated members, such as solid rods or hollow tubes that help to reduce the turbulence and noise of the water as it flows into the tank by creating a more laminar flow and distributing the pressure drop along the tube's length. *Id.*, 2:52-67; 3:20-44; 4-45-63.

90. To minimize the excess water, Brown also discloses an externally threaded adaptor tube with a restricted opening or an adjustable metering valve connected to the overflow pipe, which effectively reduces the volume of water flowing into the toilet bowl during the refill process, thus conserving water. *Id.*, 3:45-72. Brown expressly teaches that adaptor tube (which is threaded or screwed into the flush valve) is not integrally molded and does not teach this limitation of the '993 Patent.

D. Quick Connection Art

91. The Petition collectively refers to four different patents (Bjerke, Calmettes, Hall, and Kimber) as the “Quick Connection Art.”

92. Bjerke was already considered during the prosecution of the application for the '993 Patent. EX1002, 65 and 94. Bjerke outlines a detachable bathtub shower system that can be swiftly connected to a bathtub faucet via a screw-threaded fitting. EX1017, 3:23-48. This system incorporates a backflow preventer with a quick connect/disconnect feature, allowing for easy attachment or removal. *Id.*, 3:5-22. The system is designed to be user-friendly, facilitating a shower-like experience for individuals who prefer to bathe while seated or reclining in a tub. *Id.*, 2:4-26.

93. Calmettes describes a coupling device designed to securely connect the ends of two coaxial tubes, such as those found in motor vehicle cooling circuits or other industrial applications. EX1018, 1:21. The device features a locking mechanism that includes a longitudinally grooved outer tube and an inner tube with radially projecting bosses. *Id.*, 10:23; 3-30-47. A flexible locking tab, attached to the outer tube and positioned adjacent to the groove, contains apertures to receive the bosses. *Id.*, 3:67-68; 4:1-2; 10:10-20.

94. Hall pertains to a hose-coupling device that enables the quick and secure connection of adjacent hose sections without the use of traditional coupling threads. EX1019, 1:8-14. The coupling consists of mating sections, one with bayonet

slots and the other with corresponding lugs designed to fit into these slots. *Id.*, 1:66-85. A distinctive feature of this coupling is a spring-pressed sleeve or collar that slides over one of the hose sections and is equipped with locking plates that close the entrance to the bayonet slots once the lugs are inserted, thereby locking the hose sections together. *Id.*, 1:100-112. The design also includes a gasket to prevent leakage at the junction of the hose sections and mechanisms to limit the sliding collar's movement and to automatically lock it in place when extended. *Id.*, 1:86-99.

95. Kimber describes a coupling designed to create a sealed connection between two conduits, such as hoses and radiators in automobiles. EX1020, 1. The coupling consists of a tubular male fitting with an external conical portion and a tubular female fitting that snugly fits over the male fitting, featuring a complementary internal conical portion. *Id.*, 2. A seal is placed within one of these conical portions to ensure a tight seal between the male and female fittings once connected. *Id.* The design includes axially oriented guide means for proper angular alignment and relative axial movement of the fittings, as well as locking means that secure the fittings axially upon assembly. *Id.*, 3. This coupling allows for quick and easy connection and disconnection, which is particularly advantageous in automated assembly lines and maintenance scenarios. *Id.*, 8.

X. THE CHALLENGED CLAIMS OF THE '993 PATENT ARE NOT INVALID

A. Grounds 1 and 2: Guoxin in view of Ho, in further view of Bjerke, Calmettes, Hall, and/or Kimber

96. Ground 1 of the Petition alleges that Claims 1, 2, 5, 7-15, and 19-20 are obvious over Guoxin in view of Ho. Ground 2 further alleges that Claims 3-4, 6, and 16-18 are obvious over Guoxin in view of Ho, in further view of Bjerke, Calmettes, Hall, and/or Kimber.

97. Petitioner has not met their burden to show that the Challenged Claims are invalid. As such, and for the additional reasons set forth below, in my opinion each of the Challenged Claims are not invalid.

1. The Petition is deficient with respect to certain limitations of independent claims 1, 8, and 14.

a) “overflow tube” / “overfill tube”

98. Each independent claim requires a first tube that transfers water from the water flow regulator to a second toilet tank “overflow tube” or “overfill tube.” The following analysis focuses on limitation 1[E] as defined by Petitioner (“a tube that is configured to attach directly to the water flow regulator, wherein the tube is configured to direct the second portion of the water from the water flow regulator directly *to a toilet tank overflow tube*”). Pet., 41-42.² However, as explained in

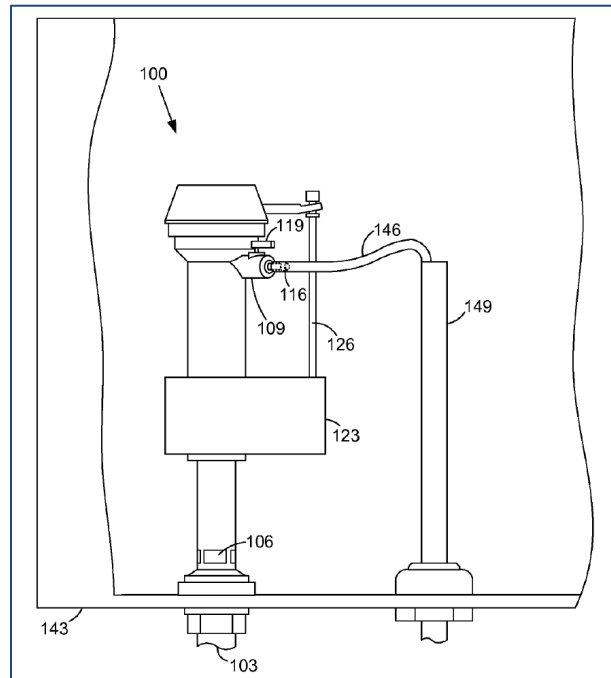
² All emphasis is added unless otherwise noted.

Section X.A.1.a)(4), below, the same analysis applies to limitations 8[E]-8[F] (“providing, via the water flow regulator, the second portion of the water to a tube that is in contact with the water flow regulator, and providing, via the tube, the second portion of the water *to a toilet tank overflow tube*”) and 14[B] (“attaching a tube directly to the water flow regulator, wherein the tube is configured to direct the water from the water flow regulator directly *to a toilet tank overflow tube*”).

99. Because each of the remaining Challenged Claims depend from Claims 1, 8, or 14, a finding that the prior art does not disclose or otherwise render obvious limitations 1[E], 8[E]-8[F] and 14[B] completely resolves Grounds 1 and 2.

100. Notably, these limitations require both (1) a first tube attached directly to the water flow regulator, which is directed to (2) a second, separate toilet tank overflow (or overflow) tube. There are two functional reasons for this configuration. First, the overflow tube prevents the tank from overflowing in the case of failure of the fill valve in an open state. Second, the break between the tubes prevents siphoning of the toilet water into the water supply in the case of negative pressure on the water supply line.

101. This configuration is depicted (for example) in Figure 3 of the '993 Patent, which depicts tube 146 and overflow tube 149.³



EX1001, Fig. 3

102. The '993 Patent explains that “[t]he tube 146 directs water that flows out of the bowl fill valve outlet 116 into the overflow tube 149 and refills the toilet bowl associated with the toilet tank 143 as can be appreciated by those with ordinary skill in the art.” EX1001, 3:60-65. This is consistent with the purpose of the '993

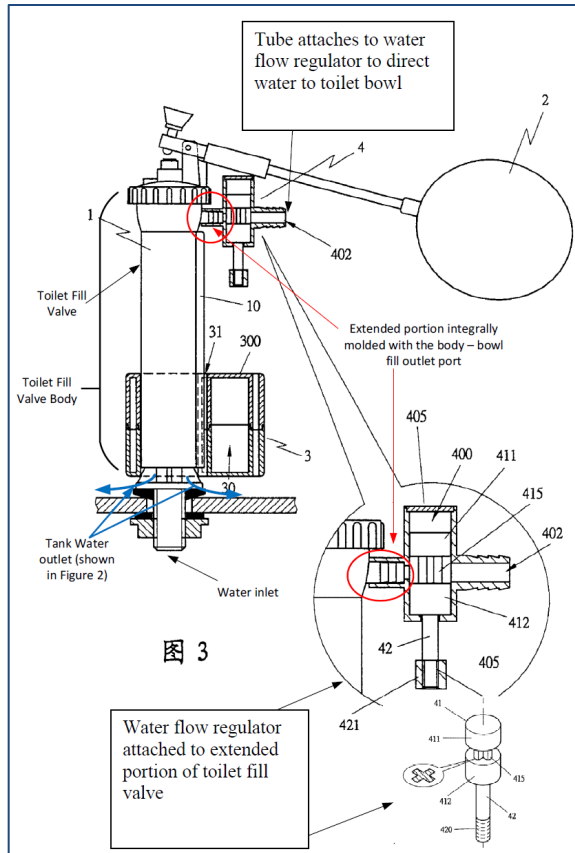
³ The '993 Patent refers to numeral 149 as both an “overflow tube” and an “overfill tube.” EX1001, 5:38-46. For purposes of my opinion, I have interpreted these terms as having the same meaning.

Patent, which is “to minimize or eliminate the amount of water that is lost down the drain of a toilet due to over filling of the toilet bowl during a flush cycle of a toilet.”

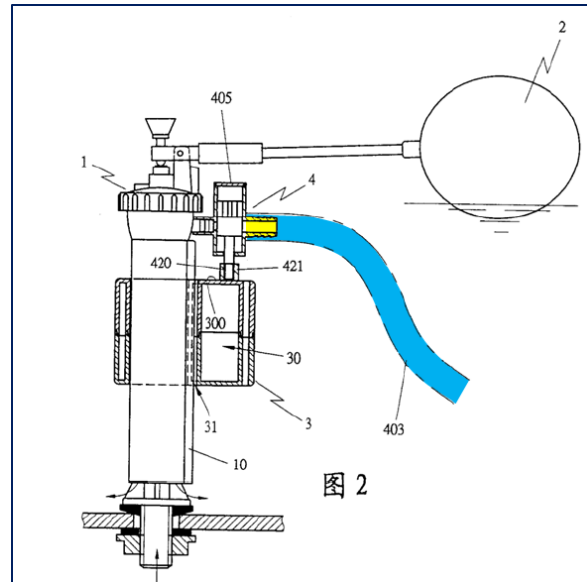
EX1001, 6:33-38.

(1) The Petition does not identify any evidence that Guoxin’s water supply line 403 directs water to the claimed overflow tube.

103. The Petition identifies Guoxin’s “water supply line 403” as the claimed tube attached directly to the water flow regulator. Pet., 42 (“Guoxin discloses tube 403 (Fig. 2), that is configured to provide water supply to the toilet bowl.”) (citing EX1016, 2:17-18; EX1004, ¶149). The Petition also notes without explanation that the claimed features are “conventional in the art.” Pet., 41 (citing “annotated figure of Guoxin illustrated above regarding claim element 1[Pre] and annotated Fig. 2 below; EX1004, ¶149). Both annotated figures are reproduced below. Dr. Cameron’s declaration does not identify any additional evidence, argument, or analysis.



EX1004, ¶120



Pet., 42

104. The Petition does not at any point identify the separate toilet tank overflow tube, as required by limitation 1[E]. A toilet tank overflow tube is not depicted in any of Petitioner's annotated figures, nor do any uncited Guoxin figures depict a toilet tank overflow tube. In fact, Petitioner's annotations to Figure 3 explicitly indicate that tube 403 "attaches to water flow regulator to direct water to *toilet bowl*," not to an overflow tube. Likewise, the cited portion of Guoxin (2:17-

18) does not reference an overflow tube.⁴ Regardless of Petitioner's deficient citations, the uncited portions of Guoxin likewise do not refer to an overflow tube.

(2) The claimed configuration is not “conventional in the art.”

105. In addition to not explicitly identifying an overflow tube, the Petition does not identify *any* evidence that Guoxin's water supply line 403 directs water

⁴ Although the Petition provides specific line citations to Guoxin, EX1016 does not contain accurate line markers. When accurate line markers are added (*see, e.g.*, EX2007 (Annotated Guoxin)), Petitioner's citation to Guoxin does not contain relevant disclosure. Pet., 42 (citing EX1016, 2:17-18) (“ball float 3 to ascend and descend along a certain trajectory. On one side of the inlet device, there is a switching mechanism 4. The switching mechanism”).

When asked about an exemplary deficient citation to Guoxin at her deposition, Dr. Cameron explained: “I don't think it's that complicated. If you don't understand that, there is more at the [uncited] end of that paragraph as well, and I likely intended to cite to that whole paragraph.” EX2008 (Cameron Tr.), 193:18-200:19. Regardless of (1) what Dr. Cameron intended to cite, or (2) whether or not Dr. Cameron thinks it is “that complicated,” the cited language does not reference an overflow tube in any capacity.

from a water flow regulator to an overflow tube. In order to correct for this glaring oversight, Petitioner and Dr. Cameron allege without support that the claimed configuration of regulator, first tube, and second, distinct overflow tube is “conventional in the art.” I disagree.

106. Toilet systems may include overflow tubes that prevent flooding in the event of failure with the fill valve or water inlet. If the water in the tank rises over the level of the overflow tube, it drains through the overflow tube, into the toilet bowl, and ultimately into the sewer system.

107. Additionally, toilet systems may use an overflow tube to assist with refilling the toilet after a flush. This can be accomplished by running a tube from the fill valve to the overflow tube. When the fill valve is activated, water runs from the fill valve, to the overflow tube.

108. When questioned on the operation of a conventional residential toilet, Dr. Cameron testified over a form objection that she was only aware of two mechanisms by which water enters a toilet bowl: (1) a tube that transfers water directly from the fill valve to the bowl, and (2) water entering the bowl through the flush valve. EX2008 (Cameron Tr.), 87:14-21; *see also id.*, 79:19-87:21

Q. Other than a tube from a toilet fill valve that goes directly to the bowl, and water from the tank passing through the flush valve into the bowl, are you aware of any other ways that water enters the toilet bowl?

MS. TOTO: Objection to form.

A. No. That's how water goes to the bowl.

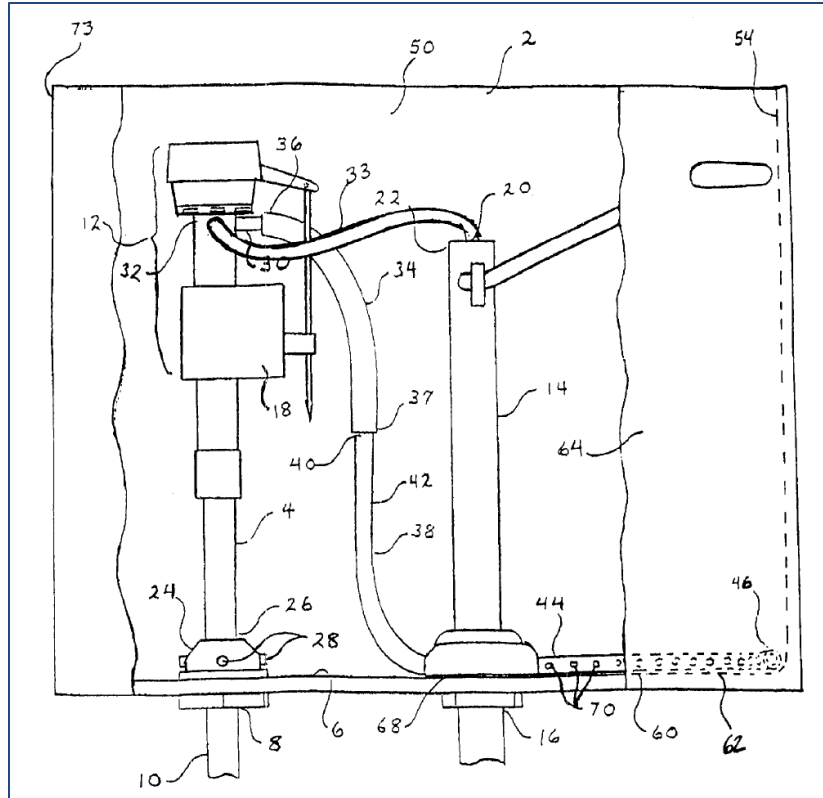
109. Notably absent from Dr. Cameron's testimony was any reference to an overflow tube, and more specifically any reference to the claimed configuration (namely, a first tube that directs water from a water flow regulator to a second, separate overflow tube).

110. Regardless of the prevalence of overflow tubes among residential toilets, the claimed configuration—a tube that directs water from a water flow regulator to a separate overflow tube—is not. Water flow regulators perform a variety of different functions in toilet systems. The specific function of a water flow regulator impacts where the water exiting the regulator is directed. Some, like the regulator disclosed and claimed by the '993 Patent, regulate the flow of water from the fill valve to the overflow tube. Others, like diverter valve 30 disclosed by Ho, “permit[] the supply of high pressure water to the rim flushing conduit of a toilet bowl when the toilet bowl is flushed.” EX1022, Abstract. Rather than directing water to an overflow tube, Ho's diverter valve 30 directs water to a conduit encircling the rim of the toilet bowl. EX1022, 4:7-9 (“[h]igh pressure water thus enters the *rim flushing conduit 54*, thereby effectively rinsing the inner wall of the toilet bowl.”).

111. Still others, like switching mechanism 4 disclosed by Guoxin, are “specifically targeted at the tanks of commercially available one-piece toilets that

have insufficient water storage capacity in the tank, which results in insufficient water volume to thoroughly flush the toilet of waste.” EX1016, p. 004; EX2007, 1:2-5. Again, rather than directing water to an overflow tube, “each time a toilet is flushed, *a portion of the water from the inlet device is directly supplied to the toilet bowl* to compensate for the lack of water in the tank, thereby ensuring the toilet is flushed clean in a single flush.” EX1016, p. 004; EX2007, 1:5-7.

112. Other fill valve configurations are also found in the industry. For example, U.S. Patent No. 8,546,568 depicts both a first tube (33) that directs water from the fill valve to the overflow tube, as well as a second tube system (34, 38) that directs water from the fill valve to the bottom surface of the toilet tank in order to prevent sediment buildup. EX1014, Fig. 1. Notably, the second tube system (despite also originating from the fill valve), is not directed to an overflow tube.



EX1014, Fig. 1

113. Contrary to Petitioner's unsupported assertions, the claimed configuration—a tube that directs water from a water flow regulator to an overflow tube—is not conventional in the art. Numerous other configurations of tubes, water flow regulators, and overfill tubes exist. Petitioner has not identified any evidence that even suggests that Guoxin discloses the claimed configuration. Likewise, Petitioner has not alleged (or provided any evidence to support) that the claimed configuration is an obvious modification of Guoxin in view of the knowledge of a POSITA.

(3) Guoxin's tube 403 does not direct water from a water flow regulator to an overflow tube.

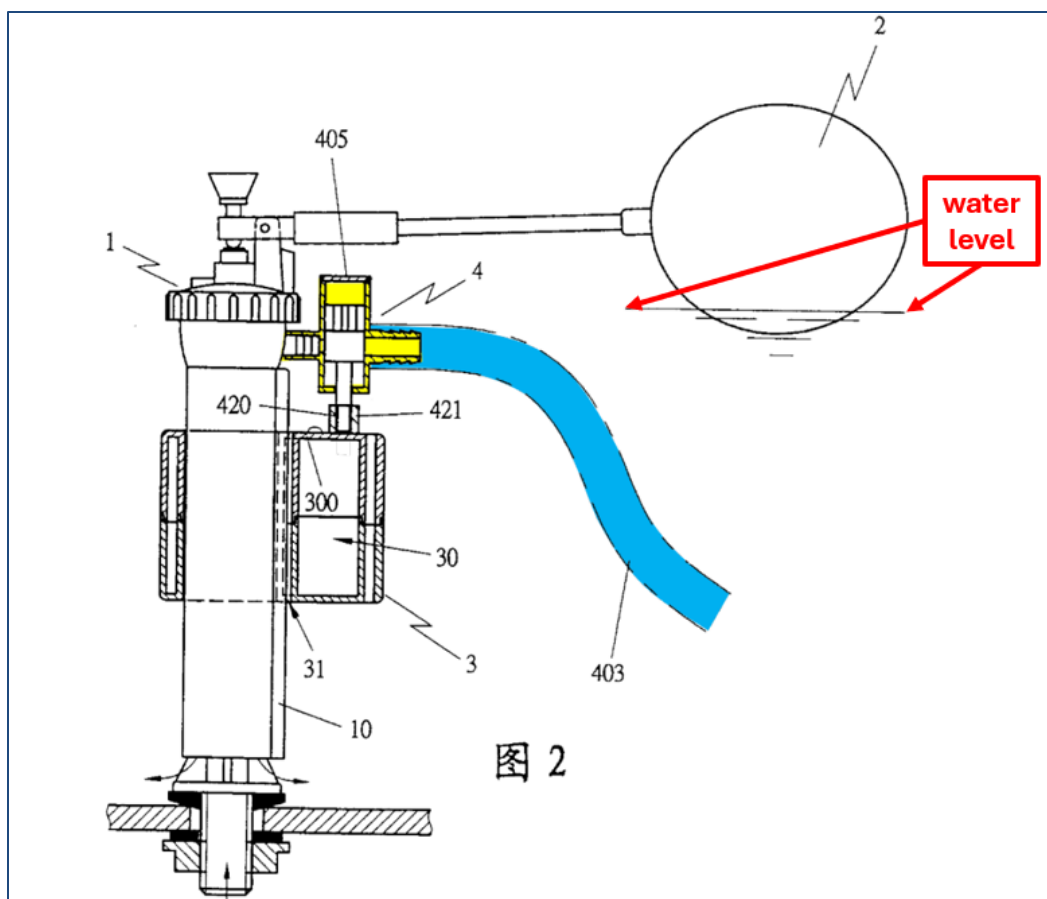
114. Petitioner’s citations and analysis of Guoxin are deficient, and that alone justifies a find that the Challenged Claims are not invalid. However, further analysis of uncited portions of Guoxin confirms that water supply line 403 is not directed to an overflow tube.

115. Consistent with its stated purpose, Guoxin explicitly teaches that water supply line 403 (1) “is directed to the toilet” and (2) “***directly*** provide[s] water supply to the toilet,” which forecloses the possibility of supply line 403 directing water to a toilet tank overflow tube:

The valve seat 40 has water inlet and outlet 401 and 402, where the water outlet 402 can be connected to the water supply pipeline 403, and ***the water supply line 403 is directed to the toilet to directly provide water supply to the toilet.***

EX1016, p. 005; EX2007, 2:18-21. Simply put, Guoxin supplies water directly to the bowl in order to increase flush volume.

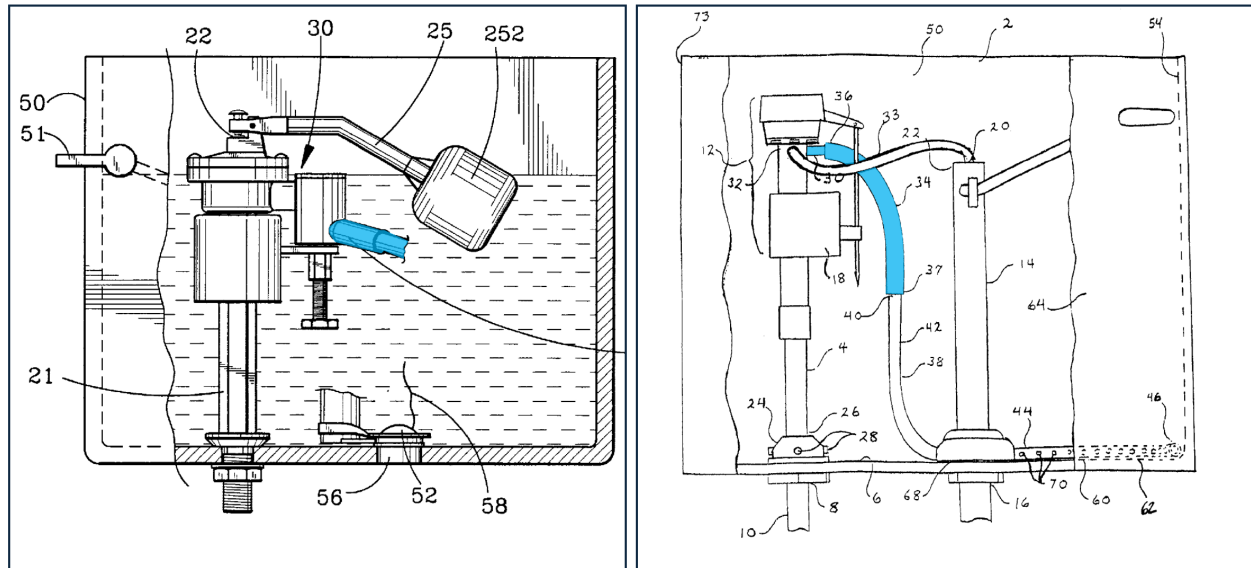
116. This is confirmed by reference to Petitioner’s annotations of Figure 2. Guoxin confirms that Figure 2 presents “[a] view of the present utility model when the water level is full.” EX1016, p. 005; EX2007, 2:6. Additional annotations have been added to Petitioner’s annotated Figure 2, below, which identify the water level. Notably, the water level when full is above both the outlet port of switching mechanism 4, and the terminal end of water supply line 403.



Pet., 42 (citing EX1016, Fig. 2) (annotated)

117. However, in order to function properly, the opening of an overflow tube must be located *above* the water level. Figure 2 indicates that water supply line 403 *descends* from the point it attaches to switching mechanism 4, which is consistent with its stated purpose of supplying water directly to the bowl in order to increase flush volume. If it were directed to an overflow tube, it would need to *ascend* from the point of attachment. This is consistent with both Ho (EX1022, Fig. 2 (below, left)) and the second tube system disclosed by U.S. Patent No. 6,546,568 (EX1014,

Fig. 1 (below, right)), both of which clearly depict a tube that (1) descends below the water line, and (2) is not directed to an overflow tube:



118. As such, limitation 1[E] is not disclosed or otherwise rendered obvious by Guoxin.

(4) Guoxin does not disclose or otherwise render obvious limitations 8[E], 8[F] and 14[B].

119. The prior analysis focused on limitation 1[E]. Each of independent claims 8 and 14 likewise include limitations that require (1) a first tube, (2) attached to the water flow regulator, which (3) provides water to a separate toilet tank overflow tube.

- **8[E] – 8[F]:** “providing, via the water flow regulator, the second portion of the water to a tube that is in contact with the water flow regulator, and providing, via the tube, the second portion of the water *to a toilet tank overflow tube.*”

- **14[B]:** “attaching a tube directly to the water flow regulator, wherein the tube is configured to direct the water from the water flow regulator directly *to a toilet tank overflow tube.*”

120. Both the Petition and Dr. Cameron merely restate the same argument and evidence previously addressed with respect to limitation 1[E]. As such, I incorporate my rebuttal herein.

b) “integrally molded with”

121. Grounds 1 and 2 rely on either Guoxin alone, or Guoxin in view of Ho to teach that the extended portion of the toilet fill valve is “integrally molded with” the body of the toilet fill valve. For purposes of my analysis, I refer to these limitations (limitations 1[A], 8[C2], and 14[A2]) collectively as the “Integrally Molded Limitations.”

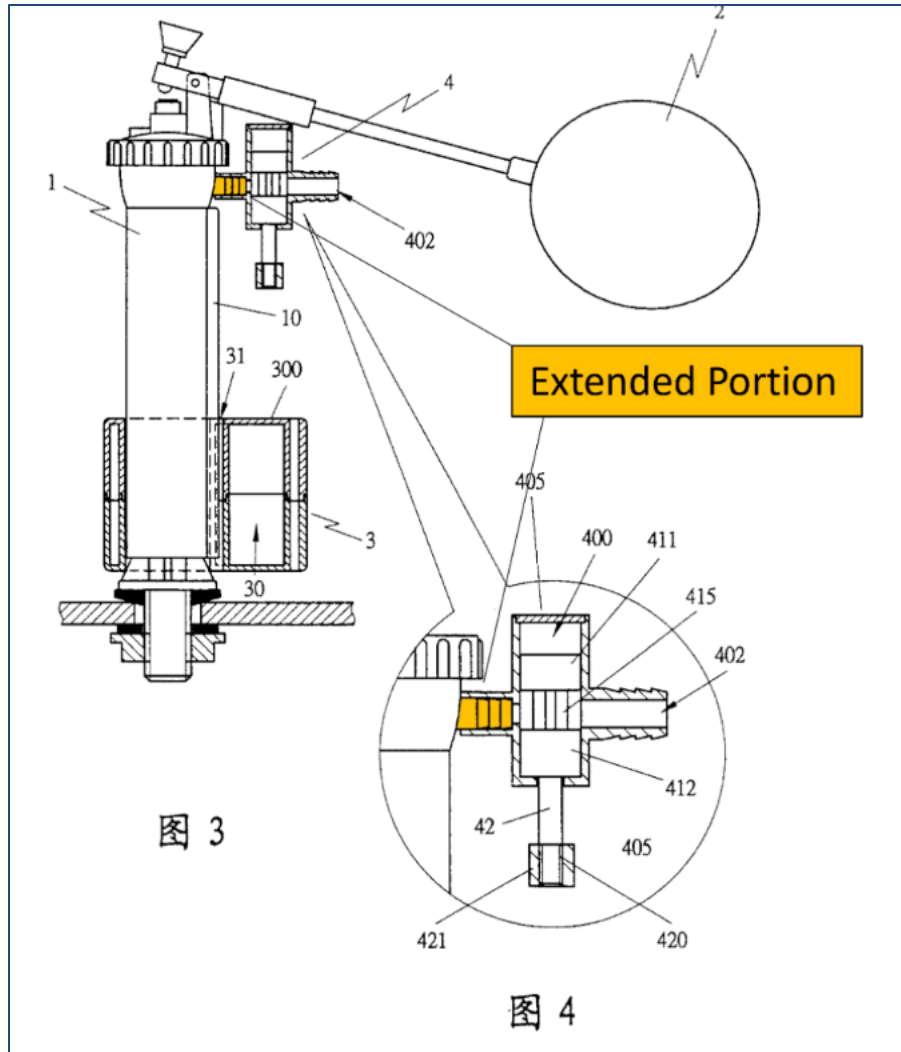
122. The following analysis is focused on limitation 1[A] as defined by Petitioner (“a toilet fill valve that comprises: a body comprising an extended portion, *wherein the extended portion is integrally molded with the body*, wherein the extended portion forms a bowl fill outlet port”). Pet., 32-34 (citing EX1004, ¶¶123-125). However, as explained in Section X.A.1.b)(3), below, the same analysis applies to limitations 8[C2] (“wherein the extended portion is integrally molded with the toilet fill valve”) and 14[A2] (“wherein the extended portion is integrally molded with the body”).

123. Because each of the remaining Challenged Claims depend from Claims 1, 8, or 14, a finding that the prior art does not disclose or otherwise render obvious limitations 1[A], 8[C2] and 14[A2] completely resolves Grounds 1 and 2.

(1) Guoxin does not disclose the Integrally Molded Limitations.

124. Guoxin does not disclose whether the alleged “extended portion” of the toilet fill valve is—or is not—integrally molded with the body of the toilet fill valve.

125. The Petition relies solely on Figures 3 and 4 of Guoxin as allegedly disclosing “a toilet fill valve having an extended portion that is integrally molded with the water inlet device 1.” Pet., 32. However, Figures 3 and 4 (reproduced below with Petitioner’s annotations) do not provide a POSITA with any information regarding the construction of Guoxin’s “water inlet device 1,” much less teach that the alleged “extended portion” and the body of the water inlet device are “molded together as a single structure.”



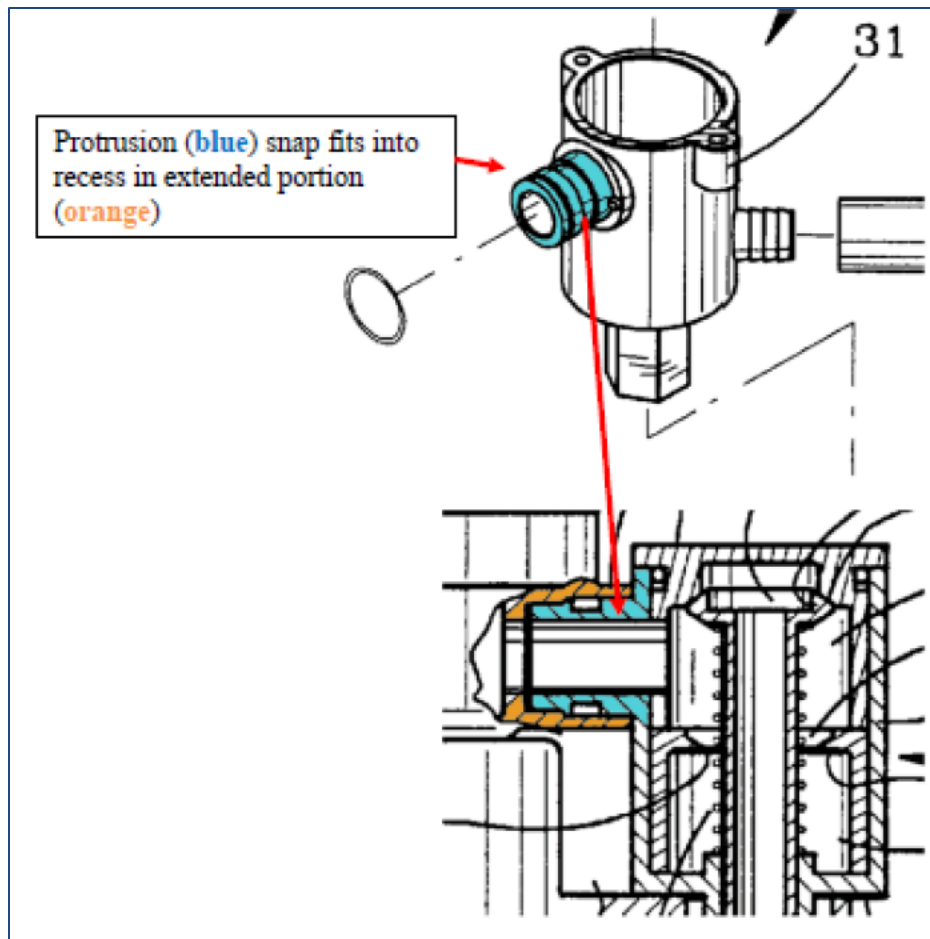
Pet., 32

126. Moreover, the Petition fails to even reference the text of Guoxin, which in turn makes no reference to the alleged “extended portion” highlighted by Petitioner in orange, nor to the portion of the body of the toilet fill valve it connects to. Likewise, Petitioner’s expert Dr. Cameron provides no additional analysis, and merely repeats the conclusory allegations from the Petition. Pet., 32 (citing EX1004 (Cameron Decl.), ¶123).

127. Guoxin itself is silent as to whether the alleged “extended portion” (as identified by the Petition) is “integrally molded” with the body of the water inlet device. Specifically, Guoxin states switching mechanism 4 is equipped with valve seat 40 with a slot to accommodate a switching valve. EX1016, p. 005; EX2007 (annotated Guoxin), 2:17-23. Guoxin discloses that the valve seat 40 has a water inlet 401 and outlet 402 but provides no disclosure—either in the specification or the accompanying figures—regarding how the alleged “extended portion” is connected to the body of the water inlet device.

(2) The Petition does not show that Ho discloses the Integrally Molded Limitations.

128. Recognizing that Guoxin does not teach the Integrally Molded Limitations, the Petition turns to Ho, alleging that in the alternative, “Ho most clearly discloses an integrally molded extended portion on a toilet fill valve with a recess into which a water flow regulator with a protrusion is inserted and locked into place.” Pet., 33 (citing EX1022 (Ho), Figs. 3, 5). Petitioner’s annotations of Ho’s Figures 3 and 5 are reproduced below:



Pet., 33

129. However, the Petition does not provide *any* analysis of Ho, nor does it make any reference to *any* portion of Ho’s disclosure other than Figures 3 and 5.⁵ Likewise, Petitioner’s expert Dr. Cameron merely reiterates the conclusory allegations set forth in the Petition. Pet., 33 (citing EX1004 (Cameron Decl.), ¶124).

⁵ Figure 5 does not even depict the alleged “extended portion” of the toilet flushing device. EX1022 (Ho), 2:29-30; Fig. 5.

Ho's specification is likewise silent regarding the construction of the device depicted in Ho's Figures 3 and 5.

130. I understand that the Board addressed Ho's disclosure as part of its Institution Decision, explaining:

But, Patent Owner's argument does not sufficiently account for what a POSITA would have known from Ho as a whole, including Ho's drawings.

...

We note that Annotated Figure 3 shows no line or other break in the orange-colored cross-hatching that would indicate separate parts. Paper 19 (Institution Decision), 20 (citing Ex. 1022, Figs. 2-5).

131. As an initial matter, I note that the Petition failed to argue the cross-hatching was indicative of integral molding. Instead, Petitioner merely referred to the figures themselves without additional analysis. Regardless, I disagree with the Board's interpretation of "what a POSITA would have known from Ho as a whole, including Ho's drawings."

132. To the extent that Figures 3 and 5 provide a POSITA with any information regarding the construction of Ho's "toilet flushing device," they do not teach that the alleged "extended portion" and the body of the toilet flushing device are "molded together as a single structure." In fact, the figures and accompanying disclosure do not confirm that Ho's fill valve is even a molded component.

(a) The Petition does not show that Ho's toilet fill valve is a molded plastic structure.

133. In order for two structures to be “molded together as a single structure,” they must comprise a single molded structure. In the context of the toilet fill valves recited by the Challenged Claims, a POSITA would have understood the term “molded” to refer to plastic structures, which are manufactured through a process such as injection molding, overmolding, or extrusion molding. EX2008 (Cameron Tr.), 35:10-39:12.

134. A POSITA would also have understood that “molded” does not refer to metal structures, which are typically “cast” or “machined.” EX2008 (Cameron Tr.), 63:21-65:21. Thus, a pre-requisite to showing that a particular prior art reference discloses “molded” toilet fill valves is first showing that the reference discloses plastic toilet fill valves. Dr. Cameron has failed to show (1) that reference to a patent figure alone is enough to determine whether a structure is plastic, and (2) that Ho in particular discloses a plastic structure. These deficiencies are fatal to a finding that Ho discloses the claimed Integrally Molded Limitations.

(i) Dr. Cameron does not analyze the composition of Ho's toilet fill valve.

135. Both the Petition and Dr. Cameron include a single conclusory sentence allegedly showing that Ho discloses the Integrally Molded Limitations.

To the extent PO <i>incorrectly</i> argues that the extended portion illustrated in Guoxin is not “integrally molded,” Ho most clearly discloses an integrally molded extended portion on a toilet fill valve with a recess into which a water flow regulator with a protrusion is inserted and locked into place.	While Guoxin alone satisfies this element, if PO incorrectly argues that the extended portion illustrated in Guoxin is not “integrally molded,” then Ho clearly discloses an integrally molded extended portion on a toilet fill valve with a recess into which a water flow regulator with a protrusion is inserted and locked into place. See EX1022, annotated Figs. 3 and 5 below.
Pet., 33 (citing EX1022, Figs. 3, 5; EX1004, ¶124).	EX1004, ¶124 (citing EX1022, Figs. 3, 5).

136. Neither the Petition nor Dr. Cameron include any analysis that Ho actually discloses a “molded” structure. Neither the Petition nor Dr. Cameron rely on any evidence from the specification. Neither the Petition nor Dr. Cameron explain which portions of the cited figure(s) allegedly show integral molding. Instead, the Petition merely points to figure(s) in question and asks Patent Owner and the Board to draw their own conclusions.

(ii) The evidence casts doubt on Dr. Cameron’s ability to determine the composition of a fill valve from figures alone.

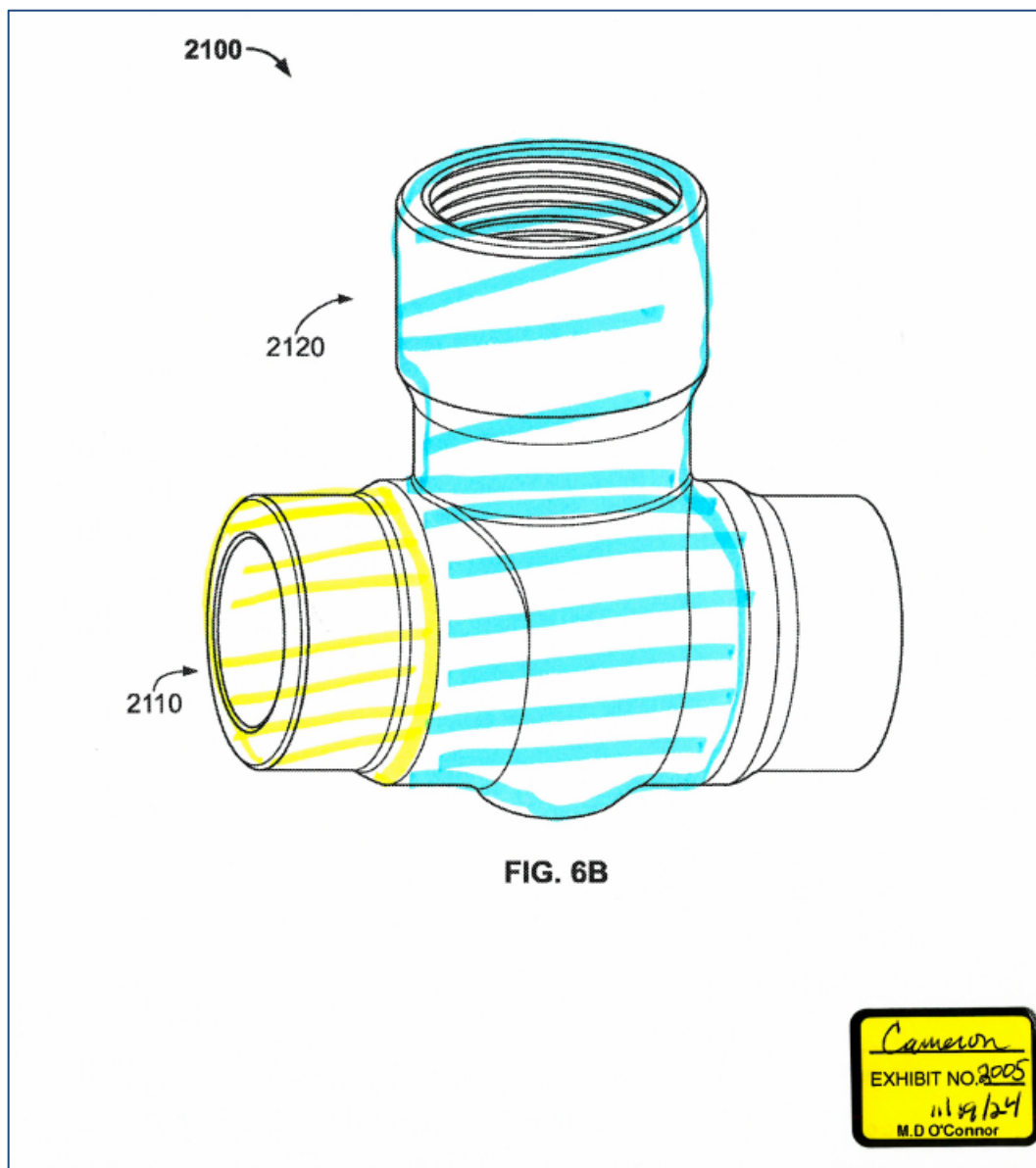
137. As referenced above, the only evidence Petitioner and Dr. Cameron rely on to show that the alleged “extended portion” of Ho’s toilet fill valve is integrally molded with the body of the toilet fill valve are Figures 3 and 5 of Ho. Notably, Dr. Cameron did not explicitly conclude Ho depicts a plastic toilet fill valve, nor does her declaration contain any analysis related to that fact.

138. In my opinion, looking solely at out-of-context figures, it is difficult to conclusively determine whether a toilet fill valve is made of plastic polymers (and therefore whether an extended portion of the fill valve *might* be integrally molded with the body of the fill valve), or whether the fill valve is made of steel, brass, or another metal.

139. Dr. Cameron has consistently shown that in order to determine whether a toilet fill valve is metal or plastic, it is necessary to consider the reference as a whole. *First*, when questioned about the makeup of the toilet fill valve depicted in Brown, Dr. Cameron testified that although the Brown does not disclose the composition of the body of the fill valve, she “would assume” the body of the fill valve is made of plastic because of her review of the specification (and in particular because the specification calls out other components as being plastic). EX2008 (Cameron Tr.), 111:3-112:2. During her deposition, Dr. Cameron was unable to identify any characteristics of a figure (other than explicit material descriptions in the specification) that would indicate the composition of a depicted structure. EX2008 (Cameron Tr.), 115:12-116:5.

140. *Second*, Dr. Cameron was presented with a figure depicting a *brass* valve during her deposition. EX2005; EX2008 (Cameron Tr.), 162:8-163:17. Based solely on her review of the figure, Dr. Cameron testified that “the portion of the

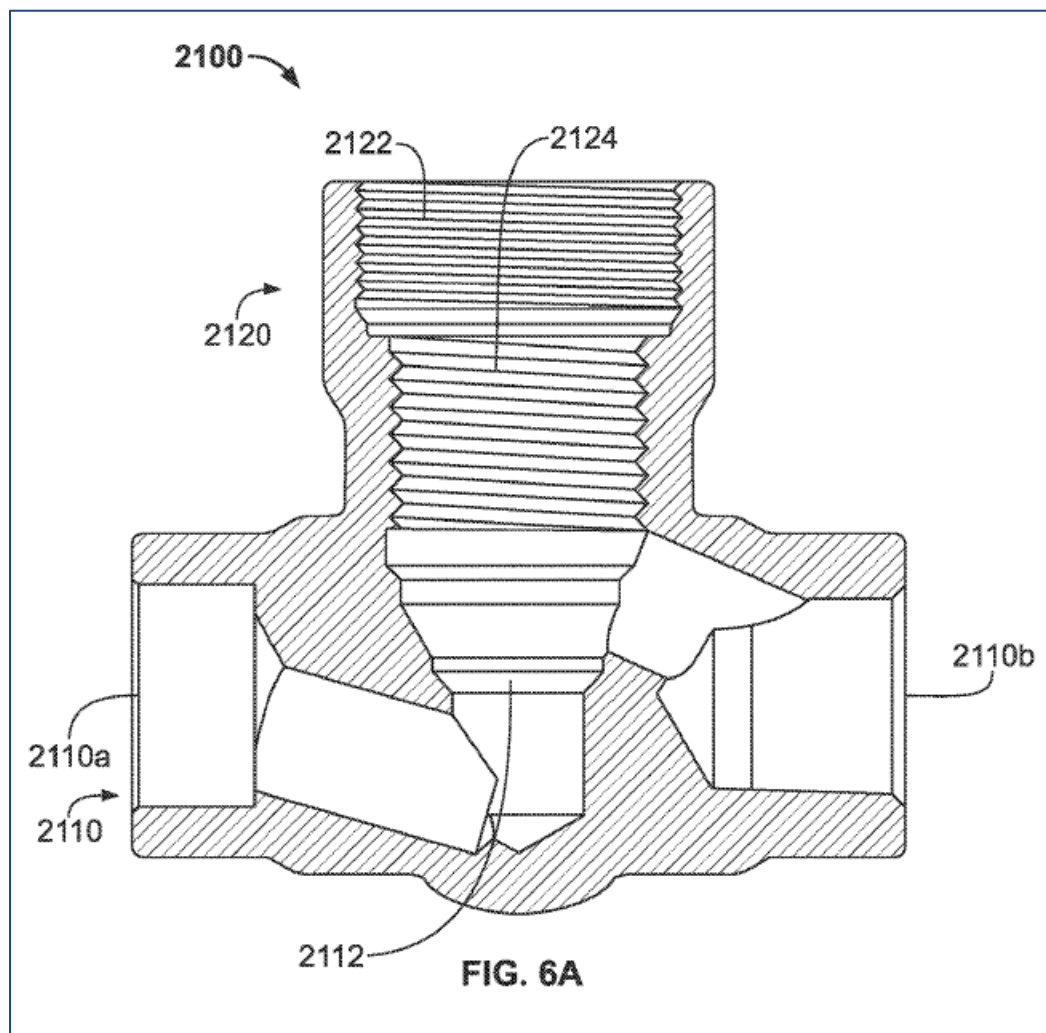
valve highlighted in yellow is integrally molded with the portion of the valve highlighted in blue.” EX2008 (Cameron Tr.), 163:6-11.



EX2005, Fig. 6B

141. According to Dr. Cameron, she came to this conclusion because “there’s nothing on here that would indicate to me that there are separate parts in here.” EX2008 (Cameron Tr.), 163:12-17. A section cut of the valve in question

confirms that the portions of the valve highlighted in blue and yellow are in fact a single structure.



EX2011, Fig. 6A

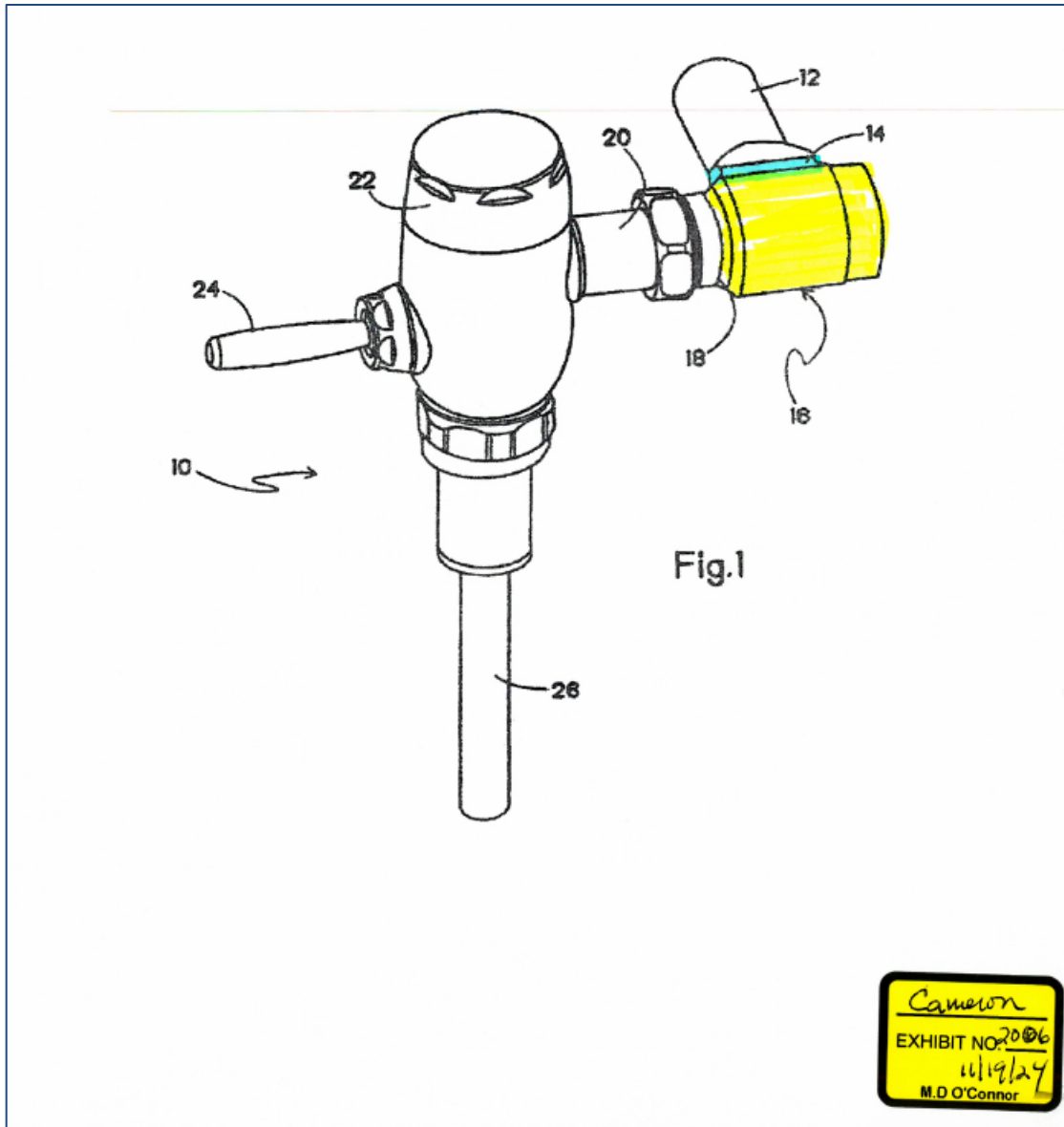
142. However, review of the specification confirms that the valve in question is made of brass, not plastic. EX2011, ¶¶[0089]-[0089] (“In this embodiment, the valve body 2100 is made of brass”). And, as Dr. Cameron confirmed, metal valves

are typically cast or machined, not molded. EX2007 (Cameron Tr.), 63:21-64:1.⁶ As such, they cannot be integrally molded. Simply put, Dr. Cameron did not identify anything in the figure that indicated that it depicted a brass valve. As such, she incorrectly concluded that the figure depicted an integrally molded plastic valve.

143. *Third*, when presented with a figure depicting a plumbing installation with a flush valve, Dr. Cameron was unable to determine whether two portions of the figure were integrally molded together based solely on her review of the figure. EX2008 (Cameron Tr.), 163:20-167:14.⁷

⁶ Dr. Cameron also notes that there are similarities between casting metal and molding plastic, but ultimately concludes the processes are different. EX2007 (Cameron Tr.), 64:2-10. I agree.

⁷ Again, the structure depicted in EX2006 is composed of brass, not plastic. EX2012, 3:31-40. However, Dr. Cameron did not consider the composition of the structure when forming her opinion.



EX2006, Fig. 1

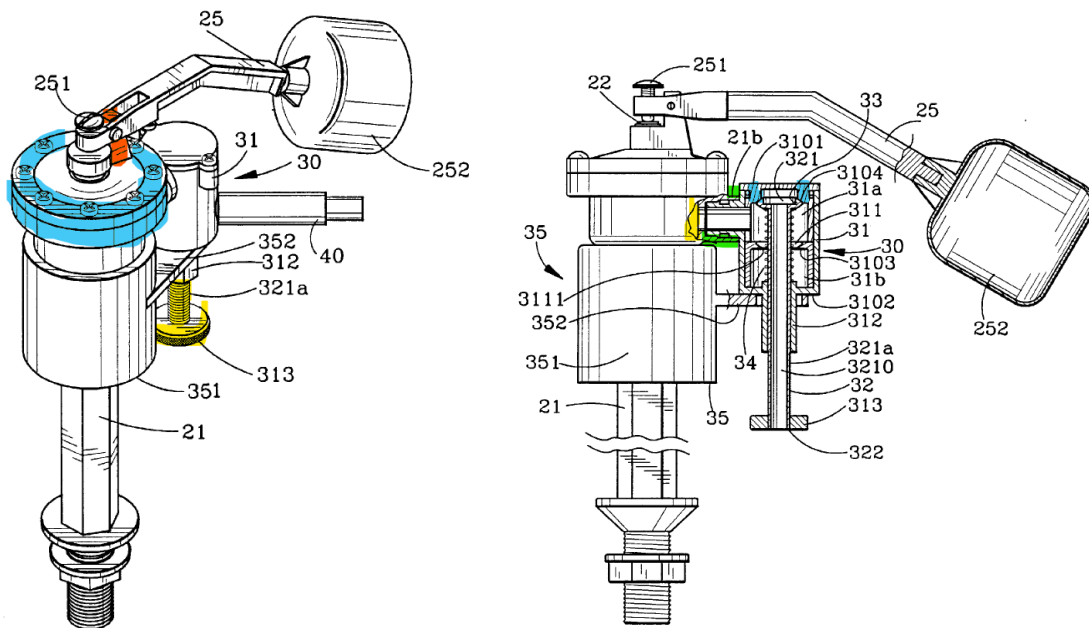
144. Dr. Cameron concluded that additional evidence was needed to determine whether or not the figure depicted an integrally molded structure. EX2008 (Cameron Tr.), 164:5-165:15.

145. When considering whether Brown disclosed a metal structure, Dr. Cameron relied on the specification. She incorrectly assumed a brass valve

(EX2005) was made of plastic in the absence of additional guidance from the specification. And, she agreed that should could not determine whether a flush valve (EX2006) was integrally molded based solely on review of a figure. In each instance, Dr. Cameron needed something more than a patent figure to correctly determine whether a structure was metal or plastic. Simply put, it is unreasonable to conclude that Dr. Cameron, or any POSITA, can identify whether or not a figure depicts an integrally molded plastic structure based solely on review of static figures.

(iii) Dr. Cameron has failed to establish that Ho's Figure 3 depicts a "molded" plastic structure.

146. Ho itself is silent to the construction of the fill valve disclosed therein. Based on my review of the figures, claims, and specification of Ho, I highlight the following aspects of the reference that would have informed a POSITA that Ho's fill valve is made of steel, brass, or some other metal:



- *First*, the valve body flange highlighted in blue, above has a cylindrical outside diameter. Commonly, in a plastic injection molded part, the screw bosses would be formed as projections from the nominal wall such as seen at 31, above. This is to avoid thick wall sections at the intersection of boss and wall, which produces residual stress and sink marks in plastic parts, but not in metal parts.
- *Second*, the orange feature projecting upwards from the blue valve housing is quite thick and does not have the characteristics of a plastic molded part. Normally, this wall thickness would be cored out to remove material to avoid the thick wall section issue described above.

- *Third*, nut 313 has a knurled outer diameter.⁸ This very clearly indicates it is a machined metal part with secondary knurling applied.
- *Fourth*, regarding valve housing 31, the overall construction could potentially be made as either machined brass, or sand cast and post machined brass. The thick wall sections in blue above are not characteristic of a properly designed injection molded part. The zero-draft nature of the inside diameters of the inner and outer parts indicate either (1) a machined or post machined form, or (2) just that the figure is illustrative and not an engineering drawing.

147. Ultimately, the specification is silent as to the composition of Ho's fill valve, and the Petition does not allege it would be obvious to implement a specific composition in light of Ho's disclosure. The figures are illustrative drawings that do not disclose the material in question. When viewed in combination with the specification (which is silent regarding material), Ho's figures do not provide clear and convincing evidence that the structure in question is (1) cast or machined metal, or (2) molded plastic. Given that Ho's figures are ambiguous—and the specification

⁸ Knurling is a manufacturing process that creates a pattern of raised ridges, typically cross-hatched, on a metal structure. It is often added to knobs to increase gripping friction.

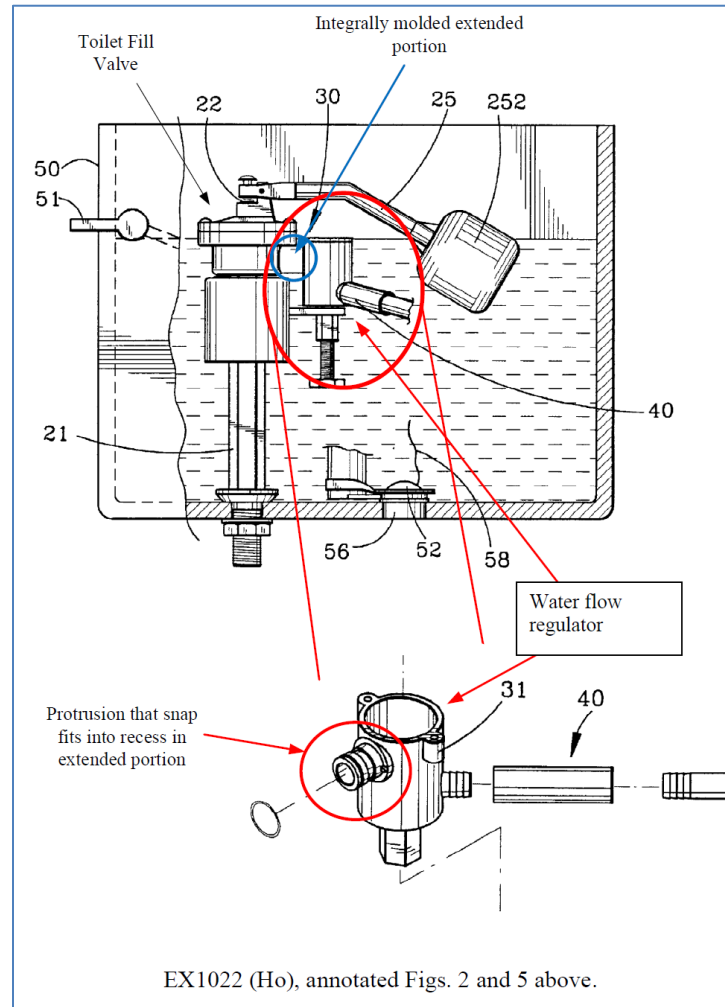
is ultimately silent—a POSITA would not have concluded that the body of Ho’s toilet fill valve is integrally molded with an extended portion of the fill valve.

(b) The Petition does not show that Ho discloses or otherwise renders obvious the Integrally Molded Limitations.

148. If the Board determines Ho discloses a “molded” structure, the Petition still fails to show that the body of the toilet fill valve is “integrally molded with” the extended portion of the body.

149. Ho’s Figure 3 (as cited by Petitioner and the Board) must be viewed in the context of “what a POSITA would have known from Ho as a whole, including Ho’s drawings.” Paper 19 (Institution Decision), 20. Ho explicitly teaches that “Fig. 2 is a partly sectional view of the toilet flushing device of the present invention when in a normal state” while “Fig. 3 is a partly sectional view of the diverter valve means of the toilet flushing device of the present invention when the latter is in the normal state.” EX1022 (Ho), 2:22-26. A POSITA would have understood that Figure 2 depicts a section cut of the toilet tank (as a whole), while Figure 3 depicts a section cut of the same diverter valve depicted in Figure 2. Indeed, elsewhere in her declaration, Petitioner’s expert Dr. Cameron points to Figure 2 as disclosing the

toilet fill valve and allegedly “integrally molded extended portion.” EX1004 (Cameron Decl.), p. 43.⁹



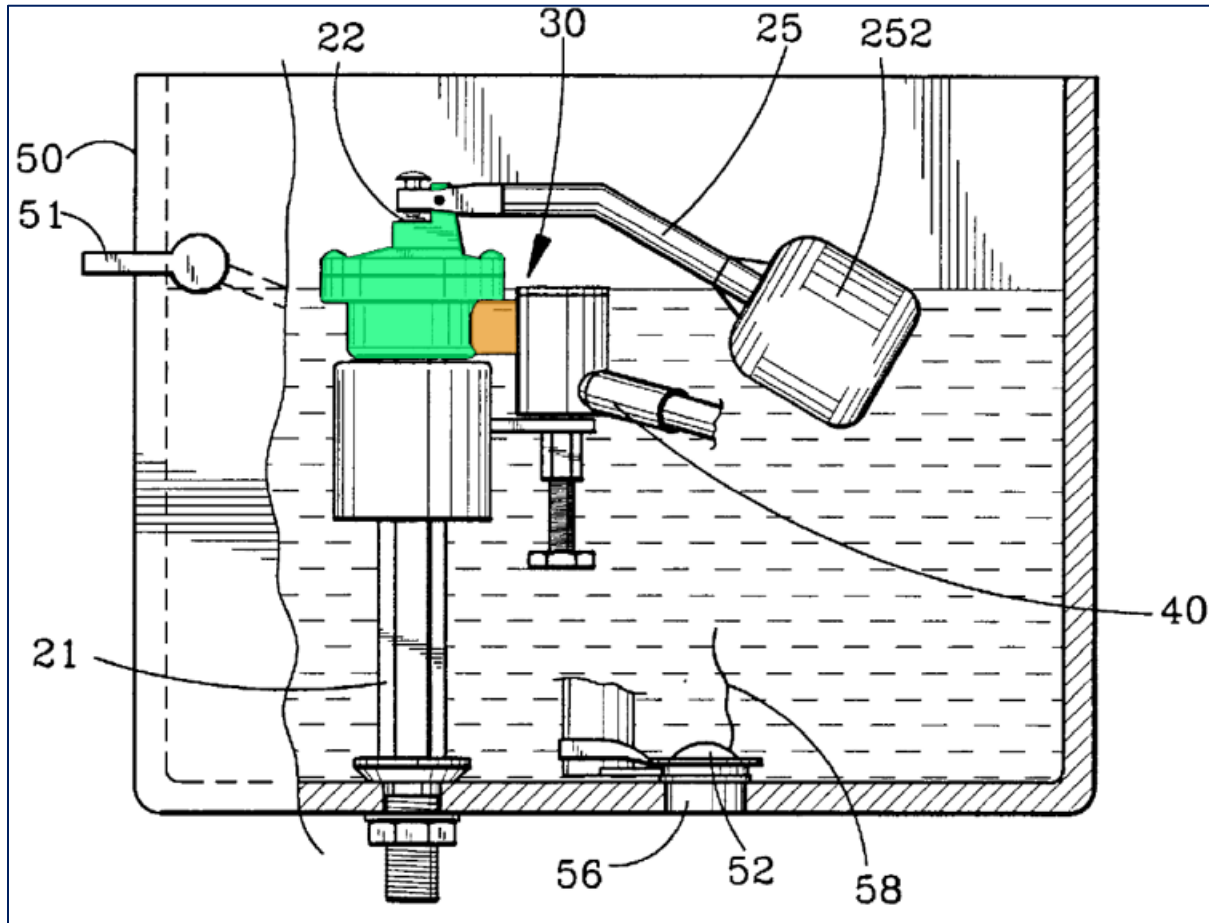
EX1004 (Cameron Decl.), p. 43

150. Ho’s Figure 2, however, depicts the body of the toilet fill valve (green) and the “extended portion” of the toilet fill valve (orange) as separate structures, and

⁹ These annotations are missing from the Petition itself. Pet., 31.

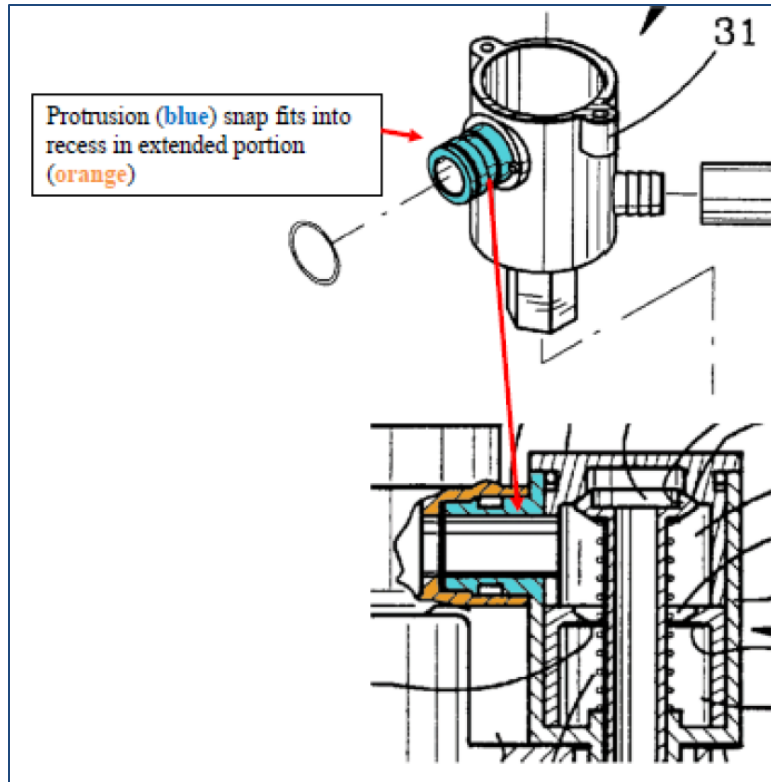
provides no indication that the two structures are integrally molded together.

EX1022 (Ho), Fig. 2 (annotated).



EX1022 (Ho), Fig. 2 (annotated)

151. Rather than address Figure 2, the Petition instead highlights the connection between the “extended portion” of the toilet fill valve (annotated by Petitioner in orange) and the *bowl* fill valve (annotated by Petitioner in blue). Specifically, the Petition explains that “[p]rotrusion (blue) snap fits into recess in extended portion (orange).” Pet., 33.



Petition, 33

152. This connection, however, is irrelevant. Instead, the appropriate analysis is whether Ho discloses an “extended portion” that is integrally molded with the *toilet* fill valve. The following annotations to Ho’s Figure 3 reproduce Petitioner’s annotations of the extended portion (in orange) and additionally identify the body of the toilet fill valve in green. EX1022, Fig. 3 (annotated). The pertinent question is whether a POSITA would have understood that Ho’s “extended portion” (orange) is integrally molded with the “toilet fill valve” (green). This analysis, however, is absent from both the Petition and Dr. Cameron’s declaration.

Paper 19 (Institution Decision), 20 (citing Ex. 1022, Figs. 2-5). However, as depicted above, the cross-hatching identified by the Board does not extend to the body of the toilet fill valve (green).

155. The cross-hatching on the alleged “extended portion” (orange) merely shows that the “extended portion” itself is not composed of separate parts, ***not*** that the extended portion and the body of the toilet fill valve (highlighted in green, above) are “molded together as a single structure.” Neither the Petition’s conclusory analysis nor the Board’s preliminary findings render the Challenged Claims obvious.

(3) Petitioner’s analysis with respect to Claims 8 and 14 fails to provide any additional support.

156. The Petition does not provide any additional substantive analysis with respect to limitations 8[C2] (Pet., 46 (citing EX1004, ¶160)) or 14[A2] (Pet., 51 (citing EX1004, ¶177)). Likewise, neither the figures referenced therein nor Dr. Cameron’s declaration provide any analysis beyond that discussed with respect to limitation 1[A]. As such, for the same reasons as discussed above with respect to limitation 1[A], neither Guoxin nor Ho disclose limitations 8[C2] or 14[A2].

2. The Petition does not articulate a motivation to combine the teachings of the prior art or a reasonable expectation of success in doing so.

a) The Petition does not articulate a motivation to reverse the configuration of Guoxin’s male and female fluid flow connectors based on the teachings of Ho.

157. Guoxin discloses a water flow regulator, wherein a portion of the toilet fill valve is configured to insert into the water flow regulator. The Challenged Claims, meanwhile, require the reverse arrangement—namely, a water flow regulator wherein a portion of the water flow regulator is configured to insert into the toilet fill valve.

158. The Petition relies on reversing the configuration of Guoxin’s male and female fluid flow connectors—based on the alleged teachings of Ho—for each of limitations 1[D2], 8[C4], and 14[A1]. Pet., 37-39, 48, 51. Because each of the remaining Challenged Claims depend from Claims 1, 8, or 14, a finding that there is no motivation to reverse Guoxin’s male and female fluid flow connectors resolves Grounds 1 and 2.

(1) The Petition does not identify the alleged “design preferences” that allegedly motivate reversal.

159. The Petition alleges that male and female fluid flow connectors are interchangeable as a matter of design preference, but fails to identify (1) what those design preferences are, or (2) why the unidentified “design preferences” would have

motivated a POSITA to reverse the fluid flow connector arrangement. Specifically, the Petition states:

- “A POSITA would understand that male and female fluid flow connectors are generally interchangeable and the selection of which is *a matter of design preference*.” Pet., 28-29 (citing EX1004, ¶¶114-117; EX1017, 7:15-24, Figs. 5-6; EX1006, 80-81).¹⁰
- “[U]sing a male connector on the bowl fill restriction, such as the one shown in Ho, instead of the female connector, such as the one shown in Guoxin, would have been obvious to a POSITA *as a matter of design preference*” because “[t]hey are well-known substitute structures for performing the same function in their known and expected manner and would require only a simple substitution of one known coupling arrangement for another to obtain predictable results.” Pet., 29 (citing EX1004, ¶119); *see also* Pet., 38 (citing EX1004, ¶¶137-140).

160. This is further emphasized by the Petition’s “summary” section, where Petitioner reiterates that “switching or reversing the mating surfaces” of “fluid conduits is merely a matter of design preference,” before explaining that the Bjerke

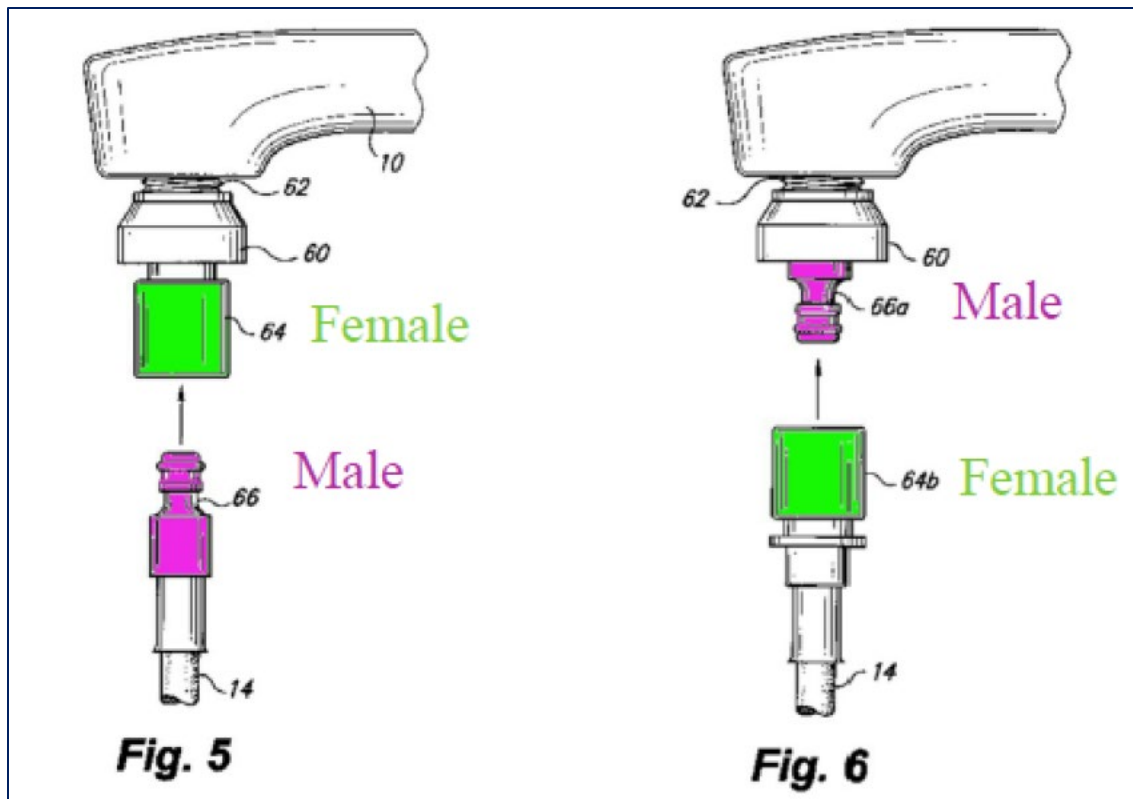
¹⁰ Dr. Cameron’s testimony largely corresponds to the statements made in the Petition. Where Dr. Cameron provided additional analysis, I address it directly.

reference teaches that “male and female connectors *can be reversed* in relation to each other and are thus interchangeable.” Pet., 42-43 (citing EX1004, ¶150; EX1017 (Bjerke), 7:15-24, Figs. 5-6).

161. The question of whether a POSITA would have been capable of reversing the fluid flow connector configuration is not in dispute. Indeed, the mere fact that a POSITA *could* have reversed Guoxin’s fluid flow connection does not mean that they *would* have been motivated to do so. Simply put, the Petition is deficient because it (1) fails to identify the alleged “design preferences” that motivate the proposed reversal, and (2) explain why a POSITA would have been motivated to reverse the fluid flow connection on the basis of those preferences.

(2) The Petition *ignores* potential design preferences discussed by the prior art.

162. As referenced above, Petitioner correctly notes that Bjerke discloses multiple configurations of fluid flow connectors, as disclosed in Petitioner’s annotations of Bjerke’s Figures 5 and 6, reproduced below:



Pet., 42-43 (citing EX1017 (Bjerke), 7:15-24, Figs. 5-6).

163. The cited portion of Bjerke is also reproduced below:

As illustrated in FIG. 6, the backflow preventer 60 may be provided with the male portion 66a of the quick connect/disconnect, while the hose 14 may be provided with the female portion 64a of the quick connect/disconnect. ***Consequently, FIG. 6 illustrates the reversal of the male and female portions of the quick connect/disconnect in comparison with the form of the invention illustrated in FIG. 5.*** It will also be appreciated that the male threads 62 and female threads on the faucet 10 may be reversed, depending upon whether the faucet has male or female threads.

EX1017 (Bjerke), 7:15-24.

164. However, the Petition does not acknowledge that uncited portions of Bjerke also provide *design preferences* that provide a POSITA with guidance regarding when to use a particular fluid flow connector configuration. Specifically, Bjerke explains that:

The arrangement set forth in FIG. 5 is preferred [for the use case contemplated by Bjerke], however, because the female connection 64 prevents upward spray at the connection and also affords an easier connection method by requiring movement of the male and female portions of the quick connect/disconnect in an upward direction.

EX1017 (Bjerke), 7:24-29. Bjerke teaches that (with respect to the problems Bjerke is designed to solve), a particular configuration is preferred because it (1) prevents upward spray at the connection, and (2) affords an easier connection by requiring an upward movement. Neither consideration is relevant here. Indeed, the connections at issue are horizontal, and contained within a toilet tank, eliminating the relevance of upward spray or connection via an upward movement.

165. As explained above, the Petition fails to identify any design considerations relevant to the problem considered by the prior art, which would lead a POSITA to modify the fluid flow connection configuration disclosed by Guoxin. Additionally, the Petition does not explain how the (unidentified) “design preferences” would have motivated a POSITA to make the modification.

(3) The Petition relies on improper hindsight.

166. In fact, the only potential “design preferences” articulated by the Petition are based on the teachings of the ’993 Patent itself, which is impermissible hindsight. *First*, Dr. Cameron relies on the prosecution history of what she calls “the grandchild ’698 patent” as providing “another example of the interchangeability of male and female connectors, and specifically connectors for toilet fill valves” (U.S. Patent No. 10,934,698). EX1004, ¶116.

167. However, Dr. Cameron fails to make clear that the ’698 Patent is (1) a ***continuation*** of the ’993 Patent, and thus has an identical specification, and (2) was prosecuted ***after*** the ’993 Patent was granted. Effectively, Dr. Cameron is relying on the specification of the ’993 Patent itself as support for the proposed modification. As such, Dr. Cameron’s allegation that portions of the ’698 Patent’s specification provide support for “the precise arrangement disclosed by Guoxin” while also teaching that “it is possible that this arrangement may be reversed” is the very definition of hindsight. EX1004, ¶¶116-117.

168. In fact, when describing what she deems “an obvious design choice,” Dr. Cameron explains that “[i]t is ***clear from the ’993 patent specification*** and the intrinsic evidence that PO placed no criticality on which portion of the coupling was the male portion and which portion was the female portion.” EX1004, ¶117. However, the mere fact that the specification discloses multiple options for fluid flow connector configurations is irrelevant. The ’993 Patent claims a specific

configuration, and Dr. Cameron fails to identify any rationale (other than the teachings of the '993 Patent itself) regarding why a POSITA would be motivated to modify Guoxin with that specific configuration.

169. *Second*, the Petition alleges that “[t]he toilet fill valve connectors here are likewise interchangeable.” Pet., 29 (citing EX1004, ¶118; EX1001, 7:21-33). However, as support for this statement both Dr. Cameron and the Petition itself rely **only on** the teachings of the '993 Patent that (according to Dr. Cameron) “confirms the obvious interchangeability of protrusions, ribs, recesses, etc., on the respective couplings.” EX1004, ¶118 (citing EX1001, 7:21-33). Once again, reliance on the challenged patent itself to provide the motivation to modify the prior art is the definition of impermissible hindsight.

170. *Third*, the Petition argues that because “the '993 Patent discloses the obvious interchangeability of the protrusions, ribs, recesses, etc., on the respective couplings” and “contemplates the use of any of a variety of well-known snap fit and sealing configurations” that “Guoxin alone, or Guoxin in view of Ho renders obvious independent claim 1.” Pet., 43 (citing EX1001, 7:21-33; EX1004, ¶151). Once again, Petitioner improperly relies on the teachings of the '993 Patent itself as justification for why a POSITA would be motivated to reverse the Guoxin’s fluid flow connectors.

171. In summation, the Petition fails to identify *any* design preferences that would allegedly motivate a POSITA to reverse the fluid flow connector configuration disclosed by Guoxin. In fact, Petitioner ignores the design considerations disclosed by Bjerke and fails to provide any analysis supporting how those considerations would—or would not—motivate a POSITA to make the suggested changes. The *only* support for the proposed modification is the '993 Patent itself, which is impermissible hindsight.

b) The Petition does not articulate any motivation to combine the Quick Connection Art with Guoxin and/or Ho, nor any reasonable expectation of success in doing so.

172. The Petition's motivation to combine analysis is also deficient with respect to the Quick Connection Art. Specifically, Petitioner relies on the conclusory allegation that the art discloses “well-known fluid flow connections.” Pet., 57. But, the mere fact that the fluid flow connections were allegedly well known says nothing about whether a POSITA would have been motivated to combine the Quick Connection Art with Guoxin and/or Ho.

173. Rather than identify any particular motivation to combine any particular reference with Guoxin or Ho (or the combination of the two), Petitioner makes the conclusory statement that “it would have been obvious to a POSITA to use any known method of connecting two fluid channels to one another, such as any of those disclosed in the quick connection art.” Pet., 57. But, once again, Petitioner

fails to identify the specific considerations that would have motivated a POSITA to further modify the fluid flow connections disclosed by Guoxin and/or Ho. As set forth below, not only did Petitioner fail to explain why a POSITA would have been motivated to make the suggested modification, but Petitioner also ignored evidence that suggested against the combination:

- **Bjerke**: As discussed above, Bjerke relies on design considerations that are not relevant to the toilet fill valves in question. Section X.A.2.a)(2).
- **Calmettes**: Calmettes provides a device for locking two coaxial tubes, “for example those constituting elements of a cooling circuit in a vehicle motor.” EX1018, 1:4-16. It further describes that these types of connections are “generally made of metal.” EX1018, 1:35-43.
- **Hall**: Hall, likewise, gives no indication that it relates to molded plastic components. Given the timing of the invention in question (1911), it seems likely that it refers to connections regarding metal pipes and/or rubber hoses, *not* plastic piping or tubing. The couplings depicted therein have characteristics of cast and/or machined metal parts, not molded plastic parts. EX1019.
- **Kimber**: Kimber relates to “the coupling of hoses to the radiators of automobiles.” EX1020, p. 003.

174. Dr. Cameron testified in her deposition that a POSITA would have typically used either metal or plastic in a fluid system (but not both). EX2008 (Cameron Tr.), 57:14-58:13. Dr. Cameron also testified that certain connection mechanisms are better suited for plastic fluid systems (as opposed to metal systems) because of (1) the pressure inside, and (2) because plastic is more easily deformed. EX2008 (Cameron Tr.), 56:2-57:13. Despite this testimony, neither Dr. Cameron nor Petitioner provide any analysis regarding how (or why) each specific connection mechanism disclosed by Bjerke, Calmettes, Hall, or Kimber would have been adapted for molded plastic toilet systems.

175. As discussed above, there are numerous design considerations that a POSITA would have taken into account when designing a fluid flow connection. The Petition's conclusory recitation that certain fluid flow connectors are well known in the art is insufficient to show that a POSITA would have been motivated to make the proposed modifications.

176. As such, Ground 2 fails to show that the proposed combinations would have been obvious to a POSITA.

3. The Petition is deficient with respect to certain dependent claims.

a) Claim 5: “wherein the actuating arm is angularly offset relative to the bowl fill valve, thereby preventing an interference with the water flow regulator and a translation

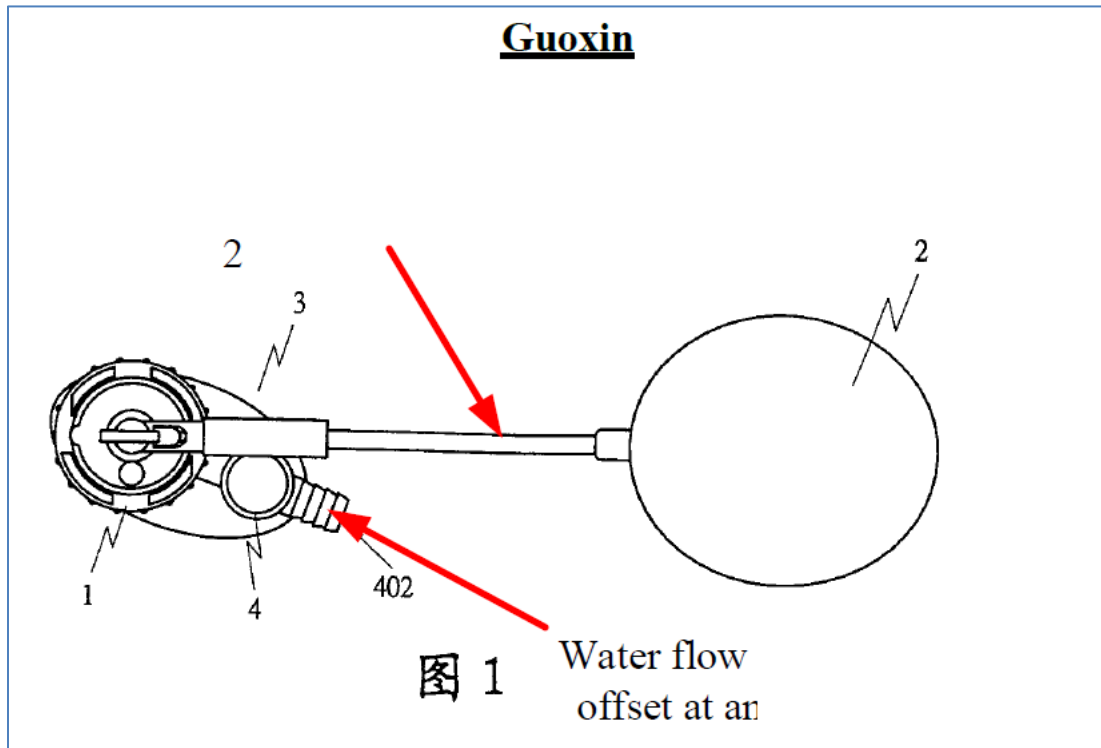
stem that extends from the float to a free end of the actuating arm”

177. Dr. Cameron explains that she understands the term “bowl fill valve” in claim 5 to refer to the claimed “water flow regulator” of claim 1. EX1004, ¶188 n. 1. During her deposition, she testified that “it seemed reasonable that what it meant to refer to was the water flow regulator.” EX2008 (Cameron Tr.), 191:15-193:3. I agree that a POSITA would have reasonably understood the term “bowl fill valve” in claim 5 to refer to the “water flow regulator” of claim 1.

178. The Petition alleges that Claim 5 “would have been intuitively obvious to a POSITA—who would not seek to design a toilet fill valve with a conventional float attached to a translational arm that was obstructed in some manner from freely translating.” Pet., 53. Despite the Petition’s unsupported conclusions regarding what a POSITA would—or would not—seek to design, neither Guoxin nor Ho disclose this limitation.¹¹

¹¹ Although the Petition alleges that “[t]he features recited by claim 5 are disclosed and illustrated in ... Ho,” it does not articulate any motivation to combine Ho’s “actuating arm,” “water flow regulator,” “translation stem,” or “float” with Guoxin’s toilet fill valve, nor does it articulate a reasonable expectation of success in doing so. Pet., 53.

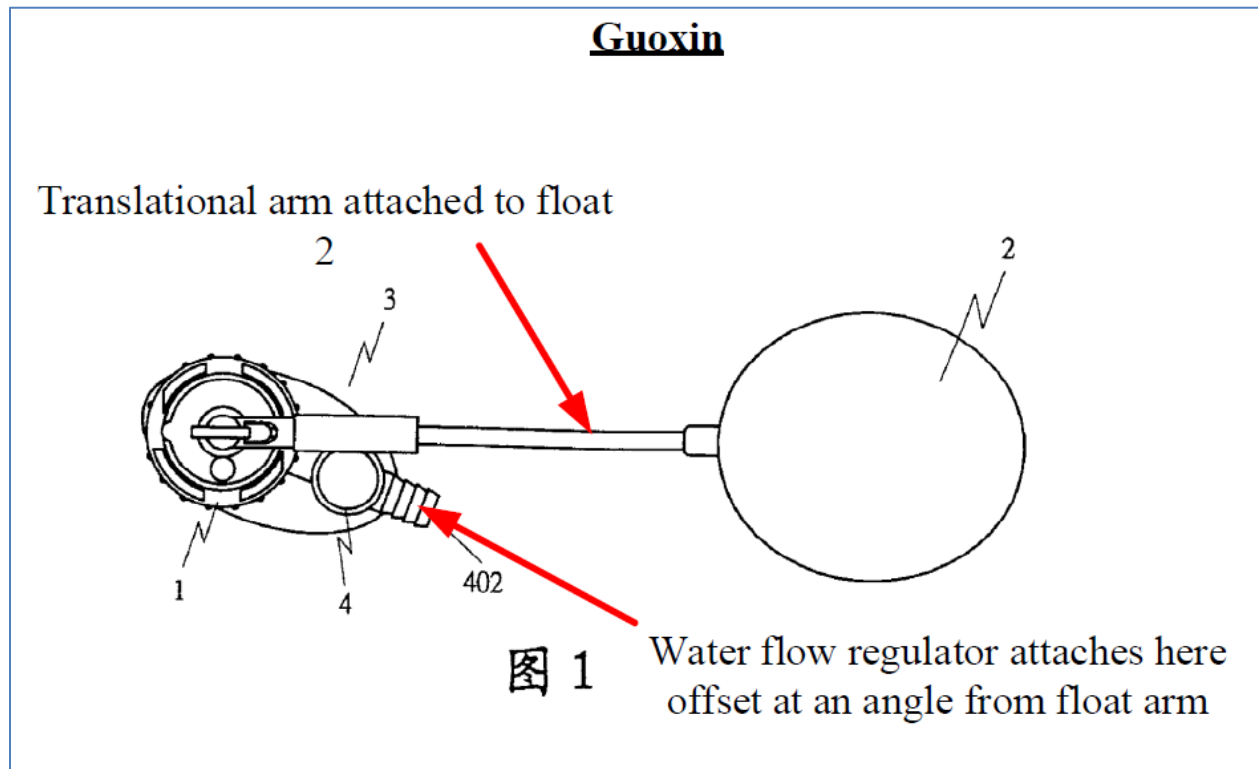
179. With respect to Guoxin, the Petition merely refers to Figure 1, but does not provide any analysis of where or how this limitation is allegedly disclosed. For this reason alone, the Petition is deficient. Pet., 53-54. Petitioner’s annotated Figure 1 is reproduced below:



Pet., 53

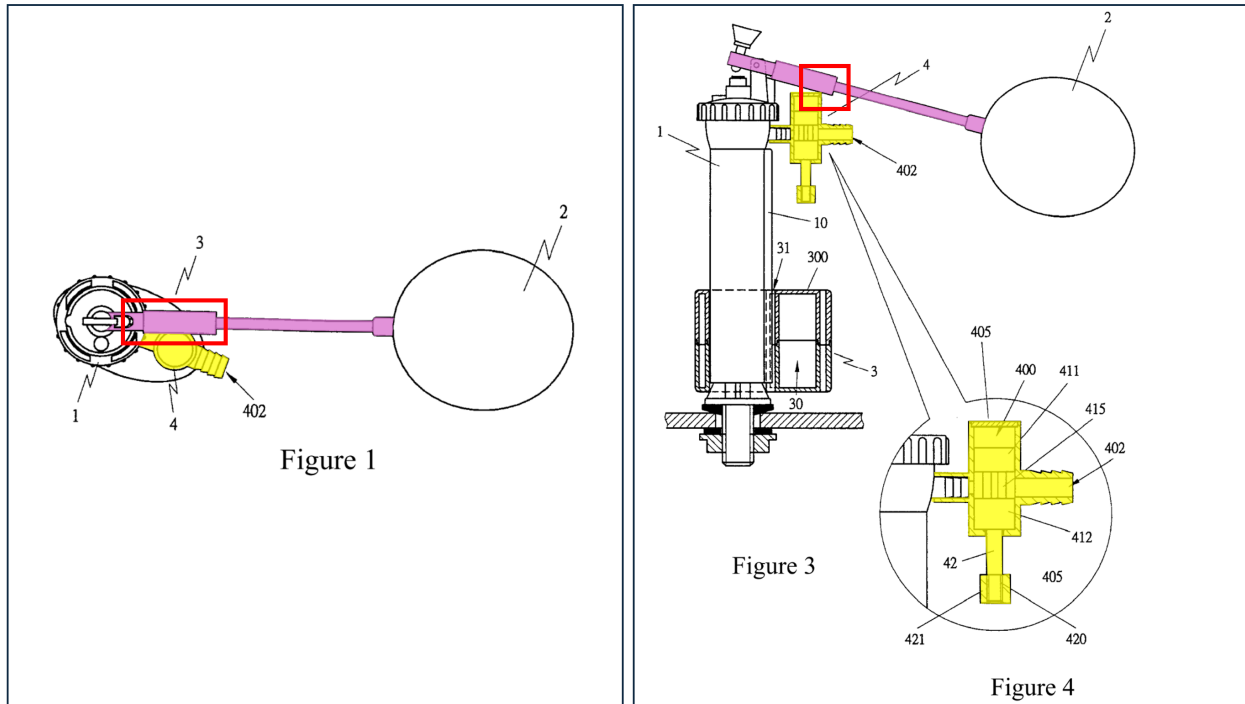
180. Importantly, neither the Petition nor Dr. Cameron’s declaration identify or differentiate between the claimed “actuating arm” and “translational stem.” Instead, Dr. Cameron’s declaration identifies a “[t]ranslational arm attached to float” and an alleged “[w]ater flow regulator” that attaches “offset at an angle from float arm.” EX1004, ¶188. Based on Dr. Cameron’s more fulsome annotations (reproduced below), Petitioner and Dr. Cameron appear to have merged the claimed

“actuating arm” and “translation stem” into a single structure, which they call a “translational arm.” Again, this alone renders the Petition deficient.

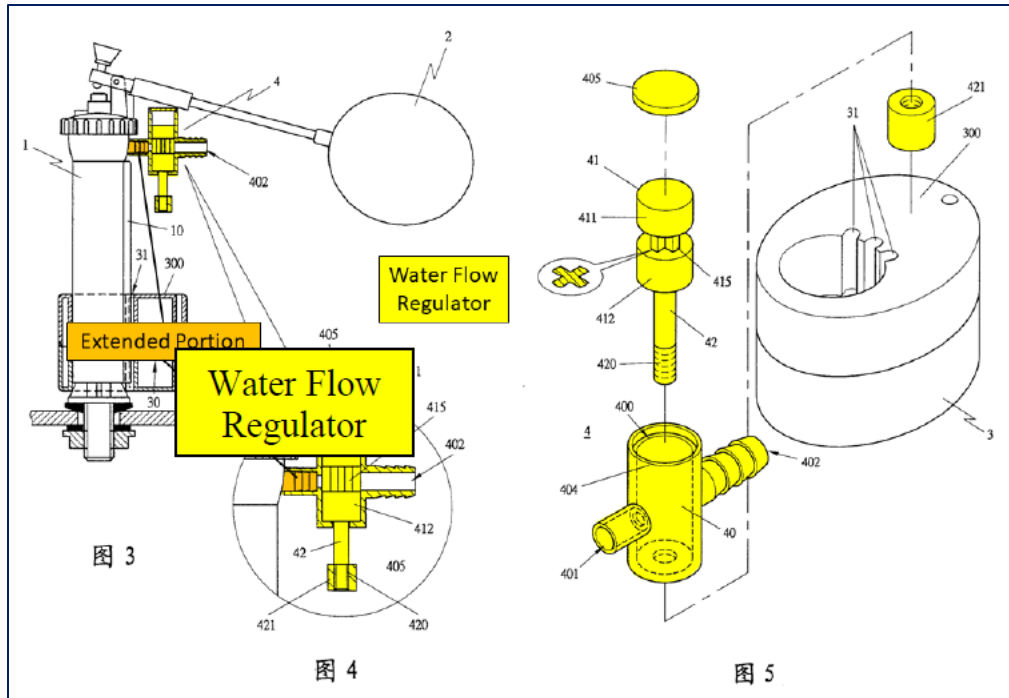


EX1004, ¶188

181. Regardless, neither the Petition nor Dr. Cameron provide any analysis whatsoever regarding where or how the “actuating arm” is “angularly offset” relative to “the water flow regulator” or how the alleged offset prevents interference between the two. In fact, Guoxin clearly discloses *interference* between the structure Petitioner has identified as the claimed “water flow regulator” (yellow) and the identified “translational arm” (pink). This interference is depicted in annotated Figures 1, 3, and 4, below, with red boxes.

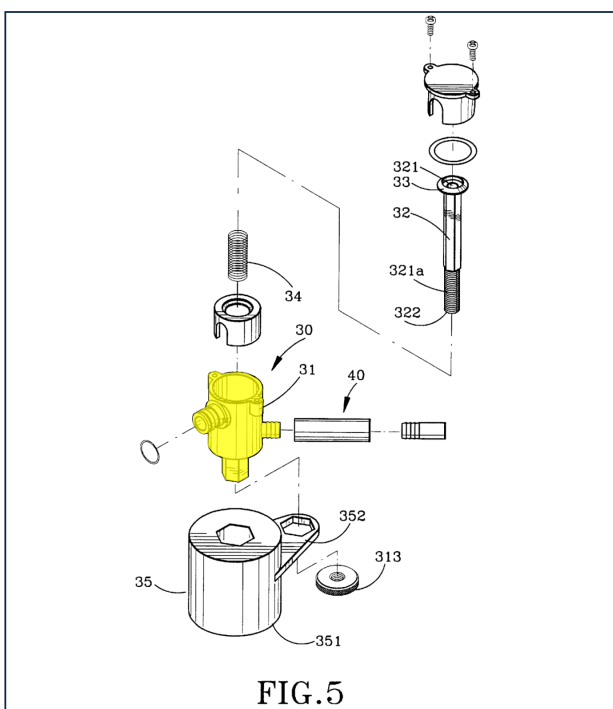
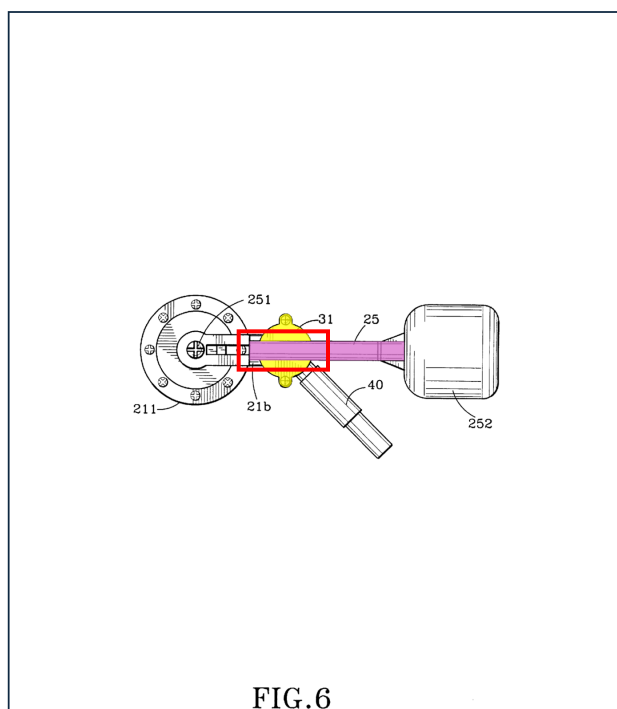


182. Dr. Cameron attempts to disguise this by alleging that the claimed “water flow regulator” *attaches* at point 402 in Figure 1. EX1004, ¶188. Not so. Petitioner’s prior identification of the claimed “water flow regulator” is consistent with the annotations in Figures 1, 3, and 4, above. Pet., 36. Petitioner’s identification of the water flow regulator in limitation 1[D1] (“a *water flow regulator* configured to attach directly to the extended portion of the body”) is reproduced below. Pet., 36.



Pet., 36

183. The Petition’s analysis with respect to Ho is deficient for the same reasons as Guoxin. Additionally, Ho does not even depict the “angularly offset” requirement of Claim 5. As depicted below, Ho explicitly discloses both (1) *interference* and (2) *angular alignment* between the structure Petitioner has identified as the claimed “water flow regulator” (yellow) and the identified “translational arm” (pink). Both the interference and angular alignment are depicted in annotated Figures 5-6, below. EX1022, Figs. 5-6.



184. Once again, Petitioner attempts to obfuscate this issue by pointing to a different structure as the “water flow regulator.” But again, the annotations above are consistent with Petitioner’s prior identification of Ho’s alleged “water flow regulator.” Pet., 36 (alleging that “Ho discloses a water flow regulator (diverter valve means 30) that attaches directly to the extended portion of the toilet fill valve”) (citing EX1022, 3:8-13, Figs. 5, 8-11).¹²

b) Claims 10 and 11: “further comprising terminating, using the toilet fill valve, the flow of the second portion of the water so that a water level in a toilet bowl is at a predefined

¹² Note that EX1022 (Ho) does not include a “Figure 11.”

level” (claim 10) / “wherein the water level is determined at least in part by the water flow regulator” (claim 11)

185. Petitioner alleges that “Guoxin discloses terminating the flow of the second portion of water when the toilet bowl reaches a certain level.” Pet., 55 (citing EX1016, 2:25-27; EX1004, ¶195). Once again, not so.

186. As an initial matter, the sole evidence relied on with respect to these limitations consists of citations to Guoxin’s specification.¹³ However, as discussed in Section X.A.1.a)(1), above, Petitioner’s and Dr. Cameron’s citations are deficient and not informative. As shown in the table below, the cited portions of Guoxin do not relate to the propositions they are cited for.

Citation	Proposition	Actual Disclosure of Guoxin
2:25-27	Guoxin discloses terminating the flow of the second portion of water when the toilet bowl reaches a certain level.	“between these two annular surrounds 411 and 412, there is a smaller annular surround 415, which the smaller annular surround 415 can be cross-shaped or another shape. This facilitates a state as shown in Figures 3 and 4, where the water inlet and outlet can be aligned in a straight line, allowing”

¹³ The Petition also incorporates “the discussion above regarding dependent claim 5.” Pet., 55. However, it is unclear how claim 5 is relevant to claims 10 and 11, and Petitioner’s discussion regarding Claim 5 does not impact my analysis.

Citation	Proposition	Actual Disclosure of Guoxin
2:27-33	The [water level in the bowl] is set by adjusting the T-shaped nut to change the position of how the switching valve's stem is driven, which in turn alters the amount of water that can leave the bowl fill restriction before the float valve stops water from entering the water inlet.	“shown in Figures 3 and 4, where the water inlet and outlet can be aligned in a straight line, allowing water to flow into the toilet. However, when the water in the toilet water tank gradually reaches a set level of height (as shown in Figure 2), the lower annular surround 412 will block between the water inlet and outlet 401 and 402, thus discontinuing the water supply to the toilet through this switching mechanism. Furthermore, the valve stem 42 is equipped with external threads 420, which are combined with a T-shaped nut 421. This T-shaped nut has an appropriate weight, such that when the water level in the water tank decreases, the weight of the nut will automatically”
2:8-10	Guoxin also discloses a conventional ball cock valve attached to float 2, which controls “whether or not the water inlet device admits water.”	“Figure 4 A partially enlarged view of Figure 3. Figure 5 A partially exploded view of the present utility model. As shown in Figures 1 and 2, the structure of the toilet water tank water supply switching”

187. When asked about an exemplary deficient citation to Guoxin at her deposition, Dr. Cameron explained: “I don’t think it’s that complicated. If you don’t understand that, there is more at the [uncited] end of that paragraph as well, and I likely intended to cite to that whole paragraph.” EX2008 (Cameron Tr.), 193:18-

200:19. Regardless of (1) what Dr. Cameron intended to cite, or (2) whether or not Dr. Cameron thinks it is “that complicated,” the cited language does not reference “terminating, using the toilet fill valve, the flow of the second portion of the water.” As such, Petitioner has failed to show that Claims 10 and 11 are obvious.

c) Claim 18: “wherein preventing the water flow regulator from detaching from the extended portion further comprises rotating the water flow regulator relative to the extended portion”

188. Petitioner alleges that Claim 18 “would have been obvious over Guoxin in view of Hall.” Pet., 63-64. However, the Petition does not disclose any motivation to exchange Guoxin’s fluid flow connector with Hall’s. Section X.A.2.b), above.

189. In fact, the *only* motivation discussed in the Petition comes from the ’993 Patent itself, which constitutes impermissible hindsight. Pet., 64 (“This well-known coupling in which axial protrusions 13 (lugs) on the male portion mate with grooves 9 (bayonet slots) formed in the female portion, which upon insertion, can be rotated to lock in place, is the same configuration shown in Figures 6A-6C of the ‘993 patent.”) (citing EX1001, Figs. 6A-6C).

190. For this additional reason, Claim 18 is not obvious over Guoxin in view of Hall.

d) Claim 19: “wherein the water flow regulator comprises an adjustable water flow regulator that is configured to adjust the flow rate of the second portion of the water based

at least in part on a setting of the adjustable water flow regulator”

191. Claim 19 requires “an adjustable water flow regulator” that “is configured to adjust the flow rate of the second portion of the water.”

192. As an initial matter, the sole evidence relied on with respect to this limitation consists of citations to Guoxin’s specification. However, as discussed in Section X.A.1.a)(1), above, Dr. Cameron’s citations are deficient and not informative. As shown in the table below, the cited portions of Guoxin do not relate to the propositions they are cited for.

Citation	Proposition	Actual Disclosure of Guoxin
2:25-27	Guoxin discloses an adjustable water flow regulator that adjusts the flow rate of water based on a setting of the water flow regulator.	“between these two annular surrounds 411 and 412, there is a smaller annular surround 415, which the smaller annular surround 415 can be cross-shaped or another shape. This facilitates a state as shown in Figures 3 and 4, where the water inlet and outlet can be aligned in a straight line, allowing”

Citation	Proposition	Actual Disclosure of Guoxin
2:27-33	That level is set by adjusting the T-shaped nut to change the position of how the switching valve's stem is driven, which in turn alters amount of water that can leave the bowl fill restriction before the float valve stops water from entering the water inlet.	“shown in Figures 3 and 4, where the water inlet and outlet can be aligned in a straight line, allowing water to flow into the toilet. However, when the water in the toilet water tank gradually reaches a set level of height (as shown in Figure 2), the lower annular surround 412 will block between the water inlet and outlet 401 and 402, thus discontinuing the water supply to the toilet through this switching mechanism. Furthermore, the valve stem 42 is equipped with external threads 420, which are combined with a T-shaped nut 421. This T-shaped nut has an appropriate weight, such that when the water level in the water tank decreases, the weight of the nut will automatically”

193. As previously noted, when asked about an exemplary deficient citation to Guoxin at her deposition, Dr. Cameron explained: “I don’t think it’s that complicated. If you don’t understand that, there is more at the [uncited] end of that paragraph as well, and I likely intended to cite to that whole paragraph.” EX2008 (Cameron Tr.), 193:18-200:19. Regardless of (1) what Dr. Cameron intended to cite, or (2) whether or not Dr. Cameron thinks it is “that complicated,” the cited language does not reference adjusting the *rate* that water passes through the water flow regulator.

194. Regardless of Petitioner's deficient citations, the Petition does not *actually* allege that the prior art discloses an adjustable flow rate. Petitioner's complete analysis is reproduced below:

Guoxin discloses an adjustable water flow regulator that adjusts the flow rate of water based on a setting of the water flow regulator. That level is set by adjusting the T-shaped nut to change the position of how the switching valve's stem is driven, *which in turn alters amount of water that can leave the bowl fill restriction before the float valve stops water from entering the water inlet*. Guoxin therefore discloses the elements of dependent claims 19 and 20.

Pet., 57 (citing EX1016, 2:25-33; EX1004, ¶203).¹⁴ After a conclusory recitation of claim language, the Petition explains that the water flow regulator disclosed by Guoxin is adjustable to alter the circumstances under which the water flow regulator terminates the flow of water; *not* the flow rate of the water passing through the regulator.

195. This interpretation of the Petition is confirmed by reference to Guoxin, which states:

This facilitates a state as shown in Figures 3 and 4, where the water inlet and outlet can be aligned in a straight line, allowing water to flow into the toilet. However, *when the water in the toilet water tank*

¹⁴ Dr. Cameron merely repeats the conclusory allegations in the Petition verbatim.

gradually reaches a set level of height (as shown in Figure 2), the lower annular surround 412 will block between the water inlet and outlet 401 and 402, thus discontinuing the water supply to the toilet through this switching mechanism. Furthermore, the valve stem 42 is equipped with external threads 420, which are combined with a T-shaped nut 421. This T-shaped nut has an appropriate weight, such that when the water level in the water tank decreases, the weight of the nut will automatically lower the switching valve. By simply turning the T-shaped nut, the length of the valve stem can be altered, thus changing the position at which the switching valve's stem is driven by the secondary ball float. This achieves a practical design for water supply switching. Additionally, the switching valve and the secondary ball float are set in a separate state, allowing the ascension and descension of the switching valve to be driven by the pushing action of the top surface 300 of the secondary ball float.

EX1016, p. 005; EX2007, 2:26-39; *see also* Figs. 2-4.

196. Simply put, Guoxin discloses a mechanism to adjust the timing of when the flow of water through the switching mechanism is discontinued. Increasing the length of the valve stem (by loosening the T-shaped nut) causes the switching mechanism to close earlier in the tank fill cycle. Although this reduces the total amount of water that enters the toilet bowl, it does nothing to impact the *flow* rate of the water passing through the switching valve.

197. Conversely, decreasing the length of the valve stem (by tightening the T-shaped nut) causes the switching mechanism to close later in the tank fill cycle. Again, this increases the total amount of water that enters the toilet bowl, but does not have any impact on the flow rate of water passing through the switching valve.

e) Claim 20: “wherein the water flow regulator comprises an adjustable water flow regulator that is configured to adjust the flow rate of the water based at least in part on a setting of the adjustable water flow regulator”

198. The Petition provides the same analysis for Claims 19 and 20. As such, regarding Claim 20, I incorporate my analysis with respect to Claim 19 herein.

B. Grounds 3 and 4: Brown in view of Ho, in further view of Bjerke, Calmettes, Hall, and/or Kimber

199. Ground 3 of the Petition alleges that Claims 1, 2, 5, 7-15, and 19-20 are obvious over Brown in view of Ho. Ground 4 further alleges that Claims 3-4, 6, and 16-18 are obvious over Brown in view of Ho, in further view of Bjerke, Calmettes, Hall, and/or Kimber.

200. Petitioner has not met their burden to show that the Challenged Claims are invalid. As such, and for the additional reasons set forth below, in my opinion each of the Challenged Claims are not invalid.

1. The Petition does not articulate a motivation to combine the teachings of the prior art or a reasonable expectation of success in doing so.

201. I understand that in order to find the Challenged Claims obvious, the Petition must demonstrate that a POSITA would have been motivated to combine the teachings of the prior art references to achieve the claimed invention.

a) The Petition does not articulate a motivation to replace Brown's set screw 26 with Ho's diverter valve 30.

202. Petitioner and Dr. Cameron rely on conclusory allegations regarding replacing Brown's set screw 26 with Ho's diverter valve 30, arguing that "a POSITA would understand that the valve disclosed in Ho, with a tube directly attached to the valve *could be adapted* for use with Brown." Pet., 75-76. Similarly, the Petition argues that "using the bowl fill restriction of Ho *instead of* the bowl fill restriction shown in Brown, would have been obvious to a POSITA as a matter of design preference." Pet., 65.¹⁵

¹⁵ The Petition does not allege that a new valve (combining features of both Ho's diverter valve 30 and Brown's set screw 26) would have been obvious. Regardless, a POSITA would not have been motivated to combine the Ho and Brown valves to create a new, hybrid structure for the reasons discussed herein.

203. Although the Petition alleges that a POSITA *could* have replaced Brown’s set screw 26 with Ho’s diverter valve 30, it does not explain that a POSITA *would* have been motivated to do so. Indeed, Petitioner relies on a single conclusory sentence in support of the alleged motivation to combine, stating that a POSITA would be motivated to make the substitution “in order to simplify the operation of the valve and increase the ease with which the valve can be adjusted.” Pet., 76 (citing EX1004, ¶248).

204. The Petition does not, however, explain how substituting Brown’s set screw 26 with Ho’s diverter valve 30 would “simplify the operation of the valve and increase the ease with which the valve can be adjusted.” Dr. Cameron alleges without support that this modification “accomplishes the same flow control function as the Brown valve with the added advantage that the flow adjustment of the Ho valve can be accomplished with the tube still connected to the valve.” I disagree.¹⁶

205. Ho’s diverter valve 30 does not “accomplish[] the same flow control function as the Brown valve.” Brown discloses a toilet fill valve that “provide[s] an improved water saving means ... for reducing the amount of water flowing through

¹⁶ Brown already discloses a toilet fill valve whereby “the metering valve is eliminated,” thus obviating the need for the valve to be adjusted. *See*, EX1021, Fig. 4 and accompanying disclosure.

the overflow pipe into the toilet bowl and thereby eliminate waste of such water.” EX1021, 1:63-70. “By properly adjusting screw 26 in slotted portion 24, the amount of water flowing into the toilet bowl (not shown) through overflow pipe 11 can be reduced to the necessary minimum for preventing sewer gases from escaping back out of the toilet bowl, and at the same time eliminate waste of such water normally experienced with the conventional valveless refill tube (not shown).” EX1021, 3:64-72. Simply put, Brown accomplishes this by allowing a user to adjust the *rate* at which water flows through set screw 26.

206. Ho, meanwhile, discloses “a diverter valve unit for directing water from the water supplying pipe to the rim flushing conduit of a toilet bowl.” EX1022, 1:6-9. Ho accomplishes this by allowing a user to adjust the point in *time* at which the diverter valve activates, not the *rate* at which water passes through the diverter valve. EX1022, Abstract, 4:24-34.

207. Moreover, Brown explicitly teaches that its water silencing means should not be employed without its flow rate restriction (which is not present in Ho). According to Brown, “if the rods 22 or tubes 32 were employed alone in order to reduce water turbulence and noise, they obviously would create a back pressure in valve casing 14 as a result of which the rate of flow through the conventional refill tube (not shown) would be substantially increased, thereby causing further waste of

such water, as well as additional noise offsetting the silencing action in the assembly.” EX1021, 5:18-25.

208. Finally, the fill valve disclosed in Brown provides a mechanism to fill the toilet tank directly from the tank fill valve assembly 13. Set screw 26 is not implicated in the process. Ho, conversely, discloses filling the toilet tank via diverter valve 30. Ho’s diverter valve serves to direct water to one of two locations—either the rim of the toilet bowl (not an option in Brown’s system) or the toilet tank (already accomplished in Brown’s system)—but does not impact the rate at which water flows through the overall system. *See, e.g.*, §X.A.3.d). As such, there is no benefit to substituting Ho’s diverter valve 30 in Brown’s system. If Brown’s set screw 26 were to be replaced with Ho’s diverter valve 30, extra water would enter the toilet tank. This in turn would cause the potential for overfilling and/or wasted water, without any appreciable benefit.

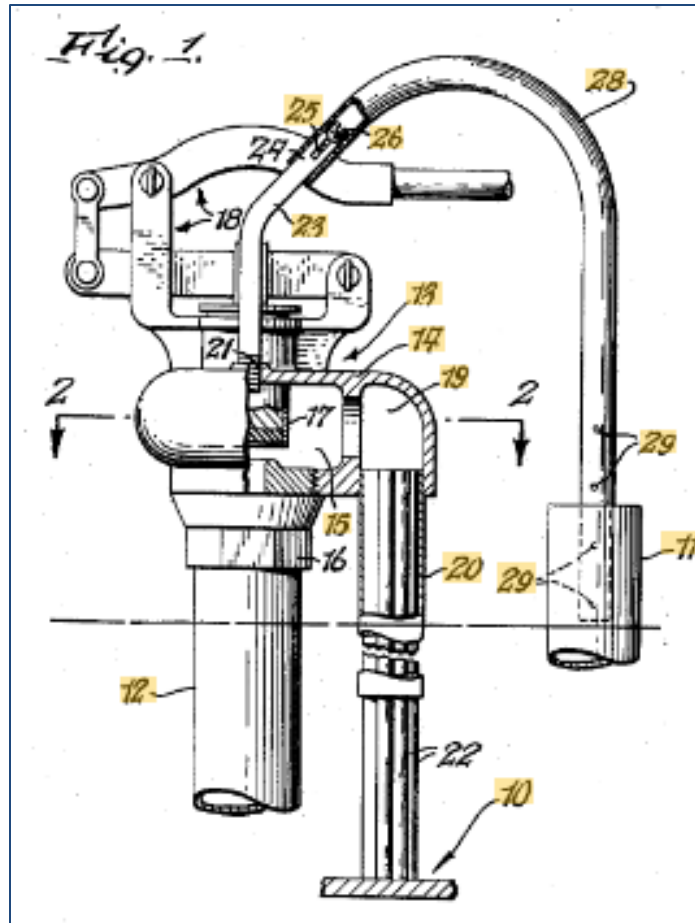
209. As such, a POSITA would not have replaced Brown’s set screw 26 with Ho’s diverter valve 30 because (1) they serve different flow control functions, (2) Brown explicitly teaches against employing a valve or flow regulator that does not restrict flow rate, and (3) Ho’s diverter valve 30 would serve no purpose in the Brown system.

b) The Petition does not articulate a reasonable expectation of success in replacing Brown's set screw 26 with Ho's diverter valve 30.

210. The Petition alleges that “a POSITA would understand that the valve disclosed in Ho, with a tube directly attached to the valve could be adapted for use with Brown. A POSITA would be motivated to use the Ho valve, in order to simplify the operation of the valve and increase the ease with which the valve can be adjusted.” Pet., 75-76. Similarly, the Petition argues that “using the bowl fill restriction of Ho *instead of* the bowl fill restriction shown in Brown, would have been obvious to a POSITA as a matter of design preference.” Pet., 65.

211. However, the Petition fails to articulate that a POSITA would have had a reasonable expectation of success in making this modification.

212. Simply put, Brown's set screw 26 is located between “adapter tube 23” and “flexible tube 28.” Importantly, adapter tube 23 extends vertically from the top of the toilet fill valve. EX1021, Fig. 1.



EX1021, Fig. 1

213. According to Brown, this configuration is (in part) to prevent the “substantial amount of turbulence and noise [that] is created because of the irregular internal surfaces of the assembly, the variations in cross-sectional area through which the water flows, and the *required reversal of direction of flow*.” EX1021, 3:6-19. EX2008 (Cameron Tr.), 120:4-122:16.

214. Ho’s diverter valve 30, however, extends horizontally from the side of the toilet fill valve, and functions based on gravity. EX1022, 4:10-16 (“Referring to FIG. 8, as the water level in the tank 50 continues to gradually decrease, the

extension plate 352 of the float member 35 moves downward and eventually engages the nut 313 and pulls the valve rod 32 to move downward against the spring force of the spring member 34 so as to permit the valve member 33 to seat on the first valve seat 3111, as best illustrated in FIG. 9.”).

215. If a POSITA were to replace Brown’s set screw 26 with Ho’s diverter valve 30 in a horizontal configuration, it would defeat Brown’s stated goals of reducing turbulence and noise due to reversal of direction of flow. As such, a POSITA would not have been motivated to make this modification. If, however, Ho’s diverter valve was substituted in place of Brown’s set screw 26 without altering the configuration, the diverter valve would not function properly due to not being properly oriented with respect to gravity.

216. Importantly, Brown’s set screw 26 is not limited by gravity in the same manner. The Petition is entirely silent regarding each of these considerations and provides no guidance as to how the proposed combination is intended to operate. Because Ho’s diverter valve 30 will not properly function without the downward force exerted by gravity, a POSITA would not have had a reasonable expectation that Petitioner’s proposed modification would have been successful.

217. Additionally, for the reasons discussed in §X.B.1.a), above, a POSITA would not have had a reasonable expectation of success because Brown explicitly

discloses that implementing a water flow regulator that does not mitigate the *rate* at which water flows through the system would not work.

c) The Petition does not articulate any motivation to combine the Quick Connection Art with Guoxin and/or Ho.

218. The Petition's motivation to combine analysis is also deficient with respect to the Quick Connection Art. Specifically, Petitioner relies on the conclusory allegation that the art discloses "known method[s] of connecting two fluid channels to one another." Pet., 86. But, the mere fact that the fluid flow connections were allegedly well known says nothing about whether a POSITA would have been motivated to combine the Quick Connection Art with Brown and/or Ho.

219. As discussed in Section X.A.2.b), above, there are numerous design considerations that a POSITA would have taken into account when designing a fluid flow connection. The Petition's conclusory recitation that certain fluid flow connectors are known in the art is insufficient to show that a POSITA would have been motivated to make the proposed modifications.

d) The Petition does not articulate a motivation to integrally mold the extended portion of Brown's toilet fill valve with the body of the toilet fill valve as allegedly taught by Ho.

220. Petitioner and Dr. Cameron rely on conclusory allegations regarding integrally molding the extended portion of Brown's toilet fill valve with the body of the toilet fill valve:

To the extent that it is argued that Brown does not disclose an extended portion integrally molded with the toilet fill valve that extends outwardly and that contains a recess into which a protrusion from a water flow regulator is inserted, Ho discloses this and this connection in Ho *can be used* in the system of Brown.

Pet., 64-65 (citing EX1004, ¶¶220-223). Although the Petition alleges that a POSITA *could* have integrally molded the extended portion of Brown’s toilet fill valve (as allegedly taught by Ho), at no point does it allege that a POSITA *would* have been motivated to do so.

221. Petitioner goes on to allege that a POSITA would have been motivated to integrally mold the extended portion of Brown’s toilet fill valve with the body of the toilet fill valve using “more recently developed molding techniques that were not readily available in 1959 when Brown was filed.” Pet., 68 (citing EX1004, ¶230). However, the Petition does not (1) identify what the new molding techniques are, (2) provide any evidence that these techniques were not available in 1959, (3) identify any benefits to the allegedly new molding techniques over those available in 1959, (4) identify any deficiencies in the molding techniques used in 1959, or (5) provide any evidence or analysis at all in support of the conclusory allegation that a POSITA would have been motivated to use Ho’s molding techniques to modify Brown’s toilet fill valve.

222. In fact, Ho does not include any disclosure at all regarding molding techniques.¹⁷ Instead, Ho merely includes a figure that Petitioner alleges discloses the claimed integral molding. In short, the Petition relies solely on conclusory allegations in support of the alleged motivation to combine. Petitioner has failed to provide a motivation to integrally mold the extended portion of Brown’s toilet fill valve with the body of the toilet fill valve as allegedly taught by Ho.

2. The Petition is internally inconsistent and fails to identify a single “water flow regulator” that discloses each limitation.

223. The ’993 Patent contains several limitations that are directed to or otherwise reference the claimed “water flow regulator.” The Petition, however, inconsistently refers to both Brown’s “set screw 26” and Ho’s “diverter valve 30” as the claimed water flow regulator.

a) Limitation 1[D4]

224. Limitation 1[D4] claims that the water flow regulator is configured to “constrict a flow rate of the second portion of the water.” With respect to limitation 1[D4], the Petition relies *solely* on Brown’s “set screw 26” as disclosing the claimed

¹⁷ As discussed in Section X.A.1.b), above, it is unclear whether Ho even discloses a molded structure at all.

water flow regulator. Pet., 73-74.¹⁸ Dr. Cameron’s declaration pays lip-service to Ho’s alleged disclosure, stating that “Ho’s disclosure of this element is discussed above with respect to the combination of the Guoxin and Ho references.” EX1004, ¶245. But, Dr. Cameron’s analysis of limitation 1[D4] with respect to the Guoxin-based grounds *does not actually refer to Ho at all*. EX1004, ¶¶145-147.

b) Limitation 1[E]

225. Conversely, with respect to limitation 1[E], the Petition alleges that “To the extent it is argued that tube 28 is not directly attached to the water flow regulator of Brown, then Ho discloses a diverter valve 30 (water flow regulator) with a supply line 40 (tube) attached directly to the valve in order to direct a portion of water from the valve to the toilet tank overflow tube.” Pet., 75.

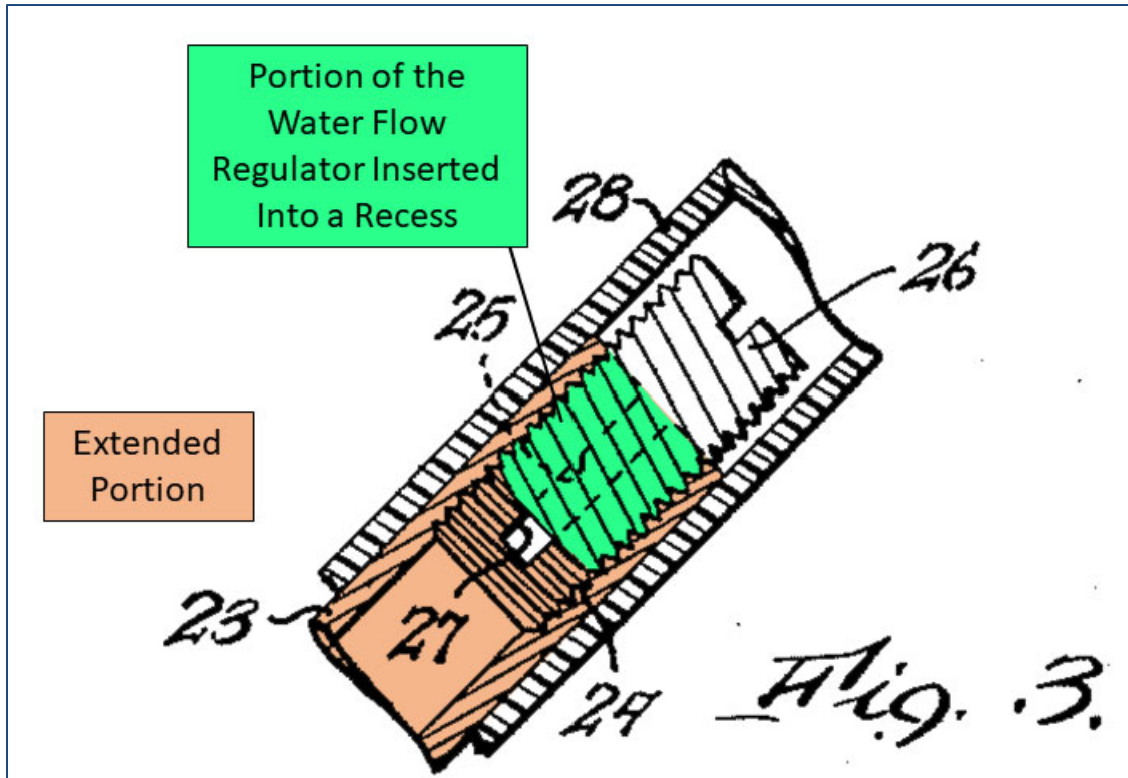
226. As explained in additional detail below, Brown does not disclose limitation 1[E]. As such, the only structure that allegedly renders limitation 1[E] obvious is Ho’s diverter valve 30.

(1) Brown does not disclose “a tube that is configured to attach directly to the water flow regulator.”

¹⁸ The Petition also relies solely on Brown’s “set screw 26” as disclosing the claimed water flow regulator with respect to limitations 1[D1] and 1[D2]. Pet., 70-72.

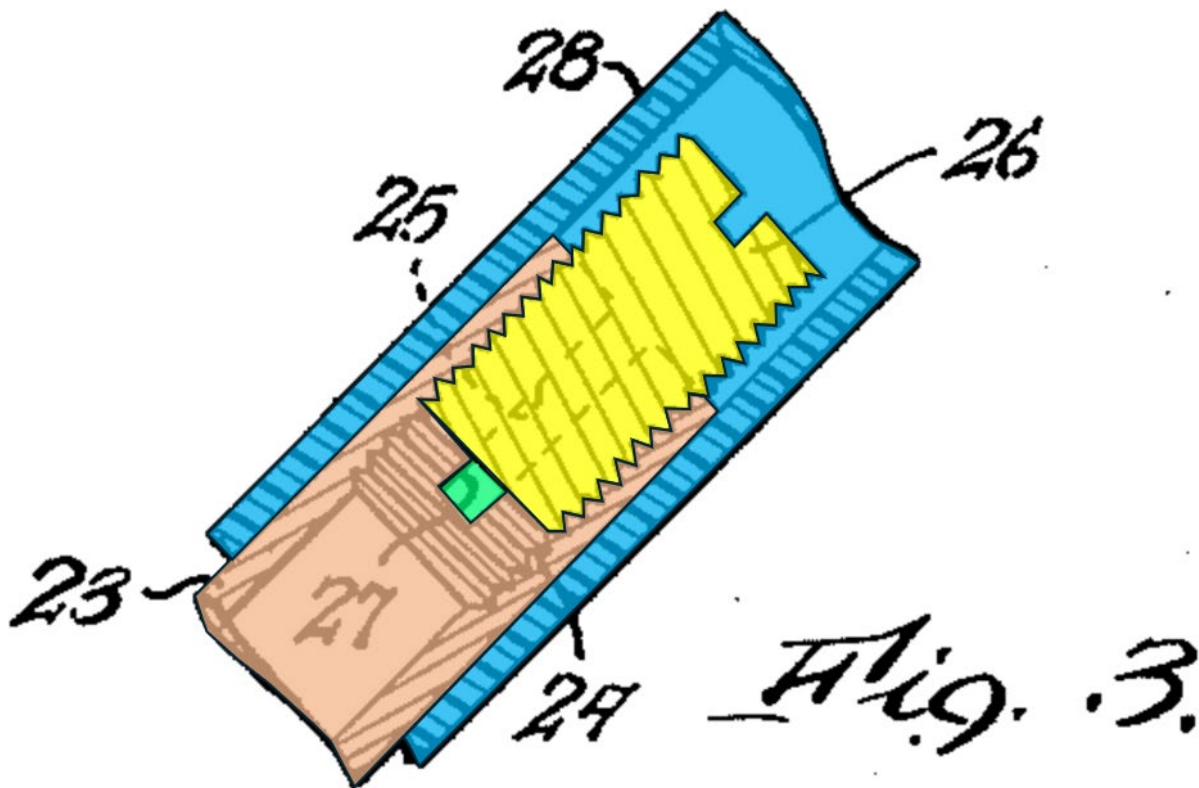
227. The Petition alleges that Brown discloses “a tube attached directly to the water flow regulator to the portion of the adaptor tube 23 that forms the metering valve and houses set screw 26.” Pet., 74. I disagree.

228. The Petition and Dr. Cameron clearly identify the claimed “water flow regulator” as Brown’s “set screw 26” and the claimed “extended portion” of the toilet fill valve as Brown’s “adaptor tube 23.” Pet., 71-72; EX1004, ¶¶238-240; *see also* EX1008 (Cameron Tr.), 200:20-201:22.



Pet., 72-72

229. The alleged water flow regulator (set screw 26, yellow), extended portion (adaptor tube 23, brown), and “tube that is configured to attach directly to the water flow regulator” (tube 28, blue) are reproduced below.



230. As is apparent from the annotated figure, tube 28 *does not* attach directly to the water flow regulator (set screw 26). Instead, it attaches directly to the alleged extended portion (adapter tube 23).

231. As such, Brown does not disclose or otherwise render obvious limitation 1[E].

(2) The Petition advocates replacing Brown’s set screw 26 with Ho’s diverter valve 30.

232. Recognizing that Brown does not disclose limitation 1[E], the Petition alternatively argues that “Ho discloses a diverter valve 30 (water flow regulator) with a supply line 40 (tube) attached directly to the valve in order to direct a portion of water from the valve to the toilet tank overflow tube.” Pet., 75 (citing EX1022, 3:6-11, Fig. 2).

233. In support of this statement, the Petition argues that “a POSITA would understand that the valve disclosed in Ho, with a tube directly attached to the valve could be adapted for use with Brown. A POSITA would be motivated to use the Ho valve, in order to simplify the operation of the valve and increase the ease with which the valve can be adjusted.” Pet., 75-76. Similarly, the Petition argues that “using the bowl fill restriction of Ho *instead of* the bowl fill restriction shown in Brown, would have been obvious to a POSITA as a matter of design preference.” Pet., 65.

234. In short, the Petition relies on *replacing* Brown’s set screw 26 with Ho’s diverter valve 30 in order to render limitation 1[E] obvious.

c) Replacing Brown’s set screw 26 with Ho’s diverter valve 30 renders the Petition’s analysis with respect to at least limitations 1[D1], 1[D2], and 1[D4] deficient.

235. The Petition does not provide any analysis regarding how limitations 1[D1], 1[D2], and 1[D4] are allegedly disclosed or otherwise rendered obvious by Ho’s diverter valve 30. As such, the Petition is deficient because it relies on one structure (Brown’s set screw 26) to disclose the “water flow regulator” claimed by

limitations 1[D1], 1[D2], and 1[D4], and a different structure (Ho's diverter valve 30) to disclose *the same* "water flow regulator" claimed by limitation 1[E].

d) The same deficiencies impact Claims 8 and 14.

236. Petitioner's analysis with respect to limitations 8[C3] and 8[D] incorporate its analysis regarding Brown's "set screw 26" with respect to limitations 1[D1] and 1[D4]. Again, Petitioner provides no analysis of how these limitations are disclosed or otherwise rendered obvious by Ho's diverter valve 30.

237. Likewise, Petitioner's analysis of limitations 8[E] and 8[F] (which require a tube that is in contact with the water flow regulator) merely incorporate 1[E]. Thus, Petitioner's analysis is deficient for the same reasons as discussed with respect to Claim 1, above.

238. Similarly, although Petitioner's analysis of limitation 14[A4] (which claims a "water flow regulator [that] is configured to constrict a flow rate of water") pays lip service to Ho's alleged disclosure, the only substantive analysis is to incorporate Petitioner's analysis of limitations 1[D4] and 8[D]. But, as discussed above, the only "water flow regulator" discussed with respect to either limitation is Brown's "set screw 26." Again, Petitioner provides no analysis of how these limitations are disclosed or otherwise rendered obvious by Ho's diverter valve 30.

239. Likewise, Petitioner's analysis of limitation 14[B] (which requires attaching a tube directly to the water flow regulator) merely incorporates limitations

1[E], 8[E], and 8[F]. Thus, Petitioner’s analysis is deficient for the same reasons as discussed with respect to Claim 1, above.

240. In conclusion, the Petition improperly relies on both Brown’s “set screw 26” and Ho’s “diverter valve 30” as the claimed “water flow regulator” with respect to both Claims 8 and 14. Therefore, Petitioner’s analysis is deficient.

3. Brown and Ho do not disclose “wherein the extended portion is integrally molded with the body” (Claims 1 and 14) / “wherein the extended portion is integrally molded with the toilet fill valve” (Claim 8).

241. Grounds 3 and 4 rely on either Brown alone, or Brown in view of Ho to teach that the extended portion of the toilet fill valve is “integrally molded” with the body of the toilet fill valve (e.g., the “Integrally Molded Limitations”).

242. Neither Brown nor Ho (individually or in combination) disclose the Integrally Molded Limitations under the construction adopted by the Board, which determined that “integrally molded” means “molded together as a single structure.” Paper 19 (Institution Decision) at 14-15.

243. The following analysis is focused on Claim Element 1[A] as defined by Petitioner (“a toilet fill valve that comprises: a body comprising an extended portion, *wherein the extended portion is integrally molded with the body*, wherein the extended portion forms a bowl fill outlet port”). Pet., 68 (citing EX1004, ¶¶229-231). However, as explained in Section X.B.3.c), below, the same analysis applies to Claim Elements 8[C2] (“wherein the extended portion is integrally molded with

the toilet fill valve”) and 14[A2] (“wherein the extended portion is integrally molded with the body”).

a) Brown does not disclose the Integrally Molded Limitations.

244. The Petition implicitly concedes that Brown does not disclose the Integrally Molded Limitations under the construction adopted by the Board, stating: “Brown’s extended portion 23 is integral to the toilet fill valve *once attached* via threaded opening 21.” Pet., 68. This allegation was made “in view of Petitioner’s claim construction,” which was rejected by the Board. Paper 19 (Institution Decision), 28 n. 13 (“however, as discussed above, we do not adopt Petitioner’s proposed construction for purposes of this Decision. We, thus, do not rely on Petitioner’s first argument that Brown alone teaches element 1B [sic] for purposes of this decision.”). Dr. Cameron has since confirmed that she does not contest the Board’s ruling on claim construction. EX2008 (Cameron Tr.), 160:19-162:7.

b) The Petition does not allege that Ho discloses the Integrally Molded Limitations.

245. For the reasons set forth in Section X.A.1.b)(2), above, the Petition fails to allege that Ho discloses the Integrally Molded Limitations.

c) Petitioner’s analysis with respect to Claims 8 and 14 fails to provide any additional support.

246. The Petition does not provide any additional substantive analysis with respect to limitations 8[C2] (Pet., 78 (citing EX1004, ¶258)) or 14[A2] (Pet., 80

(citing EX1004, ¶275)). Likewise, neither the figures referenced therein nor Dr. Cameron's declaration provide any analysis beyond that discussed with respect to limitation 1[A]. As such, for the same reasons as discussed above with respect to limitation 1[A], neither Brown nor Ho disclose limitations 8[C2] or 14[A2].

4. The Petition is deficient with respect to certain dependent claims.

a) Claim 2: “wherein the extended portion of the body extends radially from a longitudinal axis of the toilet fill valve.”

247. Claim 2 recites: “wherein the extended portion of the body extends radially from a longitudinal axis of the toilet fill valve.”

248. Neither Brown alone, nor Brown in view of Ho, discloses or otherwise renders obvious Claim 2.

249. The Petition concedes that Brown does not disclose Claim 2. Pet., 81 (“Brown does not disclose its extended portion extending radially”).

250. Recognizing this, the Petition argues “that feature is disclosed clearly by Ho” because “a POSITA would have readily molded the extended portion to extend radially from the longitudinal axis of the toilet fill valve to more readily facilitate the connection with the water flow regulator.” Pet., 81-82 (citing EX1004, ¶284).

251. Petitioner also argues that “such an arrangement ... allows for flexibility in order to create a more compact toilet fill valve.” Pet., 81-82 (citing

EX1004, ¶284). Paragraph 284 of Dr. Cameron's declaration repeats these allegations nearly verbatim. But, as discussed in Section X.B.1.a), above, a POSITA would not have been motivated to make the proposed modification, nor does the Petition include any analysis regarding why a POSITA would be motivated to move from a vertical extended portion to a radial extended portion. Indeed, a radial extended portion is directly counter to the stated goals of Brown (e.g., reducing noise caused by turbulence), at least insofar as it introduces another sudden directional change into the fluid flow system.

b) Claim 5: “an actuating arm coupled to the float, wherein the actuating arm extends radially relative to a longitudinal axis of the toilet fill valve, wherein the actuating arm is angularly offset relative to the bowl fill valve, thereby preventing an interference with the water flow regulator and a translational stem that extends from the float to a free end of the actuating arm.”

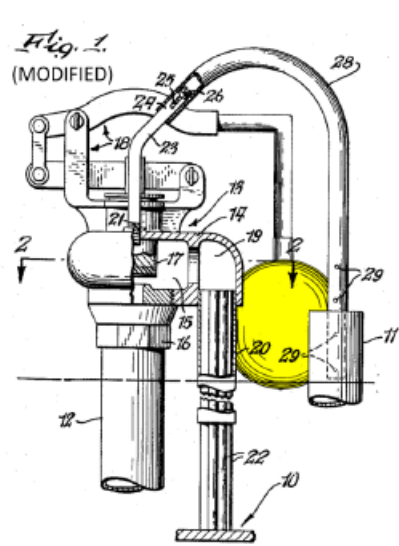
252. Dr. Cameron explains that she understands the term “bowl fill valve” in claim 5 to refer to the claimed “water flow regulator” of claim 1. EX1004, ¶188 n. 1. During her deposition, she testified that “it seemed reasonable that what it meant to refer to was the water flow regulator.” EX2008 (Cameron Tr.), 191:15-193:3. I agree that a POSITA would have reasonably understood the term “bowl fill valve” in claim 5 to refer to the “water flow regulator” of claim 1.

253. The Petition alleges that Claim 5 “would have been intuitively obvious to a POSITA” who “would not seek to design a toilet fill valve with a conventional

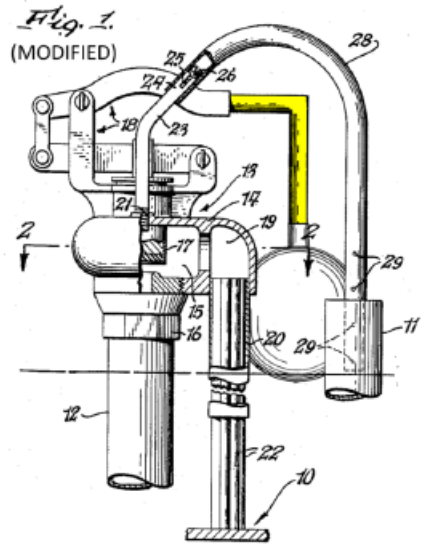
float attached to a translational arm that was obstructed in some manner from freely translating.” Pet., 82-83. Despite the Petition’s unsupported conclusions regarding what a POSITA would—or would not—seek to design, neither Brown nor Ho disclose this limitation.¹⁹

254. With respect to Brown, the Petition merely refers to Figures 1 and 2, but does not provide any analysis of where or how this limitation is allegedly disclosed. For this reason alone, the Petition is deficient. Pet., 82-83. Petitioner’s annotated Figure 1 is reproduced below:

¹⁹ Although the Petition alleges that “[t]he features recited by claim 5 are disclosed and illustrated in ... Ho,” it does not articulate a sufficient motivation to combine Ho’s “actuating arm,” “water flow regulator,” “translation stem,” or “float” with Brown’s toilet fill valve, nor does it articulate a reasonable expectation of success in doing so. Pet., 82.



Float – yellow



Translational stem - yellow

Pet., 82

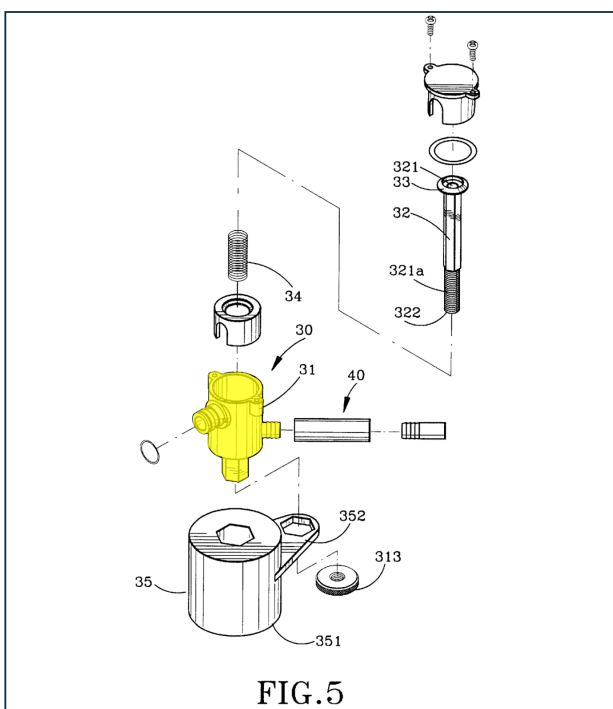
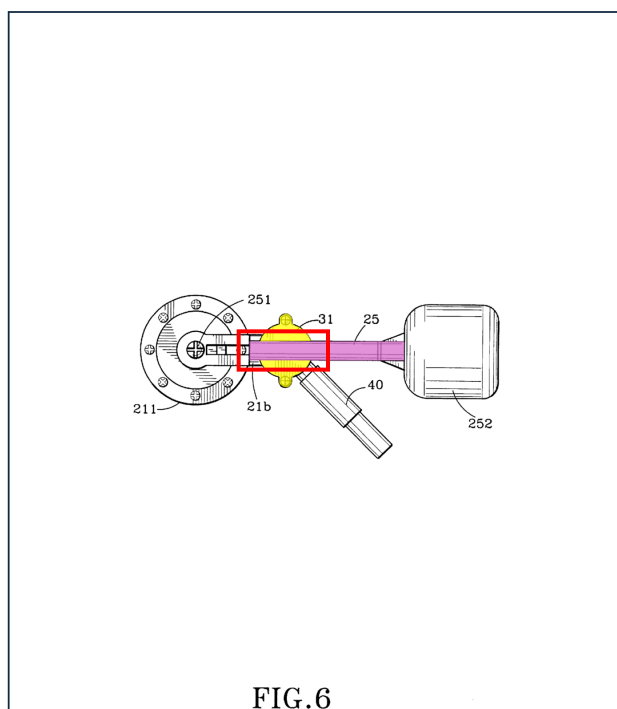
255. Importantly, neither the Petition nor Dr. Cameron’s declaration identify Brown’s claimed “actuating arm” and “translational stem.” Moreover, neither the Petition nor Dr. Cameron provide any analysis whatsoever regarding where or how the “actuating arm” is “angularly offset relative to the bowl fill valve.” In fact, Brown’s set screw 26 extends vertically from the toilet fill valve, and therefore is not “angularly offset” relative to an unidentified actuating arm.

256. Finally, analysis of interference (or lack thereof) between Brown’s alleged “actuating arm” and “set screw 26” is irrelevant because the Petition replaced “set screw 26” with Ho’s diverter valve 30 in limitation 1[E].

257. The Petition’s conclusory analysis with respect to Ho is deficient for the same reasons as Brown; namely, it does not identify any of the claimed

components with the required specificity. For example, neither the Petition nor Dr. Cameron's declaration identify or differentiate between Ho's claimed "actuating arm" and "translational stem." Instead, Dr. Cameron's declaration identifies a "[t]ranslational stem attached to float" and an alleged "[w]ater flow regulator" that attaches "offset at an angle from float arm." EX1004, ¶286. Petitioner and Dr. Cameron do not make any attempt to identify the claimed "actuating arm" nor to differentiate how it differs from the claimed "translation stem." Again, this alone renders the Petition deficient. Moreover, Petitioner's analysis is inconsistent with its analysis of Claim 5 in Ground 1. Section X.A.3.a), above.

258. Additionally, Ho does not depict the "angularly offset" requirement of Claim 5. As depicted below, Ho explicitly discloses both (1) *interference* and (2) *angular alignment* between the structure Petitioner has identified as the claimed "water flow regulator" (yellow) and the identified "translational arm" (pink). Both the interference and angular alignment are depicted in annotated Figures 5-6, below. EX1022, Figs. 5-6.



259. Once again, Petitioner attempts to obfuscate this issue by pointing to a different structure as the “water flow regulator.” But as discussed above, the annotations above are consistent with Petitioner’s prior identification of Ho’s alleged “water flow regulator.” Section X.A.3.a), above.

c) Claim 13: “wherein the extended portion of the toilet fill valve extends radially from a longitudinal axis of the toilet fill valve.”

260. The Petition alleges that “Dependent claims 12 and 13 are obvious over Brown alone or Brown in view of Ho for the same reasons discussed above with respect to elements 1[A] and 8[C2] and claim 2 above.” Pet., 85. I disagree for the reasons set forth in Section X.B.4.a), above.

d) Claim 15: “preventing the water flow regulator from detaching from the extended portion of the body.”

261. The Petition alleges that Brown’s “set screw 26” discloses this limitation. Pet., 85.

262. Claim 15 depends from Claim 14. Limitation 14[B] requires “attaching a tube directly to the water flow regulator.” In support of limitation 14[B], the Petition argues that “[f]or the same reasons discussed above with respect to 1[E], 8[E], and 8[F], Brown in view of Ho satisfies this element.” Pet., 81 (citing EX1004, ¶281).

263. However, Brown does not disclose “attaching a tube directly to the water flow regulator.” See §X.B.2.a). Recognizing this, Petitioner argues that “a POSITA would understand that the valve disclosed in Ho, with a tube directly attached to the valve could be adapted for use with Brown. A POSITA would be motivated to use the Ho valve, in order to simplify the operation of the valve and increase the ease with which the valve can be adjusted.” Pet., 75-76.

264. Because the Petition *replaced* Brown’s “set screw 26” with Ho’s “diverter valve 30” in order to (allegedly) render limitation 14[B] obvious, it cannot now point to Brown’s “set screw 26” as disclosing the limitations of Claim 15.

e) Claim 18: “wherein preventing the water flow regulator from detaching from the extended portion further

comprises rotating the water flow regulator relative to the extended portion”

265. Petitioner alleges that Claim 18 “would have been obvious over Brown in view of Hall.” Pet., 88. However, the Petition does not disclose any motivation to exchange Brown’s fluid flow connector with Hall’s. Section X.B.1.c), above.

266. In fact, the *only* motivation discussed in the Petition comes from the ’993 Patent itself, which constitutes impermissible hindsight. Pet., 88 (“This is the same configuration shown in Figures 6A-6C of the ’993 patent.”).

267. For this reason, Claim 18 is not obvious over Brown in view of Hall.

f) Claims 19: “wherein the water flow regulator comprises an adjustable water flow regulator that is configured to adjust the flow rate of the second portion of the water based at least in part on a setting of the adjustable water flow regulator.”

268. Claim 19 recites: “wherein the water flow regulator comprises an adjustable water flow regulator that is configured to adjust the flow rate of the second portion of the water based at least in part on a setting of the adjustable water flow regulator.” First, as discussed above the Petition *replaced* Brown’s “set screw 26” with Ho’s “diverter valve 30.” X.B.2.b)(2). As such, Petitioner cannot now point to Brown’s “set screw 26” as disclosing Claims 19 and 20.

269. Second, as discussed in Section X.A.3.d), above, Ho does not disclose the claimed adjustable water flow regulator that is configured to adjust the flow rate of the second portion of the water.

270. As such, neither Brown alone, nor Brown in view of Ho, discloses or otherwise renders obvious Claim 19 and/or Claim 20.

g) Claim 20: “wherein the water flow regulator comprises an adjustable water flow regulator that is configured to adjust the flow rate of the water based at least in part on a setting of the adjustable water flow regulator”

271. The Petition provides the same analysis for Claims 19 and 20. As such, regarding Claim 20, I incorporate my analysis with respect to Claim 19 herein.

C. Ground 5: Schuster

272. Ground 5 of the Petition alleges that Claims 1-20 are anticipated pursuant to 35 U.S.C. § 102 over Schuster.

273. I disagree. For the reasons set forth below, the Challenged Claims are not invalid.

1. The Challenged Claims are entitled to a priority date of March 11, 2004.

274. The Petition alleges that Ground 5 “is premised on the Challenged Claims having a priority date of January 27, 2014.” I disagree with Petitioner’s priority analysis. For simplicity, the related applications to the ’993 Patent are identified below.

Patent App. No.	Filing Date	Status	Patent No.
10/798,606	03/11/2004	Patented	6,823,889
10/958,797	10/05/2004	Patented	7,743,436
12/786,904	05/25/2010	Patented	8,104,105
13/346,355	07/09/2012	Patented	8,650,671
14/164,424	01/27/2014	Patented	9,139,993
14/457,697	08/12/2014	Patented	9,103,105
14/856,901	09/17/2015	Patented	10,519,639
16/686,328	11/18/2019	Patented	10,934,698

275. I understand that the '993 Patent is entitled to a March 11, 2004 priority date if the '606 Application (and each intervening application) would reasonably convey to a POSITA that the patentee had possession of the claimed subject matter as of the filing date of the '606 Application.

276. At various points, Petitioner and Dr. Cameron refer to the disclosure of the '904 Application. It is my opinion that the '993 Patent is entitled to its earliest priority date (March 11, 2004). To that end, I refer to the disclosure of the '606 Application in my analysis. However, the referenced disclosure is also present in each intervening application.

277. I further understand that the patentee is considered to be “in possession” of the claimed subject matter if the '606 Application describes the invention, with all its claimed limitations. This is done by such descriptive means as words, structures, figures, diagrams, formulas, etc., that fully set forth the claimed

invention. A description that renders obvious the invention for which an earlier filing date is sought is not sufficient.

278. I understand that in the mechanical world, disclosure of a species (such as a bowl fill valve) may convey to one skilled in the art that the inventors had possession of the genus (such as bowl fill restrictions or water flow regulators, categorically).

279. I further understand that if the difference between members of the group is such that the person skilled in the art would not readily discern that other members of the genus would perform similarly to the disclosed members, i.e., if the art is unpredictable, then disclosure of more species is necessary to adequately show possession of the entire genus.

a) A POSITA would have understood that the patentee was in possession of both a “bowl fill restriction” and a “water flow regulator” as of the filing of the’606 Application.

280. There are four key terms at issue: valve, restrictor, restriction, and flow regulator. Below, I explain my understanding of each term, which is consistent with its plain and ordinary meaning as understood by a POSITA. Although these are commonly accepted definitions, they are not universal. For example, a flow control valve is not manually adjustable, but is still considered a valve. *See, e.g.,* EX2009. Conversely, there are commercial products marketed as “adjustable restrictors,” which, despite being branded as “restrictors” function more similarly to the “valves”

described above. EX2010 As such, depending on the specific valve or restrictor in question, a POSITA would have understood it to be either fixed or adjustable.

281. A **valve** is typically an adjustable device that impacts the flow of a fluid through a system. Thus, a bowl fill valve is a valve that impacts the filling of a toilet bowl. The '606 Application contains numerous references to valves, including multiple types of bowl fill valves.

282. Valves typically include both “open” positions, where fluid passes through the valve, and “closed” positions, where fluid does not. Additionally, some valves are continuously adjustable and can be set at any number of positions between open and closed. Still other valves include a fixed number of biased positions between the open and closed positions.

283. In some instances, a valve is adjusted by a user. In other instances, such as via a backflow valve, a valve automatically changes position when a certain condition occurs.

284. A **restrictor** is a typically static (i.e., non-adjustable) device that restricts the flow of fluid through a system, typically by reducing the surface area available for the fluid to pass through. Restrictor is typically a commercial term and is not found in the '606 Application or '993 Patent.

285. **Restriction** is a concept of a geometry within a fluid system that hinders the flow of water, resulting in a pressure drop and reduced flow rate. As

relevant to these proceedings, the term restriction is a generic term for something that restricts the flow of fluid through a system. It includes both adjustable devices (such as the typical valve) and static devices (such as the typical restrictor). Thus, a bowl fill restriction includes any device that restricts the flow of water from the toilet fill valve to toilet bowl.

286. I understand that during prosecution, the patentee explained that a bowl fill restriction is broader in scope than a bowl fill valve, in that it includes both adjustable and static devices. EX1002, 085. This is consistent with my understanding of the term.

287. A **flow regulator** is any device that regulates the flow of fluid through a system. It includes both adjustable devices (such as the typical valve) and static devices (such as the typical restrictor). Thus, a water flow regulator includes any device that regulates the flow of water.

288. With respect to the term “water flow regulator,” the ’606 Application discloses a “bowl fill valve” with a “bowl fill valve inlet 113” that is “operatively coupled to the water inlet 103.” EX1001, 2:10-16; EX1012, p. 047, ¶[0008]. “In this respect, when the toilet fill valve 100 is open and water flows from the water inlet 103 to the water outlets 106 and into a toilet tank, an amount of water is also supplied to the bowl fill valve inlet 113 that flows through the bowl fill valve 109 and out the bowl fill valve outlet 116.” EX1001, 2:28-39; EX1012, p. 047, ¶[0008]. The ’606

Application continues, “the *flow* of *water* through the bowl fill valve 109 is *regulated*. In this manner, the flow of water is *regulated so that enough water flows out of the bowl fill valve 109 to fill a toilet bowl without wasting any water down a drain*.” EX1001, 2:28-39; EX1012, p. 047, ¶[0008]. Thus, the ’606 Application clearly discloses *regulating* an amount of water supplied to a toilet bowl using a valve to avoid water loss or, in other words, a water flow regulator that regulates the flow of water such that “enough water flows out of the bowl fill valve 109 to fill a toilet bowl.” *See id.*

289. The ’606 Application contains sufficient disclosure to show that the patentee was “in possession” of both a “bowl fill restriction” and a “water flow regulator.” Specifically, the ’606 Application identifies numerous types of “valves” that would have been considered by a POSITA, and explains that that:

The bowl fill valve 109 may be, for example, a ball valve, a gate valve, a globe valve, a plug valve, a diaphragm valve, a butterfly valve, a needle valve, a sliding gate, a quick turn valve, a knife valve or any other appropriate type of valve as can be appreciated by those with ordinary skill in the art.

EX1012, p. 048, ¶[0012]; EX1001, 3:4-8.

290. One example of a “valve” that would have been “appreciated by those with ordinary skill in the art” is a flow control valve. EX2009. Flow control valves do not have moving parts, and are not manually adjustable. Instead, a flow control

valve has an internal flexible orifice, which varies in size based on the pressure, so that a constant flow rate is maintained. *Id.* Despite being commonly considered a “valve,” flow control valves are static (i.e., non-adjustable) devices that restrict the flow rate through the device. *Id.* As such, a POSITA would have understood the ’606 Application to disclose both adjustable and non-adjustable flow control structures.

291. Dr. Cameron explains that:

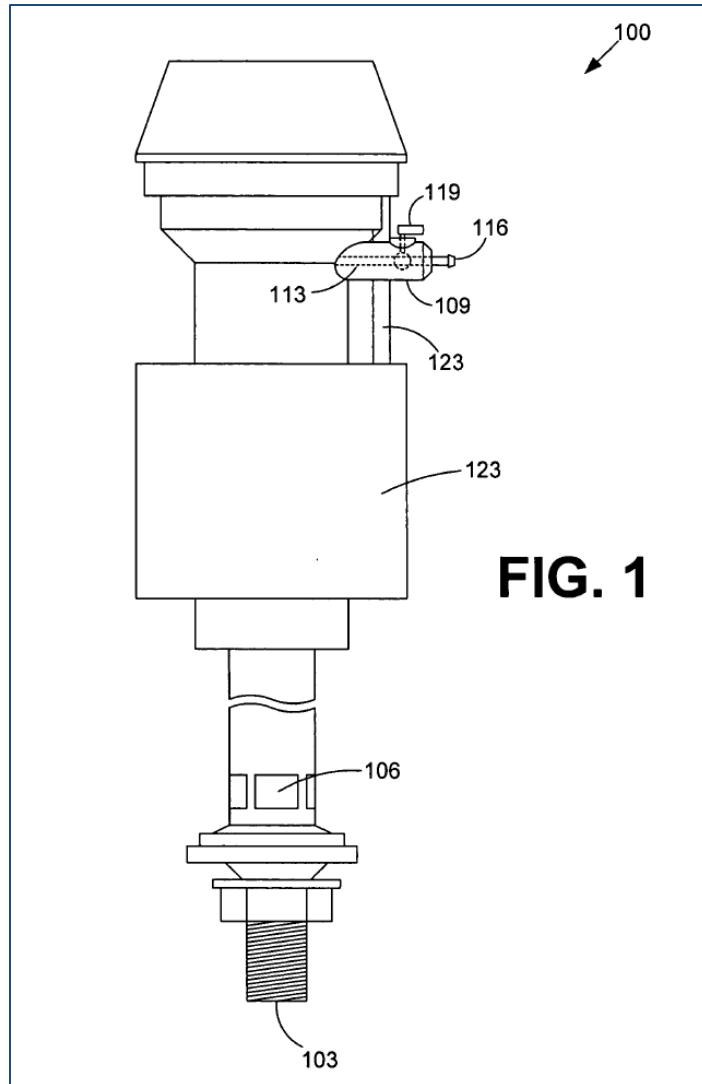
The ’904 application specification makes it clear that the adjustability of the bowl fill valve is a desirable and essential feature of the invention. Because a fluid flow restrictor is not capable of being adjusted once installed, replacing the bowl fill valve of the ’904 application with a non-adjustable restricting mechanism would defeat the purpose of the invention.

EX1004, ¶330. This, however, addresses the wrong question. The pertinent question is whether the patentee had possession of a non-adjustable flow control device (such as a restrictor) at the time of filing. They did.

292. The specification makes clear that is correct, explaining that any “adjustment” of the fill valve occurs during the installation process. EX1012, [0017]; EX1001, 4:10-29. Once the correct flow rate is determined, the “valve” is not adjusted further. A POSITA would have understood that a fixed restrictor would have performed the same function, once the appropriate size restrictor was determined. EX2008 (Cameron Tr.), 144:13-146:10. Thus, while the adjustable

valves claimed by '606 Application provide a benefit (making it easier to determine the correct flow rate), a POSITA reading the '606 Application would have understood the patentee to also be in possession of non-adjustable flow control devices such as restrictors.

293. This position is confirmed by reference to the figures filed with the '606 Application. Importantly, both bowl fill valve inlet 113 and bowl fill valve outlet 116 depict fixed restrictors, at least to the extent that they comprise devices with a reduced diameter relative to water inlet 103. As such, both bowl fill valve inlet 113 and bowl fill valve outlet 116 reduce the flow rate of any water passing through them.



EX1012, p. 056

294. Indeed, Brown itself (which was cited during the prosecution history of the '606 Application; EX1012, p. 035), discloses that use of a fixed restrictor as an alternative for an adjustable valve would have been known to both a POSITA. EX1021, 4:26-34 (“The preferred form of this water saving means differs from that illustrated in FIG. 1 in that adapter tube 23, and the slotted portion 24 and *set screw* 26 forming the metering valve are completely eliminated, and replaced by a

smaller tube 31 forming the desired restricted opening.”). Petitioner likewise agrees that “[i]n addition to valves, other mechanisms for controlling water flow [such as restrictors or diverters] were also well-known.” Pet., 19.

b) Claims 19 and 20 of the ’993 Patent are entitled to a 2004 priority date even under Petitioner’s deficient argument.

295. Both Claim 19 and Claim 20 recite “wherein the water flow regulator comprises an adjustable water flow regulator.” EX1001, Cls. 19, 20.

296. The Petition concedes that the ’904 Application provides written description support for an adjustable water flow regulator (*i.e.*, a bowl fill valve). Pet., 91 (“Indeed, the ’904 application specification makes it clear that the adjustability of the bowl fill valve is a desirable and essential feature of the invention.”). Likewise, the ’606 Application also provides written description support for an adjustable water flow regulator. EX1012, p. 048, ¶[0013].

297. As such, there is no dispute that a POSITA would have understood the ’904 Application to provide written description support for Claims 19 and 20. Claims 19 and 20 are entitled to a priority date of March 11, 2004. Under the correct priority date, Schuster is not prior art to Claims 19 and 20. As such, they are not invalid.

2. The Petition does not allege that Schuster anticipates the Challenged Claims.

a) Petitioner combines multiple embodiments.

298. The Petition cites lines 1:63-65 of Schuster as allegedly anticipating limitation 1[B]. In context, the cited passage says: “With reference to FIG. 1, shown is a *toilet fill valve 100 according to an embodiment of the present invention*. The toilet fill valve 100 includes a water inlet 103 at the bottom of the toilet fill valve 100 that is configured to be coupled to a water source outside of a toilet tank within which the toilet fill valve 100 is installed.” EX1029, 1:62-67.

299. The Petition also alleges that limitation 1[A] is disclosed by Figure 4. With respect to Figure 4, Schuster states: “With reference to Fig. 4, shown is a *toilet fill valve 200 according to another embodiment of the present invention*.” EX1029, 4:49-50.

300. Petitioner combines two distinct embodiments (i.e., the Figure 1 and Figure 4 embodiments) that respectively refer to two distinct toilet fill valves (i.e., toilet fill valve 100 and toilet fill valve 200).

b) The cited portions of Schuster do not disclose “wherein the extended portion is integrally molded with the body” (Claims 1 and 14) / “wherein the extended portion is integrally molded with the toilet fill valve” (Claim 8).

301. Petitioner’s sole allegation that Schuster discloses limitation 1[A] is a single conclusory sentence: “Schuster discloses a toilet fill valve having an extended portion 206 that is integrally molded with the water toilet fill valve, as shown in

Figure 4 above. Schuster thus satisfies this element.” Pet., 94 (citing EX1004, ¶336). Dr. Cameron’s declaration merely recites this statement verbatim without additional analysis. Neither the Petition nor Dr. Cameron’s declaration include any annotations of Figure 4.

302. Figure 4, however, does not include any indication regarding whether bowl fill outlet port 206 is, or is not, integrally molded with body 209 of toilet fill valve 200.

303. Importantly, Figure 4 merely discloses different components, without indicating how those components are connected. The Petition does not reference the corresponding specification, which is likewise silent as to relationship between bowl fill outlet port 206 and body 209.

304. The Petition does not add any additional detail with respect to limitations 8[C2] or 14[A2]. Pet., 97-98.

XI. CONCLUSION AND SUPPLEMENTATION

305. Petitioner has not met their burden to show that the Challenged Claims are invalid. As such, and for the additional reasons set forth above, in my opinion each of the Challenged Claims are not invalid.

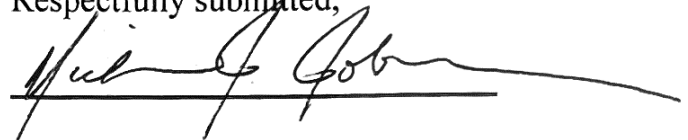
306. In this Declaration, I have presented my opinions regarding the validity of the Challenged Claims of the ’993 Patent based on the information available to me. My opinions are subject to change in view of opinions provided by the Petitioner

or its expert, or any additional information that I may receive. I reserve the right to supplement my opinions accordingly.

I hereby declare that all statements made herein of my own knowledge are true and that all opinions expressed herein are my own, and further that these statements were made with the knowledge that willful false statements and the like are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

Dated: December 4, 2024

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Michael Jobin", is written over a horizontal line.

Michael Jobin