

**UNITED STATES PATENT AND TRADEMARK OFFICE**

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**BEFORE THE PATENT TRIAL AND APPEAL BOARD**

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Fellowes, Inc.

v.

Treefrog Developments, Inc.,  
Patent Owner

**DECLARATION OF DR. CHARLES GARRIS REGARDING**  
**U.S. PATENT NO. 8,564,950B2**

Mail Stop Patent Board  
Patent Trial and Appeal Board  
P.O. Box 1450  
Alexandria, VA 22313-1450

I, Dr. Charles Garris, declare:

**I. Introduction**

1. I am a tenured full professor of Mechanical and Aerospace Engineering in the School of Engineering and Applied Science at The George Washington University. I received a Bachelor of Engineering in Marine Engineering from the State University of New York, Maritime College (1965), a Masters of Science in Mechanical Engineering from the State University of New York at Stony Brook (1968), a Ph.D. in Mechanical Engineering from the State University of New York at Stony Brook (1971), and a post-doctoral Research Associate at in the Department of Mechanical Engineering at the Massachusetts Institute of Technology (1973-1976). I joined the faculty of The George Washington University in 1978.

2. I am a Registered Professional Engineer in the Commonwealth of Virginia. I was formerly licensed by the U.S. Coast Guard as a 3<sup>rd</sup> Assistant Engineer of Steam and Motor Vessels (Unlimited Horsepower). I am also registered by the U. S. Patent and Trademark Office as a Patent Agent.

3. I am also a Fellow of the American Society of Mechanical Engineers and an Associate Fellow of the American Institute of Aeronautics and Astronautics, a member of the American Society for Engineering Education, a member of Sigma Xi, a member of Pi Tau Sigma, and a member of the American

Intellectual Property Lawyers Association.

4. I have been the principal investigator in research grants afforded by the U.S. Maritime Administration, the National Science Foundation (NSF), the Department of Energy, the U.S. Environmental Protection Agency, National Aeronautics and Space Agency (NASA), Department of Defense, and others.

5. Through many years of research, teaching, and consulting, I have gained extensive experience and expertise in mechanical systems, including how such systems interact for mechanical engineering purposes. I also have knowledge and experience regarding protective enclosures for a wide variety of devices including electronic devices as a professor who teaches mechanical design, from my experience as an experimental researcher, and from my experience as a licensed Third Assistant Engineer in the U. S. merchant marine in shipboard marine engineering, where protection of equipment from weather and water is paramount. Having performed research and teaching in mechanical engineering applications for most of my career, I have an extensive background and understanding of the principles and processes involved with the technology of the '950 Patent.

6. I am the sole inventor of seven U.S. patents. In recognition of my inventions, I was the recipient of the 2006 Thomas A. Edison Award from the American Society of Mechanical Engineers. In some of these patents, protective

enclosures for electronic equipment were essential.

7. From approximately 1988 through 1991, I served on a consulting basis as Director of Engineering for Speakman Innovations, a subsidiary of Speakman Corporation. Speakman Corporation is a leading manufacturer of shower valves for the hotel industry. My principal role was to develop a new shower control, known as the "Ultra Valve" which would have computer control of a shower valve and digital input by the user through an interface with buttons. Since the unit was placed in the harsh shower environment, protection of the electronic components from water spray was essential. The design requirements of the enclosures were very similar to many of the design requirements for those of the '950 Patent including the need for robust injection molded enclosure which protects electronics from potentially harsh environments. The effort resulted in two U. S. patents where I was the sole inventor (1.Garris, C. A.: Valve Control, Patent Number 4,875,623. Oct. 24, 1989. 2.Garris, C. A.: Valve Control. Patent Number 4,969,598, Nov. 13, 1990.) The product was marketed for the hotel industry and our first sale was in the Waldorf Astoria in New York.

8. I have also served as an expert in several cases of litigation involving mechanical inventions and other technology in mechanical engineering, and in matters before the Patent Trial and Appeals Board of the United States Patent and Trademark Office.



9. Over the past thirty-plus years and apart from my work in this case, I have reviewed several hundred technical reports, as well as reports for journal publications involving hundreds of different designs and disclosures and several hundred different patents. I have conducted a detailed analysis into the meaning of claims found in over 100 patents involved in litigation and have written dozens of expert reports on patents. I have taken several courses on patent prosecution, passed the Patent Bar exam and am a registered patent agent, prosecuted applications for my own patents, and assisted numerous attorneys in patent prosecution matters.

10. My curriculum vitae, including a list of all my publications and the cases in which I have testified during the preceding four years, is attached hereto as Exhibit 1.

11. I am providing my expert consultation and will testify in this litigation at a compensation rate of \$300 per hour. I will not receive any benefit from the outcome of this proceeding.

12. In preparation for this testimony, I have reviewed all the materials cited herein, including specifically those identified below, and as well as relied on my extensive experience and education in mechanical engineering. Set forth below is a list of the specific exhibits identified by exhibit number and a brief description. **Exh. 1010** is omitted, as I understand this Declaration will be that

exhibit. **Exhs. 1011-1016** are also omitted as I understand those relate to legal issues relating to the litigation involving the '950 Patent.

<b>Exh. No.</b>	<b>Description of Exhibit</b>
<b>1001</b>	U.S. Patent No. 8,564,950
<b>1002</b>	Prosecution File History of U.S. Patent No. 8,564,950
<b>1003</b>	District Court Complaint
<b>1004</b>	European Patent No. 1,583,251 (Kuhn)
<b>1005</b>	U.S. Patent Application Publication No. 2008/0316687 (Richardson '687)
<b>1006</b>	U.S. Patent No. 7,050,712 (the '712 Patent)
<b>1007</b>	Japanese Patent Publication 2002-82384 (JP384)
<b>1008</b>	French Patent Publication 2,705,857 (FR857)
<b>1009</b>	U.S. Patent No. 7,090,088 (the '088 Patent)
<b>1017</b>	U.S. Patent Publication 2003/0095374
<b>1018</b>	Dictionary definition for "clasp"

13. I also had discussions with Fellowes' personnel responsible for its protective case business to confirm my understanding of the level of skill in the art, the persons that typically design such products, including their education level and experience, and other such issues. They also advised me of some of the issues that are faced in designing protective cases, and particularly how the device that is to be encased drives the configuration and selection of features of the case. An important factor in case design is that the case needs to include features enabling access to or use of the functional features of the enclosed device while in the case

to avoid sacrificing functionality of the enclosed device.

## **II. Applicable Legal Principles**

### **A. “Claim Construction”**

14. I understand that determining whether a patent is patentable involves a two-step analysis. First, the claims of the patent are “construed,” or the meaning of words used in the claims is interpreted to determine the scope of coverage of the claims. Second, the properly construed claims are compared with what is disclosed in the prior art.

### **B. “Anticipation”**

15. I understand that a patent claim is unpatentable for anticipation under Section 102(pre-AIA) of the Patent Act on various bases, including (a) the claimed invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the patentee’s invention; (b) regardless of the date of invention or who first invented, every element of the claim was described in a patent or printed publication in this or a foreign country or was in public use or on sale in this country more than one year before the effective filing date of the patent; (c) the claimed invention was described in a patent filed in the United States by another before the patentee’s invention; or (d) before the patentee’s invention, the invention was made in this country by another who had not abandoned, suppressed, or concealed it. All of the prior art references

I discuss herein predate the '950 Patent by more than a year.

16. I also understand that a claim is “anticipated” if each and every element in the claim as recited is disclosed in a prior art reference, either expressly or inherently.

**C. “Obviousness”**

17. I also understand that a patent claim is unpatentable under Section 103 of the Patent Act, even if not anticipated, if the differences between the claimed subject matter and prior art are such that the claimed subject matter would have been obvious at the time of the invention to a person of ordinary skill in the art of the invention.

18. I have been advised that the legal analysis of obviousness requires determination of: (1) the scope and content of the prior art; (2) the level of ordinary skill in the art; (3) the differences between the invention as claimed and the prior art; and (4) “secondary considerations” of nonobviousness, if any.

19. I also understand that, in a patent case, the Supreme Court provided guidance on whether patent claims are unpatentable for obviousness. In that case, *KSR International Co. v. Teleflex Inc.*, the Supreme Court stated, “a combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results.” In the *KSR* case, the Supreme Court further stated, “[w]hen a work is available in one field, design incentives and other

market forces can prompt variations of it, either in the same field or in another. If a person of ordinary skill in the art can implement a predictable variation, and would see the benefit of doing so, §103 likely bars its patentability. Moreover, if a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond that person's skill." I also understand that the KSR case also stated that, to determine whether there was a reason to combine the known elements in the way a patent claims, it will often be necessary to look to interrelated teachings 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.

### **III. Overview of the '950 Patent**

#### **A. Description of the alleged invention of the '950 Patent**

20. The purported invention of the '950 Patent relates to an apparatus for covering a mobile computing device. **Exh. 1007** at claim 17. The patent is not limited to any particular type of mobile computing device, and it states that such devices may be any "electronic device with a touch screen interface, including but not limited to: a computer, a digital tablet computer, a mobile telephone, a personal digital assistant, video recorder, camera, and the like, or as indicated, one or more

of the components thereof.” *Id.* at 1:28-34. Indeed, the patent also relates to a housing for protecting a “non-electronic object.” *Id.* at 1:35-36.

21. Specifically, the ’950 Patent claims an apparatus having a bottom member with a channel formed in the perimeter portion, and a gasket positioned within the channel. The ’950 Patent also claims a top member comprising a frame that corresponds to an outer perimeter of the electronic device and the perimeter portion of the bottom member, the frame further having a ridge adapted to clasp within the channel of the bottom member and seal against the gasket. *Id.* at claim 17.

22. The alleged invention of the ’950 Patent further relates to a “switch mechanism” that enables a switch on the device inside the housing to be operated from outside the housing. This is shown in FIGS. 11B and 11E below, where switch mechanism 90 has a part on the outside of the case that can be operated by the user (FIG. 11B), which in turn operates a part on the inside of the case that engages a switch on the device (FIG. 11E). *Id.* at 59:16-24, 60:18-61:43.

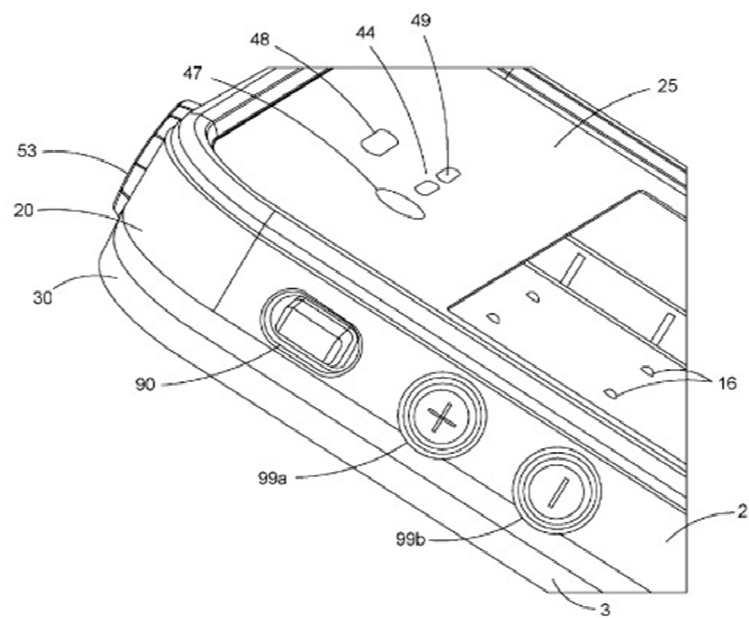


FIG. 11B

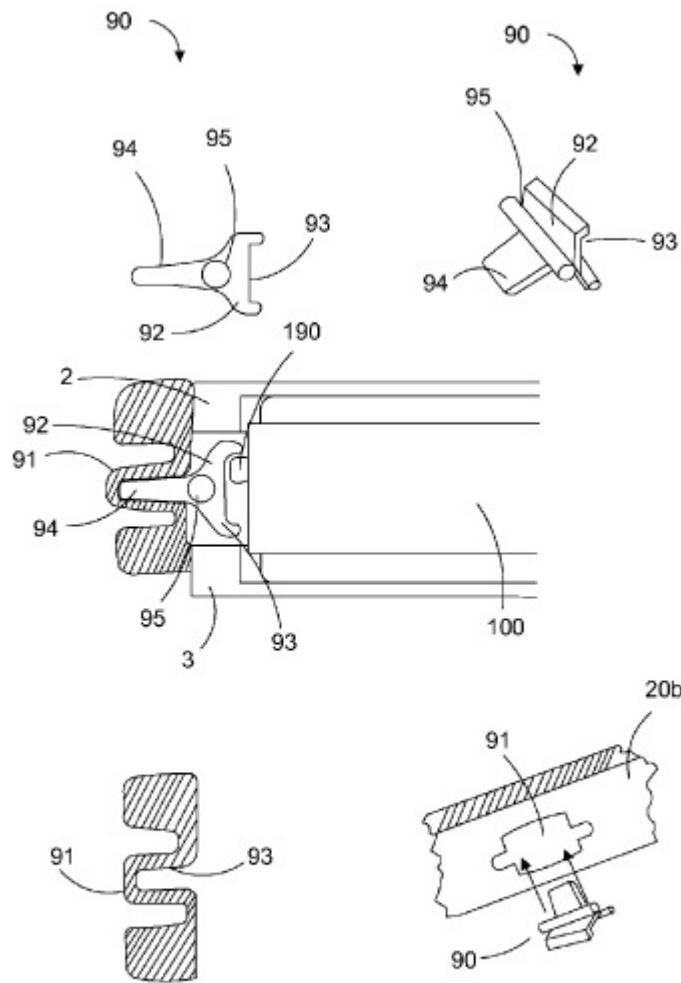


FIG. 11E

## B. The Prosecution History of the '950 Patent

23. I reviewed the prosecution history (**Exh. 1002**) of the '950 Patent, and noted that the reasons for allowance were the addition of the limitations relating to the “bottom member,” the “top member,” the “channel,” the “gasket,” the “clasp[ing] within the channel” and the “membrane.” As I discuss in detail below, those are all features that were known from Kuhn (**Exh. 1004**). I understand the Examiner did not have Kuhn to consider during the original prosecution. Thus, I



believe the reasons for allowance were incorrect because those features added to the claims were all known in the prior art and in my opinion not inventive as of 2010.

#### **IV. Field of the Invention and Level of Skill**

24. The field of the claimed invention is directed to a protective apparatus for an object, which objects may include an electronic or a non-electronic object.

**Exh. 1001** at 1:25-36 and independent claim 17, preamble. A person of ordinary skill in the art (“POSITA”), as of October 12, 2010 (the ’950 Patent’s earliest potential priority date), would have typically possessed at least a bachelor’s degree in mechanical engineering (or an equivalent degree/experience) with at least two years of experience in designing cases for electronic devices. The same would be true if the actual filing date of the ’950 Patent was used. The technology described in the ’950 Patent is straightforward and involves basic mechanical concepts readily known to persons with exposure to basic mechanical engineering concepts, either through formal education and some level of exposure to case design as I identified, or a mixture of less education and more exposure through work experience or vice versa. Similarly, work experience in a field that uses similar skills, like injection molding for example, may offset or compensate for less direct experience with case design or a lower education level. While I have a substantially higher level of education and experience, I am familiar with the skill

level of the person of ordinary skill in the art based on my many years of teaching engineering to undergraduate students, which gives me a solid understanding of what a person with this level of skill would have in terms of experience and knowledge.<sup>1</sup>

## V. Claim Construction

25. The preamble of challenged claim 17 is drawn to “[a]n apparatus for covering at least part of a mobile computing device.” **Exh. 1001** at claim 17. The preamble also defines the mobile computing device as “having a touch screen

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<sup>1</sup> My analysis below does not change even if the field were limited to housings for electronic devices. That is because the prior art cited herein is either a housing for receiving an electronic device, or for a housing that is well-known with features that a person designing a housing for receiving an electronic device would consider as being relevant analogous art. *Id.*; **Exh. 1001** at 1:25-36, 2:14-67. Kuhn, Richardson ’687, the ’712 Patent, and JP384 are all clearly housings for phones, cameras and other electronic/mobile computing devices, and FR857 is a housing for electrical equipment designed to be secure and waterproof. Thus, all these references would be subject to consideration by a person designing an electronic device housing because they are in the same or analogous fields.

display, the mobile computing device further having at least one switch that is actuated by a motion that is at least in part lateral to a surface of a housing that houses the mobile computing device,” and recites that the apparatus comprises a number of features that are all elements of the encasement itself, and not the “mobile computing device.” **Exh. 1001** at claim 17. I understand that the preamble is generally not part of a claim, and the claimed invention is typically the parts in the body of the claim (here, the parts after the word “comprising”). I understand that this is more of a legal issue than a technical issue. From a technical standpoint, in the ’950 Patent claims, whether the mobile computing device includes a touch screen display is not related to any purported inventive feature. Thus, my understanding of the presence of the touch screen display is a non-limiting intended use for the claimed “apparatus” that may be met by an apparatus that is simply capable of use with a device that includes a touch screen display.

26. I also note that the claim also recites that the encasement “enables operation of the touch screen display.” That does not define any particular structure besides the encasement itself. Just about any case can “enable operation” of something inside it simply by opening it. Thus, I view this language as restating the intended use of the claimed apparatus, rather than adding some structural feature (such as a touch screen contact membrane or an opening through which the

screen can be contacted) to the claim.

27. Regardless, the issue of whether the “touch screen display” in the preamble or reference to it in the “enables operation” language is a limitation does not change my ultimate opinion that all the claims I discuss herein are unpatentable. That is, even if the Board treated that language a limitation rather than an intended use, the claims are unpatentable under that interpretation also.

28. I do not believe any other claim terms require construction, and therefore have used their plain and ordinary meaning.

## **VI. BRIEF DESCRIPTION OF THE PRIOR ART**

29. The following is a brief summary of the general relevance of each applied reference.

### **A. Kuhn (Exh. 1004)**

30. Kuhn discloses a waterproof protective encasement for a mobile device, e.g., a phone.<sup>2</sup> Specifically, Kuhn discloses a waterproof top member 10 and a bottom member 11 that couple together to form a waterproof, protective housing for a mobile phone 32. **Exh. 1004** at Abstract, ¶¶ [0051]-[0053]. Kuhn’s top member has a frame with an inner perimeter to surround the mobile device 32.

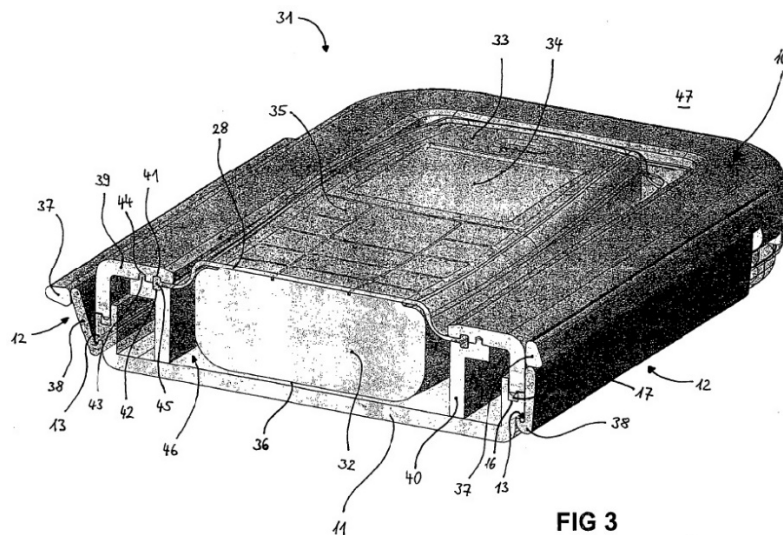
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<sup>2</sup> Kuhn was published in German. A certified translation is included with **Exh. 1004**. Reference is made to the certified translation.

*Id.* ¶¶ [0070]-[0072], [0079], FIGS. 3, 4. The housing has a membrane for operating the device: “The transparent and/or elastic material has the advantage that it allows the use of keys and/or the display of the mobile phone [to be] used.”

*Id.* ¶ [0019], Fig. 3.

31. The top member and the bottom member each have clasps or latching mechanisms that fasten the members together. To keep the enclosure waterproof, a seal 17 is positioned in a channel 16, also called a locking groove 16, between the two members. In some embodiments, the “first housing part and the second housing part can engage at least partially form-locking in the connected state.” *Id.* ¶ [0034]; *see also id.* ¶¶ [0051], [0056], [0069], [0083] (each describing connecting the top and bottom housing in a “form-fitting” or “form-locking” manner).



32. Kuhn also teaches the use of the bottom member 11 to enclose the mobile device. **Exh. 1004** at Abstract, ¶¶ [0051]-[0053], FIGS. 3, 5. The bottom

member 11 has a lateral side wall 19 around the perimeter with the channel 16 at its upper edge. *Id.* ¶ [0076]. The rubber seal 17 is placed within the channel 16. The protrusion extending from the top member will compress the seal 17 to ensure that the enclosure is waterproofed. *Id.* ¶¶ [0051]-[0053], [0063], [0070].

## B. Richardson '687 (Exh. 1005)

33. Richardson '687 discloses a protective enclosure that provides resistance to water, dust, dirt, and bump protection. **Exh. 1005** at Abstract. For example, Richardson '687 discloses an embodiment that has a “top member” as a front shell 1204 and a “bottom member” as back shell 1324. *Id.* at Figs. 12, 13 and ¶¶ [0046]-[0047]. The top member 1204 has a touch screen opening 1340. *Id.*

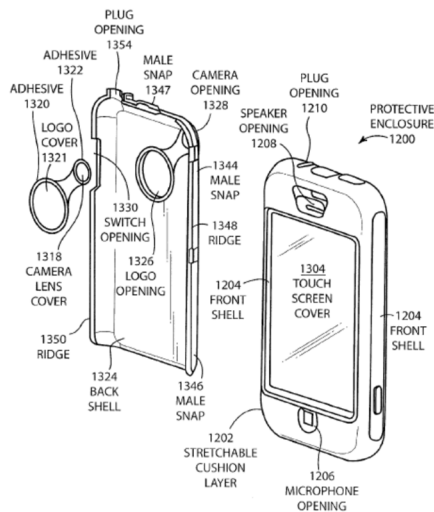


FIG. 12

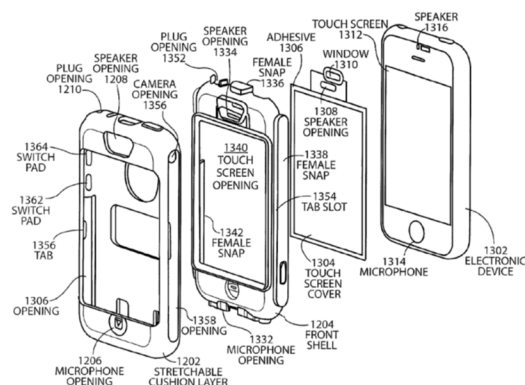


FIG. 13

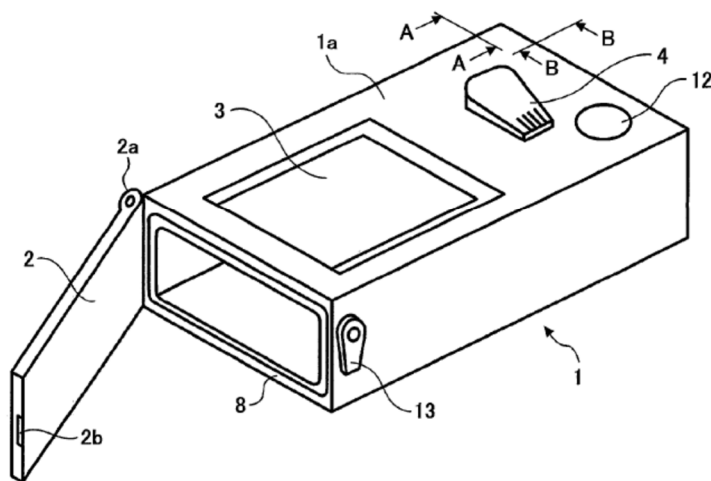
34. In addition, Richardson '687 further discloses that its front shell “top member” 1204 and back shell “bottom member” 1324 may be connected by a snap-fit features, including a “tight snap fit” provided by ridges that fit into a

groove. **Exh. 1005 ¶ [0047]**.

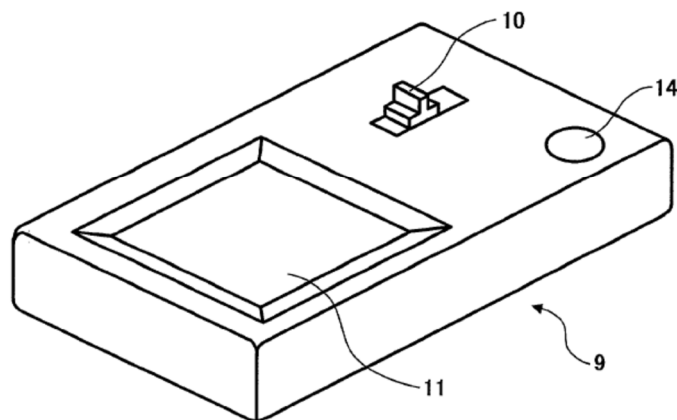
**C. The '712 Patent (Exh. 1006)**

35. The '712 Patent is directed to a waterproof housing for an electronic device such as a camera, phone, or PDA. **Exh. 1006** at Figs. 2A and 3 (below) and 1:7-10, 3:55-62, 9:1-9.

**FIG. 2A**

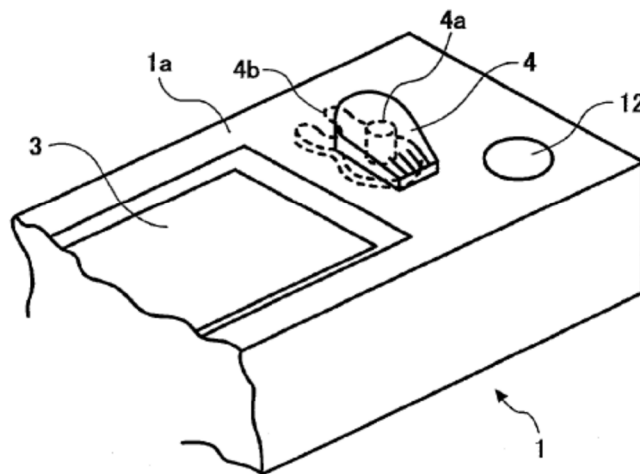


**FIG. 3**



36. The '712 Patent also discloses a “switch mechanism.” It includes a user-actuable knob or handle 4 on the case exterior that connects to an interface 4b that engages a control switch 10 on the device, as shown above in Fig. 3 and below in Fig. 2B. **Exh. 1006** at 4:6-20, 5:6-27, 9:1-9.

**FIG. 2B**

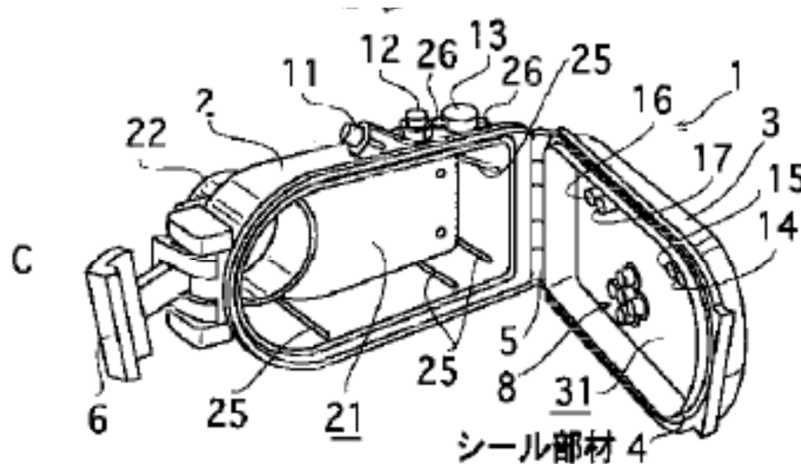


37. This construction enables the user to operate the switch 10 while encased in the '712 Patent housing by operation of the exterior control 4. **Exh. 1006** at 4:6-20, 5:6-27, 9:1-9.

**D. JP384 (Exh. 1007)**



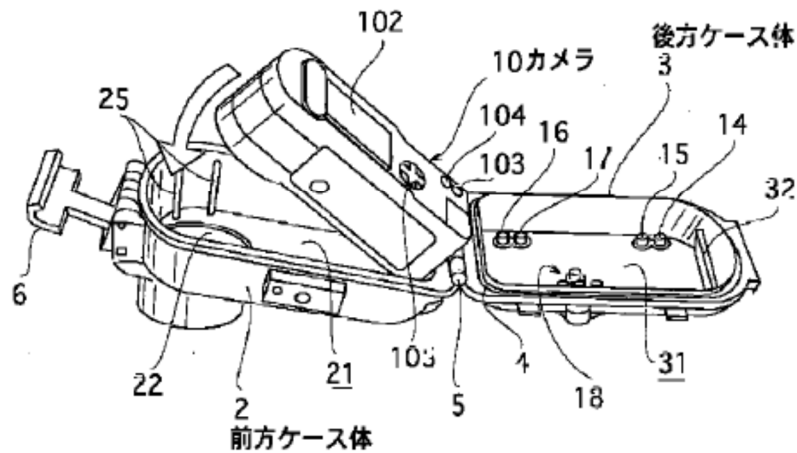
38. JP384<sup>3</sup> is directed to a housing for an electronic device, such as a camera, which the '950 Patent states may be encased in its housing. **Exh. 1001** at 1:28-34; **Exh. 1007** at Figs. 1 and 2 (below), [0001], [0011], [0013]-[0017], [0035]-[0036].



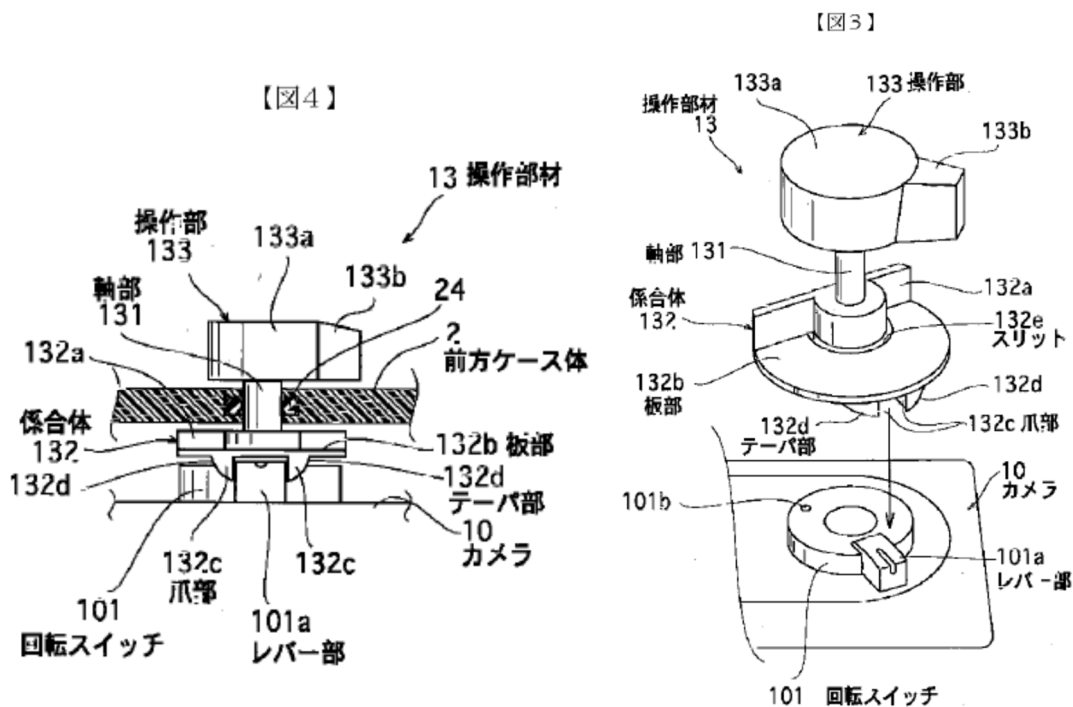
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<sup>3</sup> JP384 was published in Japanese. A certified translation is included with **Exh. 1007**. Reference is made to the certified translation.

【図2】



39. JP384 also discloses a “switch mechanism” as recited by challenged independent claim 17. It includes a user-actuable knob or handle 133 on the case exterior that connects to an “engagement body” 132 that engages a control switch 101 on the camera, as shown below in Figs. 3 and 4. **Exh. 1007** at ¶¶ [0019]–[0024], [0030].



40. This construction enables the user to operate the camera switch 101 while encased in the JP384 housing by operation of the exterior control 133 to move the switch 101 via a switch engagement body 132 and shaft 131. **Exh. 1007** at ¶¶ [0019]–[0024], [0030].

#### E. FR857 (Exh. 1008)

41. FR857 discloses a protective housing for an electronic device that includes a top member attached to a bottom member by a snap-fit connection.<sup>4</sup> **Exh. 1008** at Abstract. The clasp mechanism, or snap, of FR857 includes a lip

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<sup>4</sup>FR857 was published in French. A certified translation is included with **Exh. 1008**. Reference is made to the certified translation.

projecting from the top member that cooperates with a bearing surface on a side wall of the bottom member. *Id.* at FIGS. 2, 4, 6, 1:11-13, 2:3-6, 3:7-13, 5:22-24, 6:4-9, 9:15-16. To facilitate an adequate seal between the top and bottom members, FR857 discloses the use of clasping means and sealing means within a channel on one member. *Id.*

42. FR857 discloses a channel containing element 24, which channel is formed between “interior perimeter portion” strip 32 and “exterior perimeter portion” turned-out edge 16 in a perimeter portion of one member. *Id.* at FIGS. 2-4, 6, 8:19-24, 10:4-5. Figure 2 shows the clasping within the channel between element 18 on a ridge on one housing member frame 13 and element 20 on the other member, with the seal element 24 engaged.

FIG. 2

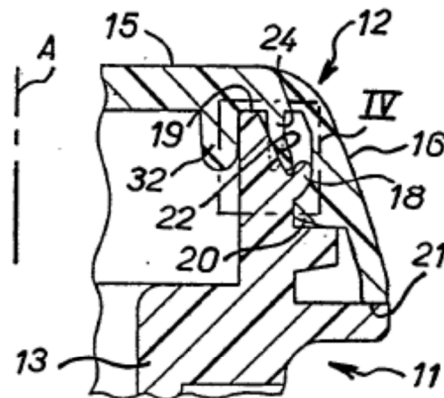
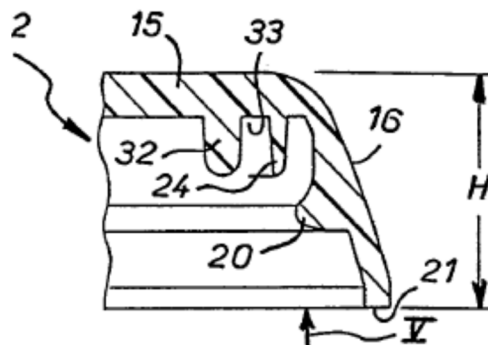
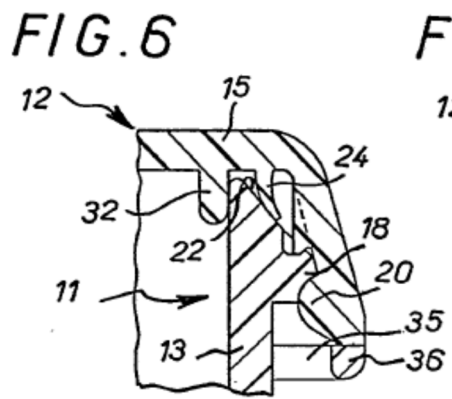


FIG. 3A



43. Figure 6 of FR857 illustrates an embodiment in which a ridge of a top member is received in the channel and includes lip and groove clasp mechanisms. Specifically, the rigid frame of one member, i.e., side wall 13, extends to a ridge (the unnumbered part of side wall 13 having support surface 22 and rim 19 that extends into a channel). *See id.* at FIGS. 2, 3B, 4, 6. The ridge has a lip 18 adapted to clasp in groove 20 within the channel of the other member and seal against element 24. *Id.*; *id.* at 5:22-6:3, 6:8-19, 7:12-15, 9:15-16.



## VII. Grounds of Unpatentability

44. For ease of convenience, I provide a chart with identifiers for the various elements of the challenged claims. I will make reference to those in the following discussion.

<b><u>Independent Claim 17</u></b>	
17[a]	17. An apparatus for covering at least part of a mobile computing device having a touch screen display, the mobile computing device further having at least one switch that is actuated by a motion that is at least in part lateral to a surface of a housing that houses the mobile computing device, the apparatus comprising:
17[b]	an encasement that enables operation of the touch screen display and covers at least part of the mobile computing device that includes the at least one switch,
17[c]	the encasement having an outer surface and an inner surface,
17[d]	the encasement is comprised of: a bottom member comprising a front surface and a back surface, and surrounded by a perimeter portion defined by a proximal end portion, a distal end portion, and opposing side portions,
17[e]	the perimeter portion of the bottom member having a channel formed by an interior perimeter portion and an exterior perimeter portion,

17[f]	the channel including a compressible gasket positioned therein; and
17[g]	a top member having an inner perimeter defined by a rigid frame that corresponds to an outer perimeter of the electronic device and the perimeter portion of the bottom member,
17[h]	the rigid frame extending to a ridge that is adapted to clasp within the channel of the bottom member and seal against the gasket,
17[i]	the top member further including a membrane that overlays the rigid frame opposite the ridge, the membrane having a transparent area,
17[j]	the top member further including a switch mechanism; and the switch mechanism including a switch actuator at the outer surface of the encasement, and
17[k]	a switch interface being provided proximate the inner surface of the encasement to contact the at least one switch of the mobile computing device and being coupled with the switch actuator such that a movement of the switch actuator controls a movement of the switch interface to actuate the at least one switch of the mobile computing device.

	<b><u>Dependent Claim 19</u></b>
19[a]	19. The apparatus in accordance with claim 17,
19[b]	wherein the encasement includes an aperture, and the switch actuator protrudes through the aperture.

	<b><u>Dependent Claim 21</u></b>
21[a]	21. The apparatus in accordance with claim 17,
21[b]	wherein the bottom member includes at least one lens formed between the front surface and the back surface of the bottom member.

**A. Ground 1: Claims 17, 19, and 21 are Obvious Over Kuhn in view of the '712 Patent**

45. Kuhn teaches most of the limitations of challenged claims 17 and 21.

The '712 Patent also provides various feature of those claims, as well as the features relating to the “switch mechanism” in claims 17 and 19.

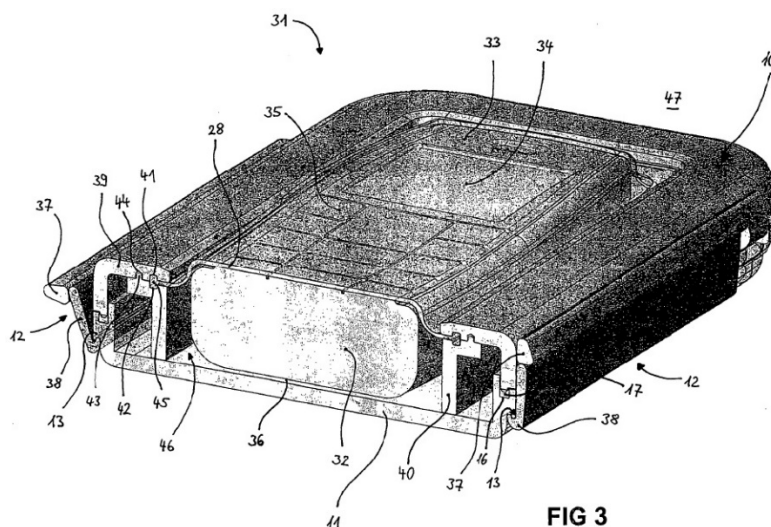
1. Independent Claim 17

46. Kuhn and the '712 Patent disclose the preamble, claim element 17[a]. Specifically, Kuhn discloses an apparatus for covering at least part of a mobile computing device. *See Exh. 1004* Abstract, ¶¶ [0001], [0013]-[0015], *passim*. As I described above, a preamble is not a limitation, and thus a device with a touch screen display is an intended use and not a claim requirement. Even if it is a claim requirement, Kuhn teaches it by disclosing “[a]n apparatus for covering at least part of a mobile computing device [mobile phone 32] having a touch screen display.” *Id.* at Abstract, [0019] (“The transparent and/or elastic material has the advantage that it allows the use of keys and/or the display of the mobile phone used.”)(emphasis added), Figs. 1-14 (membrane 28).

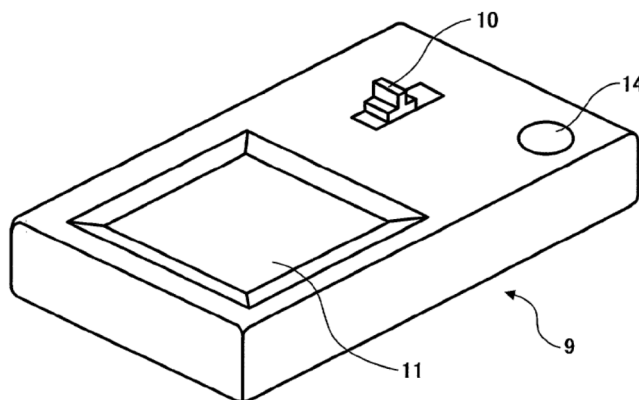
47. Kuhn also cites as background art a patent publication that is designed for use with a PDA having a membrane for a touch screen display, namely U.S. Patent Publication No. 2003/0095374 (**Exh. 1017**), and Kuhn identified its alleged invention as improving on that design. **Exh. 1004** ¶¶ [0009]-[0011]. That discloses to a POSITA that a device housing like Kuhn’s may be used for already known electronic devices with touch screens, confirming it meets the preamble “touch screen display” language (to the extent it is a limitation). That is, a



POSITA reading Kuhn as citing **Exh. 1017** as its prior art that is clearly directed to a housing a device with a touch screen display, and claiming alleged improvements to such housings in other aspects such as the manner in which the housing members are connected, would readily understand Kuhn's housing can be used on such housings for devices with touch screen displays.



48. The '712 Patent is a housing 1 for encasing a portable device, such as a camera 9 (Fig. 3), in a waterproof manner, and the camera 9 is a “mobile computing device having a touch screen display [11].” The '712 Patent discloses that the housing may also be for a PDA, game device or mobile phone, which are also “mobile computing devices.” **Exh. 1006** at 1:7-10, 9:1-9. That illustrated camera/“mobile computing device” also has “at least switch [10] that is actuated by a motion that is at least in part lateral to a surface of a housing that houses the mobile computing device.” *Id.* at 3:55-62.



49. Kuhn and the '712 Patent each also disclose claim element 17[b]. As I mentioned above, Kuhn discloses that the membrane 28 on the housing (“encasement”) allows the device screen to be used while encased in the apparatus, and thus “enables operation of the touch screen display.” *Id.* ¶¶ [0009]-[0011] (citing **Exh. 1017**) and [0019]. As I mentioned, paragraph [0019] states that the membrane (the “transparent and/or elastic material”) allows use of the display, and paragraphs [0009]-[0011] of Kuhn acknowledges that such housings for touch screen display devices were part of the prior art it sought to improve upon. That satisfies claim element 17[b] to the extent the touch screen display language relating to the device is a limitation. *Id.*

50. Moreover, to the extent it is alleged that Kuhn does not teach a device with a touch screen display or an encasement that enables operation of the same (and that those requirements are limitations rather than intended use language), the '712 Patent has one and its housing enables operation of a touch screen display.

**Exh. 1006** at 5:34-40. The housing 1 of the '712 Patent is “an encasement that enables operation of the touch screen display [11] and covers at least part of the mobile computing device [9] that includes the at least one switch [10].” *Id.*

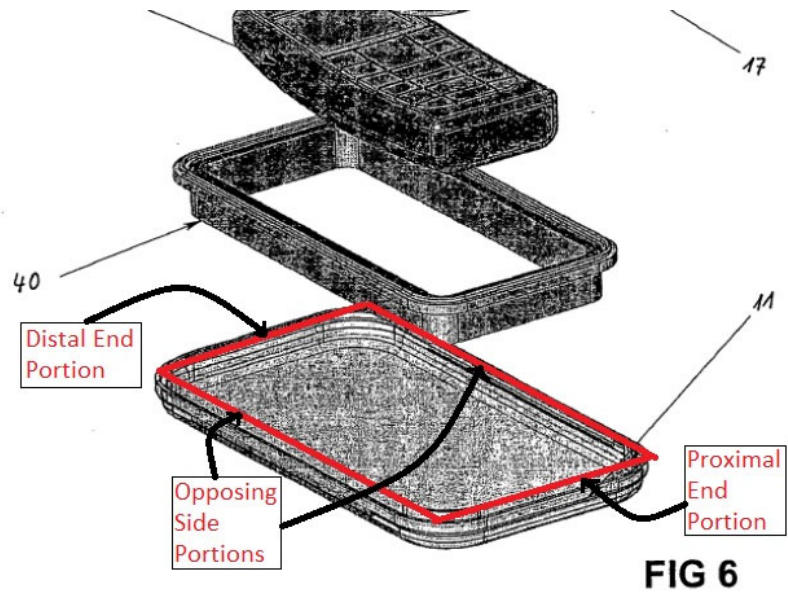
51. A POSITA would have been motivated to use Kuhn’s membrane 28 for operation of a “touch screen display” in view of the '712 Patent because both disclose waterproof encasements for mobile phones, and the '712 Patent teaches that a touch screen display can be operated through a “transparent and flexible material” at 3, i.e., a membrane. **Exh. 1004** at Title; **Exh. 1006** at 1:7-10, 5:34-40.

52. Thus, a POSITA would have found it obvious to configure Kuhn, to the extent not already configured to do so, to enable use of a mobile phone having a touch screen display while it is encased in the waterproof encasement. A key consideration in designing a protective encasement for a device is that the features of the device dictates the features of the encasement, such as its dimensions, access to control features, etc. The '712 Patent teaches that such cases can be used with devices having a touch screen display, and thus it would be obvious when designing a case with the features of Kuhn to frame that touch screen display so it can be seen and used through the membrane 28. A POSITA would also be motivated by Kuhn’s reference in its background to already-existing housings for computing devices with touch screen displays operated through a membrane, as that teaches such devices were known, predictable technology and that housings

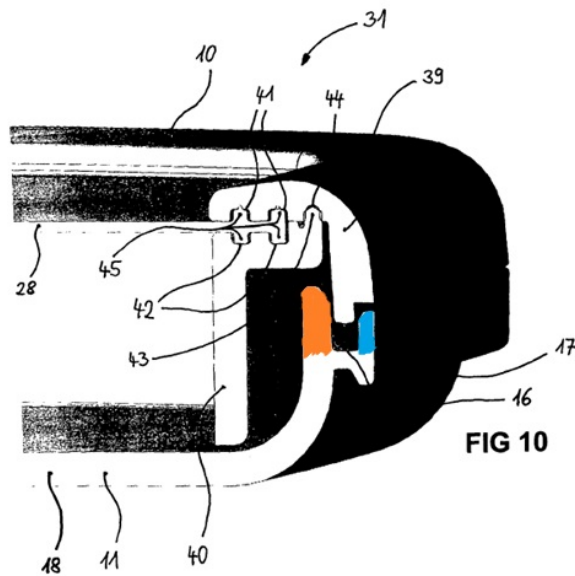
like Kuhn's can be used with such devices. **Exh. 1004 ¶¶** [0009]-[0011] (citing **Exh. 1017** touch screen device case noted above) and [0019].

53. Kuhn and the '712 Patent disclose claim element 17[c] reciting "the encasement having an outer surface and an inner surface[.]" Kuhn discloses an encasement that has an outer surface and an inner surface. *See* **Exh. 1004** at FIG. 6 (exploded view showing surfaces). The housing (encasement) of the '712 Patent also has an outer surface on the outside and an inner surface of the inside.

54. Kuhn discloses claim element 17[d]. Specifically, Kuhn discloses an encasement that includes using both a "top member" and a "bottom member" for being coupled together to form the housing 31. *See* **Exh. 1004 ¶¶** [0001], [0013], *passim*; FIGS. 3, 6, 7, 9-14. Each of the top member 10 and the bottom member 11 disclosed in Kuhn have a front surface and a back surface, further defined by a perimeter portion having a proximal end portion, a distal end portion, and opposing side portions. *See id.* at FIGS. 1, 3, 6.

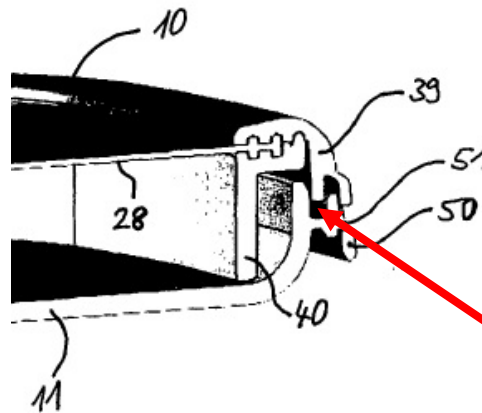


55. Kuhn also discloses claim element 17[e]. More particularly, Kuhn discloses a channel 16 formed between an “exterior perimeter portion”, i.e., outer wall and an “interior perimeter portion”, i.e., inner wall on the bottom member. *See Exh. 1004 ¶¶ [0055], [0063], [0076], [0078], [0091], FIGS. 3, 5 and 10* (the bottom member disclosed in Kuhn includes an inner wall, highlighted in orange, spaced apart from the outer wall, highlighted in blue).



**FIG 10**

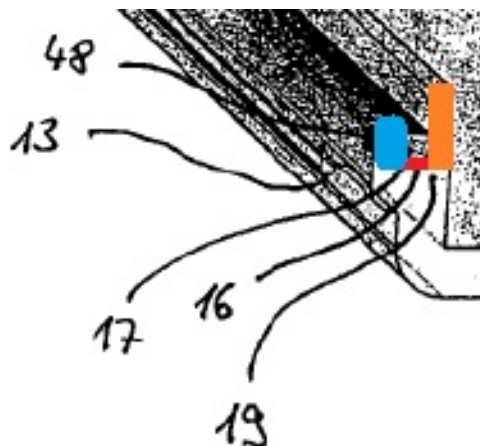
56. Interior and exterior perimeter portions forming a channel in the bottom member are also illustrated in annotated FIG. 11, below:



**FIG 11**

57. Interior perimeter portion, highlighted in orange, spaced apart from the exterior perimeter portion, highlighted in blue, forming a channel (underlined in red) in the bottom member are also illustrated by the embodiment of FIGS. 3-5. *See id.* ¶¶ [0055], [0063], [0075], [0078] (“closing groove 16”), [0091]. Annotated

FIG. 5 is produced below:



58. Kuhn discloses that the channel includes “a compressible gasket positioned therein,” satisfying claim element 17[f]. Specifically, Kuhn discloses a seal 17, i.e., a “compressible gasket,” disposed in the channel 16 and between the first member 10 and the second member 11 when they are mated together. *See Exh. 1004 ¶¶* [0055], [0063], [0069], [0070], [0076], [0078], [0091], FIGS. 3, 9-14.

59. Kuhn discloses claim element 17[g]. The top member 10 has an inner perimeter defined by a rigid frame, i.e., sealing frame 40/frame element 39, that corresponds to an outer perimeter of the electronic device. *See Exh. 1004 ¶¶* [0067], [0068], [0074]; FIG. 4 (fitted within sealing frame 40). The rigid frame also corresponds to the perimeter of the bottom member because they both have matching rectangular shapes, which also matches the general shape of the encased device as well. *Id.* ¶¶ [0050]-[0052], [0067], [0068], [0074]; *id.* FIGS. 3, 4 6, 7-14.

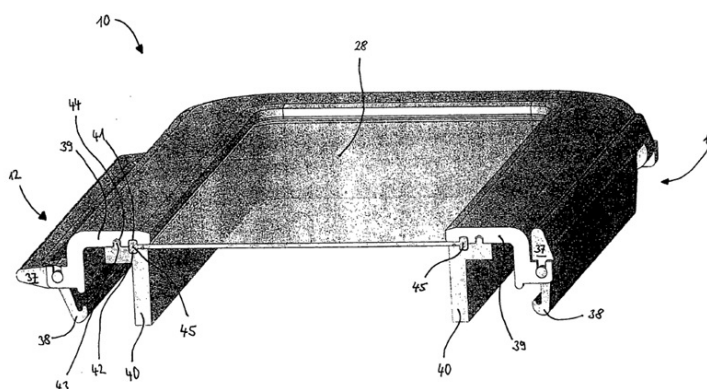


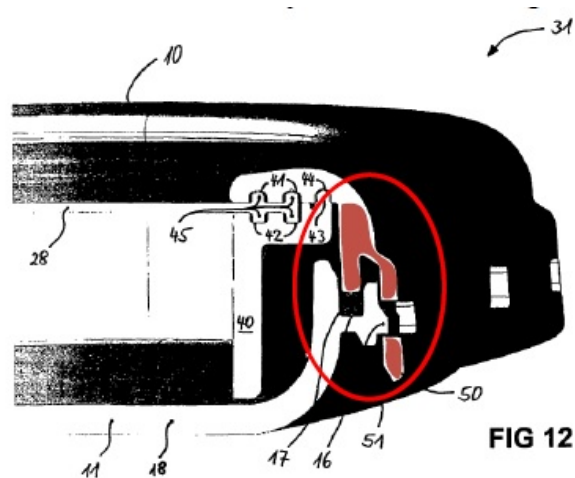
FIG 4

60. Kuhn also discloses claim element 17[h]. Specifically, Kuhn discloses a channel 16 that has the gasket 17 to “seal against” a bottom ridge of the top member’s rigid frame when the top member and bottom member are coupled together to seal the housing 31. *See Exh. 1004 ¶¶ [0055], [0063], [0069], [0070].* The seal 17 mates with the “ridge” or protrusion of the top member and clasps within the channel when the top member is mated with the bottom member. *Id. ¶¶ [0063], [0070].*

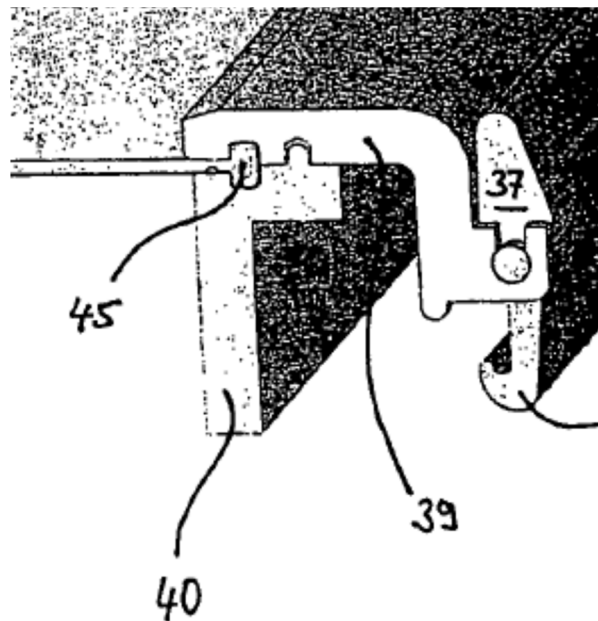
61. Kuhn’s “ridge” extends down from the rigid frame on part 39 for receipt in the channel, as shown in the red highlight below. *See also Exh. 1004 at FIG. 4.* Closure element 50 latches or clasps when mated with closure element 51 on the bottom member, such that the members may be fastened together. *Id. ¶¶ [0084], [0085].* That results in the ridge clasping within the channel on the bottom member to seal against the gasket. The ridge is part of the clasping provided by closure elements 50/51, as it hooks into the channel 16 to cooperate as part of the



securement.



62. An excerpt from Fig. 4 below shows another example of a ridge at the end of wall 39 that clasps within the channel 16.



63. In addition to teaching the positive “catch” type clasping mechanisms like 50/51, Kuhn also discloses that the “first housing part and the second housing part can engage at least partially form-locking in the connected state.” **Exh. 1004**

¶ [0034]; *see also id.* ¶¶ [0051], [0056], [0069], [0083] (each describing connecting the top and bottom housing in a “form-fitting” or “form-locking” manner). As an example, Kuhn discloses an embodiment in which the ridge itself cooperates with surfaces of the channel 16 on the bottom member (i.e., the ridge is “form-fitting” or “form-locking” with the groove), and thus is adapted to clasp within the channel. *See id.* at FIG. 3.

64. A POSITA would understand “form” fitting or locking to refer to secure clasping by the form of the engaged components, which is also commonly understood as an interference fit or snap-fit. Although the illustrated embodiments of Kuhn include external catch type latches 50/51, Kuhn discloses those as optional, and not the only means for clasping. Specifically, Kuhn discloses in paragraph [0034] that the first and second housing parts “can engage at least partially form-locking in the connected state,” and then discloses in paragraph [0036] that “[i]t is also possible” to use locking clamps, thus confirming the housing parts can be secured together by their own “form-locking” without the locking clamps.

65. Likewise, Paragraphs [0055] and [0056] also refer to the groove 16 with the seal on the bottom housing part 11 as a “locking groove” and “fastening groove,” and discuss how a “web” of the top housing part 10 is “fixed between” its side walls to be “form-fitting connected with each other.” *See Exh. 1004* ¶¶

[0063], [0076], [0078], [0091] (“closing groove,” “closure groove” and “locking groove”). That language – “locking,” “fastening,” “fixed between,” and “connected” – confirms that a clasping action is present between the channel and the protrusion/ridge received in it. That is also consistent with claim 13 of Kuhn teaching that the housing parts “engage in a connected state, at least in part form-fit,” whereas claim 14 adds the clasps as an additional, alternative feature. That is, those claims confirm Kuhn teaches the use of the external locking features as an option, and the clasping “connected state” may be achieved using the “form” locking/fitting engagement described in Kuhn between the walls/bounding members.

66. This conclusion for claim element 17[h] is also consistent with the plain and ordinary meaning of “clasp,” which broadly includes “a device (such as a hook)<sup>5</sup> for holding objects or parts together” (noun) or “to fasten with or as if with a clasp” (verb), and is not limited to any particular structure. **Exh. 1018** (<https://www.merriam-webster.com/dictionary/clasp>). Kuhn’s “form” fitting or locking between the channel 16 and the end of wall 39 includes devices that hold the top and bottom members together. That is how they are in a “connected state,”

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<sup>5</sup> The “such as” language indicates a hook is an example, and the plain and ordinary meaning is not limited to that example.

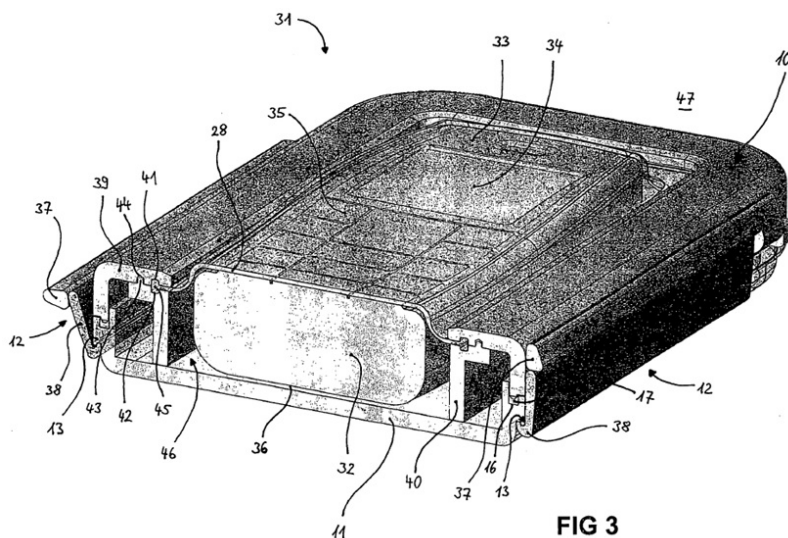
even without the optional external clasps like 50/51.

67. Thus, even though Kuhn discloses one approach with external clasps, Kuhn also discloses the additional or alternative approach where clasping (also called locking or fastening in Kuhn) is present between the ridge and channel 16 “within the channel,” as claimed.

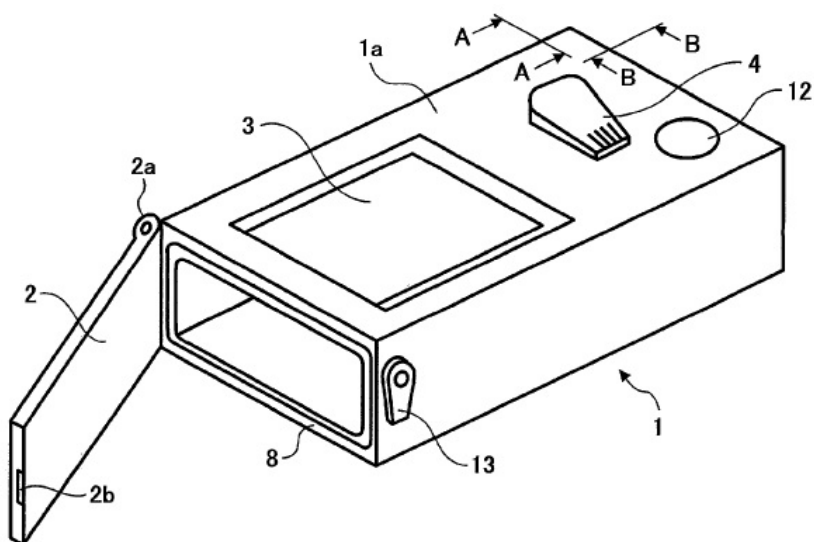
68. Moreover, the external clasping mechanisms 50/51 also independently meet the claim language, even if the “form” fitting or locking engagement is not used. That is because those structures clasp the ridge on the bottom of wall 39 within the channel 16 to seal it against the gasket 17. As can be seen from the figures, the ridge received in the channel assists in keeping the clasped connection together and cooperates with the part on the external clasp that hooks or catches underneath the wall 19 in which the channel is formed. Thus, claim element 17[h] is met by either type of clasping approach taught by Kuhn.

69. Both the top members disclosed in Kuhn and the '712 Patent include “a membrane,” thereby satisfying claim element 17[i]. More particularly, Kuhn discloses a “membrane,” i.e., film 28, that overlays the top member 10 opposite the “ridge.” See **Exh. 1004 ¶¶** [0071], [0074], [0085]. The film 28 is mated with the rigid frame 39 and extends from the proximal end portion to the distal end portion and across the opposing side portions of the top member, and its location on top is “opposite” the ridge on the bottom. *Id.*; *id.* at, e.g., FIGS. 3, 4, 10, 12. The

membrane is transparent to allow use of the mobile computing device within the case. *Id.* ¶¶ [0005], [0013], [0014], [0017], [0019].

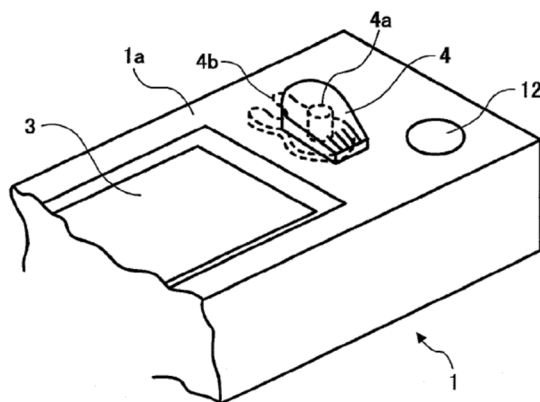


70. The '712 Patent also discloses a “membrane... having a transparent area.” The '712 Patent teaches that element 3 for the touchscreen is a “transparent and flexible material such as plastic” that enables the user to see and operate the touchscreen 11 on the camera 9. **Exh. 1006** at 5:34-40, FIG. 2A. That teaches the use of a “membrane having a transparent area” limitation, i.e., claim element 17[i].



71. Kuhn does not disclose the claimed switch mechanism. However, the '712 Patent satisfies claim elements 17[j] and [k]. Specifically, the '712 Patent has a switch mechanism as shown in Fig. 2B.

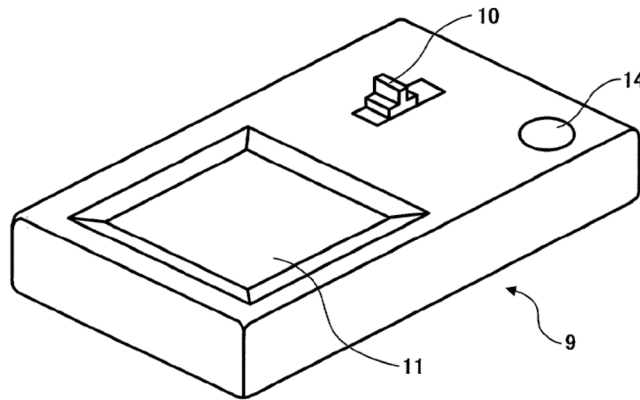
FIG. 2B



72. The switch mechanism “include[es] a switch actuator [4] at an outer surface of the encasement,” as recited in claim element 17[j]. **Exh. 1006** at 4:5-20, 5:6-27, 9:1-9. The switch mechanism as disclosed by the '712 Patent is also on the

“top member” of the encasement because it is on the same member as the “membrane.” Indeed, Kuhn only has two members, so the choice of including it on the top member is one of two limited options. Moreover, the choice of location is dictated by the location of the switch on the encased device itself, and thus its particular location is an obvious choice dictated by the necessity of interfacing with the switch on the encased device. The ’712 Patent reinforces the fact that the top member would be an obvious location, showing that the switch mechanism is on the same side as the membrane and the encased devices display screen, which makes sense so the user can see the image on the screen while the camera is facing away from him/her.

73. The ’712 Patent further discloses claim element 17[k]. Specifically, the switch mechanism of the ’712 Patent also includes the claimed “switch interface” at 4b. That “switch interface” 4b is “provided proximate the inner surface of the encasement,” as shown in FIG. 2B above. The “switch interface 4b” has a forked shape that “contact[s] the at least one switch of the mobile computing device [i.e., a camera].” As can be seen in FIG. 3, the camera has a switch 10 that is actuated by a motion that is at least in part lateral to a surface of the camera’s housing, as stated in the preamble.



74. The “switch interface 4b” is coupled with the switch actuator” 4 by a shaft 4a, as shown in FIG. 2B. As a result, “a movement of the switch actuator [4] controls a movement of the switch interface [4a] to actuate the at least one switch [10] of the mobile computing device.” **Exh. 1006** at 4:5-20, 5:6-27, 9:1-9.

75. It would be obvious to a POSITA to use the switch feature of the ’712 Patent to control a switch on the encased device in a housing like Kuhn’s while maintaining the water-resistant integrity of the casing. Indeed, Kuhn itself provides express motivation itself for the user to “have use of the entire control of the mobile phone,” which suggests to a POSITA to consider and use a “switch mechanism” like the ’712 Patent that allows for a control element to be actuated on the enclosed device without removal from the case. **Exh. 1004 ¶** [0047].

76. Further, it would be obvious for a POSITA to use the switch feature of the ’712 Patent to control a switch on the encased device while maintaining the water-resistant integrity of the casing because this is a well-known technique used



in the art known to a POSITA. The switch included on the electronic device dictates the use of a control, and a POSITA would be aware from the '712 Patent of the ability to control that switch from the exterior as taught by that reference, without having to open a port, door, or flap to access the switch and risk ingress of water or dust. This is consistent with Kuhn's stated teaching of enabling the user to use "the entire control of the mobile phone," and the '712 Patent is an obvious example of such a feature.

77. Accordingly, it is my opinion that the combination of Kuhn and the '712 Patent disclose each and every limitation of claim 17, thereby rendering claim 17 obvious.

## 2. Dependent Claim 19

78. Claim 19 depends from claim 17. The '712 Patent discloses claim element 19[b]. Specifically, the '712 Patent shows an aperture with shaft 4b extending therethrough from "switch actuator" 4. **Exh. 1006** at 4:5-20, 5:6-27, 9:1-9. Thus, the "encasement includes an aperture, and the switch actuator protrudes through the aperture," and the elements of claim 19 are satisfied. The case disclosed by Kuhn already has an aperture for a cable connection, and thus already discloses the ability to create an aperture for access to a functional element of the encased device. **Exh. 1004** ¶ [0047]. Further, the '712 Patent discloses an aperture for its "switch actuator," as discussed above. Therefore, it would be

obvious to have the switch actuator protrude through an aperture in Kuhn in order to operate the switch on the encased device. This is simple, predictable use of the structure and design taught by the '712 Patent, and would be predictable to use based on the fact that an aperture is already present in Kuhn.

79. Accordingly, in my opinion, Kuhn and the '712 Patent disclose each and every limitation of claim 19, thereby rendering the claim obvious.

3. Dependent Claim 21

80. Claim 21 depends from claim 17. Both Kuhn and the '712 Patent disclose claim element 21[b] reciting the apparatus of claim 17, “wherein the bottom member includes at least one lens formed between the front surface and the back surface of the bottom member.” Indeed, Kuhn mentions at least two different ways of enabling the camera to see through its bottom/second member 11.

81. In one approach, Kuhn makes the entire bottom wall 18 transparent, which enables the camera to take a picture therethrough. **Exh. 1004 ¶** [0077]. That teaching alone is sufficient to be considered a “lens,” as the claim does not require that the lens be any particular size or that it only constitute a portion of the bottom/second member.

82. Even if the claim language were interpreted in such a narrow manner to only be a portion of the bottom/second member, which I believe would be an incorrect interpretation, Kuhn also discloses that “one part of the first and/or

second housing part can form a transparent area.” **Exh. 1004** ¶ [0017] (emphasis added); *see also id.* ¶ [0013] (“at least one transparent area” for the camera to capture images). That discloses that a smaller region can constitute the “transparent area,” i.e., the claimed “lens,” and thus would meet claim 21 under such a narrower interpretation.

83. Moreover, the ’950 Patent makes clear that a lens can be “an optically transparent region.” **Exh. 1001** at 41:5; *see also id.* at 41:4-6 (“In this embodiment the lens feature is simply an optically clear region.”). Thus, the transparent area on Kuhn’s bottom member (whether it is the entire bottom wall or a portion thereof as disclosed) is a “lens” per the ’950 Patent. Because that lens is part of the bottom member 11, it is formed between the front surface and back surface of the bottom member. *Id.*

84. The ’712 Patent also independently satisfies claim element 21[b]. Although not shown in the Figures, a lens is included in the “bottom member” of the ’712 Patent encasement because camera lens/aperture faces towards the bottom member, and as such, there is a lens formed between the front surface and the back surface of the bottom member. It would be obvious to a POSITA to use a lens on any housing that encases a device with a camera function to enable the camera to still be used while in the housing without having to remove it.

85. Thus, in my opinion, Kuhn and the ’712 Patent disclose each and

every limitation of claim 21, thereby rendering the claim obvious.

**B. Ground 2: Claims 17, 19, and 21 are Obvious Over Kuhn and the '712 Patent in view of Richardson '687**

86. My opinion in this section adds teachings of Richardson '687 to make up for any alleged deficiencies of Kuhn and the '712 Patent the patentee may argue with respect to the independent claims. I listed dependent claim 19 in this subsection because it is dependent and thus includes all the features of claim 17, but I rely on the disclosure in the '712 Patent for its features as discussed above. The disclosures of Kuhn and the '712 Patent as discussed above still apply and are not repeated.

87. Richardson '687 discloses a protective apparatus that enables touch screen operation of a mobile computing device encased in the apparatus, satisfying claim elements 17[a] and 17[b] to the extent the language therein relating to the “touch screen display” is considered a limitation rather than merely an intended use (and to the extent not already taught by Kuhn or the '712 Patent). **Exh. 1005** at Abstract, ¶¶ [0002], [0005], [0008], [0027], [0034], [0039], [0046], [0050], [0051], [0055]. The ability of the membrane to enable operation of the touch screen is discussed in Richardson '687 throughout. *Id.* at Abstract, ¶¶ [0002], [0005], [0008], [0027], [0034], [0039], [0046], [0050], [0051], [0055]. A POSITA would have found it obvious to configure Kuhn, to the extent not already configured to do so, to enable use of its waterproof encasement with a mobile phone having a touch

screen display. *Id.* In particular, as mentioned above, a POSITA would be well aware of the desire for the user to be able to use the various controls of the encased device while still in the housing, and would readily recognize that Kuhn's membrane 28 can be used, or modified for use, to permit contact operation of a touch screen display. Indeed, Kuhn itself teaches the desire to have "have use of the entire control of the mobile phone," which suggest to a POSITA to enable operation of a touch screen display as a control through the membrane 28. **Exh. 1004 ¶ [0047]**. And Kuhn already recognizes the existence of devices with touch screen displays and housing for them as well. **Exh. 1004 ¶ [0009]**. Accordingly, to the extent a mobile phone with a touch screen display were used with the waterproof case of Kuhn, a POSITA would have found it obvious to form the transparent and/or elastic covering film 28 in Kuhn to permit a user to use the touch screen display as is also taught in Richardson '687.

88. Also, as discussed above, the '712 Patent similarly discloses its encased device may include a touch screen display, and its encasement may enable operation of that touch screen display. **Exh. 1006** at 5:34-40. This teaching reinforces that a POSITA would consider Richardson '687 and the '712 Patent when designing Kuhn's membrane to be used with or modifying it to be used with an encased device with a touch screen display.

89. As mentioned above, a key consideration in designing a protective

encasement for a device is that the features of the device dictate the features of the encasement, such as its dimensions, access to control features, etc. Both the '712 Patent and Richardson '687 teach that such protective encasements can be used with devices having a touch screen display, and thus it would be obvious to frame that touch screen display so it can be seen and used when designing a case with the features of Kuhn. Thus, to the extent the language relating to the “touch screen display” in claim elements 17[a] and [b] are considered limitations and not just an intended use, they are disclosed and obvious in view of Richardson '687, to the extent not already disclosed by Kuhn and the '712 Patent.

90. Moreover, to the extent the Patentee contends that a “ridge adapted to clasp within the channel” as claimed in element 17[h] is not disclosed by Kuhn, it is disclosed by Richardson '687. Richardson '687 discloses that its front shell 1204 and back shell 1324 “latch together using precisely manufactured male and female snaps,” and that the shells may also (“[i]n addition”) include “ridges 1348, 1350 in the back shell 1324 fit tightly within a groove (not shown) in the front shell 1204 to create a tight snap fit between the front shell 1204 (FIG. 12) and back shell 1324.” **Exh. 1005** at Figs. 12 and 13, ¶ [0047]. Thus, Richardson '687 teaches two snap-fit connections, the male and female ones, and “[i]n addition,” the snap fit created between the ridge and groove.

91. A POSITA would readily recognize that such a “snap fit” could be

applied to Kuhn, which also has a ridge and groove/channel. In particular, a snap-fit between the end/ridge of the “rigid frame” on the top member and the inner surfaces of the channel of the bottom member (i.e., a “ridge adapted to clasp within the channel”). **Exh. 1005 ¶** [0047]. Kuhn already has the claimed “rigid frame” and “channel” present, and the only modification would be the inclusion of mating snap-fit features on each to interface (“clasp within the channel”) and connect the two members together (to the extent Kuhn does not already have those).

92. For the same reasons discussed above in regard to Kuhn, those mating snap-fit features in Richardson “clasp within the channel,” as claimed, i.e., the snap-fit feature included on the ridge that extends into the channel. Moreover, those snap-fit features “clasp within the channel” as recited in claim 17, and as taught by Richardson ’687’s reference to creating a “tight snap fit.” A POSITA would have been familiar with such a connection, and readily understand that this ridge and groove snap-fitting in Richardson ’687 could be used to provide the “form locking” type of connection referenced in Kuhn between its ridge and channel to couple the housing members together. Further, a POSITA would have good reason to use that snap-fit connection within the channel because (a) it is consistent with Kuhn’s disclosure that the channel 16 may provide the locking (**Exh. 1004 ¶¶** [0034], [0051], [0055], [0056], [0069], [0083]) and (b) it is a well-known means for connecting structures that is simple, efficient and easily

implemented. This type of connection is very simple to form because it can be molded integrally into plastic material of a housing, and take advantages of its resiliency to easy snap together and apart as needed.

93. My discussion of all other elements of independent claim 17 in the section above discussing Kuhn and the '712 Patent still applies, and those are all still met for the same reasons I discussed above.

94. Further, with respect to claim 21, Richardson '687 discloses a camera opening 1328 on its bottom member that includes "at least one lens [camera lens cover 1318] formed between the front surface and the back surfaces of the bottom member." It would be obvious to a POSITA to design a camera lens in Kuhn's bottom member, as taught by Kuhn itself, in view of Richardson '687 showing the inclusion of such a feature in order for an electronic device's camera to capture images. This again is another instance of a common desire known to a POSITA, namely the desire for the user to be able to use the functions of the electronic device while still in the case without needing to remove or open the case. Here, that function is the ability to take pictures or videos with the camera, and thus it is obvious to include the claimed lens in the bottom member as taught by Richardson '687 for that purpose.



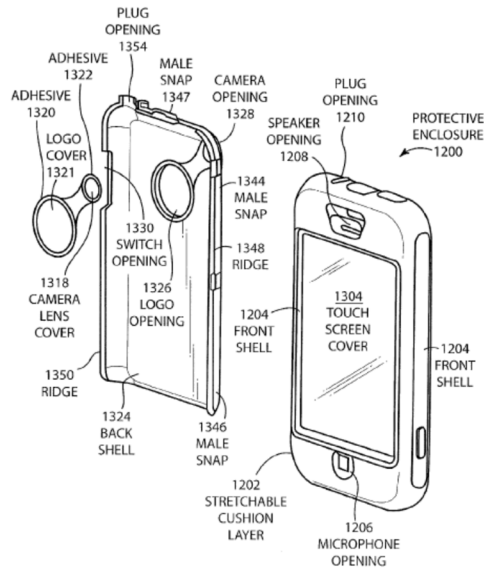


FIG. 12

95. Accordingly, in my opinion, claims 17, 19, and 21 are obvious over Kuhn and the '712 Patent in view of Richardson '687.

**C. Ground 3: Claims 17, 19, and 21 are Obvious Over Kuhn in view of JP384**

96. My application of Kuhn to claims 17, 19, and 21 is discussed above in Ground 1 and need not be repeated herein. I thus make reference to my prior analysis of Kuhn in that section, and am focusing here particularly on the added features from JP384.

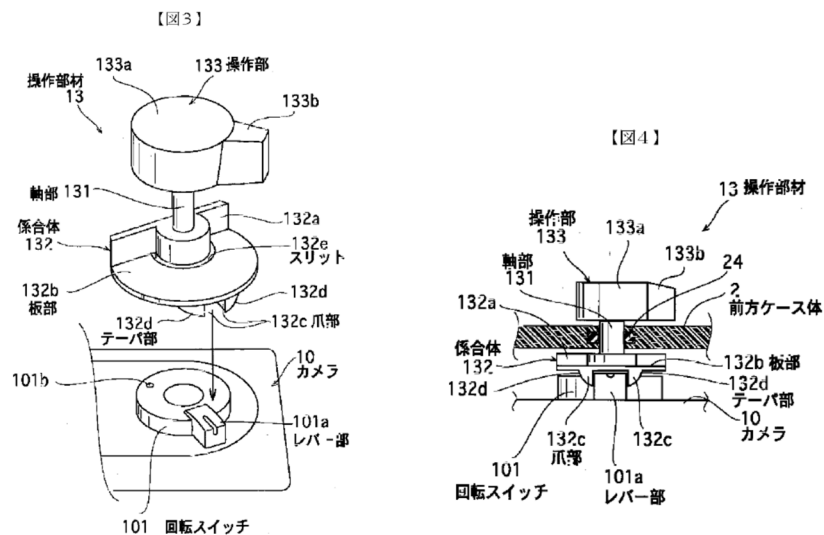
97. As I discussed above, Kuhn does not disclose a switch mechanism on the top member. However, JP384 does and satisfies elements 17[j] and [k]. JP384 discloses a housing 1 for encasing a camera 10 (Fig. 2, below) in a waterproof manner, and the camera 10 is a “mobile computing device further having at least one switch [101] that is actuated by a motion that is at least in part lateral to a

surface of a housing that houses the mobile computing device.” A camera is in the same field, as evidence by the ’950 Patent listing that as examples of devices its housing can encase. **Exh. 1001** at 1:60, 2:56. Moreover, JP384 also discloses the encased device may of other types as well, confirming them to be in the same field. **Exh. 1007** ¶ [0035]-[0036]. In particular, JP384 has a “switch mechanism” (i.e., operation member 13, generally) as shown in Figs. 3-6.

98. The claimed “switch actuator” corresponds to element 133 on the exterior surface of housing member 2. *Id.* That is the part operated by the user. *See Exh. 1007* at FIGS. 3-6 and ¶¶ [0019], [0023]. Moreover, JP384 discloses that the switch can be on any surface as well, which would include the other member as cover 3, thereby satisfying claim element 17[j]. **Exh. 1007** ¶ [0038]. Indeed, Kuhn only has two members, so the choice of including it on the top member is one of two limited options, and JP384 discloses that any surface or member is appropriate. Moreover, the choice of location is dictated by the location of the switch on the encased device itself, and thus its particular location is an obvious choice dictated by the necessity of interfacing with the switch on the encased device.

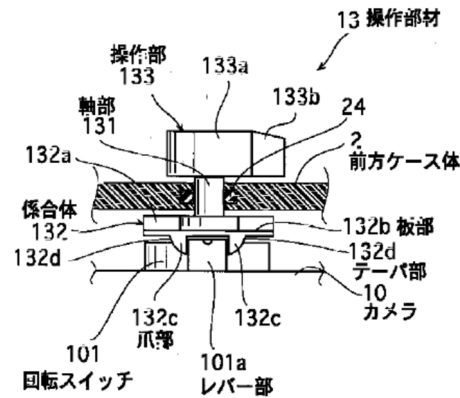
99. In JP384, the claimed “switch interface” corresponds to the element 132. That “switch interface” 132 is disposed on the interior surface of the housing member 2, as shown in Fig. 4. It “contact[s] the at least one switch [101] of the

mobile computing device and [is] coupled with the switch actuator [133] such that a movement of the switch actuator [133] controls a movement of the switch interface [132] to actuate the at least one switch [101] of the mobile computing device.” See **Exh. 1007** ¶¶ [0020]-[0022], [0030].



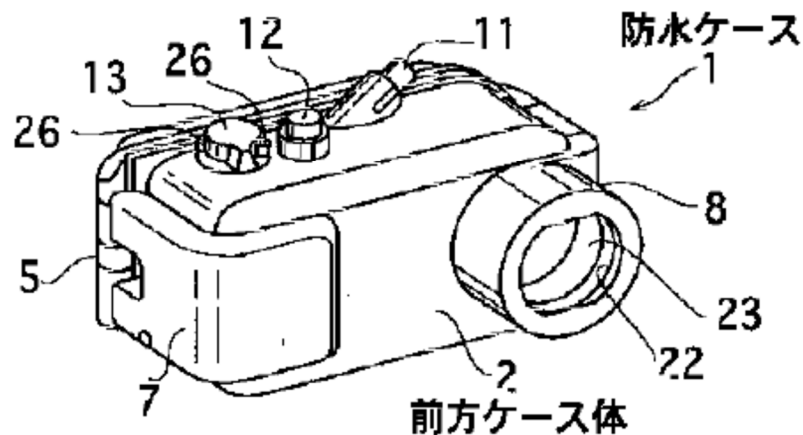
100. With respect to claim 19, JP384 discloses an aperture in a housing member 2 through with the post 131 of the “switch mechanism’s” actuator 133 protrudes. **Exh. 1007** at Fig. 4 and ¶¶ [0019]-[0021].

【図4】



101. With respect to claim 21, in addition to the teachings of Kuhn as discussed above, the bottom member 2 of JP384 also has a lens formed between its front and back surfaces. See **Exh. 1007** at Fig. 1 (below).

【図1】



102. It would be obvious for a POSITA to use the switch feature of JP384 to control a switch on the encased device while maintaining the water-resistant integrity of the casing. For the same reasons as discussed above with respect to the

'712 Patent, this is a well-known technique used in the art known to a person of ordinary skill in the art. The switch included on the electronic device dictates the use of a control, and a person of ordinary skill in the art would be aware from JP384 of the ability to control that switch from the exterior as taught by JP384, without having to open a port, door, or flap to access the switch and risk ingress of water or dust. Kuhn provides additional motivation itself, stating the desire for the user to “have use of the entire control of the mobile phone,” which suggests to a POSITA to consider a “switch mechanism” like JP384 that allows for a control element to be actuated on the enclosed device without removal from the case.

**Exh. 1004¶** [0047].

103. Accordingly, in my opinion, claims 17, 19, and 21 are obvious over the Kuhn and JP384.

**D. Ground 4: Claims 17, 19, and 21 are Obvious Over Kuhn and JP384 in view of Richardson '687**

104. My opinion in this section adds the teachings of Richardson '687 to make up for any alleged deficiencies of Kuhn and JP384 the patentee may argue with respect to the claims challenged in Ground 3.

105. I rely on the same cited disclosure and rationale discussed above in Ground 2 as applying here for adding the features of Richardson '687 to meet those claims to a housing for an electronic device, and thus I am not repeating them. Specifically, as I discussed above, Richardson '687 teaches the “touch

screen display” related language (to the extent treated as a limitation and not an intended use) and the “clasp within the channel” limitation in claim, as well as the “lens” on the bottom member in claim 21, to the extent not already taught by Kuhn. Those are not functionally related to the inclusion of a “switch mechanism,” and the inclusion of JP384’s “switch mechanism” on Kuhn’s housing does not change my opinion it would still be obvious to use the features relating to the touch screen, clasping and/or lens in Richardson ’687 on Kuhn’s housing.

106. Accordingly, claims 17, 19, and 21 are obvious over Kuhn and JP384 in view of Richardson ’687.

**E. Ground 5: Claims 17, 19, and 21 are Obvious Over Kuhn and the ’712 Patent in view of Richardson ’687 and FR857**

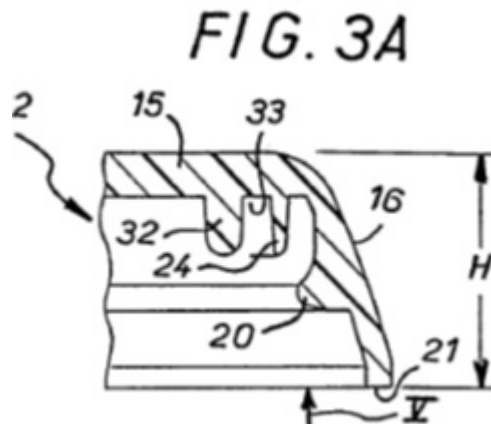
107. My opinion in this section adds the teachings of FR857 to the combination of references set forth in Ground 2. For brevity, the rationale for combining those references will not be repeated.

108. I cite FR857 to further demonstrate the obvious nature of the claimed “rigid frame extending to a ridge that is adapted to clasp within the channel.” FR857 discloses that well-known clasping mechanism commonly used in sealing two-member protective enclosures, and specifically, protective enclosures for electronic equipment and devices. **Exh. 1008** at Title (“Box with a snap-on lid, in particular for electrical equipment”), Abstract. FR857 is in the same field of the art as the ’950 Patent because it is a housing for an electronic object, **Exh. 1001** at

1:25-36, and it directly teaches how to secure two members together in a secure and waterproof manner.

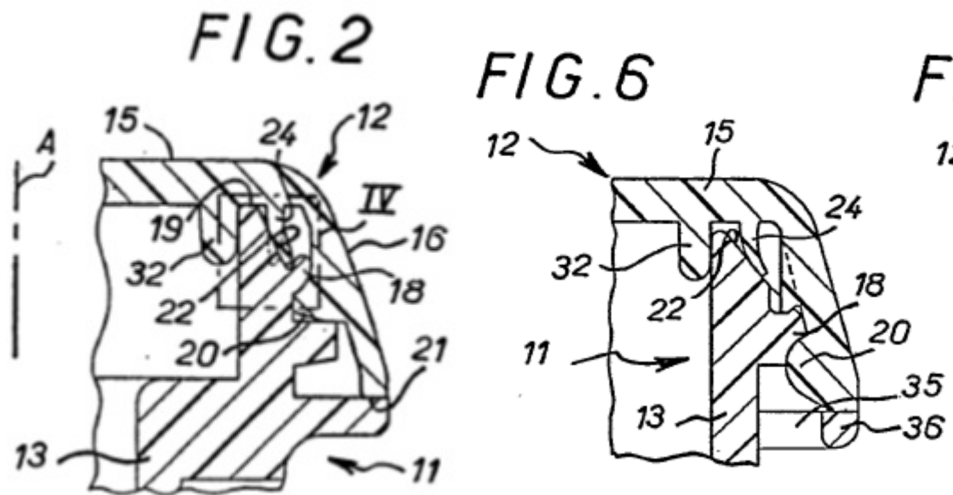
109. FR857 discloses a clasping mechanism within the channel on one member (e.g., a groove in the side wall of the channel) and a clasping mechanism adapted to clasp within the channel on the other (e.g., a lip received in that groove).

110. FR857 discloses an apparatus for housing an electronic device having a top member and a bottom member. **Exh. 1008** at Title, Abstract, 1:5-7, 1:21-22, 3:7-13, Claim 1. On one member, FR857 discloses a channel formed between “interior perimeter portion” strip 32 and “exterior perimeter portion” turned-out edge 16 (and containing element 24 and groove 33) in a perimeter portion. *Id.* at FIGS. 2-4, 6, 8:19-24, 10:4-5. Element 24 is positioned within the channel. *Id.* at 6:10-19, 7:12-15, FIGS. 2, 4, 6.



111. FR857 further discloses a rigid frame, i.e., side wall 13, extending to a ridge (the unnumbered part of side wall 13 having support surface 22 and rim 19

that extends into a channel). *See id.* at FIGS. 2, 3B, 4, 6. The ridge has a clasping mechanism 18 that clasps within the channel with element 20 and seals against element 24. *Id.*; *id.* at 5:22-6:3, 6:8-9, 9:15-16.



112. Therefore, FR857 teaches a clasping mechanism within the channel on one member (e.g., a groove or ledge/bulge 20 on the side wall of the channel) and a clasping mechanism adapted to clasp within the channel on the other member (e.g., a lip 18 received in that groove or catching on that ledge/bulge 20).

113. A POSITA would use the clasping mechanism disclosed by FR857 because it effectively secures and seals the members of a container together in a



liquid tight manner. Containers and buckets,<sup>6</sup> and especially containers in the field of electronic devices like FR857, are part of the relevant art a POSITA would consider because they are extremely well-known devices for containing and protecting materials inside, including from water or ingress of other particles. FR857 is squarely within the field of the '950 Patent because it is a housing for an electronic object, **Exh. 1001** at 1:25-36, and it directly teaches how to secure two members together in a secure waterproof manner.

114. Such features would be obvious to use in a protective housing for an electronic device, such as Kuhn (to the extent it is not already disclosed), because it is desirable to secure the housing members together in a manner to limit or prevent the ingress of liquids. Including elements in the manner claimed is an obvious design choice and well within the skill level of a POSITA. They are well-

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<sup>6</sup> The clasping mechanism of FR857 is a familiar clasping mechanism used for sealing two-member protective housings and is not unique to securing and sealing protective housings for electronic devices. For example, the '088 Patent teaches the same clasping mechanism in the field of general protective containers (e.g., buckets). **Exh. 1009** at Abstract, 1:23-25, 4:32-38, 4:42-45 (alternative embodiment), 4:55-60, 5:24-36, FIGS. 2, 3, 5; *see id.* 1:58-2:6, 3:45-65, FIG. 1 (prior art clasping mechanisms)

established features known in the container art for many years and would have, at the very least, been obvious to try. Indeed, such clasping mechanisms are suggested by Kuhn's teaching of using "form-fitting" or locking connection and Richardson '687's teaching of using a "snap-fit" connection. **Exh. 1004** ¶ [0034]; *see also id.* ¶¶ [0051], [0056], [0069], [0083] (each describing connecting the top and bottom housing in a "form-fitting" or "form-locking" manner); **Exh. 1005** ¶ [0047] (front shell "top member" 1204 and back shell "bottom member" 1324 may be connected by snap-fit features, including a "tight snap fit" provided by ridges 1348/1350 that fits into a groove (not shown) (i.e., a channel defined by interior perimeter and exterior perimeter portions)). A POSITA would readily understand what a form-locking or snap-fit connection is, as they are well known in the art, including as disclosed in FR857 (and its commonplace nature is further confirmed in the state of the art by the '088 Patent). I further note that FR857 refers to that connection as "snap-on" and "snap-fastening" consistently with Kuhn's disclosure of a locking or fastening connection in the channel 16 and Richardson '687's description of its ridge and groove connection as snap-fit, and states numerous advantages of using such an approach. **Exh. 1008** at Title, 3:7-22

115. Moreover, the features in FR857 are integrally formed with their respective housing members (e.g., a lid and container) that correspond to the housing members in Kuhn and Richardson '687, and would be recognized as

likewise being readily integrally formed into the plastic housing members of those references. A POSITA would also include the channel with a seal on one member and the part that enters the channel on the other, selection of which is an obvious design choice, given the limited (2) possibilities. Additionally, Kuhn already includes a compressible seal within the channel in its bottom member and a ridge on the top member received therein, so adding the clasp mechanisms of FR857 would be obvious for the same reasons. Adding the clasp mechanisms would be obvious for the further reason that the ridge and channel are already present, and addition of clasp features within the channel would be beneficial to provide securement between the members, as was already known in the art.

116. Accordingly, it is my opinion that claims 17, 19, and 21 are also obvious over Kuhn and the '712 Patent in view of Richardson '687 and FR857.

**F. Ground 6: Claims 17, 19, and 21 are Obvious Over Kuhn and JP384 in view of Richardson '687 and FR857**

117. My opinion and analysis for this ground is the same as Ground 5, except that, instead of using the “switch feature” disclosed by the '712 Patent, I rely on the switch feature of JP384 in combination with Kuhn, Richardson '687, and FR857. The cited disclosure and rationale I discussed above in Grounds 3 and 4 for combining JP384 to Kuhn and Richardson '687 to meet the switch mechanism related limitations claims 17, 19, and 21 applies equally here.

118. In addition, I also refer back to the cited disclosure and rationale in

Ground 5 for adding FR857 to Kuhn and Richardson '687 to provide a connection with clasping "within" the channel applies here as well, which I am not repeating.

119. Accordingly, it is my opinion that claims 17, 19, and 21 are obvious over Kuhn and JP384 in view of Richardson '687 and FR857.

### **VIII. Secondary Considerations**

120. I understand "secondary considerations," such as commercial success, praise for the invention, or a long-felt but unmet need for the invention, may be a factor in obviousness. I understand these considerations do not apply to my anticipation opinions. With regard to my obviousness opinions, I am unaware of any evidence of such secondary considerations. Based on my present knowledge, I do not believe they are present. For example, there cannot be a "long-felt need" for the invention in the '950 Patent because the purported invention is a top member with a membrane having ridge adapted to clasp within a channel in a bottom member and seal against a gasket therein, which was already known in the prior art I identified above. I also understand that to establish commercial success the patentee will need to show a "nexus" between any success it has had in the marketplace and the claimed invention, i.e., the alleged inventive feature is the reason for any success in the marketplace over other devices, as opposed to other features of the patent owner's products, or things like marketing and advertising efforts. I do not believe that could be established, given that the purported

invention was already in the prior art. I will consider and comment on any such evidence the patent owner provides on these issues in response to the Petition and my testimony.

## **IX. Conclusion**

121. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and such willful false statements or the like may jeopardize the validity of the patent.



Dr. Charles Garris  
Date: August 24, 2020

# Exhibit 1

## RESUME

Charles Alexander Garris, Jr.

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### **EDUCATION:**

B.Engr.(Marine); State University of New York, Maritime College; 1965

M. S. (Mechanical Engineering), 1968  
State University of New York at Stony Brook

Ph.D. (Mechanical Engineering), 1971  
State University of New York at Stony Brook

Twenty-Four credits toward MBA, 1986-88  
The George Washington University

### **PROFESSIONAL EMPLOYMENT HISTORY:**

#### ***The George Washington University***

##### ***The Department of Mechanical and Aerospace Engineering***

1984-Present Professor of Mechanical & Aerospace Engineering

1978-84 Associate Professor of Engineering

##### ***The Department of Civil and Environmental Engineering***

2003-2004 Interim Department Chairman

#### ***National Science Foundation***

##### ***Division of Chemical and Thermal Systems***

1988-89 Program Director of Heat Transfer & Energy Systems (GW Leave)

1990-2002 Program Director of Interfacial, Transport, and Thermodynamics (part-time & summers)

2009-2010 Expert, Division of Chemical, Bioengineering, Environmental, and Transport Systems (CBET), Engineering Directorate

***Instituto Venezolano de Investigaciones Cientificas (IVIC)***

*Centro de Ingenieria*

1971-73 & 1976-78      Chief of Mechanical Engineering, Scientist

***Massachusetts Institute of Technology***

*Department of Mechanical Engineering*

1973-76      Research Associate, Department of Mechanical Engineering

***Universidad Central de Venezuela***

*Escuela de Ingenieria*

1976-78, 71-73      Associate Professor (Adjunct)

***Universidad Simon Bolivar***

1976-78      Associate Professor (Adjunct)

***Naval Plant Representative Office, United Technologies, E. Hartford***

1974-76      Senior Scientist (Part-time)

***State University of New York at Stony Brook***

*Department of Mechanical Engineering*

1966-71      Teaching Assistant, Department of Mechanics

***Sea-Land Service, Inc.***

1966      Third Assistant Engineer, S. S. Gateway City

**PROFESSIONAL SOCIETIES**

American Society of Mechanical Engineers - Fellow

(Elected Chairman of Propulsion Technical Committee, 1989)

(Member Heat Transfer Technical Committee, 1988-94)

American Institute of Aeronautics and Astronautics - Associate Fellow

American Intellectual Property Law Association - Member



Sigma Xi - Member

President of GW Chapter 1991-92, served as VP & Secretary/Treasurer

American Society of Engineering Education - Member

Pi Tau Sigma - Member

## **HONORS**

Faculty Senate Resolution 17/5: A RESOLUTION OF APPRECIATION FOR PROFESSOR CHARLES A. GARRIS, voted on and approved unanimously by the Faculty Senate of the George Washington University, April 7, 2017.

RESOLUTION TO RECOGNIZE PROFESSOR CHARLES GARRIS: "Resolved that the Board of Trustees of The George Washington University expressed to Professor Charles Garriss its deepest appreciation and gratitude for his long and distinguished service . . ." Voted on and approved unanimously by the Board of Trustees, May 19, 2017.

Elected Fellow of the American Society of Mechanical Engineers

Elected Associate Fellow of the American Institute of Aeronautics and Astronautics

Thomas Edison Patent Award of the American Society of Mechanical Engineers. 2006

Best Paper Award: (w. K.Bulusu & D. Gould); ASME Symposium on Advanced Energy Systems; IMECE2008; "Evaluation of Efficiency in Compressible Flow Ejectors." Boston, MA, 2008.

2011 George Washington University Trachtenberg Prize for University Service.

## **OTHER PROFESSIONAL ACTIVITIES**

Panelist for NSF for proposals, Presidential Young Investigator Awards, Research Initiation Grants, Equipment Grants, etc.

Panelist for United States Agency for International Development

1987-present (Annual proposal review).

Panelist for the Environmental Protection Agency, Graduate Fellowship Program

Frequent panelist for DOE, AFOSR, etc.

Frequent Reviewer of proposals.

Reviewer for various technical journals.

Research Science Institute Mentor, 1985-90.

Technical Committee of 1992 International Power Engineering Conference

Scientific Advisory Committee, XXII International Symposium on Manufacturing and Materials Processing.

Fulbright Scholarship Award Committee, 1991, 1992, 1993, 1994.

Host for NSF Workshop on "High Performance Computing Applications in Chemical and Thermal Systems", June 4, 1993.

Session Chair, Second U. S. National Congress on Computational Mechanics, Washington, DC, August 16-18, 1993.

Invited Participant in Brookings Institution Workshop on US/Japan Scientific and Technological Cooperation, Washington DC, Feb. 18, 1994.

Invited Panelist, IEEE-USA 1994 National Forum: "Engineering, Enterprises, and National Priorities: Changing Environments and Roles.", December 12-13, 1994, Johns Hopkins University.

Invited Lecture, "Recent Developments in Fuel Cell Research", presented at the American Physical Society Symposium on "Advances in Alternative Energy", Rochester Institute of Technology, October 13, 1995.

Invited participant in Vice President's 6<sup>th</sup> PNGV Symposium, Four Stroke Direct Injection Engines", White House Conference Center, July 22-23, 1997.

Invited Panelist. Department of Energy Panelist on "Turbo-expanders Research and Development in Fuel Cell Systems", October 12-14, 1999, Detroit, MI.

External Reviewer for Tulane University Strategic Research Initiative, January 2001.

Interviewed by Nature Magazine for and Article: Powell, K.: "Patent Office Plan to Beat its Backlog Elicits Cool Response"; Nature, v419, Sept.12, 2002.

## **PATENTS**

1. Garris, C. A.: Valve Control. Patent Number 4,875,623. Oct. 24, 1989.
2. Garris, C. A.: Valve Control. Patent Number 4,969,598, Nov. 13, 1990.
3. Garris, C. A.: A Pressure Exchanging Ejector and Refrigeration Apparatus, Patent Number 5,647,221, July 15, 1997.
4. Garris, C. A.: Pressure Exchanging Ejector and Methods of Use, Patent Number 6,138,456, October 31, 2000.
5. Garris, C. A.: Pressure Exchanging Compressor-Expander and Methods of Use, 6,434,943, August 20, 2002.
6. Garris, C. A.: Fuel Cell Pressurization System, Patent Number 6,663,991, December 16, 2003.
7. Garris, C. A.: Pressure-Exchanging Ejector and Methods of Use, Patent Number 7,497,666, March 3, 2009.

## **LICENSES**

Patent Agent: Licensed by the U. S. Patent and Trademark Office (Reg. No. 45,346)

Professional Engineer, Virginia.

U. S. Coast Guard License: "Third Assistant Engineer of Steam and Motor Vessels; Unlimited Horsepower". (Not currently active).

## **ADMINISTRATION AND SERVICE**

### ***The George Washington University***

#### *University*

University Marshall 2014-2017.

Elected Chair of Faculty Senate Executive Committee, 2014-2017.

Member of GW Presidential Search Committee, 2016-2017.

Member Faculty Senate Committee on Professional Ethics and Academic Freedom

Appointed member of the Science & Engineering Complex Core Instrumentation Committee, 2011-2012.

Elected SEAS Representative to the Faculty Senate, 2002-2017, 2019-Present.

Chair of the Senate Committee on Professional Ethics and Academic Freedom, 2007-2014.

Chair PEAf subcommittee on GW Policy on Intellectual Property, 2012-2014

Chair PEAf subcommittee on GW Policy on Sexual Harassment and Sexual Assault

Member of Advisory Counsel on Research 2010-2013.

Elected member of the Faculty Senate Executive Committee, 2004-2007, 2010-2011, 2011-2012, 2012-2013.

Elected SEAS representative of the Presidential Search Consultative Committee, 2006-07.

Member of the Intellectual Property Review Panel, 2003-2010.

Chair of the Senate Committee on Appointment, Salary, and Promotion, 2003-2004.

Member of the Senate Committee on Fiscal Planning and Budgeting, 1992-1999; 2003-2004.

Appointed by Senate to the Vice President's Task Force on Post-Tenure Review 1991-1992.

Chairman of Senate Committee on Research, 1985-89.

Ex-Officio member of Senate Committee on Research, 1989-92.

Member of University Committee on Research, 1985-Present

Member of Advisory Council on Research, 1989-90, 1992-98.

Member of Middlestates Self Study Committee on Research, 1987-88

Elected to Senate Executive Committee 1988-1992.

Commissioned by President Trachtenberg for a study on faculty productivity and teaching loads. Report presented to President 4/91.

Member Joint Committee on the Virginia Campus 1994.

#### *School of Engineering and Applied Science*

Elected Member of the School of Engineering Dean Search Committee, 2018-2019.

Chair of Committee on Revision of By-Laws of the School of Engineering and Applied Science, 2018-2019.

Member SEAS Conflict of Interest Committee 2014-2016

Member SEAS Finance Committee, 2012-2014

Member SEAS Grading Committee 2011-2012.  
 Member SEAS By-Laws Review Committee, 2011-2012.  
 Member SEAS Finance Committee (2010-2013)  
 Chairman of Associate Dean Search Committee 2009  
 Dean Search Committee, 2007-2008  
 Graduate Curriculum Committee, 2007-2008  
 Chairman of the SEAS Mission Statement Committee, 2002.  
 Chairman of SEAS Strategic Planning Committee, 2002-2003  
 Northern Virginia Campus Co-Coordinator for SEAS, 1990-91.  
 Elected Senate Representative of SEAS, 1985-1992, 2003-2011  
 Member School of Engineering Graduate Curriculum Committee, 2007-Present.  
 Member of the School of Engineering Finance Committee, 1991-1998, 2001-2003.  
     Elected Chairman 1992-93, 1994-95, 1996-97.  
 Elected Member of the School of Engineering Dean Search Committee, 1990-92.  
     Elected Chairman 1990-91.  
 Member of SEAS Study-Abroad Committee  
 Member, Advisory Counsel on Continuing Engineering Education (CEEP)  
 Elected At-Large member of the School of Engineering Dean Search Committee. Elected Chair (1998).

*Department of Mechanical and Aerospace Engineering*

Member of Personnel, Committee, Laboratory Committee, Curriculum Committee, etc.  
 Developed Curriculum of the undergraduate MAE Patent Option.

*Department of Civil and Environmental Engineering*

Interim Department Chairman, 2003-2004.  
 Chairman of Dept. Chair Search Committee, 2003-2004.

## **PEDAGOGICAL EXPERIENCE**

### **The George Washington University (1978-Present)**

Undergraduate:	Fluid Mechanics I Fluid Mechanics II Thermal Systems Design Heat Transfer Vibration Analysis Thermodynamics Mechanical Engineering Laboratory Applied Science (Differential Equations) History and Economic Impact of the U. S. Patent System
----------------	---

Graduate: Intermediate Fluid Mechanics  
 Applied Aerodynamics  
 Convective Heat and Mass Transfer  
 Combustion  
 Compressible Flow  
 Energy Systems and Analysis  
 Hydrodynamics  
 Turbomachinery I  
 Viscous Flow  
 Applied Science (ApSc 211) (Complex Variables)  
 Vibration Analysis

**Massachusetts Institute of Technology (1973-76)**

Undergraduate: Fluid Mechanics

Graduate: Fluid Mechanics

**Universidad Central de Venezuela (1971-73, 1976-78)**

Undergraduate: Mechanics (Statics & Dynamics)

Graduate: Classical Mechanics  
 Theory of Perturbations

**Universidad Simon Bolivar (1976-78)**

Undergraduate: Fluid Mechanics

**State University of New York at Stony Brook (1966-71)**

Undergraduate: Teaching Assistant in Fluid Mechanics, Thermodynamics, Heat Transfer.

**THESES AND DISSERTATIONS DIRECTED BY C. A. GARRIS at GWU**

Irdmusa, J. Z.: "Energetics of Pulsed Jets", M. S., 1982.

Anjum, M. I.: "Rotating Stall in a Cascade of Vanes", M. S. 1984.

Delianides, T. P.: "Design and General Performance Characteristics of a Water-Water Rotary-Jet Forward Motion Facility", M.S., 1984.

Paparella, C.: "Comparative Exergy Analysis of Cryptosteady Energy Separation Systems in Air Cooling Cycles", M. S., 1985.

Sideropoulos, G.: "Shroud Design for the Rotary Jet", M. S., 1985.

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- Parker, W. J.: "Prediction of the Heat-Release Rate of Wood", Ph.D., 1988.
- Irdmusa, J. Z. "Experimental and Analytical Investigation of Low Solidity Axial Turbines", Ph.D., 1989.
- Cordier, S. J.: "Rotary-Jet Thrust Augmenter with Jet-Flapped Blades", Ph.D., 1989.
- Abdel-Wahab, M.: "Ejector Thrust Augmenters Pulse Starting Approach to the Second-Solution", Ph.D., 1990.
- Hodges, B. R.: "Pressure Driven Flow Through and Orifice for Two Stratified Immiscible Liquids", M. S., 1991.
- Toh, H. K.: "A Study of the Fluid Dynamics in the Mixing Region of a Hubless Rotary Jet Thrust Augmenter", M. S., 1992.
- Amin, S.: "Nonsteady Flow Induction: An Experimental Investigation", Ph.D. 1994.
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- Al-Hussan, K. "A Computational Study of the Supersonic Pressure-Exchange Ejector", PhD. Dissertation, December 2002.
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- Kamara, M. Y. "An Investigation of the Effect of Variable Ejector Efficiency on the Performance Characteristics of a Steam Condenser in an Ejector Refrigeration System", Professional Degree, May 2006.

- Zhang, H. "Computational Study of the Multi-Dimensional Aspects of the Pressure Exchange Process and its use in an Ejector and in Ejector Refrigeration using Steam as the Refrigerant", Ph.D. Dissertation, August 2007.
- Umar, M. "The Radial Flow Pressure-Exchange Ejector - Computer Simulation," Ph.D. Dissertation, December 2007.
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- Hameed Ashgar "Survey of State of the Art Energy Storage Systems", Professional Degree Thesis in Progress.
- Michael Ducker "Study of a Natural Gas Combined Cycle Power Plant with Carbon Dioxide Separation", MS Thesis , May 2012.
- Siddarth Jeripatola "Comparative Study of Thermally Powered Refrigeration Systems and the use of Environmentally Friendly Refrigerants," M. S. Thesis in Progress.
- Maryam Zahedi "Optimized Ejector Refrigeration Using Pressure Exchange," Ph.D Thesis in progress.

#### **SPONSORED RESEARCH SINCE 1980 OF C. A. GARRIS**

Principal Investigator: Air Force Office of Scientific Research: "Research on Non-Steady Flow Induction", 03/01/80-05/31/84, \$502,786,

Principal Investigator: Department of Energy: "Fluid Dynamic Energy Separation", 9/15/83-09/14/85, \$280,925.

Principal Investigator: Department of Energy: "Fluid Dynamic Energy Separation", 9/15/85-5/31/87, \$250,683.

Principal Investigator: National Aeronautics and Space Administration: "Research on Flow Induction by Rotary Jets", 06/15/85-09/01/86, \$34,971.

Principal Investigator: Department of Transportation, Maritime Administration: "Rotary-Jet Marine Propulsion", \$49,700.

Principal Investigator: Institute for Defense Analysis: "Research on Aircraft Applications of the Energy Separator", 05/28/87-05/28/88, \$100,000.

Principal Investigator: U. S. Army, Fort Belvoir Research & Development Center, "Computer Code Development", 1988, \$5,000.

Principal Investigator: National Science Foundation: "Group Travel Grant to XXII International Symposium on Manufacturing and Materials Processing", 1990, \$12,751.

Principal Investigator: National Aeronautics and Space Administration: "Research on Rotating Ejectors", 02/02/88-1994, \$270,000.

Principal Investigator: National Science Foundation / Environmental Protection Agency Partnership on Technology for a Sustainable Environment: "A Novel Pressure Exchange Ejector Refrigeration System with Water as the Refrigerant", 11/96-10/03, \$595,000.

#### **CONSULTING:**

Afros Corp.; Advanced Technology Corp.; NAVPRO at United Technologies; Bendix Corp.; Solara Corp.; Speakman Corp.; Pacific Instruments; Utility Consultants Corp.(Director); Cushman, Darby, & Cushman; Klayman & Gurley; Schmidt & O'Brian; Thompson, Larson, McGrail, O'Donnell & Harding; The Corporation Counsel, Washington D. C.; National Science Foundation; Stanwick Associates; Memry Metals, Inc.; Siciliano & Ellis; Ablondi & Forster; Gilberg & Kurent; Nixon & Vanderhye; The World Bank; Lake Center Industries; Kenyon & Kenyon; Wigman, Cohen, Leitner, & Meyers; Andrus, Sceales, Starke, Sawall; Fish & Richardson; Dickstein, Shapiro, Morin & Oshinsky LLP ; Blank, Rome, Comisky & McCauley LLP; Roycastle, Abrams, Berdo, & Goodman, LLP; Bryan Cave LLP; Heat Vehicle Corp.;

#### **REPORTS ON ACADEMIC ISSUES AT THE GEORGE WASHINGTON UNIVERSITY**

Garris, C. A.: "Survey on Teaching Loads and Research Productivity of Full-Time Faculty", Special Report, Senate Committee on Research, April 9, 1990.



Garris, C. A.: "On the Need for Teaching Load Reductions at The George Washington University", Special Report, Senate Committee on Research, April 13, 1990.

Coates, A., Cohen, M., Garris, C. A.: "Towards a Means for Assessing Academic Productivity at The George Washington University", Presidential Report, The George Washington University, April 1991.

Garris, C. A.: "A Comparison of GWU and SEAS with a Market Basket of Institutions", Prepared for the SEAS Finance Committee, July, 1992.

Garris, C. A.: "A Vision for the CMEE Department", September, 1992.

Garris, C. A.: "A Comparative Study of the Financial Development of the School of Engineering and Applied Science", May, 1993.

Garris, C. A. (Chair): "A Strategic Plan for Mechanical and Aerospace Engineering", (Unanimously adopted by MAE Faculty), 1998.

## **PUBLICATIONS**

Lee, S. L., Garris, C. A.: "The Formation of Multiple Fire Whirls", Twelfth Symposium (International) on Combustion, The Combustion Institute, 1969.

Garris, C. A., Lee, S. L.: "A Theory for Multiple Fire Whirl Formation", Fourteenth Symposium (International) on Combustion. The Combustion Institute, 1973.

Garris, C. A.: "La Conveccion Natural Laminar de Una Fuente Lineal de Calor Infinito con Vorticidad Ambiental", Acta Cientifica Venezolana, 24, 1, 1973.

Toong, T. Y., Arbeau, P., Garris, C. A., Patureau, J. P.: "Acoustic Kinetic Interactions in an Irreversibly Reacting Medium", Fifteenth Symposium (International) on Combustion, The Combustion Institute, 1975.

Garris, C. A., Lee, S. L.: "An Instability of a Shear Field-Buoyancy Field Interaction Leading to Vortex Formation", Journal of Applied Mechanics, 41, 4, pp. 891-897, December 1974.

Garris, C. A., Toong, T. Y., Patureau, J. P.: "Chemi-Acoustic Instability Structure in Irreversibly Reacting Systems", Astra Astronautica, v2, 981-997, 1975.

Moussa, N. A., Toong, T. Y., Garris, C. A.: "The Mechanism of Smoldering Combustion in Cellulosic Materials", Sixteenth Symposium (International) on Combustion, The Combustion Institute, 1977.

Patureau, J. P., Toong, T. Y., Moussa, N. A.: "An Experimental Investigation of Acoustic-Kinetic Interaction in Non-Equilibrium H<sub>2</sub>-Cl<sub>2</sub> Reactions", Sixteenth Symposium (International) on Combustion, The Combustion Institute, 1977.

Garris, C. A., Toong, T. Y., Moussa, N. A.: "A Parametric Study of Pyrolysis Wave Propagation", Proceedings of the Fifth International Symposium on Combustion Processes, Polish Academy of Sciences, 1977.

Cho, S. A., Fookes, R., Garris, C. A.: "Efficiency of Ceramic Absorber Coatings for Solar-Thermal Conversion", Ceramics International, V7,1, 1981.

Irdmusa, J. Z., Garris, C. A.: "A Preliminary Study of Vortex Formation from Pulsed Jets", Proceedings of the Ejector Workshop for Aerospace Applications, Wright-Patterson Air Force Base, June 1982.

Garris, C. A., Irdmusa, J. Z.: "The Energetics of Vortex Formation", Proceedings of the ASME WAM, Nov. 1983.

Foa, J. V., Garris, C. A.: "Promising Advances in Non-Steady Flow Utilization; Crypto-Steady Modes of Energy Exchange", Mechanical Engineering, November 1984.

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Garris, C. A., Toh, K. H., Xie, L.: "A New Concept for Hubless Rotary Jet Thrust Augmenters", Proceedings of the 27th Joint Propulsion Conference, ASME/AIAA, 1991.

Garris, C. A., Toh, K. H., Amin, S.: "Flow Induction by Pressure Forces", Proceedings of the 28th Joint Propulsion Conference, ASME/AIAA, 1992.

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Garris, C. A., Hong, W. J., Mavriplis, C. M., Shipman, J.: “An Environmentally Friendly Pressure-Exchange Ejector Refrigeration System”, Forum on Industrial and Environmental Applications of Fluid Mechanics; 1998 ASME Fluids Engineering Division Summer Meeting Washington, DC, June 21-25, 1998.

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Garris, C. A., Hong, W. J., Mavriplis, C. M., Shipman, J.: “A New Thermally Driven Refrigeration System with Environmental Benefits”, 33<sup>rd</sup> Intersociety Conference on Energy Conversion, Colorado Springs, CO, August, 1998.

Garris, C. A., Hong, W. J., Mavriplis, C. M., Shipman, J.: “The Pressure-Exchange Ejector Heat Pump”, 1998 ASME International Mechanical Engineering Conference and Exposition, Anaheim, CA, November 15-20, 1998.

Garris, C. A. “The United States Patent System: Innovation and Engineering Design Education in a Free Market Society”; Accepted for publication in the Proceedings of the International Conference of Engineering Education, Ostrava, Czechoslovakia, ASEE, 1999.

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Garris, C. A. “The United States Patent System: An Essential Role in Engineering Design Education”, J.Engineering Education, April 2001.

Hong, W. J., Alussan, K., Garris, C. A. “The Supersonic / Rotor-Vane / Pressure-Exchange Ejector”;

39<sup>th</sup> AIAA Aerospace Sciences Meeting and Exhibit, Reno, NV, January 8-11, 2001.

Garris, C. A.: “The Role in Aerospace Engineering Design Education of The United States Patent System”; 39<sup>th</sup> AIAA Aerospace Sciences Meeting and Exhibit, Reno, NV, January 8-11, 2001.

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Hong, W. J., Alhussan, K., Garris, C. A.: "An Experimental and Computational Investigation on the Overall Shapes of the Vanes of the Supersonic Rotor-Vane / Pressure-Exchange Ejector", Proceedings of Joint US ASME-European Fluids Engineering Summer Conference, Montreal, Canada, July 2002.

Zhang, H. F., Garris, C. A.: "Recent Progress in Pressure Exchange Ejector Research", Proceedings of the International Conference on Energy and the Environment, Shanghai, China, December 2003.

Hong, WJ, Zhang, H. F., Alhussan, K., Ababneh, A., Garris, C. A.: A computational Study of Two novel Non-steady Pressure Exchange Ejectors with Environmental Benefits and Energy Efficiency", Paper HT-FED2004-56370, 2004 ASME Heat Transfer / Fluids Engineering Summer Conference, Charlotte, North Carolina, July 11 -15, 2004.

Alhussan, K., Garris, C. A.: "Comparison of Cylindrical and 3\_D Cubic B-Spline Curve of Shroud-Diffuser for a Supersonic Pressure Exchange Ejector in a 3\_D, Non-Steady, Viscous Flow. IASM/WSEAS International Conference on Fluid Mechanics, Corfu, Greece, August 17-19, 2004.

Zhang, H. F., Garris, C. A.: "Pressure Exchange in Multi-Dimensions," Invited Paper on Wave Rotor Technology, International Mechanical Engineering Congress & Exposition, Anaheim, CA, November 14-19, 2004.

Alhussan, K., Garris, C. A.: "Study of the Effect of Changing Inlet Area Ratio of a Supersonic Pressure Exchange Ejector", 43<sup>rd</sup> AIAA Aerospace Sciences Meeting and Exhibit, Reno, NV, January 10-13, 2005.

Alhussan, K., Garris, C. A.: "Effect of Changing Throat Diameter Ratio on a Steam Supersonic Pressure Exchange Ejector," Modern Physics Letters B, v. 19, Special Issue, pp 1715-1718, Dec. 20, 2005.

Zhang, H., Garris, C. A.: "Pressure-Exchange: A Fundamental Inquiry," 43<sup>rd</sup> AIAA Aerospace Sciences Meeting and Exhibit, Reno, NV, January 10-13, 2005.

Zhang, H. F., Garriss, C. A.: "Comparison of Performance between Pressure Exchange Refrigeration and Absorption Cycle Refrigeration", Symposium on Absorption/Sorption Heat Pumps and Refrigeration Systems, ASHRAE Winter Meeting, Orlando, FL, Feb. 5-9, 2005.

Al-Hussan, K., Garriss, C. A.: "Qualitative Study of Flow Induction Phenomena in Three Dimensional Non-Steady Supersonic Flow.", In preparation for submission to Journal of Fluids Engineering, ASME.

Ababneh, A., Garriss, C. A.: "Progress in Numerical & Experimental Investigation of the Supersonic Pressures Exchange Ejector," JIMEC 2004, Proceedings of The fifth Jordanian International Mechanical Engineering Conference April 26-28, 2004, Amman - Jordan.

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Alhussan, K., Garriss, C. A.: "Computational Analysis of Flow Inside a Diffuser of Three-Dimensional Supersonic Non-Steady Ejectors," Forum on Industrial Flows, Paper IMECE2005-80843, ASME International Congress and Exhibition, Orlando, FL, Nov. 5-11, 2005.

Alhussan, K., Garriss, C. A.: "Characteristics of Non-Steady Pressure Exchange Ejectors", Proceedings of 2<sup>nd</sup> Joint US-Europe Fluids Engineering Summer Meeting, Paper FEDSM2006-98403, ASME, July 2006.

Zhang, H., Garriss, C. A.: "Pseudo-Impellers in Supersonic Crypto-Steady Flow Induction," IMECE2007-43240; Proc. of International Mechanical Conference, Nov. 11-15, 2007, Seattle, WA, ASME.

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Umar, M., Garriss, C. A.: "On Length Scales for the Ratial Rotating Jet Pressure Exchange Mechanism.", Proceedings of IMECE2008, Paper No.66666, ASME, Boston, MA, 2008.

Bulusu, K., Gould, D., Garris, C. A.: "Evaluation of Efficiency in Compressible Flow Ejectors," Proceedings of IMECE2008, ASME, Boston, MA, 2008.

Gould, D. M., Garris, C. A.: "The Design and Rating of the Pressure Exchange Steam Ejector for a Modified Automotive Air Conditioning System," Proc.3rd Int.Energy Sustainability Conf., ES2009-90218, San Francisco, CA, ASME, 2009.

Bulusu, K., Garris, C. A.: "Characteristics of Flow Around cone-Vane configurations for a Novel Crypto-Steady Pressure Exchange Ejector System," Proc.3rd Int.Energy Sustainability Conf., ES2009-90015, San Francisco, CA, ASME, 2009.

Chabukswar, K. A., Garris, C. A.: "Analysis of the Application of Pressure Exchange Device in Thermal Vapor Compression Desalinization Systems," Proc.3rd Int.Energy Sustainability Conf., ES2009-90065, ASME, 2009.

Bulusu, K., Garris, C. A., Peyrou, B.: "Preliminary Experiments on Entrained Fluid Mixing for Enhancing Ejector Performance," Proc. 39th AIAA Fluid Dynamics Conference, San Antonio, TX, Paper AIAA-2009-3575, AIAA, 2009.

Ababneh, A., Garris, C. A.: "Direct Interaction of Fluid-to-Fluid in an Unsteady ejector with a Zero-Coning Radial Diffuser Pressure Exchange Ejector," FEDSM2009-78544, 9th Symposium on Applications in Computational Fluid Dynamics, Vail, CO, August 6, 2009.

Umar, M., Garris, C. A.: "On Mutual Deflection for the Radial Rotating Jet Pressure Exchange Mechanism", Paper IMECE2009-12836, Lake Buena Vista, FL; November 13-19, 2009.

Umar, M., Garris, C. A.: "Effect of Geometric Parameters on the Performance of a Radial Flow Pressure Exchange Ejector", Paper IMECE2010-40480, Vancouver, BC; November 12-18, 2010.

Bulusu, K. V., Garris, C. A.: "A Study of Entropy Rise across Supersonic Pressure Exchange Enhancing Rotors," 63 Annual Meeting of the American Physical Society; Division of Fluid Dynamics; Long Beach, CA.; Nov. 21-23, 2010.

Bulusu, K. V., Garris, C. A.: "Streamwise Turbulence in Pressure Exchange Processes," Submitted to 7th International Symposium on Turbulence and Shear Flow Phenomena, Ottawa, CA, July 28-31, 2011.

Bulusu, K. V., Garris, C. A.: "The Influence of Shear Layer Turbulence on Stationary Pseudoblades in Supersonic Pressure Exchange Inducing Flow Fields", J.Fluids.Engr., ASME, v.133,Nov. 2011.

Wang, J., Liang, C., Garriss, C. A.: "Two-Dimensional Discontinuous Galerkin Simulations of Crypto-Steady Supersonic Pressure Exchange," paper number, IMECE2011-65818, Proceedings of the the International Mechanical Engineering Congress and Exhibition; Denver, CO, Nov. 11-17, 2011,

Umar, M., Garriss, C. A.: Effect of Fluid Dynamic Parameters on the Performance of a Radial Flow Pressure Exchange Ejector," IMECE2012-89360, Proceedings of the the International Mechanical Engineering Congress and Exhibition; Houston, TX, Nov. 9-15, 2012.

Garriss, C. A., Liang, C.: "Pressure Exchange Heat Pump: Natural Gas Residential Air Conditioning", Proceedings of the ASME International Mechanical Engineering Congress & Exposition; IMECE2013-65944; San Diego, CA; Nov. 15-21, 2013.

Charles A. Garriss, Jr., Charles A. Garriss III: "The United States Patent System and Engineering Education: an Alliance for Innovation": Invited paper for J. Technology and Innovation, National Academy of Inventors, September 1, 2017: <https://www.ingentaconnect.com/content/nai/ti/2017/00000019/00000002/art00005>

Zheng Cao, Jianqiang Deng, Fanghua Ye, Charles A. Garriss Jr.

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Mao Li, Zihua Qiu, Chunlei Liang, Michael Sprague, Min Xu, Charles A. Garriss, Jr.: "A New High-Order Spectral Difference Method for Simulating Viscous Flows on Unstructured Grids with Mixed Elements", J. Computational Physics, 2017, in press.

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Aihong Meng, Xiang Gao, Nannan Li, Charles A. Garriss, Jr.: "Study on the Effect of Structural Parameters on the Linear Control Performance of a High Speed On-Off Valve Based on Flow Field Analysis," 38th Annual SAE Brake Colloquium, Paper 2020-BC-0103, SAE, October 2020.

## Charles A. Garris, Jr.

### Expert Testimony in Lawsuits

1. Corporation Counsel, Washington, D. C. (Jamal Rashid)  
Rosenbloom vs. **DC**, Civil Action 11064-83  
Trial 11/21/86.  
Negligence suit involving pneumatic brakes on trucks.
2. Cushman, Darby & Cushman (Pete Gowdy, Bill West, & Carl Love)  
**Afros** vs. Kraus-Maffei  
Deposition & Trial, Feb. 1987.  
Patent infringement case involving the design of reaction injection molding heads.
3. Klayman & Gurley (Larry Klayman)  
ITC Judge Trial 7/8/87  
Meditech International vs. **Polycraft Corp.**  
Patent infringement trial involving the manufacturing process for extruded ziplock type plastic bags.
4. Ablondi & Foster (Sturge Sobin)  
Kingdom Plastics vs. **Minigrip**  
ITC Trial 3/9/89  
Patent infringement trial involving the manufacturing process for extruded ziplock type plastic bags.
5. Gilberg & Kurent (Barry Trebach, Martha Knudson)  
Tallman vs. **Mayco Pump Corporation** Deposition 11/28/90.  
Product liability case involving the design of concrete pumping machines. Settled out of court.
6. Nixon & Vanderhye (Larry Nixon)  
Schick vs. **American Safety Razor**  
Jury Trial, 4/5/92.  
Patent infringement case involving polyethylene oxide lubricating strips on disposable razors.
7. Cushman, Darby, & Cushman (Larry Hymo, Chris Comuntzis) Tec Air vs. **Nippondenso Mfg.** (defendant) .Jury trial, 12/9/92. Patent infringement case involving injection molded balancing plugs for plastic automobile radiator fans.
8. Wigman, Cohen, Leitner, & Meyers (Michael White, George Meyers)  
Mainstream Engineering vs. **Keysports USA.**  
Prepared affidavit for injunction proceeding. Settled prior to trial.  
Patent infringement case involving micro-climate control vest.



9. Kenyon & Kenyon (William Wells, Jr., Mark M. Supko)  
**Chemtron, Inc** (Plaintiff). vs. U. N. X. Chemicals  
Prepared expert report. Deposed twice. Settled out of court just before trial.  
Patent infringement case involving industrial detergent dispenser.
10. Cushman, Darby, & Cushman (George Sirilla, William West, Paul Edgell)  
Steelcase, Inc. vs. **Haworth, Inc.**.. Patent infringement case involving chair mechanisms.  
Prepared expert report, deposition. Settled out of court. 1997.
11. Cushman, Darby, & Cushman (Barry Golub, Christopher Murphy), **Incline Technology** vs. PacificMedical Group,  
Patent infringement and trade secret litigation involving the design of manufacturing machinery for sterile cleaning pads. Case  
settled. 1997
12. McDermott, Will, & Emery (Kenneth J. Jurek, Rosanne J. Faraci) Tecair vs. **Denso**. Jury trial May, 1997. Patent  
validity trial in case involving injection molded balancing plugs for plastic automobile radiator fans. Served as expert for  
defendant (Denso) at trial. Prepared declaration and was deposed.
13. Andrus, Sceales, Starke, & Sawall ( George H. Solveson, Denise Stoker); **Miotto** vs. Leggett & Platt; Patent  
infringement case involving office chair mechanisms; Prepared expert declaration in behalf of Miotto International; Testified in  
Markman Hearing and Bench Trial, Feb. 1999.
14. Pillsbury, Madison, Sutro LLP (Cushman, Darby, Cushman Group) (George Sirilla, Jeffrey Semenour); Universal Tool  
& Stamping vs. Ventra Group; International Trade Patent Infringement Case involving automotive scissors-jacks. Prepared  
Expert Witness Report. Settled out of court.
15. Fish & Richardson P. C. (Michael J. McKeon, Ralph Mittelberger); Corning Glass vs. **Precision Optical Fibre**;  
International Trade Patent Infringement Case involving the manufacture of optical fibre. Conducted investigation of  
manufacturing methods at POF, Einhoven, Netherlands, and performed computational fluid dynamic analysis of technology.  
Planned experiments to test physical hypotheses. Settled out of court.
16. Dickstein, Shapiro, Morin, & Oshinsky LLP; (Laurence Fisher, Charles Saber); Acadia Elastomers Corp. vs JRLon Inc;  
Patent infringement case involving dynamic fluid seals; prepared expert report, settled out of court March 2000.
17. Andrus, Sceales, Starke, & Sawall ( George H. Solveson, Denise Stoker); **NOVA Industries** vs. Tutco Inc.; Patent  
infringement case involving electric heater coil insulating supports; case concluded by summary judgement in favor of NOVA.
18. Pillsbury, Madison, Sutro LLP (Cushman, Darby, Cushman Group) (George Sirilla, Adam Hess); Softview Computer  
Products Corp. vs. **Haworth, Inc.** Patent infringement case involving computer keyboard supports. Prepared Expert Witness  
Report. Deposition. Case settled.
19. Walter M. Schey Associates: ( Walter Schey); Schwing vs **Putzmeister**; patent infringement case involving concrete  
pumping machinery; prepared expert report; case settled..

20. Walter M. Schey Associates: (Walter Schey); Asfeld vs. **Putzmeister**, personal injury / product liability case involving concrete pumping machinery, settled.
21. Bryan Cave LLP: (William Edgar, Christopher Manning); Roche Diagnostics vs. **Packaging Coordinators, Inc.**, liability case involving thermal environmental control during drug shipment, provided analysis and experimentation, settled.
22. Dickstein, Shapiro, Morin, & Oshinsky (Jeffrey Johnson, Mark Thronson, Mark Stickland), **Durotec** vs ASM; patent infringement case involving airless paint spray nozzles; prepared expert report, case settled.
23. Roylance, Abrams, Berdo, & Goodman (Michael Murphy, Jeffrey Howell), Centuri Corp. v. **Spinmaster Toys**, patent infringement case involving air operated reciprocating motors for model airplanes, settled 12/2000.
24. Blank, Rome, Comisky, & McCauley (Michael White, Bryan Jones), **WCM Industries** v. Oatey Co., patent infringement case involving plumbing drain fittings, prepared expert reports on infringement and on validity, settled 01/2001.
25. Blank, Rome, Comisky, & McCauley (Charles Wolfe, Denise Lane), **P&M Products** vs. Rose Art Industries; patent infringement case involving air brushes, prepared expert reports on infringement and on validity, deposed, testified in Markman Hearing, case settled.
26. Fulwider, Patton LLP.; (Verne Schooley); Farmer et al. V. **Medo Industries**; patent infringement case involving automotive air freshening devices, prepared expert reports & declarations, twice deposed, jury trial 11/2003.
27. Andrus, Sceales, Starke, & Sawall ( George H. Solveson); **Douglas Dynamics** v. Curtis International; Patent infringement case involving removable snow plows, prepared expert report, settled 3/2002.
28. Pillsbury Winthrop, LLP (Kimberley McDonnell), Turn-key Tech LLC v. **Daimler Chrysler Corp**, patent infringement case involving laminated injection molded tail-light lenses for vehicles, prepared expert report, deposed, settled March 2003.
29. Pillsbury Winthrop, LLP (William Atkins, Kevin Kramer), Simmons, Inc. v. **Bombardier**, patent infringement case involving snowmobile skis, Summary Judgement order in favor of Bombardier.
30. Dickstein, Shapiro, Morin, Oshinski (Chuck Saber, Peter Veytsman); Brother vs. **IIMAK**. Patent infringement case involving printer cassettes. Prepared expert report, twice deposed, settled 9/2003.
31. Pillsbury Winthrop, LLP (Adam Hess); Abdo Inc. vs. **Stamina**; patent inventorship case involving exercise machines; prepared expert report, deposed, case settled.
32. Andrus, Sceales, Starke, & Sawall (George Solveson, Aaron Olejniczak); **Jakel** v. FASCO; patent infringement case involving blowers for heating furnaces, prepared Markman declaration, deposed.. Case settled 2003.
33. Knobbe, Martens, Olson & Bear (Paul Tripodi II); **Winn Incorporated** v. Eaton Corporation; patent infringement case involving shock absorbing grips for golf clubs and the like. Prepared expert report, deposed. Case settled.

34. Fulwider, Patton LLP.; (Verne Schooley); **Meziere** v. Specialty Auto Parts; Trade dress case involving water pumps for racing cars. Prepared expert report. Deposed 2/17/04. Case settled.
35. Andrus, Sceales, Starke, & Sawall (George Solveson, Aaron Olejniczak); **Parker Hannifan v. Fleetguard**; patent infringement case involving diesel fuel filters. Prepared expert report, deposed 3/19/04. Case settled June 2004.
36. Blank, Rome, Comisky, & McCauley (Victor Wigman); **Green Keepers of Delaware**; patent interference case before the Board of Patent Appeals and Interferences; Case involves injection molding of polymer golf shoe cleats and the innovative aspects of the cleats; prepared expert report; deposed 3/31/04.
37. Patton Boggs LLP (Marc Labgold, Scott Chambers, Martin Sulsky); **Becton Dickinson** v. Tyco Healthcare Group; patent infringement case involving single-handedly actuatable safety shield for needles; deposed 4/28/04; jury trial 2004.
38. Fulwider, Patton LLP.; (Verne Schooley); **Motorvac** v. Norco; patent infringement case involving automatic vehicle transmission oil changing machines; prepared expert report; deposed, jury trial 2004.
39. Andrus, Sceales, Starke, & Sawall (George Solveson, Aaron Olejniczak); **PDQ** v. Ryko; patent infringement case involving brushless automobile car wash machines; prepared expert report; case pending.
40. Patton Boggs LLP (Marc Labgold, Scott Chambers, Martin Sulsky); MBO Laboratories v. **Becton Dickinson**; patent infringement case involving single-handedly actuatable safety shield for needles; case closed.
41. Andrus, Sceales, Starke, & Sawall (George Solveson, Aaron T. Olejniczak); **Flow Corp** vs. OMAX Corp; patent infringement case involving abrasive water jet cutting, prepared two declarations on claim construction, deposed 5/2006, testified at Markman hearing, case settled 08/2008.
42. Connolly, Bove, Lodge, Hutz (Harold Pezzner, Richard Powers, Eric Hutz; F. DiGiovanni, M. C. Lambert) **Parker Hannifan** v. Wix; patent infringement case involving vehicle fuel and oil filters; prepared two declarations in support of preliminary injunction; deposed 5/2006, prepared Expert Report; deposed 1/8/08; (case settled.)
43. Connolly, Bove, Lodge, Hutz (Harold Pezzner, Frank DiGiovanni, Curt Lambert) **Parker Hannifan** v. Champion; patent infringement case involving vehicle fuel and oil filters; prepared Expert Report; deposed 12/6/07; case settled.
44. Pillsbury, Winthrop, Shaw Pittman LLP (William Atkins, Bryan Collins) **Fellowes** v. Michilin: Patent infringement case involving office multimedia shredders; prepared expert report, testified in Markman hearing 7/2006; 8/30/06 - Decided by summary judgement in favor of Fellowes.
45. Jacobson Holman LLP (Harvey Jacobson, Michael Slobasky); **Avitech** v. Embrex; Patent infringement case involving avian egg injection machines; prepared expert report, expert rebuttal report, case settled 11/2008.
46. Jones Day LLP (Patrick Norton, Susan Gerber) **Robert Bosch GMBHc. v Interstate Diesel Service**; Patent infringement case involving stators for electronic diesel engine fuel injectors; prepared expert report, prepared declaration; deposed 1/11/07; case settled 1/17/07.

47. Vorys Sater Seymour & Pease LLP (Corinne Marie Pouliquen); Epstein Becker Green Wickliff & Hall PC (Steven Cochell); **Performance Aftermarket Parts Group, LTD** v. TI Group Automotive Systems, LLC.; Patent infringement case involving an electric- motor fuel pump for installation in a vehicle fuel tank; prepared tutorial, consulted with attorneys on prior art and claim construction, performed Fluent computational fluid dynamics analyses, consulted at trial; case settled 5/15/08.
48. Walter Schey Associates (Walter Schey); Campbell v. **Putzmeister Corp.**; Product liability case involving Telebelt concrete transporting machinery; prepared Expert Report, deposed 4/23/08; case settled, 10/2008.
49. Wilmer Hale LLP (William Lee, Amy Wigmore, William McElwain); **Becton Dickinson** v. Tyco Healthcare; Patent infringement case involving a single-handedly actuatable safety shield for hypodermic needles and blood collectors; testified at jury trial (11/30/2007).
50. Connolly, Bove, Lodge, Hutz (Frank DiGiovanni, Curt Lambert) **Parker Hannifan** v. Baldwin; patent infringement case involving vehicle fuel and oil filters; prepared declaration, Expert Report; case settled 7/2008.
51. Connolly, Bove, Lodge, Hutz (Frank DiGiovanni, Curt Lambert) **Parker Hannifan** v. WIX Champion Duramax; patent infringement case involving vehicle fuel filters; Prepared expert reports on infringement and validity, deposed, testified in jury trial Dec. 2009.
52. Blank, Rome (Charles Wolfe, Brian Higgins); **KEG** v. Reinhart Laimer, patent infringement case involving hydrodynamic sewer nozzles; prepared declaration on claim construction; deposition 10/21/08; deposition 01/06/12; prepared expert reports on infringement and on validity; case pending.
53. Andrus, Sceales, Starke, & Sawall (George Solveson, Aaron T. Olejniczak); **MBW** vs. Multiquip Corp; patent infringement case involving concrete riding trowels, prepared expert report on invalidity 10/20/2008, deposition 12/23/2008, case settled 10/2009.
54. Leader, Gorham LLP (Michael Purleski); Swimways vs. **Tofasco**; patent infringement case involving collapsible beach chairs; prepared expert reports, Markman declaration. Case settled, Nov. 2009.
55. Fulwider, Patton LLP (Vern Schooley); Translogic v **Leavelle**; patent infringement case involving pneumatic tube transport systems; prepared declaration on non-infringement 7/2009. Case settled 10/2009.
56. Andrus, Sceales, Starke, & Sawall (George Solveson, Aaron T. Olejniczak); **Douglas Dynamics** v. Buyers Products; patent infringement case involving snow plows, prepared declaration in support of claim construction, deposed 11/18/09 on claim construction; prepared expert reports on infringement and validity; deposed 5/28/2010 on expert reports, testified at jury trial October 2010.
57. Blank, Rome (Charles Wolfe, Katherine Barecchia ); **Methode** v Delphi, patent infringement case involving automotive sensor pad for controlling airbag deployment. Prepared declaration in support of claim construction; Case settled 9/2012..
58. Andrus, Sceales, Starke, & Sawall (George Solveson, Aaron T. Olejniczak); **Therma-Stor LLC** v Abatement Technologies; patent infringement case involving space dehumidifiers, prepared declaration on claim construction, case settled.

59. Benesch, Friedlander, Coplan, & Aronoff LLP (Robert Nupp): Jack O. Cartner and Motrim, Inc. v **Alamo Group Inc.**, patent infringement case involving hydraulic circuits and hydraulic braking for mowers affixed to tractors. Assisted in forming non-infringement contentions and invalidity contentions. Case settled 02/2010.
60. Jacobson, Holman LLP (Michael Slobasky): SCS Interactive, Inc. et al v. **Vortex Aquatic Structures International Inc**; patent infringement case involving water theme park play systems; prepared declaration on claim construction; prepared expert report and rebuttal report. Case settled 06/2010.
61. Taylor, Porter, Brooks, & Phillips (John Murrill, Frederick Tulley): Kyle Broussard, et al. v. **Go-Devil Manufacturing of Louisiana, Inc.**; patent infringement case involving outboard propulsion units for shallow watercraft. Prepared expert reports on non-infringement and validity. Deposed 3/25/2010. Testified at Markman Hrg., Testified at Bench Trial on Validity of two patents 01/2014; both patents found invalid.
62. Connolly, Bove, Lodge, Hutz (Frank DiGiovanni, Curt Lambert) **Parker Hannifan** v. Baldwin ; patent infringement case involving vehicle fuel and oil filters; case settled 09/2010.
63. Taylor, Porter, Brooks, & Phillips (Jeanne Davis, Frederick Tulley): Huntwise, Inc. v. **Higdon Motion Decoy Systems, Inc.**; Patent infringement case involving an animated waterfowl decoy . Prepared an affidavit on non-infringement and validity in response to a motion for preliminary injunction. Case settled 2011.
64. Patton, Boggs, LLP (Scott Chambers, John McKeague): **L3 Services, Inc** v. Jeffrey Szekely et al.; patent infringement case involving binary ionization sterilization technology; prepared declarations and rebuttles concerning infringement and claim construction, case settled 2011.
65. Faegre, Benson LLP (T. Budd, B. Oberst, A. Johnson) **Donaldson** v Baldwin, patent infringement case involving vehicle engine air filters. Prepared Expert reports on Infringement and Validity; deposed 11/03/2011; Case Settled 01/2012..
66. Andrus, Sceales, Starke, & Sawall (Aaron T. Olejniczak, Daniel Hanrahan); **Mercury Marine** v. Volvo; Inter Partes Reexamination of a patent on propeller shaft arrangements for multiple propellers; prepared two declarations; case pending.
67. Arnold & Knobloch LLP (Gordon Arnold, Jason Saunders, Steven Ross); WesternGeco v. **Fugro-Geoteam Inc**; Patent infringement case involving control of seismic streamers in marine seismic surveying; prepared expert reports on validity and non-infringement; deposed 5/10/2012, jury trial 7/23/2012-8/10/2012; case settled during trial.
68. Fulwider Patton (V. Schooley, Scott Hansen); Whirlpool v. **Swift Green Filters**; patent infringement case involving water filters for refrigerators; prepared two declarations in support of ex-parte reexam of two patents; deposed 5/24/2012; case stayed pending reexam.
69. Christopher Weisberg PA (N. R. Lewis): **Jetlev** v. Flyboard; patent infringement case involving water jet-propelled personal propulsion devices; prepared expert report on infringement; deposed; appeared at Markman hearing; case settled Feb. 2013.

70. Fish & Richardson (J.Pond, C. Marchese) ; **ScentAir** v. Prolitec; Interpartes patent review case involving a system and method of treating the atmosphere within an enclosed space with a liquid scent; prepared declarations supporting invalidity of patents, deposed 9/26-27/2013, PETAB ruled that two patents in case were invalid 2014.
71. Fulwider Patton (V. Schooley, Scott Hansen); Wilden Pump v. **JDA Global**. Trade dress case involving double-diaphragm air accuated pumps. Case settled 5/2013.
72. Andrus IP Law (A. Olejniczak, C. Liro); A. C. Dispensing v. **Prince Castle LLC**. Interpartes Reexamination involving food liquid dispensing systems; prepared declaration; case Pending.
73. Miles & Stockbridge P. C. (O. Gabor, M. Messina); **Honeywell International** v. Nest Labs; Interpartes Reexam on home thermostat technology; Prepared two declarations. Case Pending.
74. Morgan, Lewis, & Bockius LLP (J. White, D. Morris; Scott Sherwin, Julie Goldemberg): Cobalt Boats v. **Sea Ray Boats & Brunswick Corp**; Patent infringement case involving a retractable step for use with a boat; prepared expert reports on infringement and invalidity; deposed 5/17/17; trial 6/8/17-6/19/17.
75. Andrus, Sceales, Starke, & Sawall LLP (A. Olejniczak, C. Liro): Cobalt Boats v. **Sea Ray Boats & Brunswick Corp.**; Interpartes Reexam before USPTO on a patent involving a retractable step for use with a boat; prepared a declaration; USPTO decision instituting IPR; deposed 1/7/2016; PETAB ruled Independent claim invalid, dependent claims held valid.
76. Porzio, Bromberg, & Newman P. C.(S. Chambers, J. McKeague, R. Oparil); Fontem Ventures v. **Vapor Corp.**; Patent infringement case on electronic cigarettes; prepared expert report, deposed 7/24/2015; case pending.
77. Morgan, Lewis, & Bockius LLP (J. White, D.G. Jei): O2Cool v **One World Tech**; Patent infringement case involving portable spray misting devices for personal cooling; prepared declaration on claim construction; deposed 2/3/2016.
78. Brackett & Ellis, P. C. (Joseph Cleveland): Zup, LLC v. **Nash Mfg.**; Patent Infringement Case involving water recreational boards such as wake boards, surf boards, kick boards and the like; prepared declaration in support of motion for summary judgement in favor of Nash. Court Granted MSJ and dismissed the case with prejudice on 1/13/2017.
79. Perkins Coie (Michael Oblon, David Baltazar); Ametek Instruments vs. **Fluke Instruments.**: IPR of U. S. Patent 8,342,742 which involves a temperature calibration system comprising a heat pipe or thermosiphon, a cooling unit, and a temperature calibration unit. Prepared two declarations. Deposed 4/3/2017 & 8/3/2017. IPR Instituted. Case pending final PETAB decision.
80. Finnegan, Henderson LLP (Joshua Goldberg, Chris Isaacs), Lisk vs **GITS (Caterpillar)**. Patent infringement case involving proportional control valve assembly for a vehicle exhaust gas recirculation system. Prepared declaration, case settled.
81. Blank, Rome LLP (Ken Bressler, Russell Wong, Domingo Llagostera): Olaf Soot Design v. **Daktronics**. Patent case involving a winch system for raising and lowering theater scenery. Prepared declaration on noninfringement, deposed 8/8/2017, testified at trial 12/10/18-12/17/18.

82. Fish & Richardson (Craig Deutch, Stuart Nelson) Wagner vs **Graco**; Post-grant review (PGR) of patent involving a spray tip used to define a spray pattern that is more uniform and requires reduced pressure for paint spraying applications. prepared declaration 7/2/2018.

83. Kirland & Ellis (Adam Kaufman, Kyle Kantarek): Arrows Up vs **Sandbox**; patent infringement case involving bulk shipping containers adopted for use with a broad range of granular materials such as proppants for Fracking, pulverised coal, seed, etc. Prepared declaration on invalidity 6/20/2019; deposed 9/27/2019.

84. Webb Law Firm (Barry Coyne): **Halosil** vs Eco-Evolutions; Patent inventorship case involving a patent for disinfection systems with foggers to deliver disinfectant throughout any complex space. Prepared expert report 11/1/2019; deposed 12/13/2019, case pending.

85. Miller & Martin PLLC: Smokeware LLC vs. **Premier Specialty Brands LLC**; IPR of U. S. Patent 9,615,693 on an adjustable vented chimney cap system for use on outdoor cooking grills. Prepared declaration on claim construction, case pending.