

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

VALVE CORPORATION
Petitioner,

v.

IMMERSION CORPORATION
Patent Owner.

Case No. IPR2024-00477
U.S. Patent No. 7,336,260

EXHIBIT 2008

**DECLARATION OF ROBERT AKL, D.SC.
IN SUPPORT OF IMMERSION CORPORATION'S
PATENT OWNER RESPONSE**

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I, Dr. Robert Akl, declare as follows:

1. I have been retained by Folio Law Group PLLC, counsel for Patent Owner Immersion Corporation (“Immersion”) to assess the challenged claims of U.S. Patent No. 7,336,260 (“the ’260 Patent”) in connection with this case which is the Petition for *Inter Partes* Review of the ’260 Patent (“the Petition”).

2. I am being compensated for my work on this case at my standard rate of \$995 per hour (plus reimbursement for expenses) in connection with my preparation of this declaration, as well as for each hour spent providing deposition testimony. My fee is not contingent on my performance, the outcome of this case, any issues involved in or related to this case, or on any of my opinions or the technical positions I explain in this report. In addition, I have no financial interest in the outcome of this case or any of the parties involved in this case.

3. I believe I am qualified to serve as a technical expert in this proceeding based on my educational and work experience, including my 30+ years of experience in haptic feedback effects, user interface design, user interaction design, human-computer interaction, software engineering from 1990 through today.

4. This declaration sets forth my opinions, which I formed based on my study of the evidence; my understanding as an expert in the field; and my training, education, research, knowledge, and personal and professional experience. All of my opinions stated in this declaration are based on my own personal knowledge,

expertise, training, education, and professional judgment. In forming my opinions, I have relied on my knowledge and experience in human factors, user interface design, user interaction design, human-computer interaction, and software engineering.

5. If I am called upon to do so, I would be competent to testify to the matters set forth herein. My qualifications to testify about the technical subject matter in this case and the relevant technology are outlined in my curriculum vitae and this section of this declaration. A copy of my current curriculum vitae is provided for this proceeding as Exhibit 2009.

6. This declaration is based on the information currently available to me. If additional information becomes available to me, I reserve the right to continue my analysis, which may include a review of documents and information that may be provided to me, as well as testimony from depositions that have not yet been taken at this time.

I. BACKGROUND AND QUALIFICATIONS

7. I earned two Bachelor of Science degrees in Electrical Engineering and Computer Science *summa cum laude* with a grade point average of 4.0/4.0 and a ranking of first in my undergraduate class from Washington University in St. Louis in 1994. In 1996, I earned my Master of Science degree in Electrical Engineering from Washington University in St. Louis with a grade point average of 4.0/4.0. I

earned my Doctor of Science in Electrical Engineering from Washington University in St. Louis in 2000, again with a grade point average of 4.0/4.0, with my dissertation being on “Cell Design to Maximize Capacity in Cellular Code Division Multiple Access (CDMA) Networks.”

8. While a graduate student, from 1997 through 1999, I worked at MinMax Corporation in St. Louis, where I designed software packages that provided tools to flexibly allocate capacity in a CDMA communications network and maximize the number of subscribers. I also validated the hardware architecture for an Asynchronous Transfer Mode (ATM) switch capable of channel group switching, as well as performed logical and timing simulations, and developed the hardware architecture for the ATM switch. I also worked with Teleware Corporation in Seoul, South Korea, where I designed and developed algorithms that were commercially deployed in a software package suite for analyzing the capacity in a CDMA network implementing the IS-95 standard to maximize the number of subscribers.

9. After obtaining my Doctor of Science degree, I worked as a Senior Systems Engineer at Comspace Corporation from October of 2000 to December of 2001. At Comspace, I designed and developed advanced data coding and modulation methods for improving the reliability and increasing the available data rates for cellular communications. I coded and simulated different encoding

schemes (including Turbo coding, Viterbi decoding, trellis coded modulation, and Reed-Muller codes) and modulation techniques using amplitude and phase characteristics and multi-level star constellations. This work further entailed the optimization of soft decision parameters and interleavers for additive white Gaussian and Rayleigh faded channels. In addition, I also extended the control and trunking of Logic Trunked Radio (LTR) to include one-to-one and one-to-many voice and data messaging.

10. In January of 2002, I joined the faculty of the University of New Orleans in Louisiana as an Assistant Professor in the Department of Electrical Engineering. While in this position, I designed and taught two new courses called “Computer Systems Design I and II.” I also developed a Computer Engineering Curriculum with a strong hardware-design emphasis, formed a wireless research group, and advised graduate and undergraduate students.

11. In September of 2002, I received an appointment as an Assistant Professor in the Department of Computer Science and Engineering at the University of North Texas (UNT), in Denton, Texas. In May of 2008, I earned tenure and was promoted to the rank of Associate Professor. As a faculty member, I have taught courses and directed research in networking and telecommunications, including 2G, 3G, 4G, 5G, CDMA/WCDMA, GPS, GSM, UMTS, LTE, ad-hoc networks, antenna design and beamforming, Bluetooth, call admission control, channel

coding, channel estimation, communication interfaces and standards, compression, computer architecture, MIMO systems, multi-cell network optimization, network security, packet-networks, telephony, VoIP, Wi-Fi (802.11), 802.15.4, Zigbee, wireless communication, and wireless sensors. Between January of 2015 and August of 2022, I was appointed to Associate Chair of Graduate Studies in the Department of Computer Science and Engineering. In May of 2023, I was promoted to the rank of Professor.

12. I am also the director of the Wireless Sensor Lab (“WiSL”) at UNT. I am a member of the Center for Information and Cyber Security (CICS). It is the only program in the U.S. to be federally certified by the National Security Agency as a Center of Academic Excellence in Information Assurance Education and Research *and* Cyber Defense Research. I was also a member of the NSF Net-Centric & Cloud Software & Systems: Industry-University Cooperative Research Center (I/UCRC). Several of my research projects are funded by industry and the National Science Foundation and published in *IEEE* conference proceedings and journals.

13. Between 2011 and 2013, I was director of the Bio-Com Project that was funded by Raytheon. The project evaluated the feasibility study using Surface Electromyography (EMG) and bend resistive sensors, that are attached to each of the five fingers of the hand, for hand gesture recognition. This approach is

sometimes known as a “data glove.” A prototype was developed and demonstrated at Raytheon, to help soldiers in close-combat situations communicate with hand gestures and hand signals that would be recognized and transmitted to other soldiers’ Head Up Display (HUD) without breaking radio silence. This work also resulted in a published paper describing the prototype and analysis “Evaluating the Feasibility of EMG and Bend Sensors for Classifying Hand Gestures” and a masters’ thesis “An Accelerometer-Based Gesture Recognition System For A Tactical Communications Application.”

14. In addition to advising and mentoring students at UNT, I was asked to join the faculty of the University of Arkansas in Little Rock as an Adjunct Assistant Professor from 2004 to 2008 in order to supervise the research of two Ph.D. graduate students who were doing research in wireless communications. At UNT, I have advised and supervised more than 250 undergraduate and graduate students, several of whom received a master’s or doctorate degree under my guidance.

15. Further, between 2005 and 2017, I have received over a million dollars in funding from the State of Texas, Texas Higher Education Coordination Board, the National Science Foundation, and industry to design and conduct robotics, video, and mobile gaming (e.g., Xbox, PC, mobile device) programming summer camps for middle and high school students at UNT. By using video and mobile gaming as the backdrop, participants have learned coding and programming

principles and developed an understanding of the role of physics and mathematics in video game design. I have used competitive gaming projects in programming courses as a way to motivate and retain students in computer science. This work also resulted in two published papers “Motivating and Retaining CS2 Students with a Competitive Game Programming Project” and “Intra-Class Competitive Assignments in CS2: A One-Year Study.”

16. In addition to teaching and studying gaming, I am also an avid fan of video games. I have been playing video games for over 30 years. I have had different generations of consoles, including the PlayStation, the Xbox, and Nintendo. My first portable video game console was by Nintendo. I’ve played video games on PCs and handheld devices, and more recently, on my iPad and cell phone. I enjoy playing video games and it is the reason I sought degrees in computer science and electrical engineering.

17. In addition to my academic work, I have remained active in the communication industry through my consulting work. In 2002, I consulted for Input/Output Inc. and designed and implemented algorithms for optimizing the frequency selection process used by sonar for scanning the bottom of the ocean. In 2004, I worked with Allegiant Integrated Solutions in Ft. Worth, Texas to design and develop an integrated set of tools for fast deployment of wireless networks, using the 802.11 standard. Among other features, these tools optimize the

placement of Access Points and determine their respective channel allocations to minimize interference and maximize capacity. I also assisted the Collin County Sheriff's Office (Texas) in a double homicide investigation, analyzing cellular record data to determine user location.

18. I have authored and co-authored over 100 journal publications, conference proceedings, technical papers, book chapters, and technical presentations in a broad array of communications-related technologies, including networking and wireless communication. I have also developed and taught over 100 courses related to communications and computer systems, including several courses on signals and systems, 4G/LTE and 5G/NR, OFDM, VoIP, Wi-Fi (802.11), 802.15.4, Zigbee, wireless communication, antenna design and beamforming, communications systems, communication interfaces and standards, channel estimation, location management, sensor networks, source coding and compression, network security, computer systems design, game and app design, and computer architecture. These courses have included introductory courses on communication networks and signals and systems, as well as more advanced courses on wireless communications. A complete list of my publications and the courses I have developed and/or taught is also contained in my *curriculum vitae*.

19. My professional affiliations include services in various professional organizations and serving as a reviewer for a number of technical publications,

journals, and conferences. I have also received a number of awards and recognitions, including the IEEE Professionalism Award (2008), UNT College of Engineering Outstanding Teacher Award (2008), and Tech Titan of the Future (2010) among others, which are listed in my *curriculum vitae*.

20. I have also served as an expert in certain legal proceedings. A list of cases in which I have testified at trial, hearing, or by deposition (including those during the past four years) is provided in my curriculum vitae. Over the years, I have been retained by both patent owners and petitioners, as well as plaintiffs and defendants.

II. BASES OF OPINIONS

21. In the course of performing my analysis and forming my opinions, I have reviewed the Petition and its Exhibits 1001–1058 and other documents including, but not limited to, the materials listed below:

- IPR Petition, IPR2024-00477
- Institution Decision, IPR2024-00477
- U.S. Patent No. 7,336,260 (“the ’260 Patent”) (Ex. 1001)
- Prosecution History of the ’260 Patent. (Ex. 1002)
- Declaration of Jean R. Ward (Ex. 1003)
- US Patent App. Pub. 2001/0008849 (“Komata”) (Ex. 1005)
- Japanese Unexamined Pat. App. Pub. 11-212725 (“Tsuji”) (Ex. 1007)

- WO 99/6697 (“Rosenberg”) (Ex. 1008)
- Joint Claim Construction Statement in WDWA (Ex. 2004)
- Declaration of Craig Rosenberg, Ph.D. (EX2002).

I have reviewed and agree with the opinions expressed in the Declaration of Craig Rosenberg, Ph.D., and have incorporated relevant parts of that declaration into my present Declaration. When citing these references, all emphasis is added unless otherwise noted. My opinions are also based upon my education, training, research, knowledge, and personal and professional experience.

III. SUMMARY OF OPINIONS

22. The Petition raises three grounds of invalidity. Ground 1 of the Petition alleges that claims 1-7 are anticipated or rendered obvious by Komata (EX1005). Ground 2 alleges that claims 1-7 are anticipated or rendered obvious by Tsuji (EX1007). Ground 3 alleges that claims 1-7 are anticipated or rendered obvious by Rosenberg (EX1008).

23. Based on my analysis of the Petition and the exhibits cited in the Petition, it is my opinion that none of Grounds 1 to 3 render claims 1-7 of the '260 Patent anticipated or obvious.

IV. APPLICABLE LEGAL STANDARDS

A. Ordinary Skill in the Art

24. My opinions in this declaration are based on the understandings of a person of ordinary skill in the art—sometimes referred to as an “ordinary artisan” or by the acronyms “POSA” or “POSITA” (person of ordinary skill in the art)—as of the time of the invention, which I understand to be the earliest priority date (July 31, 2002) of the ’260 Patent. I understand that the person of ordinary skill in the art is a hypothetical person who is presumed to have known the art relevant to the challenged claims of the ’260 Patent at the time of the invention.

25. I understand that, in assessing the level of skill of a person of ordinary skill in the art, one should consider the type of problems encountered in the art, the prior solutions to those problems found in the prior art references, the rapidity with which innovations are made, the sophistication of the technology, the level of education of active workers in the field, and my own experience working with those of skill in the art at the time of the invention. I have considered these factors in reaching my opinion as to the hypothetical POSA that I set forth below.

26. I understand that the Petitioner has proposed that the level of skill in the art at the time of the ’260 Patent is as follows:

POSAs would have a bachelor’s degree in electrical engineering, computer science, or a related field, plus at least two years of industry or graduate level experience with software

engineering, haptics programming, and/or human-computer interaction, including experience with user-interfaces and applications involving touchscreens, touchpads, and related technologies.

Pet. at 7 (citing EX1003, ¶¶ 38-44).

27. In my opinion, the definition of a POSA should be defined as:

A person of ordinary skill in the art would have possessed a bachelor's degree in electrical engineering or computer science (or an equivalent degree), and two years of practical or industry experience in the field of human-computer interaction, including implementation of computer-based systems and software for providing haptic feedback effects to a user. A person could also have qualified as an ordinarily skilled artisan with more formal education and less practical or industry experience, or vice versa.

28. Consistent with either definition, I was at the time of the invention, and currently am, a POSA through my education, research experience and work experience. As of the date of the invention, I was familiar with the types of problems encountered in systems that use haptic feedback and the rapidity at which innovations are made.

B. Claim Construction

29. I understand that Petitioner believes none of the claim terms in the challenged claims require express construction at this time. Pet. at 6.

30. I understand that, for the purposes of this Patent Owner's Response, Patent Owner proposes the following claim term constructions:

Claim Term	Patent Owner's Proposed Construction
"[1a] detect a first pressure on a first input device; [1b] provide a first tactile sensation to the first input device, the first tactile sensation based at least in part on the first pressure; [1c] detect a second pressure on the first input device, the second pressure greater than the first pressure; and [1d] provide a second tactile sensation to the first input device, the second tactile sensation based at least in part on the second pressure; [1e] detect a third pressure on the first input device, the third pressure greater than the second pressure; and [1f] provide a third tactile sensation to the first input device." (Claim 1)	Steps [1a]-[1f] occur in the order recited in claim 1.
"tactile sensation" (Claims 1-7)	"vibrotactile sensation"

1. Order of Claim Limitations

31. A POSA would understand that the computer-readable medium having instructions that cause steps to be performed in claim 1 requires that the steps of detecting a first pressure, providing a corresponding first tactile sensation, detecting a second pressure, providing a corresponding second tactile sensation, detecting a third pressure, and providing a corresponding third tactile sensation are performed in the order that the claim is written in. As I explain further below, the plain language of the claim itself including the recitation of logical relationships between each pressure level in the claim (*e.g.*, second pressure greater than the first or third pressure greater than the second) describes a specific, progressive relationship in pressure intensity among the specific detected pressures.

32. Moreover, a POSA reading the claim and the specification would understand that it would not make any sense to provide a first tactile sensation (which is based at least in part on the first pressure) prior to detecting the first pressure. Likewise, it would not make sense to detect a second pressure (which must be greater than the first pressure) prior to detecting the first pressure. Also, it would make no sense to detect a third pressure (which is greater than the second pressure) prior to detecting the second pressure or detecting the first pressure. In my opinion, the claim language itself is instructive. The logical relationships between the first, second, and third pressures (where the second pressure is greater than the first

pressure or the third pressure is greater than the second pressure) are clearly recited to require that the steps be performed in the logical order that they are written in.

33. Based on my review of the specification of the '260 Patent, I believe that the '260 Patent specification also suggests that the steps to be performed by the processor as per instructions in the computer-readable medium in Claim 1 must be performed in the order written. For example, the embodiments described in Figures 4 and 5 show that these steps should be performed in a specific order that is integral to the problems that the '260 Patent aimed to solve in the prior art.

34. According to the '260 Patent, a user may not have been able to consistently or reliably sense the degree of pressure he was applying to a touchscreen input device in the prior art. EX1001 at 1:60-2:12. This was particularly problematic with multi-function touchscreen buttons where a user could activate multiple different input functions or alphanumeric characters by applying different pressure levels to a single button. In this use case, the problem was in the user's inability to consistently or reliably sense how much pressure he is increasing when pressing on touchscreen buttons. This problem was also due to the fact that visual or audio feedback may not be practical in certain environments, such as while driving, to notify to the user which function or character was activated by the user's press. *Id.*

35. For example, as shown in Figure 5 of the '260 Patent below, a user could apply different pressure levels to softkey button 36i to activate different input characters, such as W, X, Y, or Z. In this embodiment, the input character depends on the specific pressure level applied, which the user must cycle through in increasing order to arrive at the desired letter. Thus, it was difficult in prior art systems for a user to both apply and sense the amount of varying pressure he was applying in order to activate different letter inputs using only a single softkey button. *Id.*

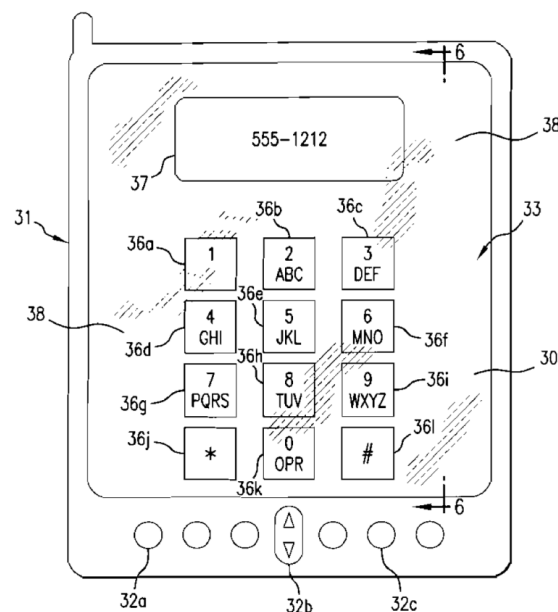


FIG. 5

36. I understand that the '260 Patent solved this problem by detecting different pressure levels as the user cycles the softkey through successive positions (W to X to Y to Z). As shown in Figure 4 below, when a user applies a first level of

pressure to move a softkey from a first position (for example, a rest position) to a second position, a corresponding first tactile sensation is provided so the user can rely on the tactile feedback. *Id.* at 12:33-55. Then, when the user continues to increase the applied pressure to move the softkey to a third position, a corresponding second tactile sensation is provided to the user. *Id.* at 12:45-50. As the user continues to progressively increase the applied pressure in successive order as Claim 1 recites, the user can further move the softkey to a fourth position, which results in a corresponding third tactile sensation to be provided to the user. *Id.* at 12:33-55.

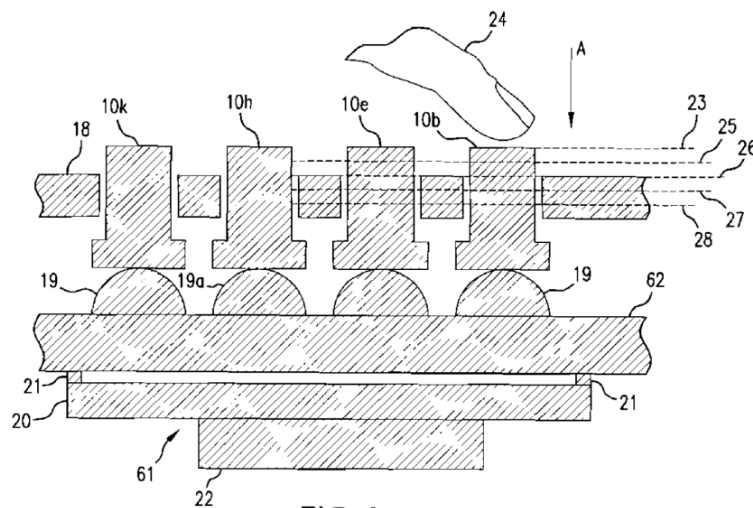


FIG. 4

37. As the '260 Patent explains that when the user presses the button with increasing pressure, the keys pass sequentially through a second position 25, third

position 26, fourth position 27, and fifth position 28, which naturally requires detecting each of those pressure level in that sequence:

As illustrated, the keys 10 are initially in a rest position 23. A biasing member arrangement (not shown) as is available and understood in the art is used to hold the keys in the rest position 23. An object 24, for example the user's finger or a stylus, is used to select one or more of the keys 10 by applying pressure in the direction of arrow A. This pressure causes the selected key to progress through a plurality of positions. As illustrated, after leaving the rest position 23, the keys pass sequentially through a second position 25, a third position, 26, a fourth position 27, and a fifth position, 28 as greater and greater pressure is applied to the button 10.

Id. at 8:62-9:5; see also *id.* at 6:11-25 (sequential detection of progressively increasing pressure applied to the button 10i). Therefore, a POSA would understand that in the claimed computer-readable medium having instructions that cause a processor to perform the recited steps, such steps of detecting progressively increasing pressure levels and providing corresponding tactile sensations must be performed in the order the claim is written.

38. I understand that, in the Institution Decision for this IPR, the Board cited an embodiment disclosed in the '260 Patent at 14:43-15:15 and FIG. 9 as showing that the pressures are not required to be detected in their written order.

However, that embodiment is not described as having any particular relationship between the pressures. Specifically, the patent does not describe that embodiment as detecting a first pressure, detecting a second pressure greater than the first pressure, and detecting a third pressure greater than the second pressure. Rather, the pressures associated with that embodiment are merely three pressures that happened to be named pressure 1, pressure 2, and pressure 3, with no specific “greater-than” relationships among the three pressures.

39. The embodiment as described at 14:43-15:15 and FIG. 9 of the '260 Patent describes a truth table where, if the processor detects pressure 1 on input device 5 during a monitoring pass, it outputs Sensation 13; if the processor detects pressure 3 on input device 5 during another monitoring pass, it outputs sensation 15; etc., but pressure 3 is not necessarily greater than pressures 1 or 2. Therefore, a POSA would understand that this specific disclosure does not appear to be an embodiment of claim 1.

40. A POSA would also understand that, while the embodiment disclosed at 14:43-15:15 and FIG. 9 of the '260 Patent refers to monitoring passes, the claims themselves do not recite any form of the word “monitor” or “pass,” and the specification does not describe monitoring passes as inherent or necessary to the claimed invention.

41. In addition, while, with respect to the embodiment described at 14:43-15:15 and FIG. 9 of the '260 Patent, the specification discloses detecting pressure 1 during a monitoring pass and then detecting pressure 3 on a later monitoring pass ('260 Patent at 14:44-46, 58-59) without mentioning pressure 2, a POSA would understand that this disclosures does not mean that pressure 2 would not have been detected or that the embodiment could detect pressure 1 and then detect pressure three without also detecting an intermediate pressure 2.

2. Tactile Sensations

42. According to the '260 Patent, a tactile sensation provides vibrotactile sensations that, for example, can be created and adjusted by varying the frequency, amplitude, and waveform of a vibrational signal that the actuator produces. The '260 Patent states:

The apparatus 1 shown in FIG. 1 also includes a vibrotactile actuator 6 in communication with the input device 2. Preferably, the actuator 6 is configured to output a plurality of distinct tactile feedback sensations to the input device 2. **Suitable tactile sensations include vibrations, for example, jolts and textures, and a plurality of distinct tactile sensations can be created by varying the frequency, amplitude and waveform output by the actuator 6.** The actuator 6 is selected to deliver the desired tactile sensations to the input device 2.

EX1001 at 3:44-52. Thus, the '260 Patent describes an oscillating signal output by the actuator with various characteristics of a vibration rather than a continuous force.

43. The '260 Patent also explains that “the actuator can include a flexure, for example an arrangement of flexible material, couple to the rotating shaft of a DC motor or step motor to transform the rotation of the motor shaft into vibrations or other haptic sensations.” *Id.* at 3:56-60; *see also id* at 4:35-38 (“the actuator is an existing eccentric mass motor as is used, for example, as a vibrating ringer in a pager or mobile telephone”), 4:39-42 (“[t]he vibrotactile actuator 6 can also be mounted to a portion of the case or housing of the electronic device in which the apparatus 1 is disposed, communicating the tactile sensations to the entire electronic device”).

44. There are many kinds of possible tactile feedback, such as resistive force feedback, electrotactile feedback, ultrasonic feedback, and thermal feedback, However, except for vague references to prior art in the BACKGROUND section of the '260 Patent, vibrotactile sensations are the only type of tactile sensation that the '260 Patent attributes to the invention. Vibrotactile sensations are also the only type of tactile sensations specifically described as “suitable” by the '260 Patent. A POSA would understand that the '260 Patent lacks written description and enabling disclosure for forms of feedback other than vibrotactile. Accordingly, a POSA

would also understand that the term “tactile sensation” as recited in the challenged claims of the ’260 Patent refers specifically to a “vibroctactile sensation” rather than simple force feedback or other types of tactile sensations.

3. Other Claim Terms

45. I also understand that, except for the terms listed in the table above, Patent Owner submits that all other terms in the challenged claims should be given their plain and ordinary meaning as Patent Owner has submitted in the current parallel litigation in the Western District of Washington (EX2004).

46. Therefore, in my analysis of the challenged claims throughout this Declaration, I apply the constructions set forth in the table above. For all other claim terms, I apply the plain and ordinary meaning of each claim term as understood by a POSA in the context of the ’260 Patent specification.

47. I understand that in interpreting the claims of the ’260 Patent in this IPR according to their plain and ordinary meaning, one must take into consideration the so-called “intrinsic evidence” of the patent consisting of (1) the claim language; (2) the specification; and (3) the prosecution history.

48. I understand that claim terms may be explicitly defined in the patent specification or they may be implicitly defined through consistent usage in the specification. I also understand that the scope of claim terms may be limited by

statements in the specification or prosecution history where the applicant unambiguously disavows or disclaims subject matter.

C. Anticipation

49. Counsel has informed me, and I understand, that a showing of anticipation involves a comparison of the construed claims to the alleged prior art and, to anticipate a patent claim, a single prior art reference must disclose each element of the claimed invention, either expressly or inherently. The prior art reference must also have disclosed each element prior to disclosure of the claimed invention.

50. Further, a party claiming inherency must prove that the alleged inherent element or feature necessarily is present by clear and convincing evidence. The fact that the feature is likely to have existed is not sufficient. It must be shown that the feature was necessarily present in the reference to show inherency.

D. Obviousness

51. Counsel has informed me, and I understand, that an issued patent claim is invalid as obvious if it can be shown that the differences between the patented subject matter and the prior art are such that the subject matter as a whole would have been obvious, at the time the invention was made, to a person having ordinary skill in the art. Relevant considerations include the level of ordinary skill in the art; the scope and content of the prior art; differences between the prior art and the

claims at issue; and the objective indicia, or secondary considerations, of nonobviousness.

52. In this regard, I am informed and I understand that the secondary considerations of nonobviousness could include factors such as commercial success, long felt but unresolved needs, the failure of others, skepticism by experts, praise by others, award and accolades, and copying.

53. Counsel has informed me, and I understand, that in order to evaluate the obviousness of any claim of the '260 Patent over a given prior art combination, I should analyze whether the prior art references, included collectively in the combination, disclose each and every element of the allegedly invalid claim as those references are read by the person of ordinary skill in the art at the time of the invention.

54. Counsel has informed me, and I understand, that even where all of the claim limitations are expressly disclosed in the prior art references, there must be some showing that a person of ordinary skill in the art would have been motivated to combine such prior art references, and explanation of how the combination would be achieved, and that there would have been a reasonable expectation of successfully achieving the claimed invention from such combination.

55. Counsel has informed me, and I understand, that absent some additional reasoning, mere routine optimization for a person of ordinary skill in the art to arrive

at the claimed invention through the combination of prior art references is insufficient to support a conclusion of obviousness.

56. Counsel has informed me, and I understand, that to rely on a reference it must be analogous prior art. Counsel has informed me and I understand that a reference is considered analogous prior art: (1) if the reference is from the same field of endeavor as the claimed subject matter, or (2) if the reference “is reasonably pertinent to the particular problem with which the inventor is involved,” even though the reference is not within the field of the inventor’s endeavor.

57. Counsel has informed me, and I understand, in considering the obviousness of a claimed invention, one should not view the invention and the prior art with the benefit of hindsight. In an obviousness analysis, one must be aware of the distortion caused by hindsight bias and must be cautious of arguments reliant upon ex post reasoning. Counsel has instructed me, and I understand that when considering obviousness, I should not consider what is known today or what was learned from the invention of the ’260 Patent itself. Instead, obviousness is assessed by the person of ordinary skill in the art at the time the invention of the ’260 Patent was made, but without the knowledge of the invention.

58. In this regard, I am informed and I understand that the ’260 Patent may not be used as a guide or roadmap to select, understand, and combine or modify the prior art, because such an approach would improperly apply hindsight bias to the

obviousness analysis. Also, at a minimum, this approach discounts the value of combining various existing features or principles in the prior art in an inventive way so as to achieve a novel result.

59. Counsel has informed me, and I understand, that obviousness cannot be predicated on what was unknown at the time of the invention, even if the inherency of a certain feature is later established. Counsel has also informed me, and I understand, that unknown or undisclosed properties of the prior art (such as features in the prior art that the obviousness combination or rationale to combine might rely on, but are not disclosed or taught by the reference) may not be relied upon to provide the rationale for modifying or combining the prior art to reach the claimed subject matter.

60. Counsel has informed me, and I understand, that a reference may be said to teach away when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the applicant of the '260 Patent.

V. OVERVIEW OF THE '260 PATENT

61. The '260 Patent is entitled “Method and Apparatus for Providing Tactile Sensations” and is directed to an invention that provides vibrotactile sensations to electronic user devices, offering a wide range of potential applications

and benefits in enhancing user interaction with electronic devices such as mobile phones and video game devices. EX1001 at 1:1-2:37.

62. The '260 Patent aimed to solve a problem inherent in prior art devices related to the user's inability to rely solely on visual feedback when interacting with electronic devices, such as in situations where users might need to focus their attention elsewhere (*e.g.*, while driving), in distracting environments, or when the device's screen is not visible. EX1001 at 1:60-2:12. Furthermore, the patent aims to overcome the challenge that humans cannot reliably or consistently sense the degree of pressure applied to an input device like a touchpad or touchscreen, nor accurately gauge how this pressure is increasing or decreasing as the user applies varying pressure on the touchscreen. *Id.* This is particularly problematic in systems with multi-function softkeys or buttons, in which a single button can provide multiple input functionality. *Id.* at 1:40-2:12.

63. For example, as described in the patent, softkey 36i shown in Figure 5 below has positions associated with four distinct applied pressures with each progressively increasing pressure associated with a different input letter—such as W, X, Y, or Z. EX1001 at 12:50-55. In this situation, users may struggle to consistently apply the specific pressure level required to perform a desired input function or achieve a particular result.

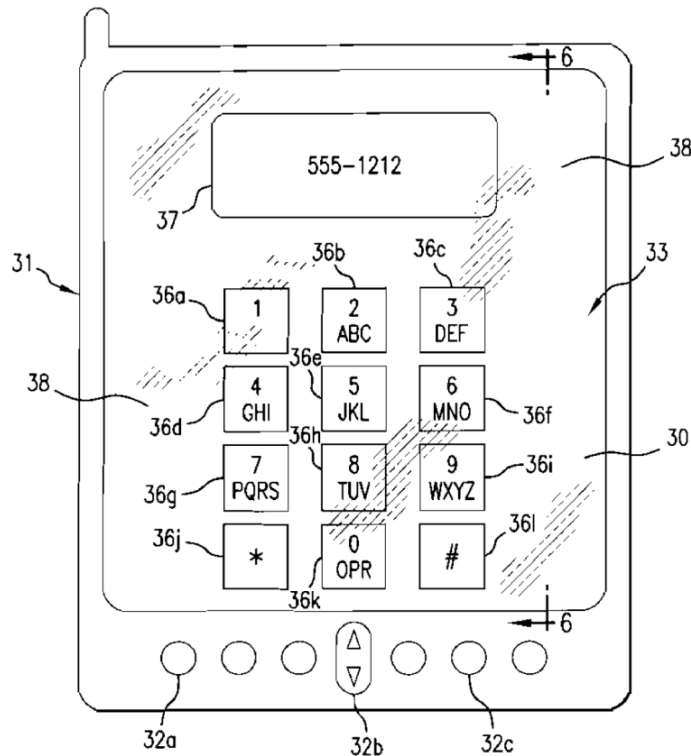


FIG. 5

64. The '260 Patent solved these problems by providing tactile feedback that varies as the user progressively increases pressure exerted on a pressure-sensitive touch device in sequence. For example, providing a tactile sensation as feedback for each letter as the user cycles through W, X, Y, and Z by progressively increasing pressure levels allows the user to distinguish the selected input without visual or audio feedback. *Id.* at 12:56-66. This is also illustrated in Figure 4 of the patent reproduced below, which is a side view of the mobile phone depicted in Figure 3. In Figure 4, increasing pressure levels are applied by a user's finger in the progressive sequence from level 23 through level 28:

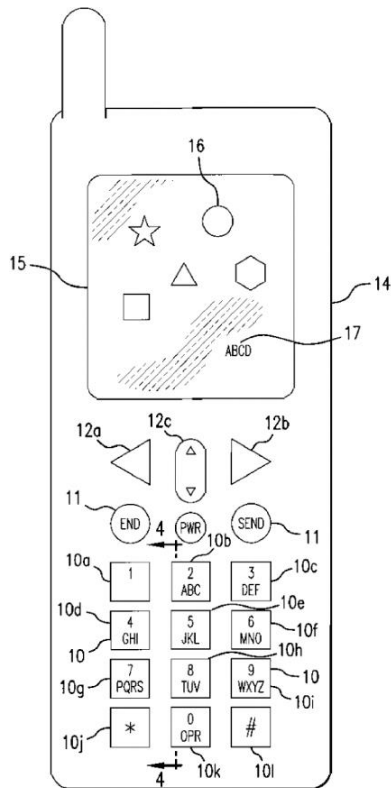


FIG. 3

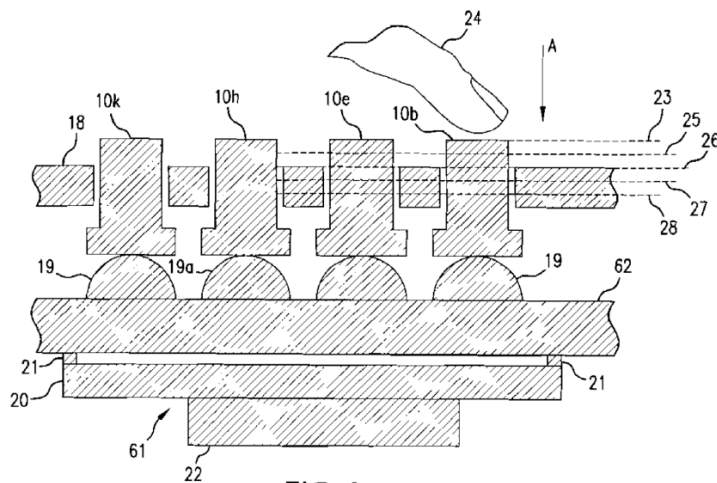


FIG. 4

65. The '260 Patent explains that as a user presses button 10 and applies increasing pressure, the keys pass sequentially through successive positions 25 through 28 where each pressure level is detected in that order:

As illustrated, the keys 10 are initially in a rest position 23. A biasing member arrangement (not shown) as is available and understood in the art is used to hold the keys in the rest position 23. An object 24, for example the user's finger or a stylus, is used to select one or more of the keys 10 by applying pressure in the direction of arrow A. This pressure causes the selected key to progress through a plurality of positions. As illustrated, **after leaving the rest position 23, the keys pass**

sequentially through a second position 25, a third position, 26, a fourth position 27, and a fifth position, 28 as greater and greater pressure is applied to the button 10.

Id. at 8:62-9:5.

66. The '260 Patent further describes how a user can move from a first level 23 to a second level 25 and so on by increasing the pressure applied on the alphanumeric key in successive order.

a key 10i is moveable from a first level (rest) 23 to a second level 25 upon the application of a sufficient amount of pressure to the input device. In the embodiment shown in FIG. 3, the amount of pressure necessary to move the key 10i from rest 23 to the second position 25 is about equal to the amount of pressure that user's finger would exert upon contact with the key without actually selecting the key

Id. at 9:11-18. A POSA would understand that in order for a user to activate each input or letter in a multi-function or multi-character button, a user would apply pressure in successive order and the input device would detect each pressure level in that order from level 23 through 28.

67. According to the '260 Patent, a distinct tactile sensation is provided to a user whenever one of the positions 25 through 28 are reached and detected. *Id.* at 9:65-10:1. The '260 explains that with each progressively increasing pressure level

that is applied to the button and detected in the order applied, the system transmits a corresponding control signal for each detected pressure level:

When the button 10i is in its first state, then the button 10i does not transmit an input signal. When pressure is applied to the button 10i by the user that exceeds the first magnitude, the button 10i transmits a first signal to the controller 9. When greater pressure is applied to the button 10i that exceeds the second magnitude of pressure, the button 10i transmits a second signal to the controller. When still greater pressure is applied to the button 10i that exceeds a third magnitude of pressure, the button 10i transmits a third signal to the controller. When even greater pressure is applied to the button 10i that exceeds the fourth magnitude of pressure, the button transmits a fourth signal to the controller.

Id. at 6:11-25, 5:48-6:9.

68. Independent Claim 1 and dependent Claim 2 reflects this ordered sequence of detecting progressively increasing pressure levels applied by the user and providing tactile sensations in that order for each distinct pressure level detected. Claim 1 covers the application and detection of pressure levels one to three, and Claim 2 covers the fourth or next pressure level in sequence that is greater than the first three.

VI. EXEMPLARY CLAIM OF THE '260 PATENT

69. Independent claim 1 is recited below:

- 1[pre].** A computer-readable medium having instructions, the instructions including instructions that cause a processor to:
- [1a]** detect a first pressure on a first input device;
 - [1b]** provide a first tactile sensation to the first input device, the first tactile sensation based at least in part on the first pressure;
 - [1c]** detect a second pressure on the first input device, the second pressure greater than the first pressure; and
 - [1d]** provide a second tactile sensation to the first input device, the second tactile sensation based at least in part on the second pressure;
 - [1e]** detect a third pressure on the first input device, the third pressure greater than the second pressure; and
 - [1f]** provide a third tactile sensation to the first input device.

VII. KOMATA DOES NOT DISCLOSE CLAIM 1 OF THE '260 PATENT

A. The Komata Reference (EX1005)

70. U.S. Patent Application Publication No. 2001/000849 to Komata (“Komata” or “EX1005”) is entitled “Computer with Pressure-Sensitive Means, Method of Computer Having a Pressure-Sensitive Means and Vibration Means, Method of Using the Same, and Recording Medium for the Method.”

71. Komata is directed to a method and computer system for providing vibrations of a video game controller. EX1005 at Abstract. As illustrated in Figure 1, Komata’s system includes an Entertainment System 500 connected to controller 200. Controller 200 is shown in Figure 6 below.

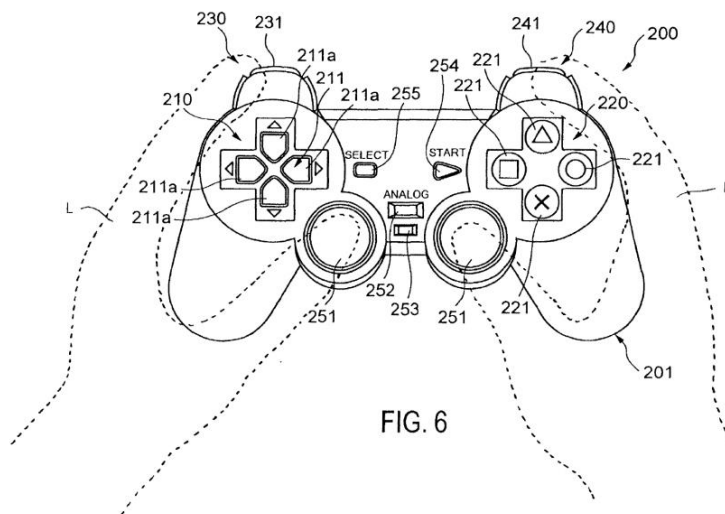
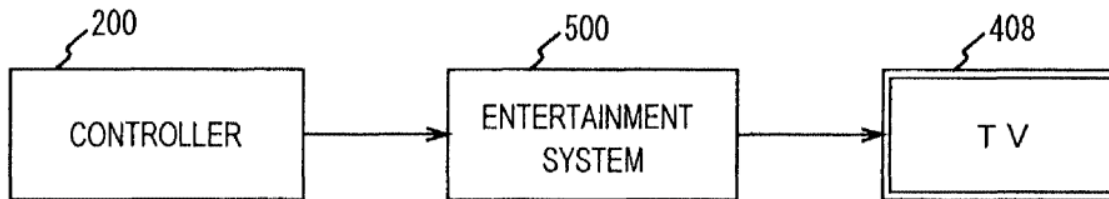


FIG. 6

72. Two video game controllers are included in Komata's system to allow two players to play a game against one another. Each controller has a pressure-sensitive unit and a vibration unit connected to the video game system. The system 500 reads pressure-sense values from a switch in one controller and provides a drive signal for driving the motor in the other controller. EX1005 at ¶¶ 7, 32.

73. Komata describes a "a head-to-head" game between two players using the controllers which are connected to the entertainment system 500 (Fig. 1). *Id.* at ¶ 34. When a first player pushes a pressure sensitive switch on her controller to generate a vibration in a second player's controller, the second player can react and

push a pressure-sensitive switch on his controller. EX1005 at ¶¶ 34-35. For example, Komata states:

Based on the output value from the pressure-sensitive unit of one of the controllers, vibration is caused in the vibration unit of the other controller, and based on the output value from the pressure-sensitive unit of the other controller, vibration is caused in the vibration unit of the first one of the controllers.

Id. at Abstract. The reacting player can score points based on the speed of the response time—a faster response time can earn more points. EX1005 at ¶35, 48.

74. Komata provides a table shown in Figure 2 below. The table maps the pressure-sense value detected in a controller to the corresponding drive signal. EX1005 at ¶ 36.

PRESSURE-SENSE VALUE	DRIVE SIGNAL
0	0
1	P 1
⋮	⋮
2 5 5	P 2 5 5

75. When first player presses a button on her controller, the system 500 receives a pressure-sense value and provides a drive-signal according to the mapping table in Figure 2. The drive signal is sent to the second player's controller which causes it to vibrate. EX1005 at ¶¶ 34-36. A POSA would understand that Komata and its mapping table above do not disclose detecting the pressure-sense values and providing corresponding drive-signals in any specific order.

B. Komata Does Not Disclose Detecting Progressively Increasing Pressure Levels in the Order That Each Distinct Pressure is Applied as Recited in Claim 1 of the '260 Patent

76. I have reviewed the Petition and Declaration of Petitioner's expert Mr. Jean Ward (EX1003) regarding how Petitioner alleges that Komata discloses the claimed steps of detecting a first, second, and third pressure. My understanding is that Petitioner and Mr. Ward argue that Komata discloses detecting various pressures because the pressure-sensitive device outputs digital values in the range of 0-255, where each digital value corresponds to a distinct pushing pressure applied to the button. Pet. at 20 (citing EX1003 at ¶¶ 145-147). As I explain in detail below, Komata's mere disclosure of 256 digital values, each representing a different pressure level that can be detected, does not show that Komata teaches detecting a first pressure level, a second pressure level greater than the first, and a third pressure level greater than the second, in that progressively increasing order, as required by Claim 1 of the '260 Patent.

77. In my opinion, and as explained above in Section IV.B, a POSA reading the plain language and grammar of Claim 1 in light of the specification would understand that the steps of this claim should be performed in the order recited. The first step of Claim 1 detects **a first pressure**. The second step provides a first tactile sensation based at least in part on the first pressure detected. Then, the third step detects a **second pressure that is greater than first pressure**. The fourth step provides a second tactile sensation based at least in part on the second pressure detected. The fifth step detects a **third pressure that is greater than the second pressure**. And the sixth step provides a third tactile sensation.

78. Petitioner contends that Komata discloses the sensing of pressure when the button on the video game controller is pressed. Pet. at 19-20. I understand that Petitioner and its expert simply rely on the fact that Komata discloses 256 digital values that each signify a distinct “Pressure-Sense Value” as shown in the truth table in Figure 2. Pet. at 20 (citing EX1005 at ¶ [0032], FIG. 2).

PRESSURE-SENSE VALUE	DRIVE SIGNAL
0	0
1	P 1
⋮	⋮
2 5 5	P 2 5 5

79. Based on Komata’s explanation of the table above, the Petition argues that Komata discloses detecting a first pressure and then detecting the next successive levels of increasing pressure applied. Petitioner argues “[u]sing that same process [as for detecting Pressure-Sense Value 1], the CPU can also detect digital Pressure-Sense Value 10,” for example, when the user has pushed the button in a manner that would generate “Pressure-Sense Value 10.” Pet. at 24-25. Likewise, Petitioner’s expert opines that a CPU can detect Pressure-Sense Value 1 and then when a user has pushed button 221 with even greater pressure, the CPU can for example detect Pressure-Sense Value 10. EX1003 at ¶¶ 165-166.

80. In my opinion, Komata does not disclose detecting progressively increasing pressure levels that were applied to the game controller button in the successive order recited in Claim 1 of the ’260 Patent. Instead, Komata only discloses the truth table of Figure 2, which lists Pressure-Sense values that can be

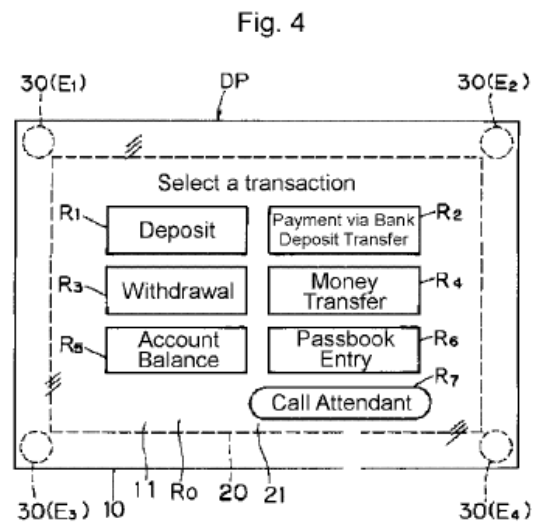
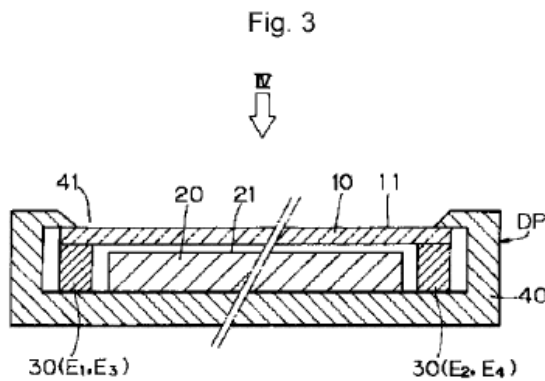
detected in the range of 0 to 255. But Komata does not disclose applying pressure levels in any progressively increasing sequence, nor does it disclose detecting pressure levels in the sequence they were applied, as claimed, to provide corresponding tactile sensations. In my opinion, a POSA would understand that the table in Figure 2 does not teach the ordered steps of detecting progressively increasing pressure levels.

81. Thus, in my opinion, Komata does not disclose the ordered steps of detecting a first, second, and third pressure applied in progressively increasing sequence as recited in Claim 1 of the '260 Patent.

VIII. TSUJI DOES NOT DISCLOSE CLAIM 1 OF THE '260 PATENT

A. The Tsuji Reference (EX1007)

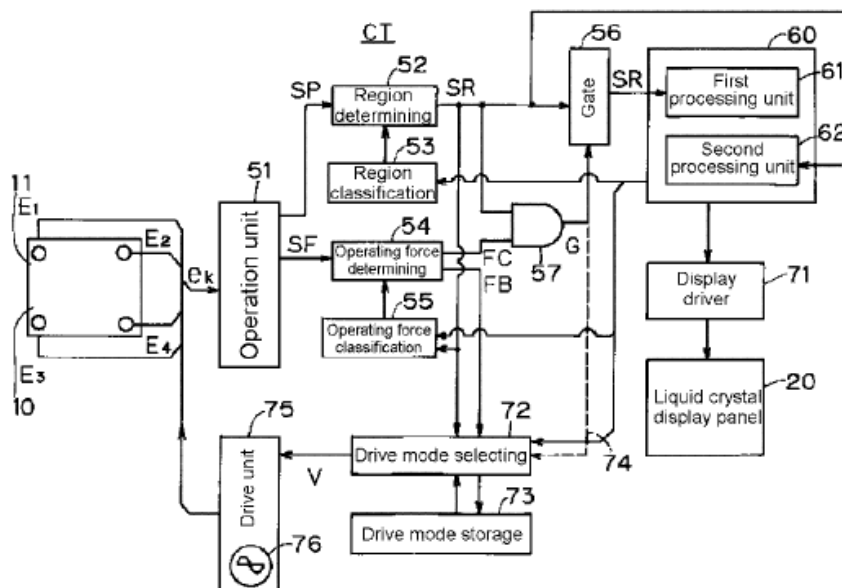
82. Japanese Unexamined Patent Application Publication No. 11-212725 to Tsuji ("Tsuji" or "EX1007") is entitled "Information Display Device and Operation Input Device." Tsuji describes hardware configurations for an information display device with a touch screen, for example, an automatic teller machine (ATM). One configuration is shown in Figure 3, in which a display unit DP includes a transparent operation panel 10 positioned over a liquid crystal display panel 20. EX1007 at ¶¶ [0045]-[0046]. Figure 4 illustrates a menu displayed on the screen, where a user can select Regions R1–R7 to initiate a function such as a Deposit or Withdrawal. *Id.* at ¶ [0047].



83. Tsuji's display unit employs piezoelectric elements E1-E4 to detect which areas on the screen were pressed and the amount of force used to press on the screen. *Id.* at ¶¶ [0046], [0048]. These piezoelectric elements are also used to vibrate the operation panel 10. *Id.*

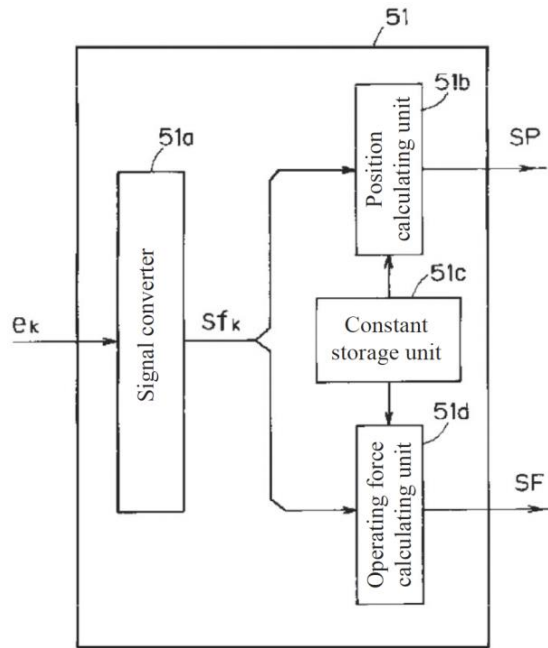
84. Figure 7 shown below illustrates a hardware control circuit CT that is used with the ATM embodiment.

Fig. 7



85. Figure 8 shown below illustrates the internal configuration of the operation unit 51 from Figure 7.

Fig. 8



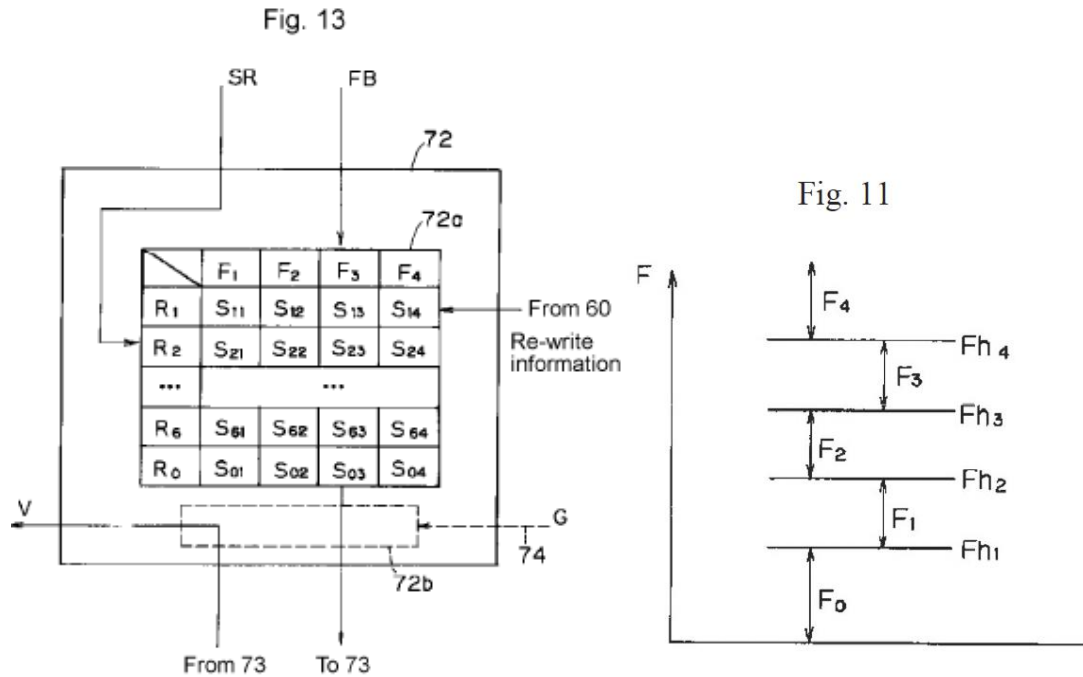
86. Position calculating unit 51b is responsible for determining the operation position and outputs operation position signal SP. This signal is sent to region determining unit 52. *Id.* at ¶¶ [0084], [0087]. Region determining unit 52 determines if a user touched any of the operation regions (R1–R7 or non-operation region R0) and then outputs region determining signal SR, which indicates the region that the user pressed. *Id.* at ¶¶ [0088]–[0091].

87. The operating force calculating unit 51d is responsible for calculating the force applied to the operating surface and outputs an operating force signal SF. EX1007 at ¶¶ [0085]–[0086]. Operating force signal SF is sent to an operating force determining unit 54. *Id.* at ¶ [0092]. The operating force determining unit 54 in

Figure 7 determines whether the force falls within one of the thresholds F1, F2, F3, or F4, and outputs two signals: an operation enabling signal FC and a force determining signal FB. *Id.* at ¶¶ [0095]-[0102]; *see also id* at Fig. 11.

88. If a user touches the operating surface with a pressure below Fh1, the operating enabling signal FC is at a non-active level. If FC is at a non-active level, no vibration is provided. *Id.* at ¶¶ [0104]-[0105]. Tsuji discloses activating a selection only when both the region determining signal SR indicates that the touch is within a valid region (for example R2) and the region is pressed with a predetermined threshold force.

89. The region determination signal SR and force determining signal FB are input into a drive mode selection unit 72 as shown in Fig. 13 below. The drive mode selection unit 72 selects a single drive mode (for example, S12) based on the signals SR and FB, and will cause a single touch button operating surface to vibrate. *Id.* at ¶ [0108].



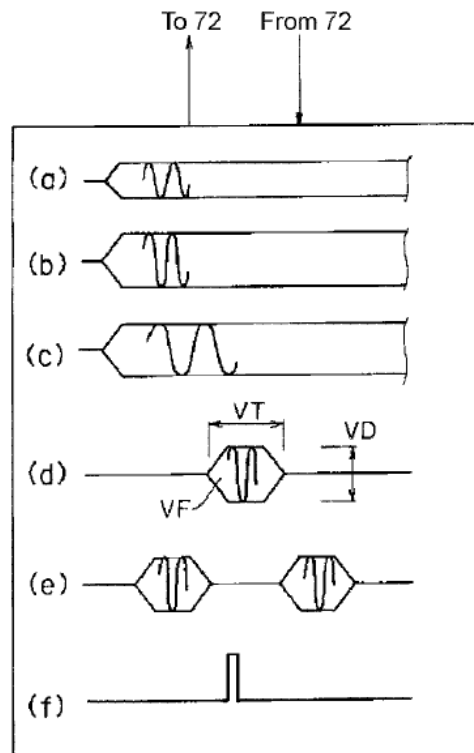
90. As shown above in Figure 11, force classifications F1 through F4 correspond to certain levels of applied force that are in between force threshold levels Fh1 to Fh4. For example, in the truth table of Figure 13 shown above, if a force level of F3 is applied to region R2, then code for single drive mode S23 will be selected to provide a certain vibration mode. If a greater force level F4 is applied to region R2, then code S24 will be selected to drive a stronger vibration mode than S23. *Id.* at ¶ [0111].

91. A POSA would understand that Tsuji does not disclose applying and detecting force levels F1 through F3 in progressive order. Tsuji only discloses a truth table that provides a certain vibration based on the region or button that was pressed and the pressure level of the press. If a user applies a certain force level to

a certain region, then a certain vibration mode is selected, and if a user applies another force to the region (or another region), then a different vibration mode is selected. *Id.*

92. Tsuji also discloses different drive modes (as shown below in Fig. 14) which are stored in the drive mode storage unit. *Id.* at ¶¶ [0110]-[0111]. Figures 14(a)–(b) are continuous drive modes having small and large amplitudes, respectively. Figure 14(c) is a continuous drive mode having a different frequency from drives modes 14(a) and 14(b). If the vibration selected is one of modes 14(a)–14(c), the vibration continues until the operation is larger than the minimum threshold F1. When a user applies less pressure to the display touch surface or lifts his finger off of the surface, the vibration will cease. *Id.* at ¶ [0126]. Figures 14(d)–(e) show drive modes where the single or double vibration is instead provided to the user. Figure 14(f) shows a drive mode that provides a oneshot pulse. *Id.* at ¶ [0110].

Fig. 14



93. Tsuji also describes another embodiment, which is a game device 200, shown in Figures 17-19. *Id.*, ¶¶ [0145]-[0152]. In this embodiment, operating regions R1–R4 on the display panel are visible through the operating surface 11 in FIG. 17. *Id.*, ¶ [0146]. Tsuji explains that when a user presses one of the operating regions R1–R4 with a pressure greater than a predetermined threshold, the operating surface will vibrate. *Id.* Tsuji does not disclose detecting multiple levels of pressure in the operating regions R1–R4 in Figures 17-18.

B. Tsuji Does Not Disclose Detecting Progressively Increasing Pressure Levels in the Order That Each Distinct Pressure is Applied as Recited in Claim 1 of the '260 Patent

94. I have reviewed the Petition and Declaration of Petitioner's expert Mr. Jean Ward (EX1003) regarding how Petitioner alleges that Tsuji discloses the claimed steps of detecting a first, second, and third pressure. My understanding is that Petitioner and Mr. Ward argue that Tsuji discloses detecting various pressures because it discloses different force classifications such as F0 to F4 that can be applied to different regions R1 to R7 on the ATM touch screen and detected accordingly using piezoelectric elements E1 to E4 which converts mechanical pressure into voltage. Pet. at 42-43 (citing EX1003 at ¶¶ 247-250).

95. As I explain in detail below, Tsuji's mere disclosure of different force classifications that can be applied by the user and detected accordingly on a touch screen region, does not show that Tsuji teaches detecting a first pressure level, a second pressure level greater than the first, and a third pressure level greater than the second, in that progressively increasing order, as required by Claim 1 of the '260 Patent.

96. As I explained in detail above in Section IV.B, a POSA reading the plain claim language of the claim as well as the corresponding embodiments set forth in the specification would understand that the steps of Claim 1 of the '260 Patent must be performed in the specific order the claim is written. EX1001 at Claim

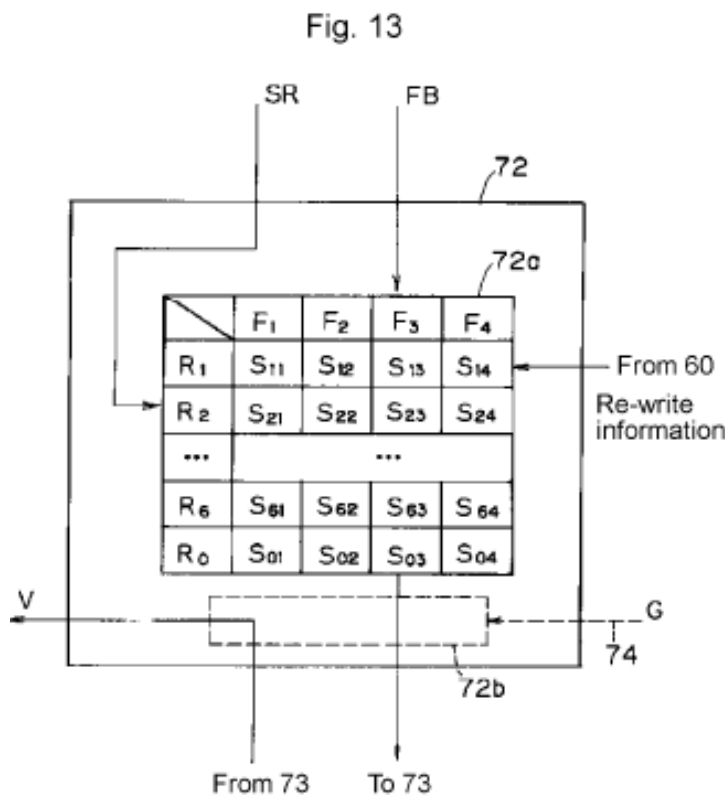
1, 8:62-9:5, 12:33-55, Figs. 4-5. **First**, the claim detects a *first pressure* applied by the user and then provides a corresponding *first tactile sensation*. See EX1001 at Claim [1a]-[1b]. **Second**, the claim detects a *second pressure* that is greater than the first pressure and then provides a corresponding *second tactile sensation*. See EX1001 at Claim [1c]-[1d]. **Third**, the claim detects a *third pressure* that is greater than the second pressure and then provides a *third tactile sensation*. See EX1001 at Claim [1e]-[1f].

97. I understand that Petitioner and its expert argues that Tsuji detects a pressure level when a user presses on the operating regions displayed on for example, an ATM touch screen. Pet. at 42-43 (citing EX1003 at ¶¶ 244-250). The Petition states that “voltages from piezoelectric elements E1-E4 within device 100 are used to detect pressure that is applied to the display, *e.g.*, when a finger presses an operating region.” *Id* (citing EX1007 at ¶¶ [0018], [0051], [0081]-[0085]). For example, a user can press on a certain region of the ATM screen with a certain pressure that results in detection of a force that is within the F1 classification. Pet. at 43.

98. I understand the Petition argues that simply because Tsuji shows five force classifications F0 to F4 which can be detected depending on the pressure level applied by a user when pressing on a region of the ATM touch screen, Tsuji

discloses detecting the next successive levels of increasing pressure levels applied to the region. Pet. at 46.

99. In Tsuji’s truth table shown below, for example, a certain feedback signal, S62, is output if a certain level of force, F2, is applied and detected on a certain region, R6. *Id.* Accordingly, Petitioner and its expert assume that if a greater force F3 is applied and detected on the same region R6, a feedback signal S63 is output. *Id.*



100. In my opinion, Tsuji does not disclose applying three progressively increasing pressure levels to begin with nor does it disclose detecting progressively

increasing pressure levels that are applied to the touch screen in the successive order recited in Claim 1 of the '260 Patent. Tsuji merely discloses the truth table of Figure 13 and the range of various force classifications in Figure 11. All this discloses is that when a certain level of force is applied and detected on a certain operating region of the ATM touchscreen, a certain drive mode signal (such as S62 or S63) is output. In my opinion, Tsuji does not disclose detecting pressure levels in a progressively increasing sequence (as they were applied) and providing corresponding tactile sensations in the order the claim is written.

101. Petitioner also points out a statement in Tsuji that says “a stronger vibration is to be applied as the operating force F gets larger.” Pet. at 46 (citing EX1007 at ¶ [0111], EX1003 at ¶ 260). In my opinion, this statement is merely explaining how the logic of the truth table works. The table shows that for a higher force classification, a stronger drive signal is generated. For example, if a force level $F1$ is detected on operating region $R2$, then drive signal $S21$ is output to create a certain vibration, and if a greater force level $F3$ is detected on the same region $R2$, then a drive signal $S22$ is output to create a stronger vibration. But this does not disclose detecting successive pressure levels that were distinctly applied in progressive sequence and providing corresponding tactile sensations in the order the claim was written.

102. Thus, in my opinion, Tsuji does not disclose the ordered steps of detecting a first, second, and third pressure applied in progressively increasing sequence as recited in Claim 1 of the '260 Patent.

IX. ROSENBERG DOES NOT DISCLOSE CLAIM 1 OF THE '260 PATENT

A. The Rosenberg Reference (EX1008)

103. International Patent Application No. WO 99/66997 to Rosenberg (“Rosenberg” or “EX1008”) is entitled “Low Cost Force Feedback Devices.” The Rosenberg reference is directed to a low-cost force feedback interface device that enhances user interactions in environments such as video games or virtual reality environments that have a computer display. EX1008 at Abstract. The force feedback device, such as a mouse, is manipulatable by the user and is equipped with a movement detection sensor or a sensor to detect button presses on the device. *Id.* The device is also equipped with an actuator to generate force feedback in a vertical direction perpendicular to the plane of the device’s lateral movement. *Id.* Figure 1 below shows the force feedback interface device and how it interacts with the user.

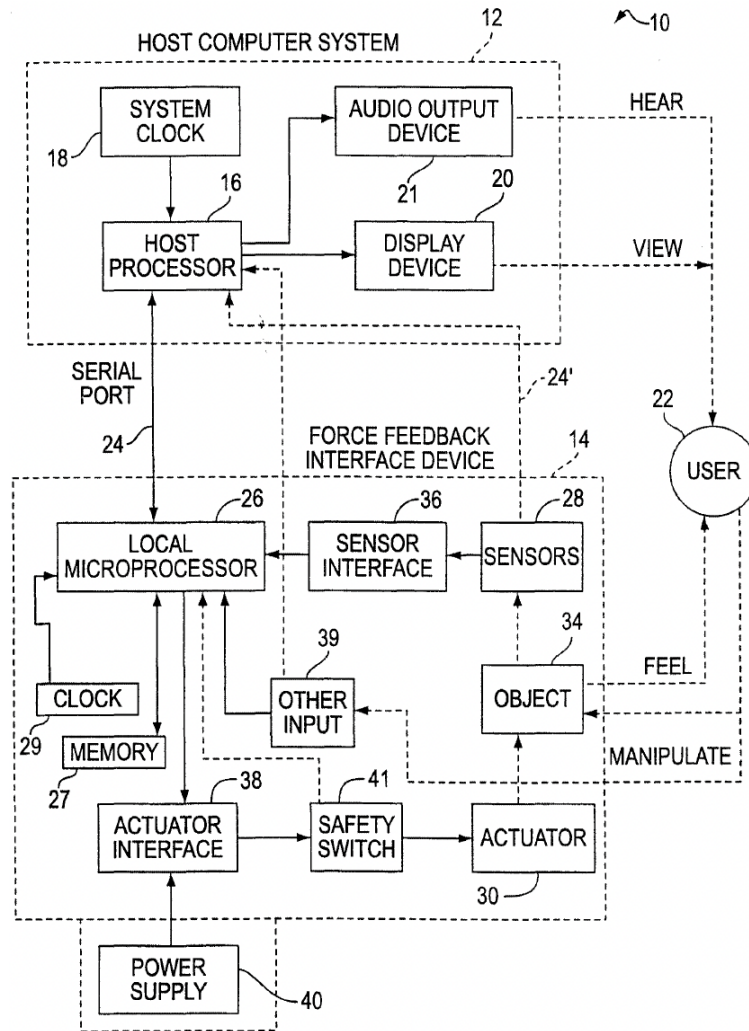


FIG. 1

104. Rosenberg discloses two embodiments. In one embodiment, the force feedback interface device is a computer mouse movable in a planar workspace. EX1008 at 23:15-24:3. The mouse is equipped with a sensor to detect button presses and to detect the position of the button in its vertical range of motion as it is pressed. *Id.* at 23:15-24:3, 25:33-26:4, 28:20-25. The sensor can also be a force-sensing switch to detect the amount of force applied when pressing the button in order to

determine the position of the button within its vertical range of motion. *Id.* at 28:20-25. A force feedback output is provided to the user based on the determined position of the button. *Id.* at 25:33-26:4. As Rosenberg's specification explains, this embodiment functions like an ordinary computer mouse:

Buttons 316a and/or 316 b are selected by the user as a "command gesture" when the user wishes to input a command signal to the host computer 314. The user pushes the button 316a down (in the degree of freedom of the button approximately along axis z) toward the actuator 318 to provide a command to the computer.

Rosenberg at 25:23-26.

105. The computer mouse of this embodiment is a conventional computer mouse from the time of the invention, which, based on the filing date and priority dates of the application that issued as the '260 Patent, would be approximately 1998-1999. Accordingly, a POSA would understand that the mouse shown has buttons 316a and 316b which operate over a short range of travel in a single degree of freedom to input a single command signal (*i.e.*, a mouse click) when pressed. A POSA would further understand that in the conventional mouse described in this embodiment of Rosenberg, pressing the mouse button results in only one click that registers and one corresponding feedback sensation associated with that click because that is how conventional computer mice work, both at the time of the invention and even today. Moreover, the short range of a mouse button is too narrow for a user to conveniently, efficiently, and reliably register multiple-stage clicks,

each with an associated tactile sensation. Rather, Rosenberg explains that, as with a conventional computer mouse, the switch determines “a simple on or off state of the button.” Rosenberg at 25:32.

106. I understand that Petitioner argues that:

by using a “continuous-range sensor,” like a force-sensing switch (Ward, ¶327), “**each position** of the button can be sensed as a different analog value and used as an analog value or a digital value in processing the button position. This allows **the host computer 314 (or local microprocessor)** to determine the position of the button and to control a force output based on that position.” 25:33-26:4.

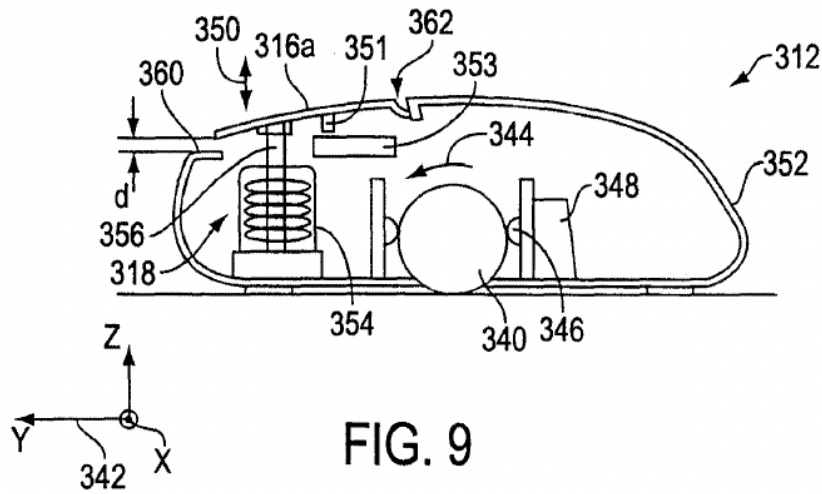
Pet. at 61. However, a POSA would understand that the quoted language of Rosenberg does not mean that the mouse provides different tactile sensations at different button positions. Rather it is meant to convey that a force output is provided at the ON position. Even for this purported “continuous-range sensor,” Rosenberg does not disclose multiple-stage clicks. Rosenberg at 25:33-26:4. The “continuous-range” of Rosenberg’s button is meant to provide flexibility on where to define the threshold line for the ON or OFF state. For example, it allows a POSA to determine where the mouse click happens and dead zones before or after the click happens. However, Rosenberg does not disclose multiple pressures, with one greater than another, or different tactile sensations provided for each pressure, including with respect to the “continuous-range.” In the context of a mouse button, a POSA would

understand that there is simply no room or need for multiple stages of pressures and associated effects, such as tactile sensations.

107. I understand that Petitioner points to claims 35 and 36 of Rosenberg as disclosing detecting a range of at least three positions of the button and that output force is dependent, at least in part of the position of the button. However, all that claims 35 and 36 describe is a button with, *e.g.*, a rest position, a stop position, and a predetermined threshold position at which the mouse outputs a force. *See, e.g.*, Rosenberg at 26:14-36 (discussing rest positions and stop positions). Thus, the mouse click is either on or off with only one ON position that registers a single click with a single corresponding feedback. Notably, they are separate claims that do not depend on each other, and Rosenberg provides no indication that they describe the same embodiment or that they can be combined. Both claims ultimately depend on claim 30, which states that when the “button is pressed by said user to a predetermined position, a command signal is sent to said host computer.” Rosenberg at 38:5-6. A POSA would understand that this indicates that there is a single predetermined position that registers a click to send a single command signal, consistent with Rosenberg’s previously described mouse button embodiment that registers an on or off state as mouse buttons typically do. Accordingly, claims 35 and 36 of Rosenberg, alone or in combination, do not disclose three pressures, each

greater than the last, and corresponding tactile sensations provided upon detecting each pressure

108. Figure 9 below shows actuator 318 that provides a spring force which is the force feedback output. *Id.* at 30:29-34. According to Rosenberg, the magnitude of this force feedback is dependent on the distance of the button from the origin of the spring as shown in Figure 9. *Id.* As illustrated in Figure 9, the feedback mechanism of the button is simply like a traditional loaded spring where the further a user pushes down on the spring, the greater the resistance. *Id.* In my opinion, this does not disclose detection of discrete pressures and providing discrete tactile sensations corresponding to each detected pressure. As I further detail the '260 Patent's description of tactile sensations below in ¶ 113, in my opinion, a POSA would understand that this type of blunt or resistive force provided by Rosenberg's spring-like mouse button is not a "tactile sensation" as claimed in the '260 Patent.



109. In the second embodiment, the mouse provides sensations that enhance user interaction with graphical objects making the experience more compelling and intuitive. *Id.* at 29:14-21. Figure 12 below shows display screen 326 of host computer 314, which displays a graphical user interface (GUI) to be used with the mouse device. *Id.* In Figure 12, the mouse controls cursor 446 to select and manipulate the graphical objects displayed on the screen. *Id.* The position of the cursor corresponds to a position of the mouse as it is manipulated on its planar workspace such as a mousepad. *Id.*

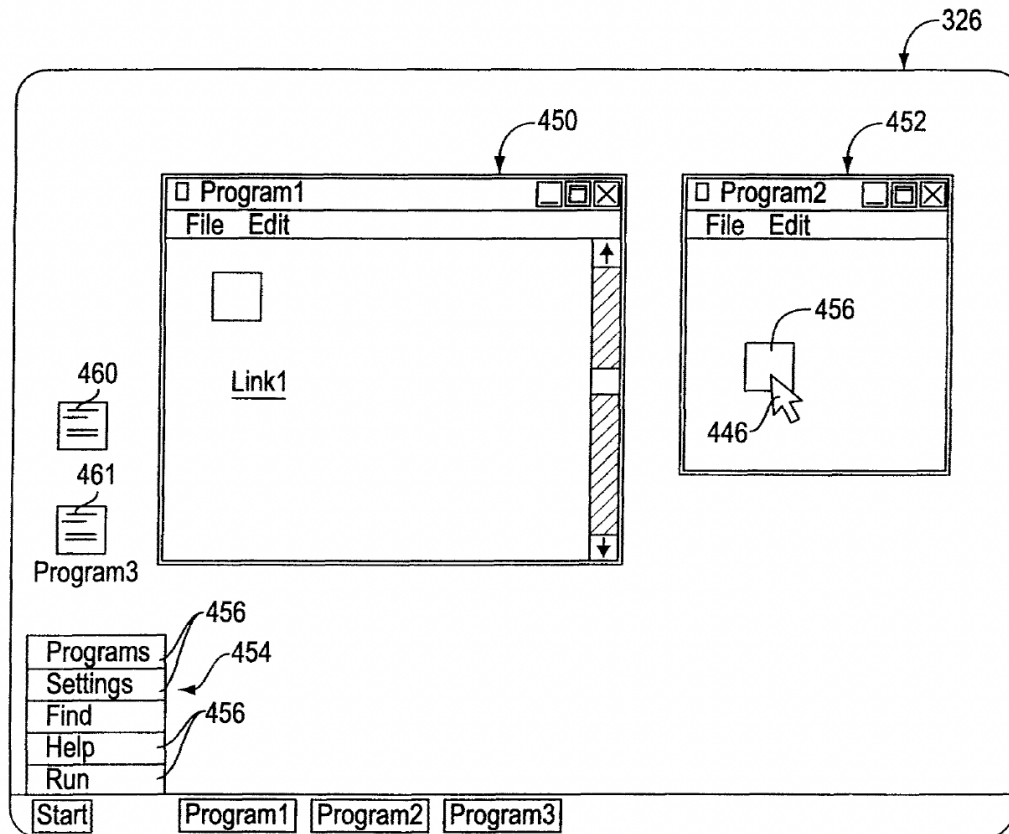


FIG. 12

110. In this embodiment, the mouse device's actuator 318 provides tactile feedback such as vibration sensations and textured sensations based on the cursor's movements in the displayed graphical environment and the cursor's interactions with the graphical objects. *Id.* at 29:20-30:6. When the sensed position of the mouse (*i.e.*, the cursor on the screen) moves over a designated texture area or a location of a bump in a graphical object, sensations described as texture bumps are output by the actuator. *Id.* Thus, in this embodiment, tactile sensations are provided based on

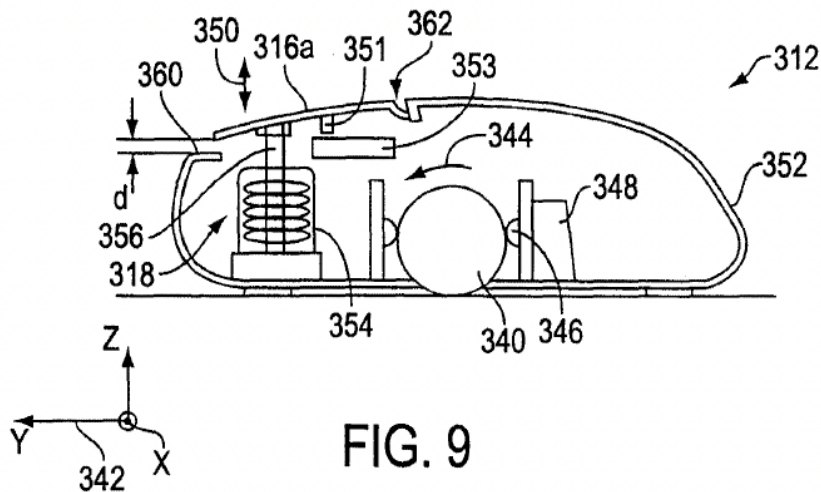
the location of the mouse in its planar workspace, and not based on any pressure applied to the mouse button.

B. Rosenberg Does Not Disclose Providing Tactile Sensations Based at Least in Part on the Pressure Level Detected as Required by the '260 Patent

111. I have reviewed the Petition and Declaration of Petitioner's expert Mr. Jean Ward (EX1003) regarding this claim limitation for providing tactile sensations based at least in part on the detected pressure level. My understanding is that Petitioner and Mr. Ward argue that the force feedback or spring-like force that Rosenberg's mouse provides (as shown in the embodiment of Figure 9) meets the "tactile sensation" limitation. *See, e.g.*, Pet. at 61-63. As discussed in Section IV.B above, a POSA would understand that the term "tactile sensation" recited in the challenged claims refers to a "vibrotactile sensation" since that is the only type of feedback that the '260 Patent describes as "suitable," and the only type of feedback for which the '260 Patent provides sufficient written description and enabling disclosure. Thus, as I detail further below, this force feedback output in the embodiment of Figure 9 is not a "tactile sensation" as required by the '260 Patent.

112. I understand that Petitioner points to Rosenberg's embodiment for mouse 312 that mimics a spring effect for when a user presses the mouse button. Pet. at 62. Petitioner claims that "Rosenberg teaches a force sensation that mimics a mechanical spring so '[t]he magnitude of this force sensation is dependent on the

distance of the button from the origin of the spring.”” *Id.* at 62. Petitioner further argues that for mouse 312, the magnitude of the force sensation that Rosenberg’s actuator 318 communicates through button 316a will increase as the user pushes harder on the button. *Id.*



113. As I discussed in Section IV.B. above, I do not understand this type of force feedback effect provided by Rosenberg’s mouse 312 to be a tactile sensation as described in the ’260 Patent.

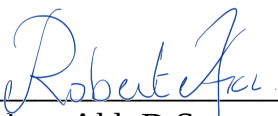
114. Thus, the ’260 Patent’s tactile sensations are produced by vibrational actuators, whereas Rosenberg’s actuator 318 is designed to mimic a spring mechanism and produce a non-vibrational force. In my opinion, Rosenberg’s simulation of a spring effect in a mouse button, which provides a continuous force, is not the same as the vibrational sensations described in the ’260 Patent.

115. I understand that Petitioner’s expert Mr. Ward explains how simulating spring effects was known to POSAs in the context of Hooke’s Law which models a spring as exerting a continuous restoring force proportional to displacement distance. EX1003 at ¶ 330-331 (citing EX1008 at 30:29-30). In my opinion, this explanation still does not support the argument that such a “restoring spring force” meets the tactile sensation limitation. In my opinion, restoring spring forces are not vibrotactile sensations.

116. Therefore, in my opinion, Rosenberg does not disclose tactile sensation based at least in part on the detected pressure level as required by the claims of the ’260 Patent.

I declare under penalty of perjury that the foregoing is true and correct. I acknowledge that willful false statements and the like are punishable by fine and/or imprisonment, that all statements made of my own knowledge are true, and that all statements made on information and belief are believed to be true.

Executed October 15, 2024, in Dallas, Texas.

By: 
Robert Akl, D.Sc.