

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG ELECTRONICS CO., LTD., SAMSUNG ELECTRONICS
AMERICA, INC.,

Petitioners

v.

WHIRLPOOL CORPORATION

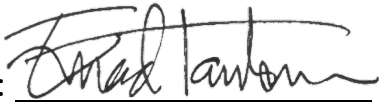
Patent Owner

Case IPR2026-00336
Patent 12,232,681

DECLARATION OF DR. EMAD TANBOUR

Mail Stop "PATENT BOARD"

Patent Trial and Appeal Board
U.S. Patent and Trademark Office
P.O. Box 1450
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Signed: 

Dr. Emad Tanbour

July 15, 2026

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I. Introduction

1. My name is Emad Tanbour. I am over eighteen years of age, of sound mind, and qualified to make the statements set forth in this Declaration. With the exception of the legal principles counsel has supplied to me, all the facts and statements contained herein are within my personal knowledge and are in all respects true and correct.

2. I have been asked by Whirlpool Corporation (“Whirlpool” or “Patent Owner”) to submit this declaration in response to a Petition in IPR2026-00336 from Samsung Electronics Co. Ltd., and Samsung Electronics, America, Inc., (“Samsung” or “Petitioner”) regarding U.S. Patent No. 12,232,681 (“the ’681 Patent”).

3. 3. I am being compensated for my time at my current standard rate of \$595 per hour for the services that I provide in connection with this case. That compensation is not contingent upon my performance, the outcome of the case, or any issues involved in or related to this case.

4. 4. I declare under penalty of perjury that all statements made herein of my own knowledge are true and all statements made on information and belief are believed to be true. I further understand 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.

5. I previously submitted several declarations in connection with the district court litigation between Whirlpool and Samsung. I have expanded on my opinions offered in those declarations here, as necessary.

II. Professional Background

6. I am a Professor of Mechanical Engineering at Gameabove College of Engineering and Technology at Eastern Michigan University in Ypsilanti, Michigan, where I have taught since 2016.

7. I graduated third in my cohort from Jordan University of Science and Technology in 1987 with a B.S. in Mechanical Engineering. I then graduated in 1990 with a Master of Science in Mechanical Engineering also from Jordan University of Science and Technology. I then received a full scholarship to pursue graduate studies toward my Ph.D. in Mechanical Engineering from the University of Iowa in the United States. During my time at Iowa, I worked on thermal design of all control circuits for NASA Cassini spacecraft ultimately launched to Saturn. I graduated from University of Iowa in 1997–1998 with my doctorate degree in Mechanical Engineering.

8. Upon graduation from my undergraduate institution, I worked for several years in engineering and technical teaching in the areas of Mechanical Engineering. Upon retaining my master's degree, I worked in other engineering capacities until I joined Gail Industries, a manufacturer of high-pressure plunger

pumps and hydraulics systems until graduation from my Ph.D. program. Upon completing my doctorate degree in Mechanical Engineering, I joined the corporate tech center of HNI, the office furniture and fireplace manufacturer for eight years where I managed R&D of hearth appliances and office furniture components and systems. I then joined A. O. Smith, the largest water heater manufacturer in North America as the Product Development Engineering Manager. I stayed in that position for over 4 years. I then transitioned to academia and served in many capacities in teaching and leadership, and I am currently a full professor and chair of Mechanical Engineering at Eastern Michigan University. While serving in academia for the past 16+ years, I served as a technical expert on several patent-related cases related to various appliances such as water heaters, heat exchangers, condensers, air conditioners, microwaves, refrigerators, and ice makers. I also worked on designs of various appliances such as combined heat pumps and water heaters.

9. I now have more than 38 years of combined experience in Mechanical Engineering in both academia and industry. My industry experience spans over 18 years working for corporate America with focus on the areas of product development—specifically with respect to energy efficient appliances—as well as with thermal systems design and engineering management.

10. I am also an innovator with over 21 U.S. pending and issued patents, many if not all of which resulted in products sold in North America. Most of my

innovations are in the field of sustainable design of domestic and commercial appliances.

11. I am the recipient of the Arch T. Colwell Award from the Society of Automotive Engineers and served for five years as an ABET industry consultant.

12. I am a product design and development expert with decades of proven field experience in designing appliances and appliance systems and components. I also lead the capstone design courses in my Mechanical Engineering program at Eastern Michigan University where I teach principles of product development engineering and product realization. I am a named inventor in over 21 U.S. patents and prior art publications related to appliance design and improvements.

13. I am an expert engineering designer of various appliance components and assemblies, and I have designed appliance components made of wire structures such as the dish racks relevant in the current case. I have extensive experience in designing appliance components to provide functions similar to the dish rack of a dishwasher. I also have significant experience in designing moving parts common in most appliances that are more complex than the dish rack.

14. I have included a copy of my curriculum vitae and litigation work experience with this Declaration, which details my professional qualifications and lists my publications, awards, research grants, and other professional activities.

III. Materials Considered

15. Among the materials I have reviewed in forming my opinions are the '681 Patent, its prosecution history, as well as the patents, references, and other materials cited in this expert declaration.

16. I have also reviewed the Petition and its exhibits, including the declaration of Dr. Kimberly K. Cameron (Exhibit 1002).

IV. Legal Principles

17. I am not a lawyer. In forming my opinions as set forth in this Declaration, I have relied upon legal principles supplied to me by attorneys for Atlas. In forming my opinions, I have not relied upon Patent Owner's attorneys for any purpose other than the following legal principles.

A. Claim Construction

18. I understand that determining whether a patent claim is valid requires a two-step analysis. First, the claim must be construed. Second, the properly construed claim must be compared to the prior art.

19. With respect to the first step, I understand that claims are construed from the perspective of a person of ordinary skill in the art ("POSITA") at the time of the purported invention. I understand that, absent a disclaimer or express definition, claim terms are given their plain and ordinary meaning to a POSITA in view of the specification and file history and the knowledge of a POSITA. Unless

otherwise noted, I have applied what I consider to be the plain and ordinary meaning of all terms as understood by a POSITA at the time of the invention.

B. Anticipation

20. I understand that, although not expressly disclosed, subject matter may be inherently disclosed in a prior art reference where that subject matter is necessarily present in the subject matter disclosed and would be understood to be so by those of ordinary skill in the art. I understand that the fact that a certain result or characteristic may occur or be present in the prior art is not sufficient to establish the inherency of that result or characteristic.

21. I understand that a claim is invalid if each and every element of the claim is disclosed in a single prior art reference with the elements arranged as specified in the claim, either expressly or inherently. I understand that invalidity based on the disclosure of a single prior art reference in this manner is called anticipation.

C. Obviousness

22. I understand that a claim would have been obvious under 35 U.S.C. § 103 if one or more prior art references disclose every claim limitation in such a way so as to render the claim, as a whole, obvious to a person of ordinary skill in the art at the time the purported invention was made.

23. In determining whether or not a patented invention would have been obvious, the following factors should be considered: (a) the scope and content of the prior art; (b) the differences between the prior art and the claims at issue; (c) the level of ordinary skill in the art; and (d) whatever “secondary considerations” may be present.

24. I understand that certain “secondary considerations” may be relevant in determining whether or not an invention would have been obvious, and that these secondary considerations may include commercial success of a product using the invention, if that commercial success is due to the invention; long-felt but unsolved need for the invention; evidence of copying of the claimed invention by others; industry acceptance; initial skepticism of the invention; failure of others to solve the problem; praise of the invention by others; the taking of licenses under the patents by others; and simultaneous invention by others (which may be an indication that the claimed invention was the result of ordinary skill in the art).

25. I understand that a patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art. While multiple prior art references or elements may, in some circumstances, be combined to render a patent claim obvious, I understand that I should consider whether there is an apparent reason to combine the prior art references or elements in the way the patent claims. To determine whether such an

apparent reason exists to combine the prior art references or elements in the way a patent claims, it will often be necessary to look to the interrelated teaching of multiple patents, to the effects of demands known to the design community or present in the marketplace, and to the background knowledge possessed by a person having ordinary skill in the art.

26. I also understand that when the prior art teaches away from combining prior art references or certain known elements, discovery of a successful means of combining them is more likely to be non-obvious. A prior art reference may be said to teach away from a patent when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the patent or would be led in a direction divergent from the path that was taken by the patent.

27. I also understand that it is not permissible to use hindsight in assessing whether a claimed invention is obvious. Rather, I understand that, to assess obviousness, you must place yourself in the shoes of a person having ordinary skill in the relevant field of technology at the time the inventions were made who is trying to address the issues or solve the problems faced by the inventor and ignore the knowledge you currently now have of the inventions.

28. I also understand that there are numerous ways in which to articulate the legal standard for obviousness, including: (1) combining prior art elements according to known methods to yield predictable results, (2) simple substitution of

one known element for another to obtain predictable results, (3) use of a known technique to improve similar devices (methods, or products) in the same way, (4) applying a known technique to a known device, method, or product ready for improvement to yield predictable results, (5) choosing from a finite number of identified, predictable solutions with a reasonable expectation of success, (6) known work in one field of endeavor may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces if the variations are predictable to one of ordinary skill in the art, and (7) some teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill to modify the prior art reference or to combine prior art reference teachings to arrive at the claimed invention.

D. Person of Ordinary Skill in the Art

29. I understand that the meaning of claim terms and a patent's validity are to be determined from the vantage point of one of ordinary skill in the art at the time of the invention (a "POSITA"). In determining who would be one of such ordinary skill, I understand it is appropriate to consider criteria such as: (a) the type of problems encountered in the art; (b) prior art solutions to those problems; (c) the rapidity with which innovations are made; (d) the sophistication of the technology; and (e) the education level of active workers in the field.

V. The Level of Ordinary Skill in the Art

30. For the purposes of this declaration supporting the Patent Owner's Preliminary Response, I have been asked to apply the same POSITA definition as Dr. Cameron and assume that a POSITA "would have had at least a bachelor's degree in mechanical engineering or a related field, and two years of experience in the design or development of consumer appliances, including dishwashers or comparable fluid-delivery systems, with additional education substituting for experience and vice versa." EX1002 ¶ 20. I understand that if trial is instituted, I will have the opportunity to propose my own definition of a POSITA.

VI. Analysis

31. I have been asked to opine on a limited number of issues for the purpose of supporting the Patent Owner's Preliminary Response. I understand that if trial is instituted, then I will have the opportunity to submit additional analysis on these and other issues.

A. Technology Background

32. The technology at issue in this case relates to the market category of household dishwashers. My understanding is that well-known brands, such as Whirlpool, KitchenAid, Maytag, JennAir, Samsung, LG, Bosch, GE, and Frigidaire, exist within this category that is divided into price segments. This matter concerns dishwashers sold at the premium price point.

33. I understand that a dishwasher is a common household appliance used for cleaning soiled dishware. I understand that a dishwasher tub is defined by its plain meaning and is the interior cavity that holds the dirty dishes and contains the water, sprayers, filters, and other components needed for the washing cycle.

34. I have reviewed and examined the patent at issue.

B. Overview of the '681 Patent

35. I understand that U.S. Patent No. 12,232,681 (“the '681 Patent”) was filed on December 11, 2023, and issued on February 25, 2025. EX1001, Cover

36. The named inventors of the '681 Patent were originally Mark S. Feddema, William J. Snell, and Sachie Kakehi. But I understand that Whirlpool filed to have inventorship corrected on October 3, 2025. All inventors, including both those originally listed and also those originally unintentionally excluded, agreed with the inventorship correction. The United States Patent and Trademark Office granted that request on October 9, 2025.

37. The '681 Patent is a continuation of application No. 17/830,947, filed on Jun. 2, 2022, now Pat. No. 11,864,712, which is a continuation of application No. 16/833,984, filed on Mar. 30, 2020, now Pat. No. 11,375,874.

38. Claim 14 of the '681 Patent recites:

14[pre]. An automatic dishwasher configured to implement an
automatic treating cycle of operation, comprising:

[a] a tub defining a dish treating chamber; and

[b(i)] a dish rack located within the dish treating chamber having

a first end spaced from a second end and comprising a bottom wall from which extends a peripheral wall defining side walls of the dish rack, [b(ii)] at the first end of the dish rack, the bottom wall has a first portion defined by a first substantially horizontal planar portion extending across a first portion of the bottom wall and [b(iii)] at the second end of the dishrack, a second portion is angled with respect to the first portion and defining a depression; [b(iv)] the depression extending lower than the first portion relative to the peripheral wall;

[c(i)] the first portion supporting a first set of utensil holders for supporting one or more utensils and [c(ii)] the second portion defining a cup seat for supporting one of more cups in the depression.

Id., 12:657-13:7.

39. Figure 1 and Figure 3 illustrate embodiments that cover all claim elements of Claim 14 of the '681 Patent:

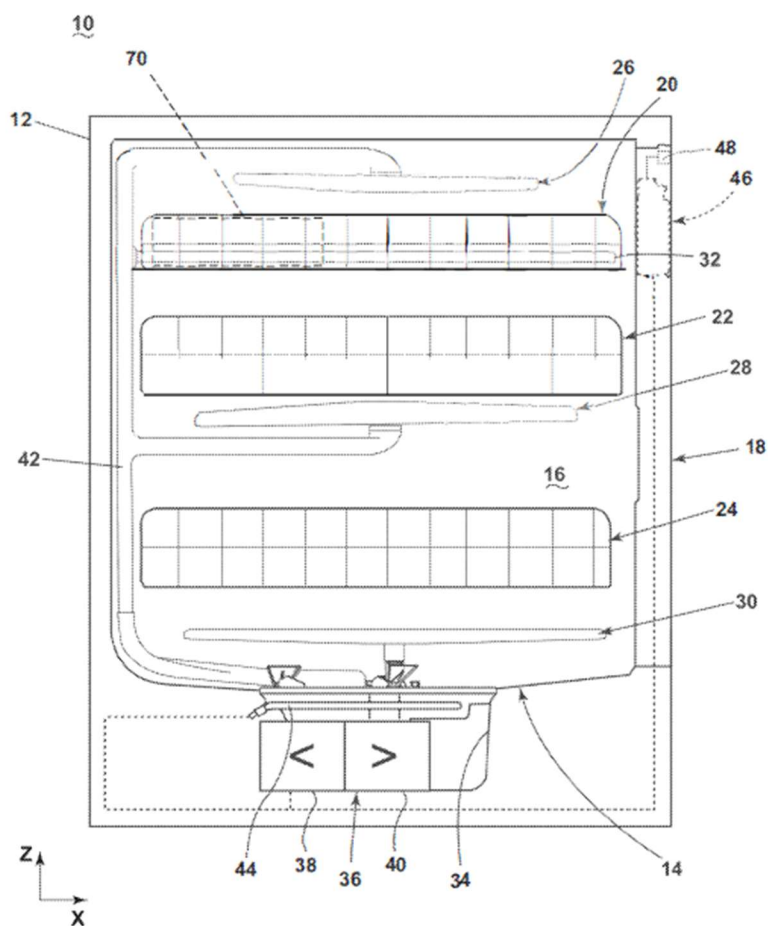


FIG. 1

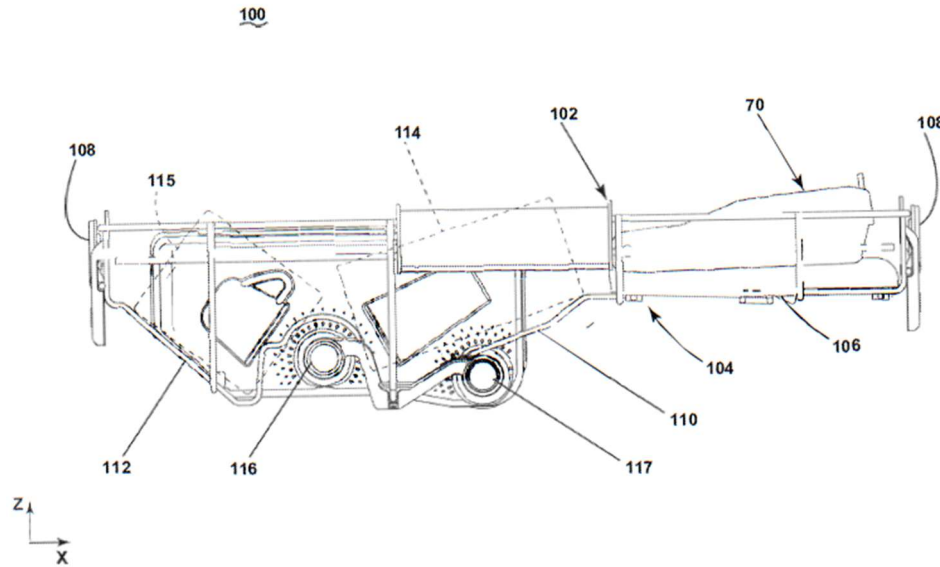


FIG. 3

C. The References Addressed by Dr. Cameron

40. In her declaration, Dr. Cameron addressed the following references in making her assertions with respect to the '681 Patent:

- Carr (U.S. Patent Publication No. 2018/0220867), published August 9, 2018.
- Mailander (U.S. Patent Publication No. 2008/0169009), published July 17, 2008
- Ochoa (U.S. Patent No. 6,869,029) issued March 22, 2005¹

¹ I have been asked to focus my analysis on Carr and Mailander for the purpose of this declaration and Whirlpool's preliminary response.

D. Overview of the Asserted References

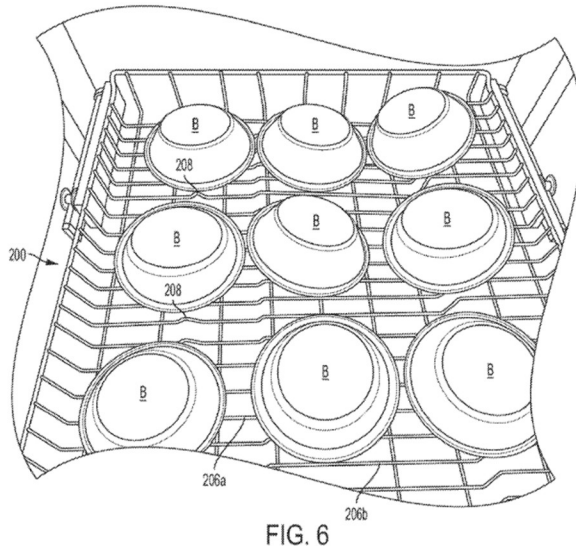
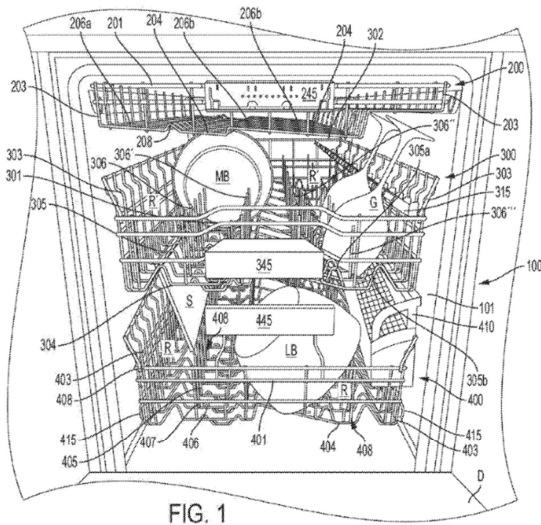
1. U.S. Patent Publication No. 2018/0220867 (“Carr”)

41. Carr discloses a wire dishware and cutlery rack with “at least one angled portion that is configured to hold bowls.” EX1005 ¶19. Carr teaches this angled portion to assist with draining water from the bowls. *Id.* ¶9. Unlike the ’681 Patent, Carr does not teach an angle designed to accommodate tall cups in its top rack. Indeed, Dr. Cameron acknowledges that Carr is “configured to hold bowls.” EX1002 ¶ 71.

42. Carr also teaches a notch section of the “third[] top washware rack” for utensils, which permits “stemmed wine glasses having a height of approximately 9 inches” to be stored directly below the third rack. EX1005 ¶17. While glasses may fit below Carr’s top rack, unlike the ’681 Patent, Carr does not teach a top rack capable of accommodating glasses with ordinary dimensions.

43. The bottom walls of the dish racks disclosed in the ’681 Patent and Carr are also fundamentally different. The ’681 Patent discloses a bottom wall that creates cup seats. Carr does not teach an angled portion of the cutlery rack specifically designed to be a cup seat.

44. Carr also does not disclose two angled portions forming the opposing two angled portions disclosed in the ’681 Patent.



2. U.S. Patent Publication No. 2008/0169009 (“Mailander”)

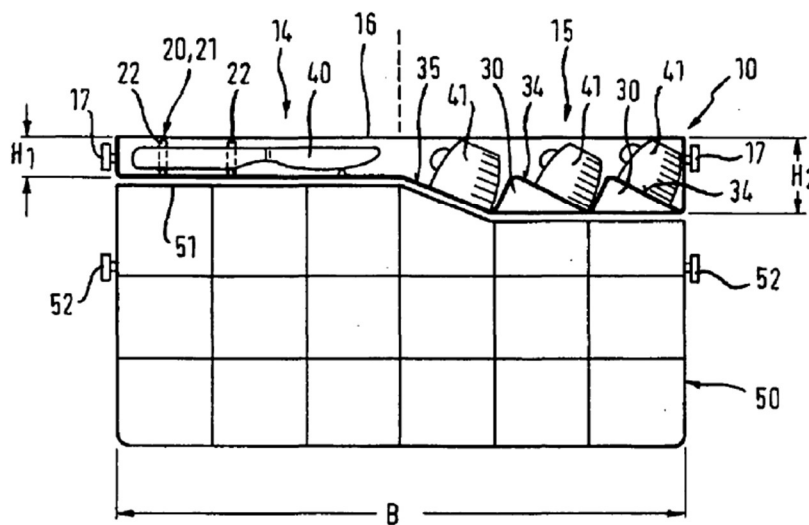
45. Mailander discloses a “washing items support.” Unlike the ’681 Patent’s three portion structure, Mailander has only two regions: (1) a cutlery container region, and (2) a region with wedge shaped incline to support surfaces referred to as “washing items holders” which are inclined. EX1006 ¶11. Furthermore, “the washing items holders” are wedge or L-shaped add-on components that are not part of the wire rack but rather “designed as inserts” and “releasably inserted” and placed on the bottom wall of the dish rack contrary to the “formed angled portions” built into the bottom wall of the dish rack disclosed in the ’681 Patent and practiced by the Accused Products. *See id.* ¶28. Mailander also does not disclose a spray tube mounted on the dish rack.

46. Unlike the depression disclosed in the '681 Patent, Mailander's wedge-shaped "washing items holders" are not integrated into the bottom wall of the

Mailander rack. Instead, they sit atop the bottom wall. A POSITA looking at the washing items holders of Mailander would understand that these components are add-on components and not generated by forming the bottom wall. Also, Mailander does not disclose first and second angled portions formed in the bottom rack. *See id.*

47. Because Mailander's "washing items holders" are not integrated into the bottom wall, there is wasted space within Mailander's "washing items support" triangular areas trapped under the L-shaped components and the horizontal bottom wall. As a result, unlike the rack disclosed in the '681 Patent, Mailander cannot accommodate glasses or cups having ordinary dimensions:

Fig. 1



E. Carr does not render obvious Claim 14.

48. Dr. Cameron opines that Carr renders obvious Claim 14 of the '681 Patent. I disagree because Carr does not disclose the limitations of those claims alone or in combination.

1. Claim 14[c(ii)]: the second portion defining a cup seat for supporting one or more cups in the depression.

49. Carr does not teach a cup seat. Instead, Carr discloses a wire dishware and cutlery rack which includes “an angled portion to hold bowls”— critically distinct from the “cup seat for supporting one or more cups” that is disclosed in Claim 14 of the '681 Patent. Indeed, Dr. Cameron and I agree that Carr’s dish rack is “configured to hold bowls.” EX1002 ¶71, 105-106.

50. Dr. Cameron presses that while Carr uses bowls, its top rack can also hold cups. *See* EX1002 ¶106. Dr. Cameron’s reliance on Carr’s singular mention of “cups” is unavailing. Even if cups could be placed on Carr’s third rack, Carr does not teach a third rack containing “cup seat[s]” as disclosed in Claim 14 of the '681 Patent. The cup seat disclosed in Claim 14 of the '681 Patent is capable of securely supporting glasses and cups of ordinary dimension along their cylindrical side. For example, the '681 Patent explains that the cup seat “hold cups as illustrated” in Figure 3, similar to how the utensil holders “hold smaller utensils.” EX1001, 5:55-60, 6:58-7:5.

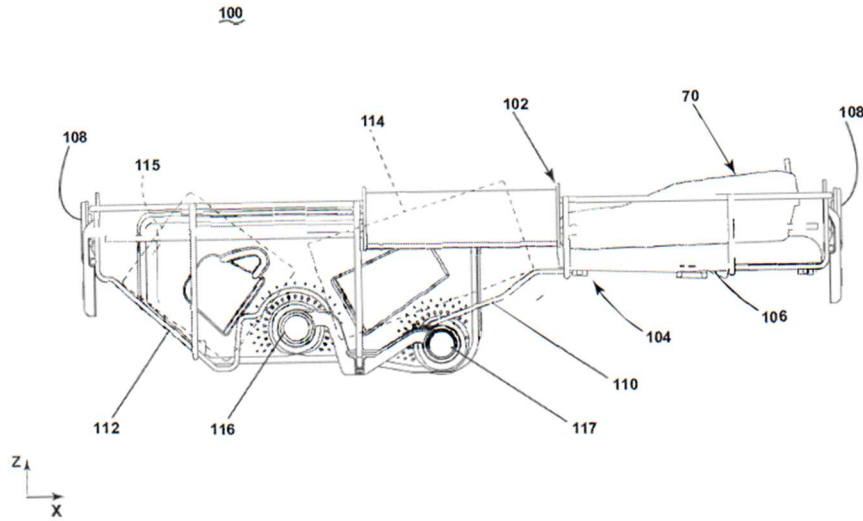


FIG. 3

51. There is nothing analogous in Carr. Indeed, a POSITA would not consider Carr's bowl-based top rack design to teach a cup seat as disclosed in the '681 Patent.

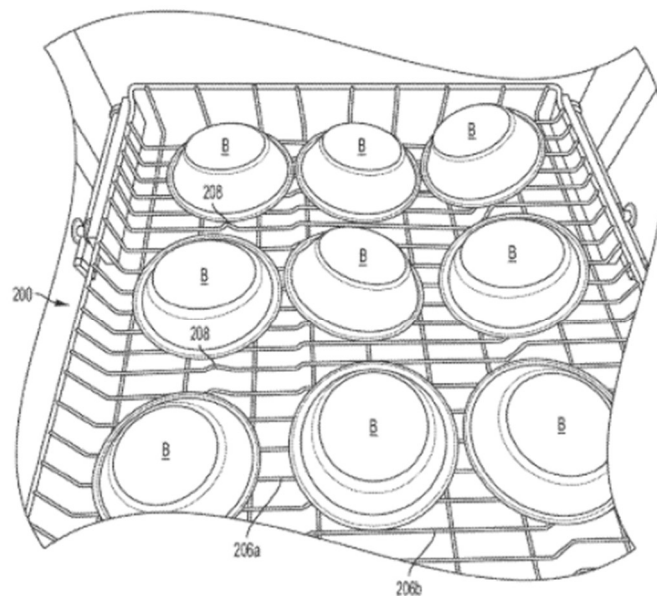


FIG. 6

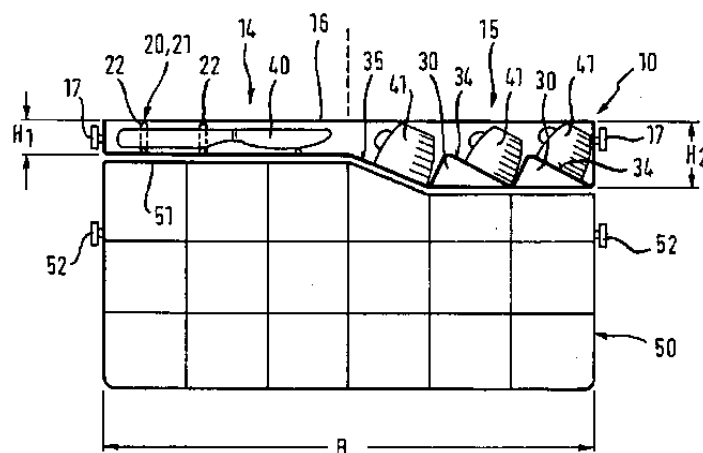
Carr only explains that its top rock could hold a number of items, as with any general use portion of a dish rack. But this does not specifically form a cup seat. Carr's forms 208 (seen above) also do not hold form a cup seat because they cannot hold a cup and prevent it moving, at best they can keep a bowl from moving side to side.

F. Mailander does not render obvious Claim 14

1. Claim 14[c(ii)]: the second portion defining a cup seat for supporting one or more cups in the depression

52. Mailander does not teach a second portion defining a cup seat. Dr. Cameron erroneously concludes that a cup seat is created by the two wedges—described as “washing items holders”—placed along the bottom wall. EX1002 ¶134. But Claim 14 includes a limitation that “the second portion” of the bottom wall defines the cup seat. Mailander's wedge shaped holders are not integrated into the bottom wall, as I explained above.

Fig. 1



Instead, Mailander says these web shaped holders are inserts. EX1006 ¶28.

53. Dr. Cameron argues that, when Mailander says the dish rack could be made of plastic, then the holders would not be inserts. EX1002, ¶¶77, 122. I disagree. Mailander always states the holder would be an insert, and if it was not, the benefits and flexibility of an insert would be lost. I also do not agree with how Dr. Cameron describes her plastic version of Mailander. She only stated that the wires below the holders would be removed. But Mailander also uses wire holders on the side of the dish rack. Some other structure needs to replace the wires on both the base and side form the plastic version of the dish rack.

54. Moreover, even if the holders were a “second portion” of the bottom wall, Mailander’s “washing items holders” do not teach a “cup seat” as understood in Claim 14. The ’681 Patent’s innovative cup seats are not only integrated into the structure of the rack but also oriented to cradle larger cups along their cylindrical side—as opposed to on their top—for security during a wash cycle and to optimize for space. As discussed earlier, the first and second angled portions in the asserted patent are formed in the bottom wall and are integral to the bottom wall.

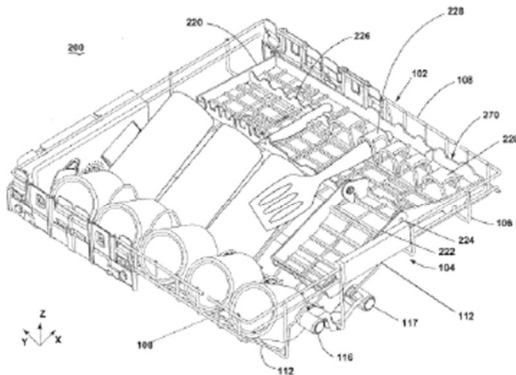


FIG. 7

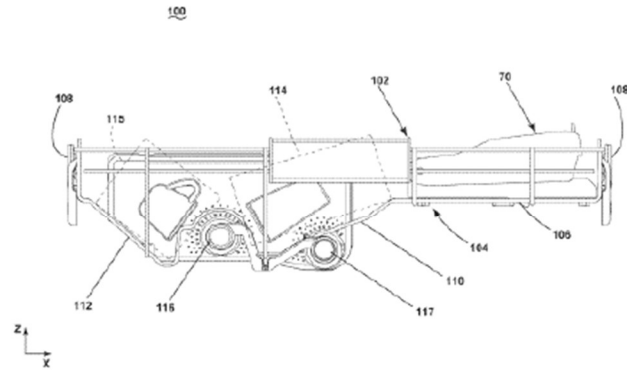
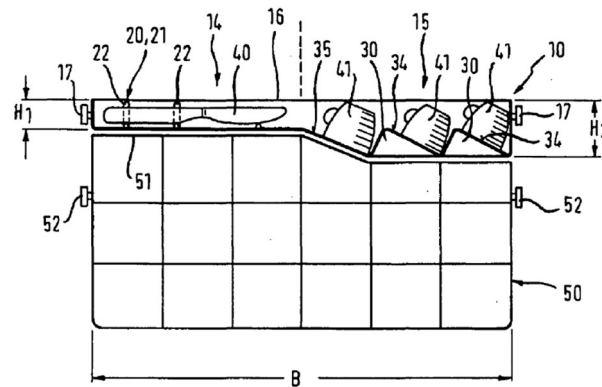


FIG. 3

55. Mailander only shows mugs placed face down on the holders.

Fig.1



At best, this layout only prevents the mugs from moving side to side (from this perspective), but it does not stop forward and back motion. Mailander also does not appear to be tall enough to accommodate cups this way. A cup on its side in Mailander's holder would be unsecure and easily roll back and forth.