

United States Patent and Trademark Office
Before the Patent Trial and Appeal Board

Valve Corporation

(Petitioner)

v.

Immersion Corporation

(Patent Owner)

Inter Partes Review

No. IPR2024-00478 | **U.S. Patent No. 9,430,042**

Petitioner's Demonstrative Exhibits

April 30, 2025

Valve Exhibit 1095
Valve v. Immersion
IPR2024-00478

The Challenged Patent: U.S. Patent No. 9,430,042

Petition at 4-7

With many traditionally mechanical functions being replaced by electronics, operation of electronic controls has been made less intuitive to users. For example, without click-stops or “detents,” or otherwise a sense of mechanical resistance, it may be difficult to obtain a similar experience from an electronic substitute for a traditional mechanical control device or even effectively and efficiently operate such a device. A detent, such as a mechanical detent, can refer to the resistance of rotation of a wheel or shaft. A detent can be used to divide a rotation into discrete increments, or may be used to arrest rotation in a direction. For instance, a mechanical detent can be constructed from a notched wheel and a small gravity or spring-actuated lever.

EX1001 at 1:30-43 (cited by Petition at 4)

Embodiments of the present invention provide methods and systems for virtual detents through vibrotactile feedback. In one illustrative embodiment, a rotary knob input device is rotated. A sensor detects the rotation of the rotary knob and sends an input signal to a processor. The input signal comprises information related to the rotation of the rotary knob, such as how far the knob has been turned. The processor determines whether to manipulate an audio system based at least in part on the input signal. The processor further determines whether to generate a signal configured to cause an actuator to vibrate the rotary knob, the vibration based at least in part on the signal.

EX1001 at 2:39-50 (cited by Reply at 7)

The Challenged Patent: U.S. Patent No. 9,430,042

Petition at 4-7

FIG. 9A depicts a programmable virtual detent profile. Virtual detents are shown at A, B, C, D, and E. For example, as a rotary knob is rotated through each point A-E, the rotary knob may be vibrated to generate the feeling of a real detent. The magnitude and width of the vibrotactile feedback applied to the input device at each virtual detent may simulate the magnitude and width of a mechanical detent.

EX1001 at 13:47-53 (cited by Petition at 6)

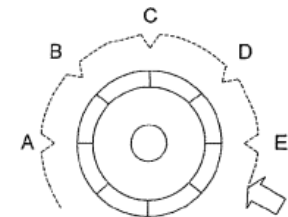
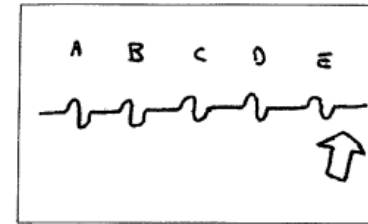


Figure 9A

EX1001 at FIG. 9A (cited by Petition at 6)

waveforms. In one embodiment, the virtual detent may comprise a simulated click generated through a single pulse.

EX1001 at 6:16-17 (cited by Petition at 5)

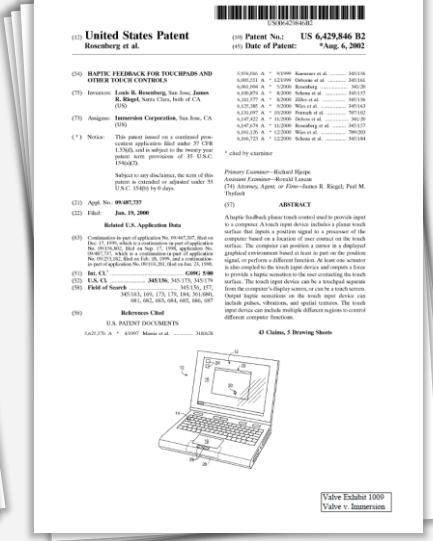
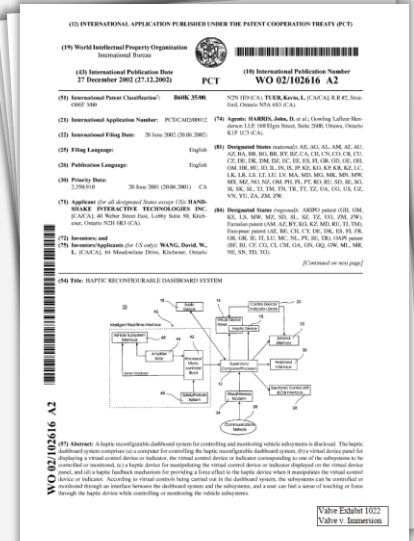
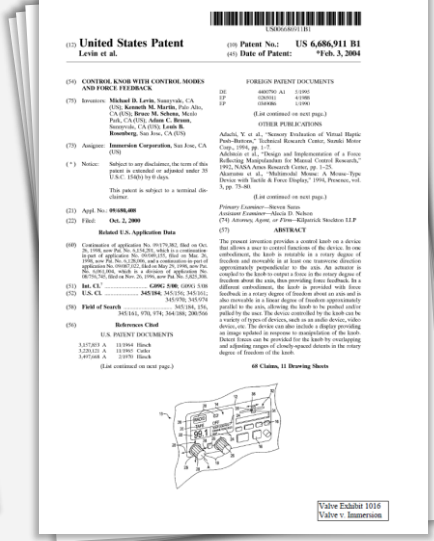
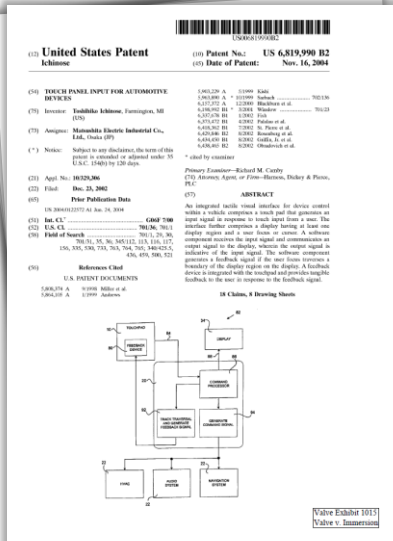
For example, in Desktop Mode on the Steam Deck, using the left track pad acts as a scroll wheel. Testing this functionality confirms the vibrotactile effects for the “Scroll Wheel” Behavior, which is an example of a virtual detent:

Further, pressing the left trackpad while viewing the user interface that results from pressing “Steam” menu button results in haptics similar to the “Directional Pad” behavior. That is, touching the top, bottom, left, and right edges of the right trackpad results in navigation and haptic effects, which is also an example of a virtual detent. Testing this functionality on the Steam Deck confirms these results.

EX1021 at 12-13 (cited by Petition at 15, 54)

1. A method comprising:
receiving an input signal comprising information associated with a manipulation of an input device configured to control a plurality of systems, wherein the input device comprises a touch-pad;
receiving a detent profile associated with one of the systems, the detent profile comprising haptic data associated with a virtual detent; and
generating a vibrotactile signal configured to cause an actuator to produce a vibrotactile effect to the input device, the vibrotactile effect comprising the virtual detent.

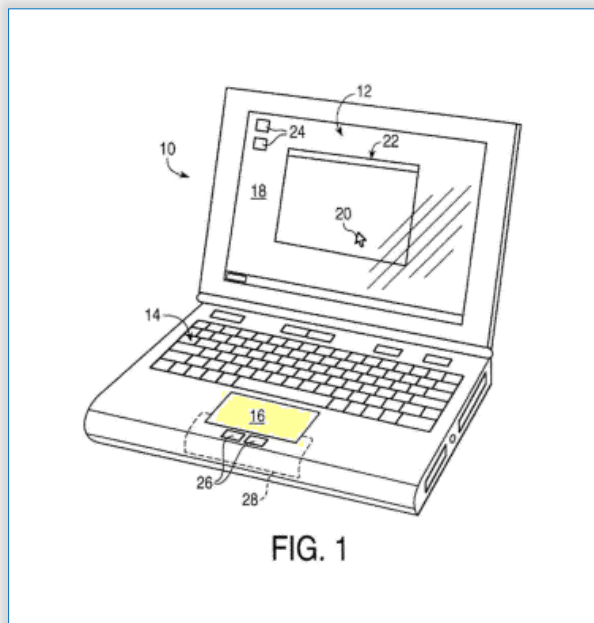
EX1001 at Claim 1 (cited by Petition at 7)



GROUND	CLAIMS	BASIS
1. Ichinose (EX1015) Combined with Levin (EX1016)	1-19	103
2. Wang (EX1022) Combined with Ichinose	1-19	103
3. Rosenberg (EX1009)	1-19	102

Ground 3: Rosenberg's Disclosure

Petition at 49-51



EX1009 at FIG. 1 (cited by Petition at 49)

In other related interactions, when a rate control or scrolling function is performed with the touchpad (through use of the cursor), a vibration can be displayed on the device to indicate that scrolling is in process. When reaching the end of a numerical range that is being adjusted (such as volume), a pulse can be output to indicate that the end of the range has been reached. Pulse sensations can be used to indicate the location of the “ticks” for discrete values or settings in the adjusted range. A pulse can also be output to inform the user when the center of the range is reached. Different strength pulses can also be used, larger strength indicating the more important ticks. In other instances, strength and/or frequency of a vibration can be correlated with the adjustment of a control to indicate current magnitude of the volume or other adjusted value. In other

EX1009 at 12:50-64 (cited by Petition at 50)

Ground 3: The Disputed Issues

Reply at 19-28

GROUND	CLAIMS	BASIS
1. Ichinose Combined with Levin	1-19	103
2. Wang Combined with Ichinose	1-19	103
3. Rosenberg	1-19	102

- Ground 3: Does Rosenberg’s touchpad control a “*plurality of systems*,” and do Rosenberg’s vibrational “pulses” meet the claimed “*virtual detents*.”?

Immersion Misconstrues “Plurality of System,” But Its Construction is Ultimately Irrelevant

Reply at 20-25

Patent Owner Response (at 38)

Accordingly, the term “input device configured to control a plurality of systems” means “input device configured to control a plurality of systems, where each system to be manipulated provides context for virtual detents.”

Patent Owner Response

1. A method comprising:
receiving an input signal comprising information associated with a manipulation of an input device configured to control a plurality of systems, wherein the input device comprises a touch-pad;
receiving a detent profile associated with one of the systems, the detent profile comprising haptic data associated with a virtual detent; and
generating a vibrotactile signal configured to cause an actuator to produce a vibrotactile effect to the input device, the vibrotactile effect comprising the virtual detent.

042 Patent

Immersion Seeks to Limit the Claims Based on Optional Functionality

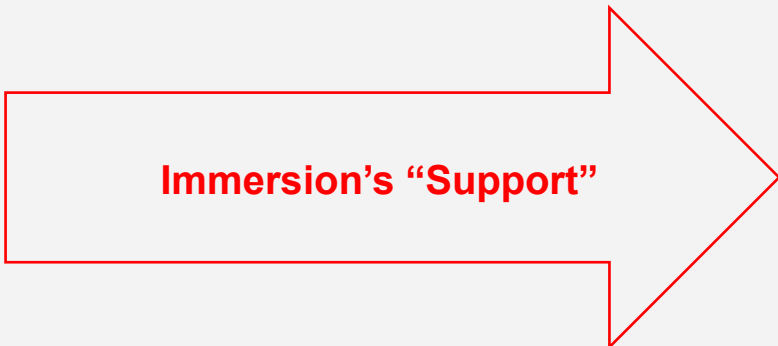
Reply at 21



Immersion's "Support"

The processor **206** can be configured to determine a specific detent signal to generate. The detent signal may be based at least in part on the system which is actively being controlled. For example, if the video system **210a** is being controlled, the processor **206** may generate one type of detent signal, such as a click effect. Alternatively, if the stereo system **210b** is being controlled, the processor **206** may generate a second type of detent signal, such as a hard stop virtual detent.

EX1001, 8:38-46 (cited by POR at 34-35)



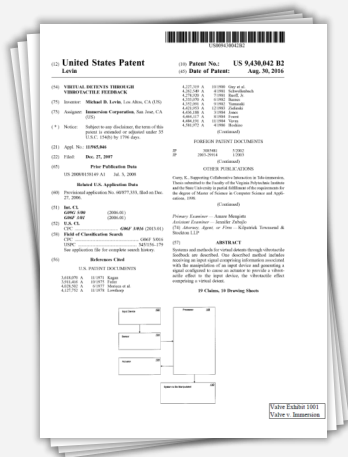
Immersion's "Support"

the manipulation. In one embodiment, the processor **106** may process software code running as an application on the processor and utilize the input signal in the context of the software code to generate signals configured to cause virtual detents.

EX1001, 4:30-34 (cited by POR at 35)

Immersion Misconstrues “Plurality of System”

Reply at 21-22



042 Patent

Once the processor 206 receives an input signal, the processor 206 can determine whether to generate a detent signal and/or a system signal. For example, if the input signal indicates a rotation of a knob in more than 5 degrees of motion, the processor 206 may generate a system signal and a detent signal.

EX1001 at 7:66-8:4 (cited by Reply at 21)

The processor 106 may generate a signal by accessing a detent profile stored in a memory (not shown in FIG. 1). In one embodiment, the processor 106 may access a specific detent profile based at least in part on the input signal. In certain embodiments, the processor 106 may determine which of a plurality of simulated mechanical detents to generate. For example, the processor 106 may analyze the input signal and determine that a hard stop is appropriate. Further, the processor 106 may then access the hard stop virtual detent profile in a memory, and generate a detent signal based on the hard stop virtual detent profile.

EX1001 at 4:50-60 (cited by Reply at 21)

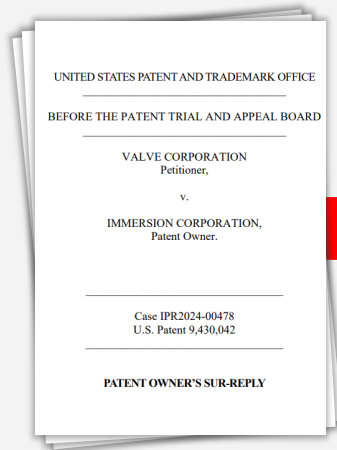


“We normally do not interpret claims in a way that excludes embodiments disclosed in the specification.” *Google LLC v. EcoFactor, Inc.*, 92 F. 4th 1049, 1058 (Fed. Cir. 2024).

Cited by Reply at 22

Immersion Misconstrues “*Plurality of System*”

Reply at 21-22



Sur-Reply (at 7)

original). None of these disclosures say that the detent signals are based on the input signal “alone.” Indeed, all of these disclosures say the opposite by expressly stating “based at least in part” or “comprising.” See MPEP 2111.03; *Mars Inc. v. H.J. Heinz Co.*, 377 F.3d 1369, 1376, 71 USPQ2d 1837, 1843 (Fed. Cir. 2004) (finding that term “comprising” is open-ended). For example:

Sur-Reply

But See Ward Reply

67. The specification thus describes embodiments where the processor generates a detent signal (thus triggering a virtual detent) based at least in part on the input signal, thus encompassing embodiments where the processor generates a detent signal (and virtual detent) based on the input signal alone. Requiring that the system(s) being controlled “provide context for virtual detents,” as Immersion proposes, would read these system-agnostic embodiments out of the claims.

EX1090 (Ward Reply) at ¶ 67 (cited by Reply at 21)



“We normally do not interpret claims in a way that excludes embodiments disclosed in the specification.” *Google LLC v. EcoFactor, Inc.*, 92 F. 4th 1049, 1058 (Fed. Cir. 2024).

Cited by Reply at 22

Reply at 23-25



EX1009 at 6:7-23 (cited by Reply at 23-24)

Reply at 23-25



EX1009 at 3:46-48 (cited by Reply at 24)

EX1009 at 13:6-21 (cited by Reply at 24)

Rosenberg's Touchpad Controls a “*Plurality of System*” Even Under Immersion's Construction

Reply at 23-25



Sur-Reply

Sur-Reply (at 15-16)

disclosure simply states that applications originate force feedback commands. Citing no evidence in support, Valve argues that this disclosure supports its contention that “applications determine what vibrotactile feedback the touchpad outputs, and the feedback is thus application-specific.” But as discussed in Section III.B above,

But See Ward Reply

101. A POSITA would interpret the above disclosure in Rosenberg-I to mean that the application program—*e.g.*, a web browser or videogame—takes coordinate input from Rosenberg-I’s touchpad and then “outputs” a command to the touchpad’s actuator to perform a particular type of force feedback such as a pulse. That is, the application determines which haptic feedback (*e.g.*, “*virtual detents*”) to output and thus the haptic feedback is application-specific or—as Immersion would say—the application being manipulated “provides context for virtual detents.”

Ground 3: The Disputed Issues

Reply at 25-27

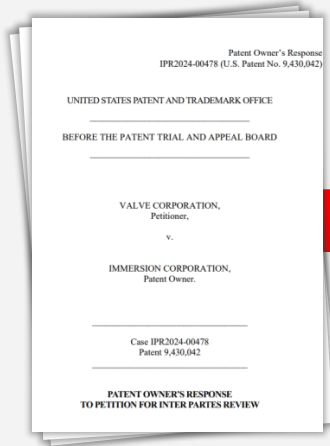
GROUND	CLAIMS	BASIS
1. Ichinose Combined with Levin	1-19	103
2. Wang Combined with Ichinose	1-19	103
3. Rosenberg	1-19	102

- **Ground 3**: Does Rosenberg’s computer control a “*plurality of systems*,” and do Rosenberg’s vibrational “*pulses*” meet the claimed “*virtual detents*.”?

Immersion's “Virtual Detent” Argument

Reply at 25-27

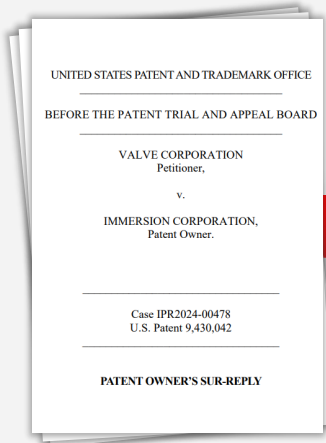
Patent Owner Response (at 59)



Patent Owner Response

Similarly, Petitioner argues that Rosenberg I's “pulses” corresponds to the '042 Patent's “click effect.” Pet., 53. Again, Rosenberg does not teach that such “pulses” simulate mechanical resistance. EX2007, ¶141. A POSA would understand that generic “pulses,” without explanation, does not teach simulating mechanical resistance. *Id.* Accordingly, Rosenberg does not disclose “virtual detent.”

Sur-Reply (at 2)

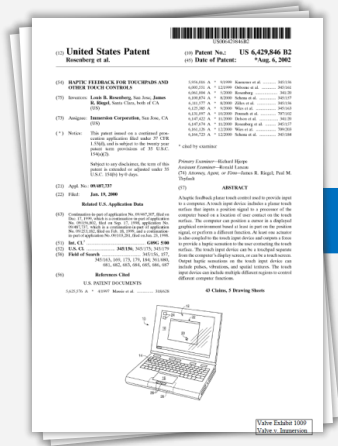


Sur-Reply

Ground 3, Rosenberg-I: Rosenberg-I discloses a laptop touchpad with vibrational effects. That is not enough. The claims separately recite a “virtual detent” and a “vibrotactile effect,” which each need to be given effect. Valve acknowledges the distinction between generic vibrations and the claimed “virtual detents” by proposing that a virtual detent must further simulate a mechanical detent. Yet Valve reads out this distinction by equating generic vibrational effects with virtual detents.

Rosenberg's Pulse is the Same as the Patent's Pulse

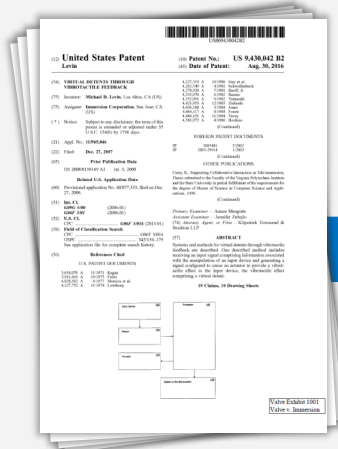
Reply at 25



Rosenberg

the cursor with displayed graphical objects. For example, a jolt or “pulse” sensation can be output, which is a single impulse of force that quickly rises to the desired magnitude and then is turned off or quickly decays back to zero or small magnitude. The touchpad 16 can be jolted in the z-axis to

EX1009 at 11:29-34 (cited by Reply at 25)



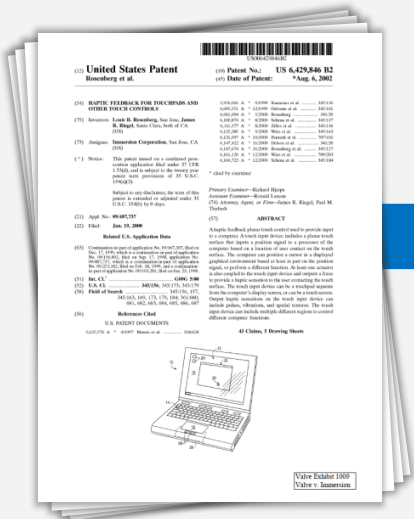
042 Patent

waveforms. In one embodiment, the virtual detent may comprise a simulated click generated through a single pulse.

EX1001 at 6:16-17 (cited by Reply at 25)

Rosenberg's Vibrations Are Not Generic, They Simulate Detents

Reply at 25-26



Rosenberg

A software designer may want to allow a user to be able to select options or a software function by positioning a cursor over an area on the screen using the touchpad, but not require pressing a physical button or tapping the touchpad to actually select the option. Currently, it is problematic to allow such selection because a user has physical confirmation of execution when pressing a physical button. A pulse sent to the touchpad of the present invention can act as that physical confirmation without the user having to press a button or other control for selection. For example, a user can position a cursor over a web page element, and once the cursor is within the desired region for a given period of time, an associated function can be executed. This is indicated to the user through a tactile pulse sent to the pad 16.

EX1009 at 13:41-54 (cited by reply at 26)

at 13:41-54. In other words, Rosenberg-I's pulse simulates the mechanical detent (i.e., resistance) that a user would expect to feel if a mechanical button were being pressed rather than a virtual button being pressed via a touchpad.

EX1090 (Ward Reply) at ¶ 109 (cited by Reply at 26)

Ward Reply Decl.

Rosenberg's Vibrations Are Not Generic, They Simulate Detents

Reply at 25-26

Sur-Reply (at 9)

The passage expressly states that a *pulse* is used when the user does *not* press a button—contradicting Valve's claim that Rosenberg-I teaches mechanical resistance. Further, the passage explains that hovering, unlike physical buttons, completely *lack* detents to simulate. Because there is nothing to simulate, the disclosed pulse—a mere “vibrotactile effect”—serves as confirmation feedback as the cursor hovers over website elements, not a simulated detent. Thus, the disclosure draws a clear distinction between physical button presses (which provide inherent confirmation through mechanical detents) and confirmation pulses that occur in their absence. By attempting to erase this distinction, Valve improperly rewrites the reference.

waveforms. In one embodiment, the virtual detent may comprise a simulated click generated through a single pulse.

EX1001 at 6:16-17 (cited by Reply at 25)

Sur-Reply

042 Patent

Rosenberg's Vibrations Are Not Generic, They Simulate Detents

Reply at 25-26

042 Patent

Rosenberg

In other related interactions, when a rate control or scrolling function is performed with the touchpad (through use of the cursor), a vibration can be displayed on the device to indicate that scrolling is in process. When reaching the end of a numerical range that is being adjusted (such as volume), a pulse can be output to indicate that the end of the range has been reached. Pulse sensations can be used to indicate the location of the “ticks” for discrete values or settings in the adjusted range. A pulse can also be output to inform the user when the center of the range is reached. Different strength pulses can also be used, larger strength indicating the more important ticks. In other instances, strength and/or frequency of a vibration can be correlated with the adjustment of a control to indicate current magnitude of the volume or other adjusted value. In other

EX1009 at 12:50-64 (cited by Petition at 50, 53-54)

FIG. 9A depicts a programmable virtual detent profile. Virtual detents are shown at A, B, C, D, and E. For example, as a rotary knob is rotated through each point A-E, the rotary knob may be vibrated to generate the feeling of a real detent. The magnitude and width of the vibrotactile feedback applied to the input device at each virtual detent may simulate the magnitude and width of a mechanical detent.

FIG. 9B depicts a hard stop virtual detent profile. A hard stop, or barrier virtual detent, may simulate a mechanical hard stop or barrier. For example, a virtual hard stop may indicate that a system can no longer be manipulated. As an illustration, as a user turns a rotary knob, virtual detents may indicate each increasing fan level selected by a user. When the fan level reaches its maximum, the processor 106 may send a detent signal to the actuator 108 comprising a barrier detent instruction.

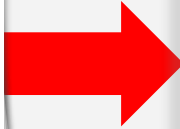
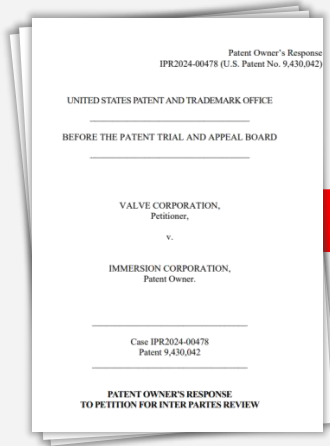
FIG. 9C depicts a hill virtual detent profile. A hill effect may simulate the approach to the end of a menu system, or a maximum or minimum threshold of a system. For example, as the user approaches the last item in a menu, the vibrotactile effect may gradually increase. As another example, when the user is approaching the end of a wrap-around menu structure, the intensity of the vibrotactile feedback may increase until the user reaches the beginning item, which may be accompanied by vibrotactile feedback with lower intensity.

EX1001 at 13:47-14:5 (cited by Petition at 6, 53-54)

Rosenberg's Vibrations Are Not Generic, They Simulate Detents

Reply at 26

Patent Owner Response (at 58)



39. Namely, Rosenberg-I teaches that pulses indicate information such as certain locations within a range or events, but never as a way to simulate mechanical resistance vibrationally. EX1009, 12:53-59 (pulse indicates information); 13:3-5 (pulse indicates occurrence of event), 13:39-40 (pulse indicates occurrence of event).

Patent Owner Response

But See 042 Patent

such a device. A detent, such as a mechanical detent, can refer to the resistance of rotation of a wheel or shaft. A detent can be used to divide a rotation into discrete increments, or may be used to arrest rotation in a direction. For instance, a mechanical detent can be constructed from a notched wheel and a small gravity or spring-actuated lever.

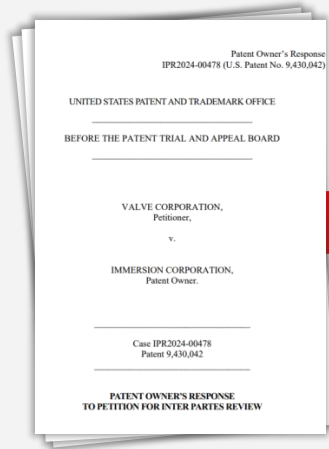
EX1001 at 1:38-41 (cited by Reply at 26)

Rosenberg's Vibrations Are Not Generic, They Simulate Detents

Reply at 26

Sur-Reply (at 10)

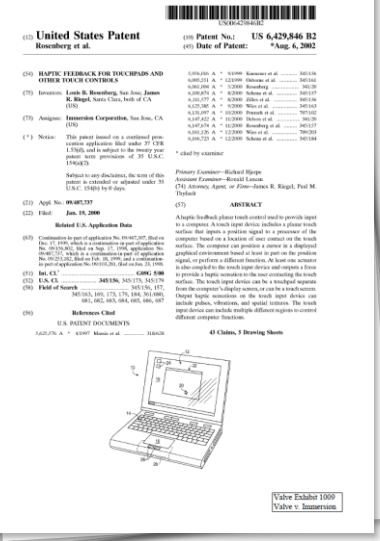
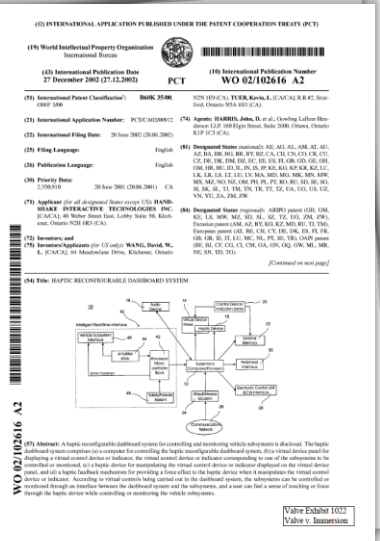
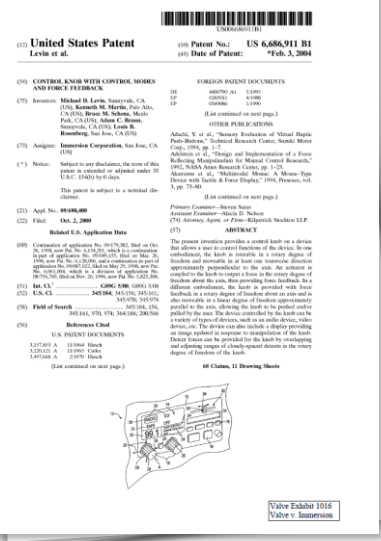
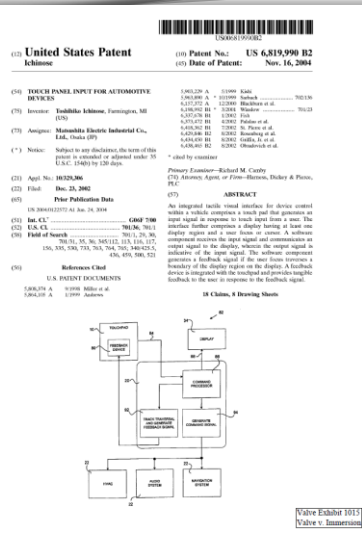
Instead of supporting Valve's argument in any way, the above passage describes scrolling interactions within the context of a touchpad, where pulses *indicate* locations within the scrolling process. Like hovering with a cursor, scrolling "through the use of a cursor," lacks a mechanical detent to simulate, specifically because the disclosed scrolling is a purely virtual control. Valve's attempt to equate



Sur-Reply

But See Ward Decl.

Rosenberg-I's "ticks" correspond with what the '042 Patent calls a "click effect virtual detent." EX1001, 11:55-63; *see also* EX1001, 13:47-53, FIG. 9A. It also aligns with a "virtual detent" that Patent Owner identifies in the related district court litigation. Specifically, in the district court litigation, Patent Owner identifies "Scroll Wheel" behavior as a "virtual detent." EX1021, 8. The "Scroll Wheel" behavior Patent Owner appears to be referring to would be the typical click-click detent sensation that a user experiences as they scroll a mouse's scroll wheel back and forth.



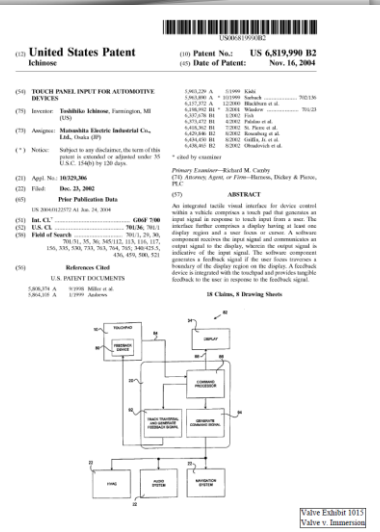
GROUND	CLAIMS	BASIS
1. Ichinose (EX1015) Combined with Levin (EX1016)	1-19	103
2. Wang (EX1022) Combined with Ichinose	1-19	103
3. Rosenberg (EX1009)	1-19	102

Petition at 10-17

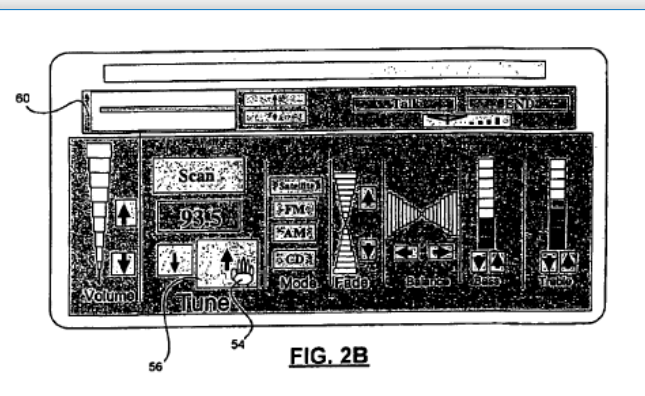


Ground 1: Ichinose's Disclosure

Petition at 10-17



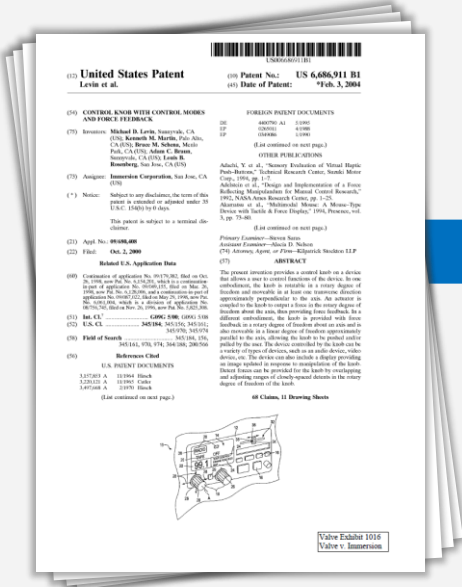
Ichinose



EX1015 at FIG. 2B (cited by Petition at 11)

Referring now to FIGS. 1B and 7, a further embodiment of the present invention incorporates a feedback device 80. When activated, the feedback device 80 actuates, causing the user to experience a tangible vibration through the touchpad 10. The feedback device 80 provides the user with indicia relating to the user's interaction with the touchpad 10 and the display 34. For example, as the user slides a finger across the touchpad 10, the feedback device 80 may actuate at discrete intervals to indicate the position of the cursor 54. In particular, the feedback device 80 may actuate when the cursor 54 is moved to a different area of the display 34. For example, the feedback device 80 actuates when the cursor 54 is moved from the mode function 44 to the tuning function 42, as shown in FIG. 2A. Additionally, the feedback device 80 actuates when the cursor 54 is moved over a control button such as the tuning control button 56, as shown in FIG. 2B. The feedback device 80 may also actuate when the cursor is moved from the primary window 38 to the secondary window 60 or 62.

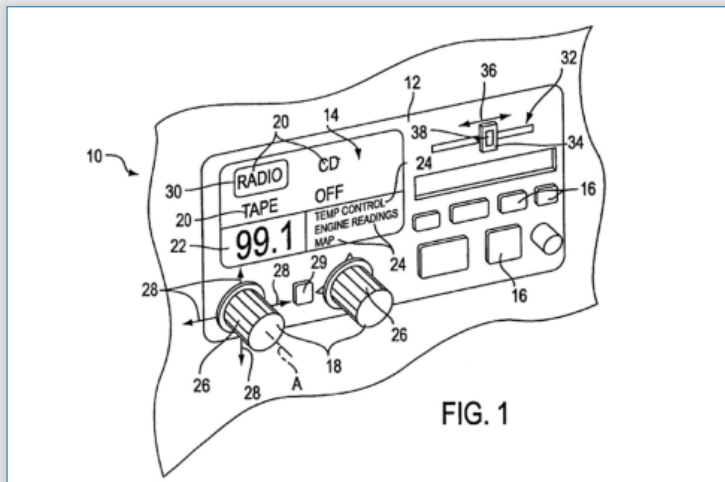
In this manner, the feedback device 80 enables the user to navigate the selectable devices on the display 34 while maintaining focus on driving the vehicle. It is therefore not necessary for the user to look at the display 34 while navigating and interacting with the selectable devices. In another embodiment, the feedback device 80 actuates when the user taps the touchpad 10 to select a function or device. The user can be confident that a function or device was properly selected without directing his or her attention away from the road. Other variations of the feedback device 80 are anticipated. Any suitable actuator that is operable to provide vibration or tapping to the touchpad 10 may be used.



formed by the knob. A basic force sensation is force detents that are output at particular rotational positions of the knob to inform the user how much the knob has rotated and/or to designate a particular position of the knob. The force detents can be simple jolts or bump forces to indicate the detent's position, or the detents can include forces that attract the knob to the particular rotational detent position and resist movement of the knob away from that position. The position

EX1016 at 10:4-21 (cited by Petition at 20)

Levin



EX1016 at FIG. 1 (cited by Petition at 12)

Petition at 12

As a user turns the control knob to adjust a setting, *e.g.*, the car's temperature (5:30-50; 7:32-8:26; FIG. 2), "force detents" are output onto the knob to "indicate particular settings or how far the knob has rotated" (7:55-62). For example, "[t]emperature can preferably be adjusted by rotating knob 18, where force detents indicate each temperature setting." 8:21-26; 10:11-32. "[F]orce detents" allow the driver to "feel" a change in a system setting "so that the driver need not look at the display." 8:18-26; Ward, ¶¶110-113.

Ground 1: The Ichinose-Levin Combination

Petition at 15

Petition at 15

First, Ichinose teaches up and down arrow keys to adjust various system parameters like radio settings. For example, Figures 2A and 2B illustrate how a user moves a cursor (via the touchpad) onto a “tuning control button 56” to adjust the radio station by “tapping the touchpad” when the cursor is over the button. Ichinose, 2:47-3:9; *see also id.*, 3:19-46; FIGS. 3A-5B (showing similar functionality for other systems, including HVAC). Ichinose explains that its “feedback device 80 actuates when the user taps the touchpad 10 to select a function or device,” *e.g.*, when selecting the “tuning control button” to adjust the radio. Ichinose, 4:18-30; Ward, ¶120. Although Ichinose does not describe what vibrotactile feedback is provided when the user taps “tuning control button 56” to adjust the radio station, Levin teaches providing a “detent force (e.g., jolt)...to indicate how much a particular value has been changed. For example, a jolt can be output for each 10 MHz of frequency that is increased.” Levin, 7:55-8:2; FIG. 2; Ward, ¶¶120-122. POSAs thus had reason to output a “detent force (e.g. jolt),” *i.e.* a vibrotactile effect, each time a user taps the up/down button to change the radio frequency. Ward, ¶120; *see also* EX1021 at 13 (identifying feedback associated with a “Directional Pad,” *i.e.*, a click, as a “virtual detent”).

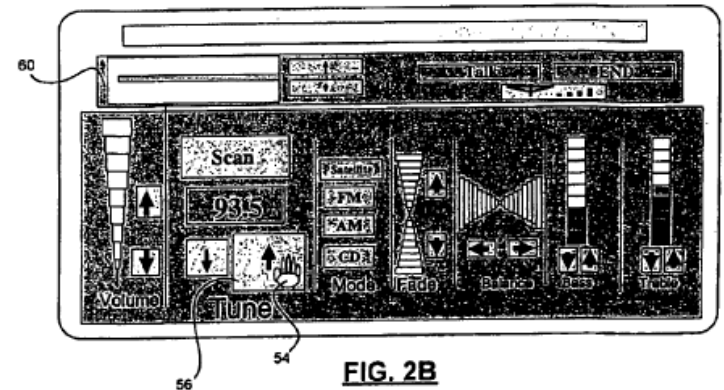


FIG. 2B

EX1015 at FIG. 2B
(cited by Petition at 15)

121. A POSITA would have understood that Levin’s “jolt” detent force is a form of vibrotactile effect. More specifically, a POSITA would have known that a “jolt” could be produced by a short single vibration of particular magnitude, and it would feel like a “click” to a user touching the touchpad. Levin’s “jolt” thus aligns with the “click effect replicating a mechanical click” that the ‘042 Patent discusses. EX1001 at 6:6-11; 6:16-18, 10:14-17.

EX1003 (Ward Decl.) at ¶ 121
(cited by Petition at 15)

The Disputed Issues for Ground 1

GROUND	CLAIMS	BASIS
1. Ichinose Combined with Levin	1-19	103
2. Wang Combined with Ichinose	1-19	103
3. Rosenberg	1-19	102

- **Ground 1: Is Levin analogous prior art**, does Levin teach vibrotactile jolts, and would a POSA have had reason to use vibrotactile jolts with Ichinose's haptic touchpad?

The Analogous Art Dispute: No Basis In Fact or Law

Reply at 3-7

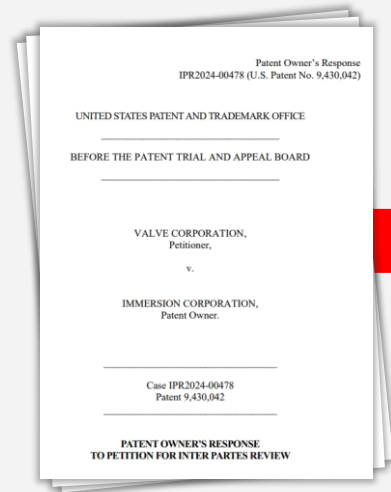
Patent Owner Response (at 2)

A common theme across the Petition's obviousness grounds is the hindsight reconstruction of the '042 Patent by combining two types of prior art: (1) patents that disclose virtual controls on 2-dimensional touchpads and (2) patents that disclose detents with physical 3-dimensional controls (such as knobs and sliders) and mechanisms that provide continuous contact forces, i.e., force feedback, to mimic the feel of a traditional mechanical detent. Petitioner attempts to combine

Patent Owner Response

Patent Owner Response (at 5)

Second, the knob prior art (Levin, Wang, and Goldenberg) are not analogous to the '042 Patent because they disclose physical input devices with force feedback, rather than vibrotactile feedback, which are not in the same field of endeavor as, nor reasonably pertinent to, the '042 Patent and the problem it solves. *Third*, because the



Mechanical Knobs Are Plainly Analogous

Reply at 7

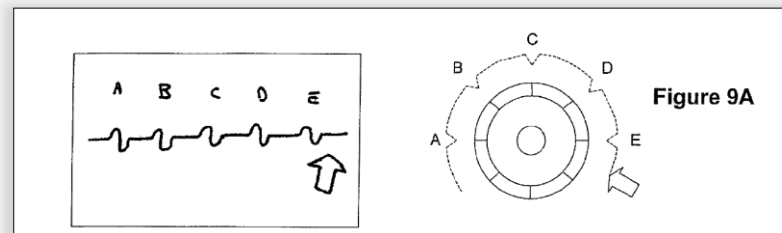
The input device 102 can be, for example, a mechanical input device. Examples of mechanical input devices include a rotary knob coupled to an encoder. Encoders of the input device 102 may comprise an optical encoder or a potentiometer. In other embodiments, the input device 102 may be a non-mechanical input device. For example, the input device 102 may be a touch-sensitive device, such as a touch pad or a touch screen.

EX1001 at 3:40-42 (cited by Reply at 7)

C

FIGS. 9A, 9B, 9C, 9D, 9E, 9F, 9G, and 9H are eight illustrations of virtual detent profiles in various embodiments of the present invention. In FIGS. 9A-9H, the rotary knob 202 is shown on the right along with a representation of the virtual detent profile on the left corresponding with the rotary knob. The virtual detent profiles illustrated in FIGS.

EX1001 at 13:37-46 (cited by Reply at 7)



EX1001 at FIG. 9A (cited by Reply at 7)

(12) United States Patent
Levin

(10) Patent No.: US 9,430,042 B2
(45) Date of Patent: Aug. 30, 2016

(54) VIRTUAL DETENT FEEDBACK
(57) Inventor: Michael B. Levin, Los Altos, CA (US)
(73) Assignee: Immersion Corporation, San Jose, CA (US)
(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 1796 days.

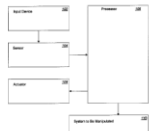
(21) Appl. No.: 13/965,046
(22) Filed: Dec. 27, 2013
(65) Prior Publication Data
US 2008/0138140 A1 Jul. 3, 2008

Related U.S. Application Data
(60) Provisional application No. 60/877,333, filed on Dec. 27, 2006.

(51) Int. Cl. (2006.01)
G06F 0001/00 (2006.01)
G06F 0003/00 (2006.01)
(52) U.S. Cl. (2006.01)
G06F 0001/00 (2006.01)
G06F 0003/00 (2006.01)

(53) Field of Classification Search: G06F 0001/00 (2006.01)
G06F 0003/00 (2006.01)
See application file for complete search history.

References Cited
U.S. PATENT DOCUMENTS
3,618,079 A 10/1973 Sagan
3,618,079 A 10/1973 Sagan
4,028,762 A 01/1977 Shuman et al.
4,127,782 A 01/1978 Lombardi



Value Exhibit 1001
Value v. Immersion

042 Patent

Sur-Reply

Does Not Respond

Immersion's Overly Narrow Definition of the Field of Endeavor Invites Legal Error

Reply at 3

Patent Owner Response (at 19)

The '042 Patent's "field of endeavor" is explicitly defined by the "Field of Invention": "The present invention generally relates to *vibrotactile feedback*. More particularly, the present invention relates to methods and systems for providing *virtual detents through vibrotactile feedback*." EX1001, 1:14-17. This express



"The field of endeavor of a patent is **not limited** to the specific point of novelty, the narrowest possible conception of the field, or the particular focus within a given field." *Unwired Planet, LLC v. Google Inc.*, 841 F.3d 995 (Fed. Cir. 2016).

Cited by Reply at 3



"...the question whether the art is or is not "analogous," as that term is generally used in patent law, **i.e., too remote to be treated as prior art....**" *In re Sovish*, 769 F.2d 738, 741-42 (Fed. Cir. 1985).

Cited by Reply at 3



"[KSR] directs us to construe the scope of analogous prior art **broadly.**" *Wyers v. Master Lock*, 616 F.3d 1231, 1238 (Fed. Cir. 2010).

Cited by Reply at 3 n.2

Reply at 3-7



EX1001 at 2:58 (cited by Reply at 4)

EX1001 at 5:13-16 (cited by Reply at 4)

EX1001 at 6:40-45 (cited by Reply at 4)



“We determine the field of endeavor “by reference to explanations of the invention's **subject matter in the patent application**, including the **embodiments**, function, and structure of the claimed invention.” *Netflix, Inc. v. DivX, LLC*, 80 F.4th 1352, 1359 (Fed. Cir. 2016).

Cited by Reply at 3

Immersion's Overly Narrow Definition Is Inconsistent With Immersion's Own Understanding of the Patent

Reply at 3-7

[001] The present invention relates generally to input devices that provide haptic feedback. The present invention more particularly relates to systems and methods for virtual detents through vibrotactile feedback method.

EX1005 (Provisional Application) (cited by Reply at 3-4)

36. The '042 patent, in general, describes advances in providing haptic feedback in, among other things, portable video players and portable game systems, operated through, for example, a touch-pad. The '042 patent teaches, among other things, providing virtual detents to simulate mechanical feedback through vibrotactile feedback delivered to an input device such as, for example, a touch-pad. Further details of the invention are described in the specification and the claims.

EX1088 (District Court Complaint) (cited by Reply at 4)

Immersion submits that a POSA at the time of the '042 Patent would have had 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 (HCI), including implementation of computer-based systems and software for providing haptic feedback effects to a user. EX2007, ¶30. Also, a

Patent Owner Response at 27

Levin Relates to Haptic Feedback for Input Devices, and Is Within the Patent's Field of Endeavor

Reply at 3-7

U.S. PATENT DOCUMENTS					
Examiner Initials *	Cite No. ¹	Document Number	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		Number - Kind Code ² (if known)			
	1.	6,128,006	10-03-2000	Rosenbourg et al.	
	2.	6,686,911	02-03-2004	Levin et al.	
	3.	2005/151720	07-14-2005	Cruz-Hernandez et al.	

EX1002 at 406 (cited by Reply at 4)

Commissioner for Patents

IDS filed 10/29/12 and IDS filed 2/5/13 have been considered and are attached. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure: US 2006/038781 A1; WO 97/25657 A1; US 6,128,006 A; US 2005/151720 A1; US 6,686,911 B1; JP 2008-508600; JP 2004-171157; JP 2005-71157; and JP 2003-29914.

EX1002 at 513 (cited by Reply at 4)



“[P]rior art listed in an [IDS] can be informative as to the field of endeavor.”
***Apple Inc. v. Samsung Elec.*, 816 F.3d 788, 803 n.8 (Fed. Cir. 2016).**

Cited by Reply at 5

Levin's Teachings Are Reasonably Pertinent to the Patent's Problem(s)

Reply at 7

37. The '042 patent is thus directed toward the problem of providing users of electronic controls with a virtual or simulated feel of a mechanical detent as a substitution for an actual mechanical detent. Each of Levin, Wang, and Goldenberg are directed to that same problem.

EX1090 (Ward Reply) at ¶ 48 (cited by Reply at 7)

50. Put simply, Levin teaches techniques for mimicking or simulating a mechanical detent, which is the problem to which the '042 patent is directed. *See also* EX1016 at 1:43-45 (“a variety of programmable feel sensations can be output on the knob, such as detents, spring forces, or the like”), 2:3-5 (“An actuator is coupled to the knob to output a force in the rotary degree of freedom about the axis, thus providing force feedback.”), 10:57-60 (“Another type of force sensation that can be output on knob 18 is a spring force. The spring force can provide resistance to rotational movement of the knob in either direction to simulate a physical spring on the knob.”), 11:54-56 (“Other force sensations that can be output on knob 18 include forces that simulate ends of travel for the knob 18 or inform the user that the end of travel has been reached.”), claim 33 (“simulated spring”).

Sur-Reply

Does Not Respond

EX1090 (Ward Reply) at ¶ 50 (cited by Reply at 7)

Levin's Teachings Are Reasonably Pertinent to the Patent's Problem(s)

Reply at 7

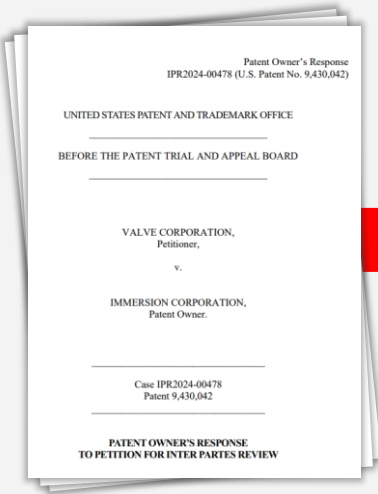
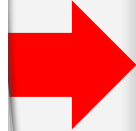
Patent Owner Response (at 24)

The Knob Prior Art is also not pertinent to the problem being solved because they relate to real detents (i.e., force feedback) that the '042 Patent claims sought to *virtualize* on touchpads with virtual vibrotactile detents. This alone confirms they are directed to different purposes, and thus, not reasonably pertinent. *See In re Clay*,

Patent Owner Response (at 2)

A common theme across the Petition's obviousness grounds is the hindsight reconstruction of the '042 Patent by combining two types of prior art: (1) patents that disclose virtual controls on 2-dimensional touchpads and (2) patents that disclose detents with physical 3-dimensional controls (such as knobs and sliders) and mechanisms that provide continuous contact forces, i.e., force feedback, to mimic the feel of a traditional mechanical detent. Petitioner attempts to combine

Patent Owner Response



The Analogous Art Dispute

GROUND	CLAIMS	BASIS
1. Ichinose Combined with Levin	1-19	103
2. Wang Combined with Ichinose	1-19	103
3. Rosenberg	1-19	102

- **Ground 1**: Is Levin analogous prior art, **does Levin teach vibrotactile jolts**, and would a POSA have had reason to use vibrotactile jolts with Ichinose's haptic touchpad?

Immersion Wrongly Limits Levin's Jolts to a Form of Force Feedback

Reply at 9-13

Patent Owner Response (at 39)

The plain and ordinary meaning of “virtual detent” includes a simulated mechanical detent created through *vibrotactile feedback*. See *supra* §V.B. In the district court, Petitioner agreed that “virtual detent” must include “vibrotactile feedback that simulates a mechanical detent.” EX2003, 19. Now, Petitioner attempts to map Levin’s force feedback to “virtual detent.” But force feedback does not include vibrotactile effect. The former exerts a continual force or pressure against

Patent Owner Response

Patent Owner Response (at 41-42)

Levin does not disclose that jolts are vibrations. Instead, Levin merely describes jolts as a kind of force feedback detent that are “stronger in magnitude than *normal detents*”—not as a virtual detent. *Id.*, 11:62-63. Indeed, Levin does not contemplate or use the word “virtual.” There is no disclosure in Levin for use of vibration effects for mechanical detents. The only use of vibration remotely related

Levin Distinguishes Jolts from Assistive/Resistive Force Feedback

Reply at 9-13

Patent Owner Response (at 41-42)

Levin does not disclose that jolts are vibrations. Instead, Levin merely describes jolts as a kind of force feedback detent that are “stronger in magnitude than *normal detents*”—not as a virtual detent. *Id.*, 11:62-63. Indeed, Levin does not contemplate or use the word “virtual.” There is no disclosure in Levin for use of vibration effects for mechanical detents. The only use of vibration remotely related

Patent Owner Response

Other force sensations that can be output on knob 18 include forces that simulate ends of travel for the knob 18 or inform the user that the end of travel has been reached. For example, as the user rotates the knob in one direction to adjust the radio frequency 22, the end of the radio frequency range is reached. There is no hard stop on the knob 18 at this position, but the actuator 70 can be controlled to output an obstruction force to prevent or hinder the user from rotating the knob further in that direction. Alternatively, a jolt force can be output that is stronger in magnitude than normal detents, which informs the user that the end of the frequency range has been reached. The user can then continue to rotate the knob in that direction, where the displayed frequency 22 wraps around to the beginning value in the range.

Levin

EX1016 at 11:54-67 (cited by Reply at 11-12)

Levin Distinguishes Jolts from Assistive/Resistive Force Feedback

Reply at 9-13

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

VALVE CORPORATION,
Petitioner,

v.

IMMERSION CORPORATION,
Patent Owner.

Case No. IPR2024-00478
Patent No. 9,430,042

REPLY DECLARATION OF JEAN RENARD WARD

Valve Exhibit 1090
Valve v. Immersion
IPR2024-00478

Ward Reply Decl. EX1090

87. The cited Levin passage's distinction between a jolt and assistive/resistive force feedback is consistent with other passages in Levin. For example, Levin discloses the following:

A basic force sensation is force detents that are output at particular rotational positions of the knob to inform the user how much the knob has rotated and/or to designate a particular position of the knob. The force detents can be simple jolts or bump forces to indicate the detent's position, or the detents can include forces that attract the knob to the particular rotational detent position and resist movement of the knob away from that position.... Force feedback "snap-to" detents can also be provided, for example, for the favorite station frequencies preprogrammed by the user, where a small force biases the knob to the detent position when it is just outside the position.

EX1016 at 10:14-21.

88. The above-quoted passage is explicit that a "force detent" can be generated with "simple jolts...or the detents can include forces that attract the knob to the particular rotational detent position and resist movement of the knob away from that position." Again, Levin explicitly distinguishes a "simple" vibrational jolt from assistive/resistive force feedback, and further, teaches "jolts" as distinct alternatives for assistive/resistive force-feedback based detents.

EX1090 (Ward Reply) at ¶¶ 87-88 (cited by Reply at 12); see also Pet. at 20.

POSAs Understood Levin's "Jolts" Encompass Vibrotactile Effects

Reply at 9-13

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

VALVE CORPORATION,
Petitioner,

v.

IMMERSION CORPORATION
Patent Owner,

Case No. TBD
Patent No. 9,430,042

DECLARATION OF JEAN RENARD WARD

Valve Exhibit 1003
Valve v. Immersion

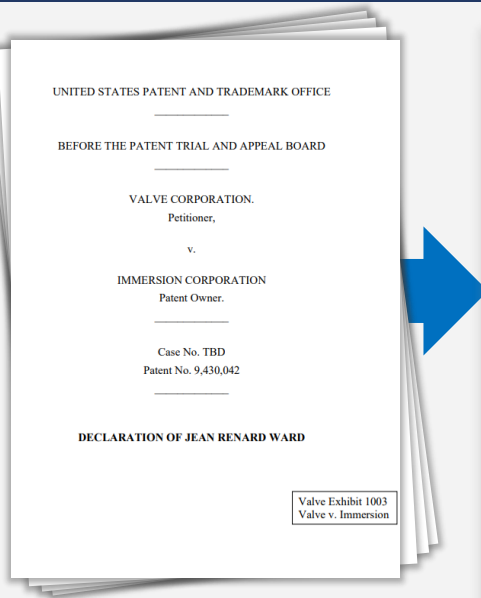
**Ward Opening Decl.
EX1003**

71. Along the same lines, a POSITA would know the teachings that haptic “jolt” sensations can be produced by short bursts or periods of vibration¹⁹. In addition, a POSITA would also know from prior-art teachings that a jolt sensation is a vibrotactile sensation.²⁰ For that matter, a POSITA would know from the prior art that vibrotactile sensations also include sensations for clicks, touch and contact, rotation, textures, and thumps etc.²¹, and that vibrotactile sensations can be substituted for force-reflecting reactive feedback.²²

EX1003 (Ward Decl.) at ¶ 71 (cited by Pet. at 1 and Reply at 9)

POSAs Understood Levin's "Jolts" Encompass Vibrotactile Effects

Reply at 9-13



Ward Opening Decl. EX1003

20 For example, this was taught by EX1059 (U.S. Patent Appl. No. 2006/0049010) which discloses at [0026] that: "Other vibrotactile effects may also be implemented, such as a jolt, shake, buzz, or other suitable vibrotactile effect." (emphasis added). Likewise, EX1060 (WO2004042693) teaches that "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" at 5:12-15 (emphasis added). Also EX1061 (U.S. Patent Appl. No. 2003/0030619) states at [0045] "a jolt of 'pulse' sensation can be output, which is a single impulse of force that quickly rises to the desired magnitude and then is turned off or quickly decays back to zero or small magnitude" and continues at [0060] "[i]n vibrotactile embodiments, only a very small range of motion is required to produce effective pulses (jolts) or vibrations on the direction pad 18." (emphasis added).

EX1003 (Ward Decl.) at ¶ 71 (cited by Pet. at 1 and Reply at 9)

POSAs Understood Levin's "Jolts" To Be Vibrotactile Effects

Reply at 9-13

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

VALVE CORPORATION,
Petitioner,

v.

IMMERSION CORPORATION
Patent Owner,

Case No. TBD
Patent No. 9,430,042

DECLARATION OF JEAN RENARD WARD

Valve Exhibit 1003
Valve v. Immersion

Ward Opening Decl. EX1003

adjust the radio station, Levin teaches providing a "detent force (e.g., jolt)...to indicate how much a particular value has been changed. For example, a jolt can be output for each 10 MHz of frequency that is increased." Levin at 7:55-8:2; FIG. 2. (I note that while Levin here gives a "jolt" as one example ("e.g.") of a detent force, Levin also teaches detent force profiles created from periodic waves – that is, vibrations. See for example Levin at 3:9-12, 4:1-2.) For that matter, a POSITA would be aware that it was known in the art to produce vibrotactile jolt sensations with bursts of vibration. A POSITA thus had reason to output a "detent force" each

EX1003 (Ward Decl.) at ¶ 120 (cited by Pet. at 15 and Reply at 9)

121. A POSITA would have understood that Levin's "jolt" detent force is a form of vibrotactile effect. More specifically, a POSITA would have known that a "jolt" could be produced by a short single vibration of particular magnitude, and it would feel like a "click" to a user touching the touchpad. Levin's "jolt" thus aligns with the "click effect replicating a mechanical click" that the '042 Patent discusses. EX1001 at 6:6-11; 6:16-18, 10:14-17.

EX1003 (Ward Decl.) at ¶ 121 (cited by Pet. at 15 and Reply at 9)

POSAs Understood Levin's "Jolts" To Be Vibrotactile Effects

Reply at 9-13

the cursor with displayed graphical objects. For example, a jolt or "pulse" sensation can be output, which is a single impulse of force that quickly rises to the desired magnitude and then is turned off or quickly decays back to zero or small magnitude. The touchpad 16 can be jolted in the z-axis to provide the pulse. A vibration sensation can also be output,

EX1009 at 11:29-33 (cited by Reply at 11)

allow the touchpad 16 to be moved along the z-axis 56. Only a very small range of motion is required to produce effective pulses (jolts) or vibrations on the pad 16. Stops (not shown)

EX1009 at 8:58 (cited by Reply at 11)

screen. Furthermore, since the tactile sensations are directed in a third degree of freedom relative to the two-dimensional planar workspace and display screen, jolts or pulses output along the Z axis feel much more like three-dimensional bumps or divots to the user that come "out" or go "into" the screen, increasing the realism of the tactile sensations and creating a more compelling interaction. For example, an

EX1009 at 11:3 (cited by Reply at 11)

United States Patent

US 6,429,846 B2
(45) Date of Patent: Aug. 6, 2002

540 RAPID FEEDBACK FOR TOUCHPADS AND OTHER TOUCH CONTROLS

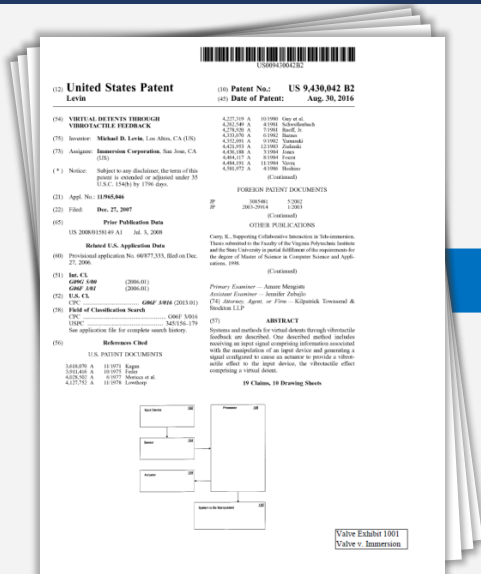
Inventors: Louis B. Rosenberg, San Jose, Calif.
(US)

Assignee: International Business Machines Corporation, San Jose, Calif.
(US)

Filed: May 1, 2000

U.S. Class: 345/159; 345/160; 345/161; 345/162; 345/163; 345/164; 345/165; 345/166; 345/167; 345/168; 345/169; 345/170; 345/171; 345/172; 345/173; 345/174; 345/175; 345/176; 345/177; 345/178; 345/179; 345/180; 345/181; 345/182; 345/183; 345/184; 345/185; 345/186; 345/187; 345/188; 345/189; 345/190; 345/191; 345/192; 345/193; 345/194; 345/195; 345/196; 345/197; 345/198; 345/199; 345/200; 345/201; 345/202; 345/203; 345/204; 345/205; 345/206; 345/207; 345/208; 345/209; 345/210; 345/211; 345/212; 345/213; 345/214; 345/215; 345/216; 345/217; 345/218; 345/219; 345/220; 345/221; 345/222; 345/223; 345/224; 345/225; 345/226; 345/227; 345/228; 345/229; 345/230; 345/231; 345/232; 345/233; 345/234; 345/235; 345/236; 345/237; 345/238; 345/239; 345/240; 345/241; 345/242; 345/243; 345/244; 345/245; 345/246; 345/247; 345/248; 345/249; 345/250; 345/251; 345/252; 345/253; 345/254; 345/255; 345/256; 345/257; 345/258; 345/259; 345/260; 345/261; 345/262; 345/263; 345/264; 345/265; 345/266; 345/267; 345/268; 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POSAs Understood Levin's "Jolts" To Be Vibrotactile Effects



042 Patent

user as the user manipulates an input device. The perception of a virtual detent might be a jolt or bump. The virtual detent may be closer to a hard stop, serving to provide a strong

EX1005 at [0012] (cited by Reply at 11)

waveforms. In one embodiment, the virtual detent may comprise a simulated click generated through a single pulse.

EX1001 at 6:16-17 (cited by Reply at 11)

Provisional Appl. EX1005

POSAs Understood Levin's "Jolts" To Be Vibrotactile Effects

Reply at 9-13

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

VALVE CORPORATION,
Petitioner,

v.

IMMERSION CORPORATION,
Patent Owner.

Case No. IPR2024-00478
Patent No. 9,430,042

REPLY DECLARATION OF JEAN RENARD WARD

Valve Exhibit 1090
Valve v. Immersion
IPR2024-00478

Ward Reply Decl. EX1090

82. Beyond the references already submitted in this trial, there are other prior-art references (assigned to Immersion) that explicitly confirm the fact that a jolt was known in the art to be a short vibration and therefore a vibrotactile effect. For example, International Publication No. WO 01/24158A1 is assigned to Immersion and was published five years before the '042 patent's provisional application was filed. The publication teaches that "jolts can be output as a single period of a vibration or part of a period of a vibration." EX1091 at 16:28-29.

83. The reference likewise confirms that jolts are used with vibrotactile devices like the vibrating touchpad that Ichinose discloses⁵ and which would have been used in the hypothetical Ichinose-Levin combination. EX1091 at 22:20-21 ("In most vibrotactile devices, a directional force cannot typically be output and must be approximated using vibrations or jolts."), 25:4-5 ("In vibrotactile applications, an encounter with a wall or other object can be simulated using a jolt or low frequency vibration."). The reference thus confirms a POSITA reading Levin would have recognize that Levin's "jolts" were (i) a vibrotactile effect, and (ii) would have been suitable for use with Ichinose's vibrating touchpad.⁶

EX1090 (Ward Reply) at ¶¶ 82-83 (cited by Reply at 11)

POSAs Understood Levin's "Jolts" To Be Vibrotactile Effects

Reply at 9-13

UNITED STATES PATENT AND TRADEMARK OFFICE

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REPLY DECLARATION OF JEAN RENARD WARD

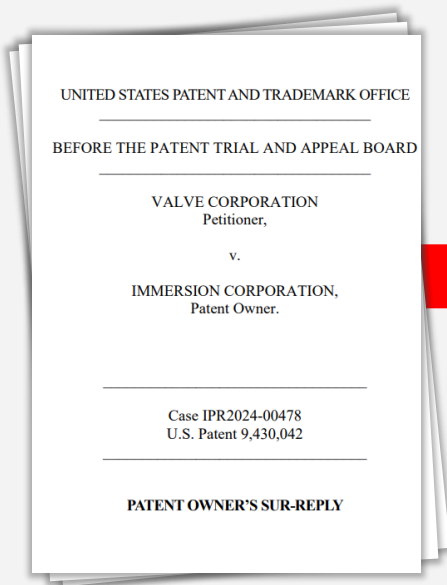
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Ward Reply Decl. EX1090

84. U.S. Patent No. 6,906,697—assigned to Immersion and published five years before the '042 patent's provisional application—likewise explains that “The duration, or number of periods in the commanded wave, determines how long the vibration sensation is output. If a small number of high frequency periods of a waveform are commanded, it typically feels like a single ‘pulse’ or jolt of force to the user.” EX1092 at 8:47-52; *see* also EX1092 at 9:9-19 (“For example, a waveform having a frequency of 125 Hz and a duration of 14 milliseconds can convey this sensation. To the user, this feels like a small jolt or pulse on the mouse which indicates the graphical object has been engaged or interacted with the cursor. As another example, the sensation of an even smaller object, such as a radio button, can be conveyed by commanding a periodic wave form having a very high frequency and a very short duration, such as 300 Hz for 5 milliseconds. These vibrations are a high enough frequency as to feel like a single jolt or pulse to the user.”).

EX1090 (Ward Reply) at ¶ 84 (cited by Reply at 11)

Immersion's Sur-Reply Focuses on Inherency



Sur-Reply

Sur-Reply (at 16)

IV. GROUND 1: ICHINOSE+LEVIN

A. “Jolts” are not inherently vibrotactile

Sur-Reply (at 17-18)

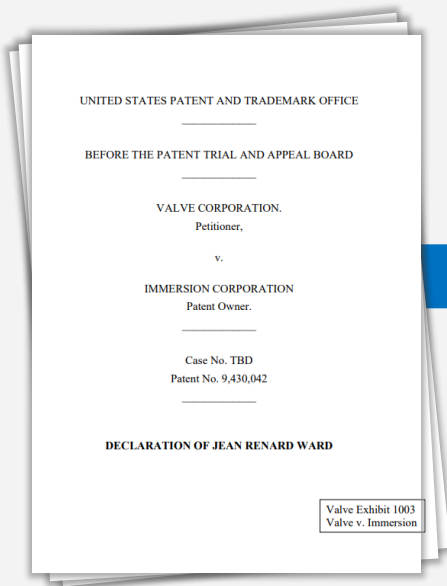
Further, Valve’s own citations demonstrate that Levin’s “jolts” are force feedback: “*force* detents can be simple *jolts*[.]” EX1016, 10:14-18; “a detent *force* (e.g., *jolt*)[.]” *id.*, 7:65. “Jolts” are a subset of detent forces, which Levin describes only as non-vibrational. *Id.*, 7:12-17, 10:17-19 (“The *force detents* can be simple jolts or bump forces to indicate the detent's position . . .”).



“A reference may be read for all that it teaches, including uses beyond its primary purpose.” *In re Mouttet*, 686 F.3d 1322, 1331 (Fed. Cir. 2012).

Cited by Reply at 8

But Immersion's Focus on Inherency Is Misplaced



121. A POSITA would have understood that Levin's "jolt" detent force is a form of vibrotactile effect. More specifically, a POSITA would have known that a "jolt" could be produced by a short single vibration of particular magnitude, and it would feel like a "click" to a user touching the touchpad. Levin's "jolt" thus aligns with the "click effect replicating a mechanical click" that the '042 Patent discusses. EX1001 at 6:6-11; 6:16-18, 10:14-17.

EX1003 (Ward Decl.) at ¶ 121 (cited by Pet. at 15 and Reply at 9-10)

Ward Opening Decl. EX1003

71. Along the same lines, a POSITA would know the teachings that haptic "jolt" sensations can be produced by short bursts or periods of vibration¹⁹. In addition, a POSITA would also know from prior-art teachings that a jolt sensation is a vibrotactile sensation.²⁰ For that matter, a POSITA would know from the prior

EX1003 (Ward Decl.) at ¶ 71 (cited by Pet. at 1 and Reply at 6, 9-10)

Immersion Concedes Mr. Ward Was Right

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Case IPR2024-00478
U.S. Patent 9,430,042

PATENT OWNER'S SUR-REPLY



Sur-Reply (at 18)

abrupt forces. Valve's extensive discussion of "jolts" only shows that vibrotactile effects can implement jolts—not that all jolts are vibrational. That is, Valve's citations to the Ward Declaration (EX1003) and prior art teachings show that vibrotactile effects can be implemented to simulate jolts—i.e., abrupt effects. Reply,

Sur-Reply (at 19)

Mr. Ward's reliance on EX1061 confirms that jolts are not vibrational by nature but can be simulated by vibrotactile effects. EX1003, ¶71 n. 20. In fact, EX1061 defines "jolt" as "a single impulse of *force* that quickly rises to the desired magnitude and then is turned off" EX1061, ¶45 (emphasis added). This is consistent with the plain meaning. Then, EX1061 discusses that a "jolt"—single impulse of force—can be produced vibrationally, not that jolts *are* vibrational: "[i]n vibrotactile embodiments, only a very small range of motion is required to produce effective pulses (jolts) or vibrations on the direction pad 18." *Id.*, ¶60. A "jolt" is thus *produced* vibrationally using a smaller "range of motion" otherwise required to produce the "jolt."

Sur-Reply

Immersion's Attempt to Limit Levin's "Jolts" Fails

Reply at 9-13

Sur-Reply (at 16)

In response, Valve conflates "physical sensations" and "force feedback" with "vibrations" by contending that "Levin uses the term 'force feedback' to refer to various 'physical sensations' provided to a user, including vibrations." Reply, 6 (citing to EX1016, 1:36-38, 10:11-21, 14:26-29). The full disclosure of Valve's citations illustrate the distinction between these conflated positions.

Sur-Reply

Some control knobs have been provided with "force feedback." Force feedback devices can provide physical sensations to the user manipulating the knob. Typically, a motor is coupled to the knob and is connected to a controller such as a microprocessor. The microprocessor receives sensor signals from the knob and sends appropriate force feedback control signals to the motor so that the motor provides forces on the knob. In this manner, a variety of programmable feel sensations can be output on the knob, such as detents, spring forces, or the like.

EX1016 at 1:36-38 (cited by Reply at 6)

The force feedback output on knob 18 can include a variety of different force sensations. The force feedback can be integrally implemented with the control functions performed by the knob. A basic force sensation is force detents that are output at particular rotational positions of the knob to inform the user how much the knob has rotated and/or to designate a particular position of the knob. The force detents can be simple jolts or bump forces to indicate the detent's position, or the detents can include forces that attract the knob to the particular rotational detent position and resist movement of the knob away from that position. The position

EX1016 at 10:11-21 (cited by Reply at 6)

Immersion's Attempt to Limit Levin's "Jolts" Fails

Reply at 9-13

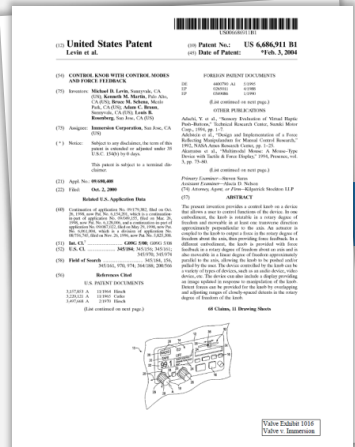
Sur-Reply (at 16)

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Sur-Reply

The force sensations and modes described above for the rotary knob in FIGS. 3a–3b and 4a–4c may also be used for the slider control 32 in a linear degree of freedom. For example, force detents can be applied in a position control paradigm as the knob 34 is moved in its linear degree of freedom. In a rate control paradigm, a spring return force can bias the knob 34 toward a center origin position, for example the center of the range of motion of the knob. The further the user moves the knob from the origin position, the greater the spring force opposing that motion and the greater the rate of the controlled value changes (increases or decreases). Other force effects include damping forces, texture forces, jolts, obstruction forces, assistive forces, periodic forces such as vibration forces, and end-of-travel forces.

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Immersion's Attempt to Limit Levin's “Jolts” Fails

Reply at 9-13

Sur-Reply (at 17)

10-11), Levin only discloses such “vibration forces” as an augment or overlay “other” effect, such as indicating fan speed—not as a mechanical detent. *See* POR, 10-11 (citing EX1016, 8:11-26) (“a small vibration can be output on the knob ... where the frequency (or magnitude) of the vibration forces correlate with the magnitude of fan rotation speed, i.e., a high fan speed provides a fast vibration.

Sur-Reply

The force sensations and modes described above for the rotary knob in FIGS. 3a–3b and 4a–4c may also be used for the slider control 32 in a linear degree of freedom. For example, force detents can be applied in a position control paradigm as the knob 34 is moved in its linear degree of freedom. In a rate control paradigm, a spring return force can bias the knob 34 toward a center origin position, for example the center of the range of motion of the knob. The further the user moves the knob from the origin position, the greater the spring force opposing that motion and the greater the rate of the controlled value changes (increases or decreases). Other force effects include damping forces, texture forces, jolts, obstruction forces, assistive forces, periodic forces such as vibration forces, and end-of-travel forces.

UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE PATENT TRIAL AND APPEAL BOARD

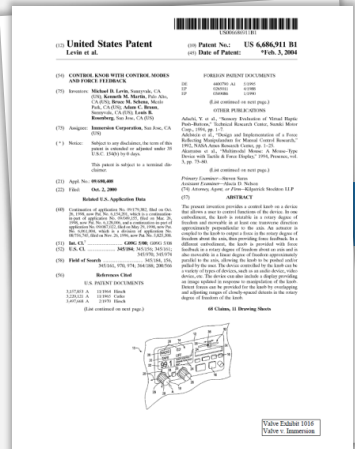
VALVE CORPORATION
Petitioner,

V.

IMMERSION CORPORATION,
Patent Owner.

Case IPR2024-00478
U.S. Patent 9,430,042

PATENT OWNER'S SUR-REPLY



Levin

EX1016 at 14:26-29 (cited by Reply at 10)

Immersion's Attempt to Limit Levin's "Jolts" Fails

Reply at 9-13

Sur-Reply (at 17-18)

Further, Valve's own citations demonstrate that Levin's "jolts" are force feedback: "*force* detents can be simple *jolts*[,]” EX1016, 10:14-18; “a detent *force* (e.g., *jolt*)[,]” *id.*, 7:65. “Jolts” are a subset of detent forces, which Levin describes only as non-vibrational. *Id.*, 7:12-17, 10:17-19 (“The *force detents* can be simple jolts or bump forces to indicate the detent's position . . .”).

Sur-Reply

The force sensations and modes described above for the rotary knob in FIGS. 3a–3b and 4a–4c may also be used for the slider control 32 in a linear degree of freedom. For example, force detents can be applied in a position control paradigm as the knob 34 is moved in its linear degree of freedom. In a rate control paradigm, a spring return force can bias the knob 34 toward a center origin position, for example the center of the range of motion of the knob. The further the user moves the knob from the origin position, the greater the spring force opposing that motion and the greater the rate of the controlled value changes (increases or decreases). Other force effects include damping forces, texture forces, jolts, obstruction forces, assistive forces, periodic forces such as vibration forces, and end-of-travel forces.

UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE PATENT TRIAL AND APPEAL BOARD

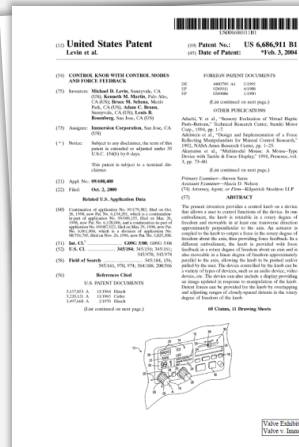
VALVE CORPORATION
Petitioner,

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Patent Owner.

Case IPR2024-00478
U.S. Patent 9,430,042

PATENT OWNER'S SUR-REPLY



Levin

EX1016 at 14:26-29 (cited by Reply at 10)

Immersion's Attempt to Limit Levin's "Jolts" Fails

Reply at 9-13

Sur-Reply (at 18)

EX1060 explains that “haptic feedback” can be broken up into (1) “kinesthetic feedback (such as, without limitation, active and resistive force feedback)” and (2) “tactile feedback (such as, without limitation, vibration, texture, and heat)[.]” 3:4-6. Levin is concerned only with “kinesthetic” or force feedback rather than tactile.

Sur-Reply

The force sensations and modes described above for the rotary knob in FIGS. 3a–3b and 4a–4c may also be used for the slider control 32 in a linear degree of freedom. For example, force detents can be applied in a position control paradigm as the knob 34 is moved in its linear degree of freedom. In a rate control paradigm, a spring return force can bias the knob 34 toward a center origin position, for example the center of the range of motion of the knob. The further the user moves the knob from the origin position, the greater the spring force opposing that motion and the greater the rate of the controlled value changes (increases or decreases). Other force effects include damping forces, texture forces, jolts, obstruction forces, assistive forces, periodic forces such as vibration forces, and end-of-travel forces.

UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE PATENT TRIAL AND APPEAL BOARD

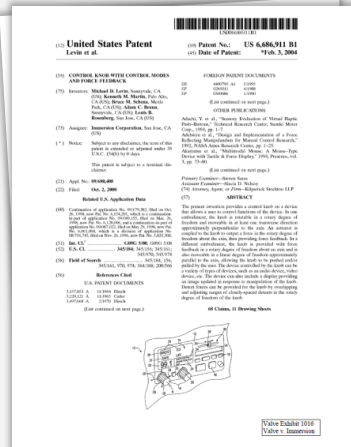
VALVE CORPORATION
Petitioner,

v.

IMMERSION CORPORATION,
Patent Owner.

Case IPR2024-00478
U.S. Patent 9,430,042

PATENT OWNER'S SUR-REPLY



Levin

EX1016 at 14:26-29 (cited by Reply at 10)

Immersion's Attempt to Limit Levin's "Jolts" Fails

Reply at 9-13

Sur-Reply (at 19)

Levin does not discuss "jolts" in the vibrotactile context. A POSA reading Levin would understand its "jolt" to simply be an abrupt rather than gradual force.

121. A POSITA would have understood that Levin's "jolt" detent force is a form of vibrotactile effect. More specifically, a POSITA would have known that a "jolt" could be produced by a short single vibration of particular magnitude, and it would feel like a "click" to a user touching the touchpad. Levin's "jolt" thus aligns with the "click effect replicating a mechanical click" that the '042 Patent discusses. EX1001 at 6:6-11; 6:16-18, 10:14-17.

EX1003 (Ward Decl.) at ¶121 (cited by Pet. at 15)

**But See
Ward Decl.**

77. Levin is explicit that its force feedback can come in many forms including "vibrations" and "jolts," which are both vibrotactile effects. A POSITA reading Levin, would not consider its teachings to be limited to assistive and resistive force feedback. See also EX1016 at claim 22 ("an actuator coupled to said rotary wheel and able to apply tactile sensations to said wheel").

EX1090 (Ward Reply) at ¶ 77 (cited by Reply at 10)

UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE PATENT TRIAL AND APPEAL BOARD

VALVE CORPORATION
Petitioner,

v.

IMMERSION CORPORATION,
Patent Owner.

Case IPR2024-00478
U.S. Patent 9,430,042

PATENT OWNER'S SUR-REPLY

Sur-Reply

Immersion's Attempt to Limit Levin's "Jolts" Fails

Reply at 9-13

Trials@uspto.gov
571-272-7822

Paper 11
Date: July 25, 2024

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

VALVE CORPORATION,
Petitioner,

v.

IMMERSION CORPORATION,
Patent Owner.

IPR2024-00478
Patent 9,430,042 B2

Before WILLIAM V. SAINDON, PATRICK R. SCANLON, and
CHRISTOPHER L. OGDEN, Administrative Patent Judges.
SCANLON, Administrative Patent Judge.

DECISION
Granting Institution of *Inter Partes* Review
35 U.S.C. § 314

Institution Decision

As such, the detent force profile of Figure 6A does not appear to produce a vibrotactile effect as required by the claim. Based on the current record, we fail to see how or why one of ordinary skill in the art would have applied the assisting and resisting forces from the detent force profile of Figure 6A to touchpad 10 of Ichinose. It is not clear that the Petition explains sufficiently how one of ordinary skill in the art would implement the assisting and resisting forces taught by Levin into Ichinose's touchpad 16 that is manipulated by the user sliding a finger across. *See* Pet. 18–20; Ex. 1003 ¶¶ 131–139.¹¹

¹¹ We note that our comments here do not rely upon a finding that Levin's sensations are "force feedback" specifically, and we do not wish to imply that the issue comes down to a debate between "force feedback" versus "vibrotactile" sensations, to the extent there is any difference between the two. Instead, we agree, on this record, with Patent Owner's argument that the types of sensations provided by Levin appear to be incompatible with the types of sensations provided by Ichinose due to the way in which they are delivered.

Institution Decision at 30

The Motivation-to-Combine Dispute

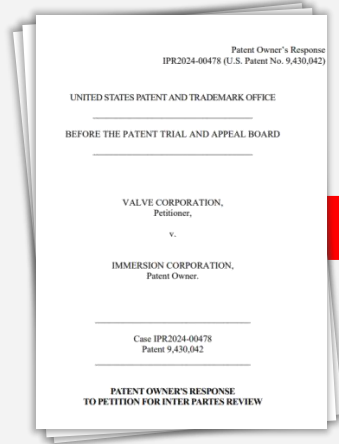
GROUND	CLAIMS	BASIS
1. Ichinose Combined with Levin	1-19	103
2. Wang Combined with Ichinose	1-19	103
3. Rosenberg	1-19	102

- **Ground 1**: Is Levin analogous prior art, does Levin teach vibrotactile jolts, and **would a POSA have had reason to use vibrotactile jolts with Ichinose's haptic touchpad?**

The Motivation-to-Combine Dispute

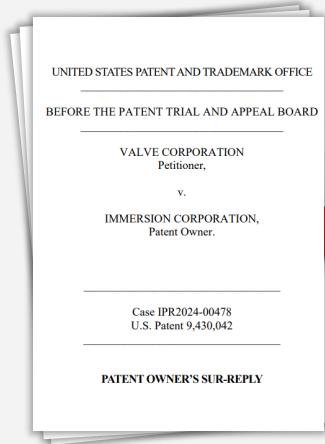
Reply at 9-13

Patent Owner Response (at 44)



Patent Owner Response

Petitioner also fails to provide adequate reasoning for why a POSA would have thought to modify Ichinose's 2-dimensional touchscreen with Levin's rotary and linear **force feedback** mechanical detent, which require 3-dimensional input devices such as knobs and sliders. A POSA would not have reason to modify a 2-dimensional touchscreen with rotary and linear **force feedback** with 3-dimensional appendages. EX2007, ¶¶109-11. Obviousness requires "a reason that would have



Sur-Reply

Sur-Reply (at 20)

The Board correctly found that one of ordinary skill would not have applied such **assisting resisting forces** of a detent *force* profile to a *vibrational* touchpad. *See*

The Motivation-to-Combine Dispute

Reply at 13-15

Sur-Reply (at 20)

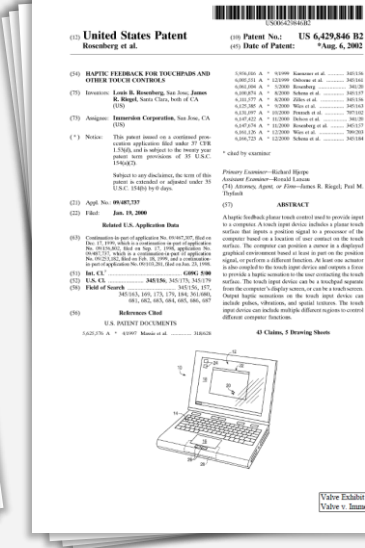
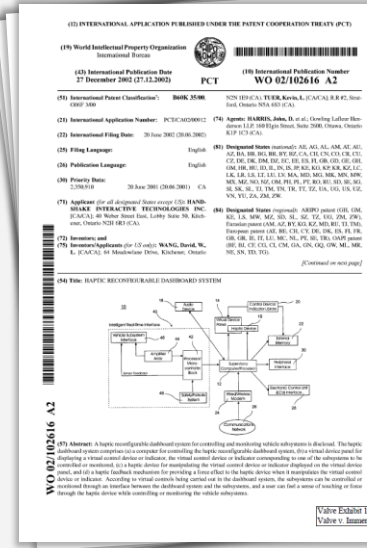
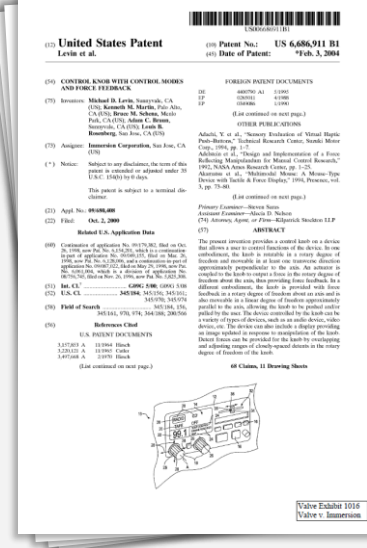
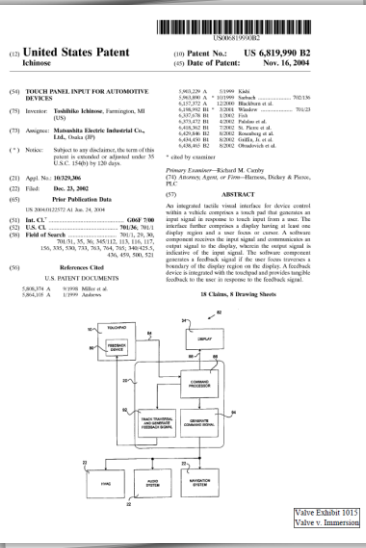
For the reasons stated above, Levin's jolts are not vibrational and further do not constitute virtual detents. Even if Levin's jolts were vibrational, Valve has not established that vibrational jolts were "*a known technique* for simulating a detent"

Sur-Reply

formed by the knob. A basic force sensation is force detents that are output at particular rotational positions of the knob to inform the user how much the knob has rotated and/or to designate a particular position of the knob. The force detents can be simple jolts or bump forces to indicate the detent's position, or the detents can include forces that attract the knob to the particular rotational detent position and resist movement of the knob away from that position. The position

EX1016 at 10:11-21 (cited by Reply at 6)

Levin



GROUND	CLAIMS	BASIS
1. Ichinose (EX1015) Combined with Levin (EX1016)	1-19	103
2. Wang (EX1022) Combined with Ichinose	1-19	103
3. Rosenberg (EX1009)	1-19	102

Ground 3: Wang's Disclosure

Petition at 32-35

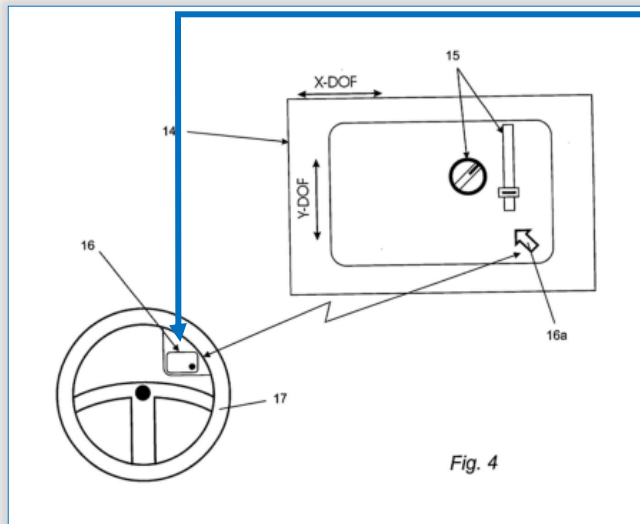


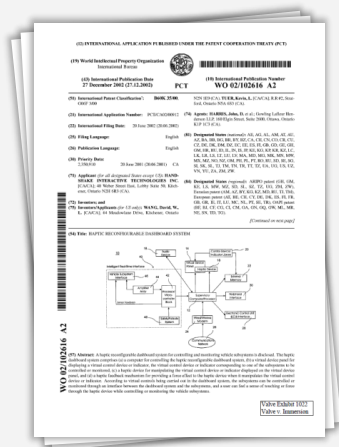
Fig. 4

The haptic device is a “thumb-actuated device” with actuators to generate “force effects.” 7:26-29; 9:20-28; 16:1-8; claim 13. The driver uses the input haptic device to position cursor 16a over a virtual knob or slider and manipulate (e.g., rotate/push) the knob or slider, which causes the haptic device actuators to “emulate a series of detents as the knob rotates.” 8:29-31; 7:18-22 (“emulate...detent effects encountered while rotating the dial”); 16:22-24 (“turn virtual knobs and push virtual slides controls as if they are real.”); 16:30-17:2 (“each and every control feels like its mechanical counterpart”).

Petition at 33

The use of touchpads in automobile applications, including touchpads that provide haptic feedback, was well-known. Ward, ¶¶215-219 (citing, e.g., EX1023-1026 as corroboration). Therefore, selecting Ichinose’s particular touchpad to implement Wang’s haptic device 16 would have also been a simple and routine design choice for POSAs. Ward, ¶220.

Petition at 34-35



Wang

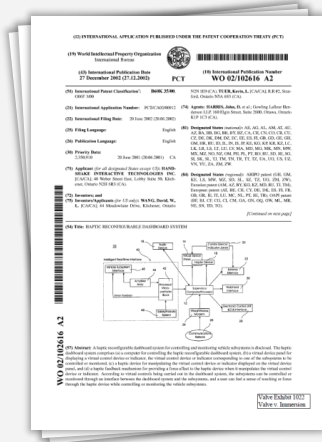
The Disputed Issues

GROUND	CLAIMS	BASIS
1. Ichinose Combined with Levin	1-19	103
2. Wang Combined with Ichinose	1-19	103
3. Rosenberg	1-19	102

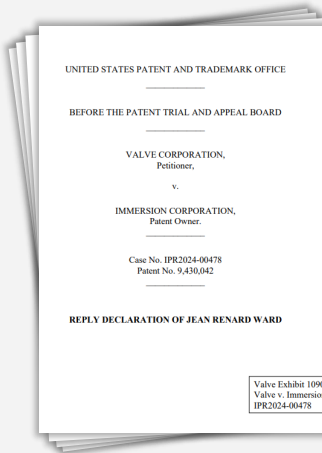
- **Ground 2**: Is Wang analogous prior art, is Wang limited to force-feedback effects, and would POSAs use Wang's effects in a touchpad?

Wang's Disclosure Is Not Limited to Force Feedback

Reply at 17-19



Wang



Ward Reply Decl.
EX1090

(57) Abstract: A haptic reconfigurable dashboard system for controlling and monitoring vehicle subsystems is disclosed. The haptic dashboard system comprises (a) a computer for controlling the haptic reconfigurable dashboard system, (b) a virtual device panel for displaying a virtual control device or indicator, the virtual control device or indicator corresponding to one of the subsystems to be controlled or monitored, (c) a haptic device for manipulating the virtual control device or indicator displayed on the virtual device panel, and (d) a haptic feedback mechanism for providing a force effect to the haptic device when it manipulates the virtual control device or indicator. According to virtual controls being carried out in the dashboard system, the subsystems can be controlled or monitored through an interface between the dashboard system and the subsystems, and a user can feel a sense of touching or force through the haptic device while controlling or monitoring the vehicle subsystems.

EX1022 at Abstract (cited by Pet. at 32 and Reply at 17)

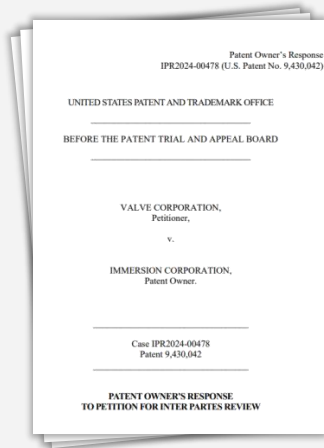
95. As I explained above in paragraphs 38-41, Wang is broadly directed to a “haptic device” that allows a user to “feel a sense of touching or force through the haptic device while controlling or monitoring the vehicle subsystems.” EX1022 at Abstract; *see also* claim 1. Wang never says the “touching or force” that a user feels through the haptic device is limited to assistive or resistive force feedback, and a POSITA would not have interpreted “haptic” in Wang to be narrower than its ordinary meaning which encompasses both assistive and/or resistive force feedback as well as other tactile feedback like vibrations. Indeed, the fact that Wang distinguishes between “a sense of touching” and “a sense of...force” (EX1022 at Abstract) would have been interpreted by a POSITA to confirm that Wang’s haptic effects are not limited to assistive and resistive force feedback (as Dr. Akl suggest) and include tactile feedback like vibrations.

EX1090 (Ward Reply) at ¶ 95 (cited by Reply at 17)

Wang's Disclosure Is Not Limited to Force Feedback

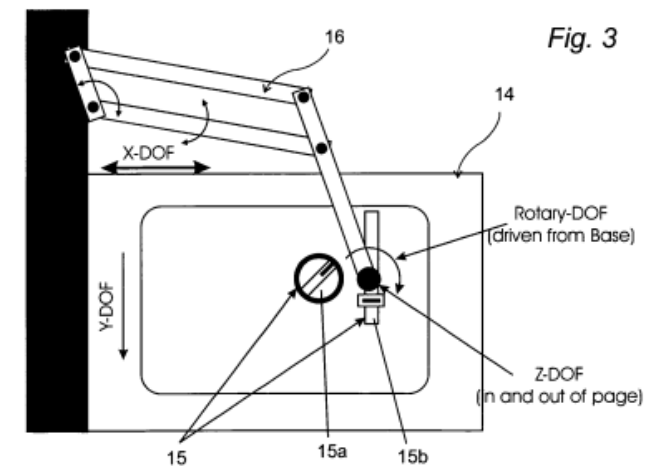
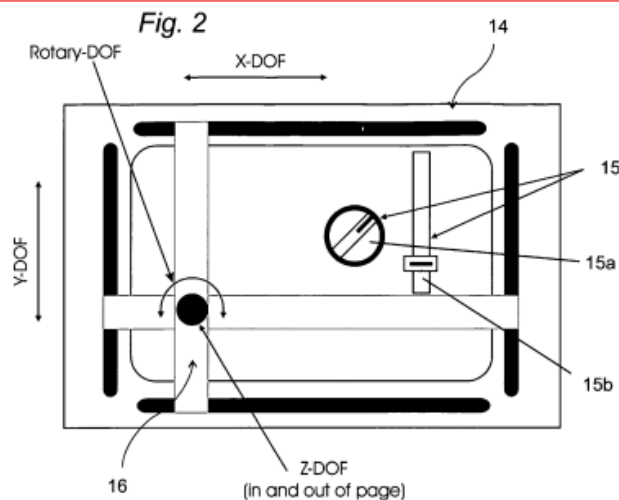
Reply at 17-19

Patent Owner Response (at 50)



Patent Owner Response

A POSA would understand that Wang does not disclose the claimed virtual detent. EX2007, ¶¶116-18. Wang provides a sensation of resistance to the user by way of contact force effects that are exerted in the degrees of freedom that the overlaid haptic device (i.e., physical control appendages) is moved around on the surface of the virtual device panel. EX1022, 7:23-26 (haptic feedback actuator generating force effects in each of the **active degrees-of-freedom**), 7:26-31. Neither reference discloses this element. Thus the combination is not obvious over Claim 1.

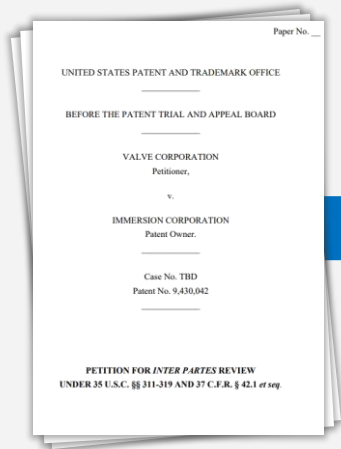


Wang's Disclosure Is Not Limited to Force Feedback

Reply at 17-19

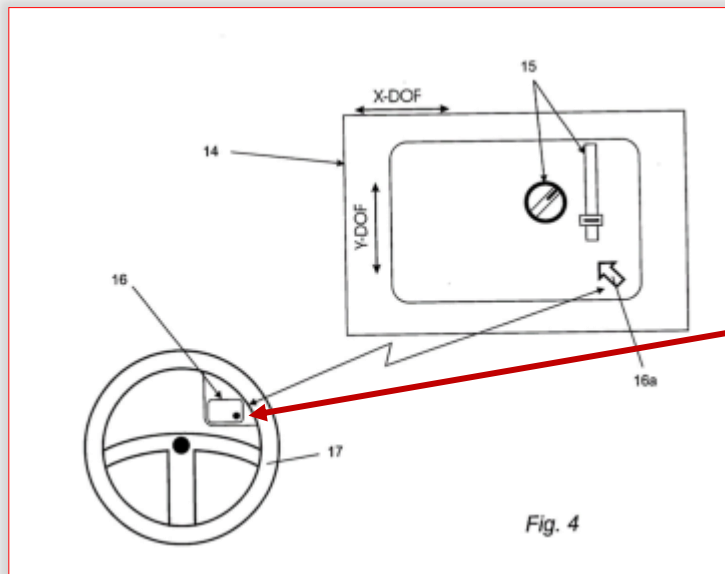
Petition (at 39)

by other electronic components). In Wang-Ichinose, these signals cause the actuator(s) to produce emulated detents, *i.e.*, vibrotactile effects, in accordance with the “associated properties” stored in the “control devices/indicator library” for the virtual control being manipulated. *Supra* §VII.B.4.c ([1B]); Ichinose, 4:7-35 (explaining touchpad 10’s actuator causes vibrations to be felt); Ward, ¶¶233-238.

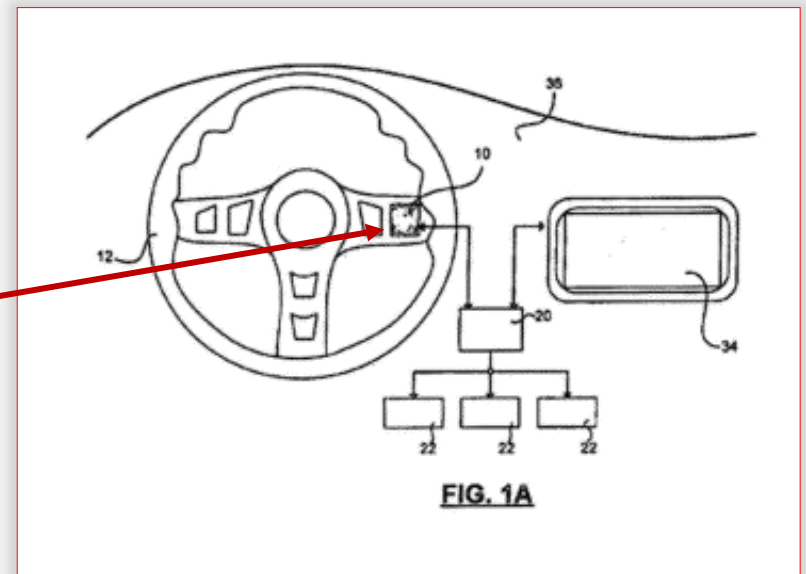


Petition

Wang



Ichinose



Wang's Disclosure Is Not Limited to Force Feedback

Reply at 17-19

Trials@uspto.gov
571-272-7822

Paper 11
Date: July 25, 2024

UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE PATENT TRIAL AND APPEAL BOARD

VALVE CORPORATION,
Petitioner,

v.

IMMERSION CORPORATION,
Patent Owner.

IPR2024-00478
Patent 9,430,042 B2

Before WILLIAM V. SAINDON, PATRICK R. SCANLON, and
CHRISTOPHER L. OGDEN, Administrative Patent Judges.
SCANLON, Administrative Patent Judge.

DECISION
Granting Institution of *Inter Partes* Review
35 U.S.C. § 314



At this stage, we agree with Patent Owner that the Petition appears deficient with respect to explaining why Wang's command signals would generate a vibrotactile signal to emulate detents. Although Ichinose discloses vibrotactile feedback, neither reference appears to disclose using vibrotactile signals to emulate a detent. It is not clear to us that the Petition explains sufficiently why the emulated detents in the proposed combination would be vibrotactile effects. Petitioner cites, but does not discuss, Mr. Ward's testimony on this point. Pet. 39 (citing Ex. 1003 ¶¶ 233–238).

Institution Decision at 32 (cited by Reply at 19)

Institution Decision



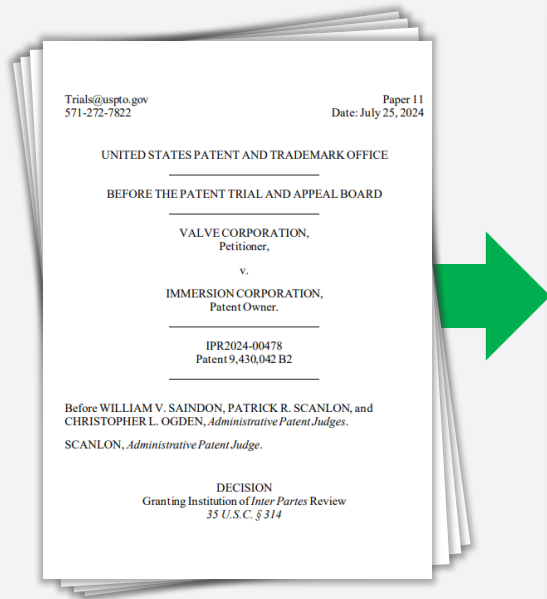
“That the proposed combination[]—rather than one of the individual references—discloses the disputed claim limitations does not defeat the Board's conclusion of obviousness. In this case, it is sufficient that a person of ordinary skill in the art would have been motivated to combine the prior art in a way such that the combination discloses the claim limitations.” *Fleming v. Cirrus Design Corp.*, 28 F.4th 1214, 1222 (Fed. Cir. 2022).

Cited by Reply at 19

Additional Slides

The Board Already Rejected a Similar Attempt by Immersion to Narrow the Claims to System-Specific Detents

Reply at 20-21



Trials@uspto.gov
571-272-7822

Paper 11
Date: July 25, 2024

UNITED STATES PATENT AND TRADEMARK OFFICE
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CHRISTOPHER L. OGDEN, *Administrative Patent Judges*.
SCANLON, *Administrative Patent Judge*.

DECISION
Granting Institution of *Inter Partes* Review
35 U.S.C. § 314

Institution Decision

At this stage, we disagree with these arguments. The claim language in question requires only that the detent profile be “associated with one of the systems.” Claim 1, which is an open-ended claim, does not require a “unique” or “application-specific” association between the detent profile and one of the systems. The detent profile is not required to have a unique association with only *one* of the systems and not with any of the other systems; there is no requirement that each one of the plurality of systems be associated with its own unique detent profile. Rather, the detent profile need only be associated with at least one of the systems and could be associated with multiple systems.

Institution Decision at 24-25 (cited by Reply at 21)

Rosenberg's Touchpad Controls a “*Plurality of System*” Even Under Immersion's Construction

Reply at 24

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

VALVE CORPORATION,
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Case No. IPR2024-00478
Patent No. 9,430,042

REPLY DECLARATION OF JEAN RENARD WARD

Valve Exhibit 1090
Valve v. Immersion
IPR2024-00478

**Ward Reply Decl.
EX1090**

101. A POSITA would interpret the above disclosure in Rosenberg-I to mean that the application program—e.g., a web browser or videogame—takes coordinate input from Rosenberg-I's touchpad and then “outputs” a command to the touchpad's actuator to perform a particular type of force feedback such as a pulse.

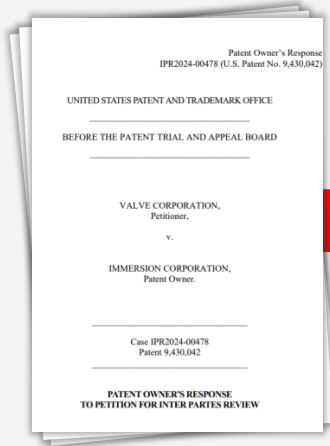
That is, the application determines which haptic feedback (e.g., “*virtual detents*”) to output and thus the haptic feedback is application-specific or—as Immersion would say—the application being manipulated “provides context for virtual detents.”

102. This understanding of Rosenberg-I is consistent with a subsequent passage in Rosenberg-I that explains that “[t]he touchpad device also includes circuitry that receives signals from the host and outputs tactile sensations in accordance with the host signals using one or more actuators. In some embodiments, a separate, local microprocessor can be provided for the touchpad 16 to both report touchpad sensor data to the host and/or to carry out force commands received from the host, such commands including, for example, the type of haptic sensation and parameters describing the commanded haptic sensation.” EX1009 at 6:29-37. A POSITA would have understood the “host” referred to in this passage as including a “host application program.”

EX1090 at ¶¶101-102 (cited by Reply at 24)

Rosenberg's Vibrations Are Not Generic, They Simulate Detents

Reply at 26



Patent Owner Response (at 58)

39. Namely, Rosenberg-I teaches that pulses indicate information such as certain locations within a range or events, but never as a way to simulate mechanical resistance vibrationally. EX1009, 12:53-59 (pulse indicates information); 13:3-5 (pulse indicates occurrence of event), 13:39-40 (pulse indicates occurrence of event).

Patent Owner Response

But See Ward Reply

POR at 58

range.”⁸ EX1009 at 12:56-58. A POSITA would understand that the “ticks” Rosenberg-I refers to are individual settings within a range such as discrete radio stations within the FM broadcast band (*e.g.*, 88.0 Mhz to 108 Mhz) or discrete temperature settings (*e.g.*, 63 degrees to 95 degrees). If a mechanical knob or knob with traditional mechanical components were used to adjust individual settings within a range, then the user would expect to feel a “click” (or “tick”) each time an individual setting is selected. When, as in Rosenberg-I, a vibrational touchpad is used to control a virtual knob or slider, the pulse that is generated simulates the “click” (or “tick”) effect that a user would have expected to feel with a mechanical knob or slider. This is the same effect as depicted in Figure 9A of the '042 patent.