

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent of: Michael S. Smith
U.S. Patent No.: 10,649,580 Attorney Docket No. 50095-0165IP1
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Appl. Serial No.: 16/664,777
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Title: DEVICES, METHODS, AND GRAPHICAL USER INTERFACES
FOR MANIPULATING USER INTERFACE OBJECTS WITH
VISUAL AND/OR HAPTIC FEEDBACK

SUPPLEMENTAL DECLARATION OF DR. ANDREW COCKBURN

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I. INTRODUCTION

1. I have been retained as a technical expert by counsel on behalf of Apple Inc. (“Apple”/“Petitioner”) in Case No. IPR2024-01091 with respect to U.S. Patent No. 10,649,580 (“the ’580 Patent”) (APPLE-1001).

2. I understand that this declaration (“Supplemental Declaration”) will be submitted in support of Petitioner’s Reply to Patent Owner’s Response to the Petition for *inter partes* review of the ’580 Patent. This Supplemental Declaration supplements certain portions of my prior declaration in support of the Petition for this IPR Proceeding (APPLE-1003, “Prior Declaration”). In my Prior Declaration, I address many topics, including (but not limited to) my background and qualifications, the level of skill in art, an overview of the ’580 Patent, a POSITA’s background knowledge, certain legal standards explained to me by counsel, and a detailed analysis of the prior art against the claim elements of the ’580 Patent.

3. I maintain all of my earlier analysis and continue to hold the opinions expressed in my Prior Declaration. This Supplemental Declaration does not replace my Prior Declaration. These declarations are complementary and should be read in tandem. Accordingly, this Supplemental Declaration does not cover every topic addressed in my Prior Declaration.

4. In forming this Supplemental Declaration, I have considered the references listed in my original declaration (APPLE-1003, ¶15), my

knowledge and experience in this field, including my research and work experience in the field, my experience working with others involved in the field, and the third-party documents cited throughout my analysis. *See* APPLE-1003, ¶¶1-14 (discussing qualifications), ¶¶26-27 (discussing the level of skill for a “POSITA”). In addition, I considered the transcript from the deposition of Dr. Mahon (APPLE-1033) and U.S. Patent Publication No. 2008/0122796 to Jobs et al. (“Jobs2”) (APPLE-1034), which the ’580 Patent incorporates by reference.

5. Note that, unless I have indicated otherwise, all emphasis (bold/italics/underline) in any quoted text are ones I have added.

6. Although I cite and quote to selected portions of various references in this Supplemental Declaration, the reader should understand that these citations are representative examples. A POSITA would have viewed each reference in its entirety and in combination with other references. Accordingly, I intend the references identified in this Declaration to be viewed as incorporated in their entireties.

7. I am not, and never have been, an employee of Apple. I received no compensation for this Supplemental Declaration beyond my normal hourly compensation based on my time actually spent preparing this declaration. I will

not receive any added compensation based on the outcome of any IPR or other proceeding involving the '580 Patent.

II. LEGAL PRINCIPLES

A. Anticipation

8. I have been informed that a patent claim is invalid as anticipated under 35 U.S.C. § 102 if each and every element of a claim, as properly construed, is found either explicitly or inherently in a single prior art reference. Under the principles of inherency, if the prior art necessarily functions in accordance with, or includes the claimed limitations, it anticipates.

9. I have been informed that a claim is invalid under 35 U.S.C. § 102(a) if the claimed invention was known or used by others in the U.S., or was patented or published anywhere, before the applicant's invention. I further have been informed that a claim is invalid under 35 U.S.C. § 102(b) if the invention was patented or published anywhere, or was in public use, on sale, or offered for sale in this country, more than one year prior to the filing date of the patent application (critical date). And a claim is invalid, as I have been informed, under 35 U.S.C. § 102(e), if an invention described by that claim was described in a U.S. patent granted on an application for a patent by another that was filed in the U.S. before the date of invention for such a claim.

B. Obviousness

10. I have been informed that a patent claim is invalid as “obvious” under 35 U.S.C. § 103 in light of one or more prior art references if it would have been obvious to a POSITA, taking into account (1) the scope and content of the prior art, (2) the differences between the prior art and the claims, (3) the level of ordinary skill in the art, and (4) any so called “secondary considerations” of non-obviousness, which include: (i) “long felt need” for the claimed invention, (ii) commercial success attributable to the claimed invention, (iii) unexpected results of the claimed invention, and (iv) “copying” of the claimed invention by others. For purposes of my analysis above and because I know of no indication from the patent owner or others to the contrary, I have applied a date of August 5, 2011, as the date of invention in my obviousness analyses, although in many cases the same analysis would hold true even at an earlier time than August 5, 2011.

11. I have been informed that a claim can be obvious in light of a single prior art reference or multiple prior art references. To be obvious in light of a single prior art reference or multiple prior art references, there must be a reason to modify the single prior art reference, or combine two or more references, in order to achieve the claimed invention. This reason may come from a teaching, suggestion, or motivation to combine, or may come from the reference or references themselves, the knowledge or “common sense” of one skilled in the art,

or from the nature of the problem to be solved, and may be explicit or implicit from the prior art as a whole. I have been informed that the combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results. I also understand it is improper to rely on hindsight in making the obviousness determination.

III. OVERVIEW OF CONCLUSIONS FORMED

12. This declaration explains the conclusions that I have formed based on my analysis. To summarize those conclusions, based upon my knowledge and experience and my review of the prior art publications listed above, I believe that:

- Claims 1-4, 6-10, 17, 19, 22-26, 28-30, 32-33, 36, 41, 58-62, 64-65, 67, 69-70, 73, 77, and 82 are obvious over Ramos Paper in view of Ramos Video and Ording (Ground 1A)
- Claim 48 is obvious over Ramos Paper in view of Ramos Video, Ording, and Hayward (Ground 1B)

IV. LEVEL OF ORDINARY SKILL IN THE ART

13. In my opinion, a person of ordinary skill in the art (“POSITA”) relating to, and at the time of, the purported invention of the ’580 Patent would have had at least a bachelor’s degree in computer science, computer engineering,

electrical engineering, human-computer interaction, or a related field, and would have had at least two years of relevant work experience in the design and development of graphical user interfaces (GUIs), human-computer interfaces, or equivalents thereof. Less work experience may be compensated by a higher level of education and vice versa.

14. Based on my experiences, I have a good understanding of the capabilities of one of ordinary skill. Indeed, I have taught, participated in organizations, and worked closely with many such persons over the course of my career. Based on my knowledge, skill, and experience, I have an understanding of the capabilities of one of ordinary skill. Furthermore, I possess those capabilities myself.

V. INTERPRETATIONS OF THE '580 PATENT CLAIMS AT ISSUE

15. I have been informed by Counsel and understand that the best indicator of claim meaning is its usage in the context of the patent specification as understood by one of ordinary skill. I further understand that the words of the claims should be given their plain meaning unless that meaning is inconsistent with the patent specification or the patent's history of examination before the Patent Office. Counsel has also informed me, and I understand that, the words of the claims should be interpreted as they would have been interpreted by one of

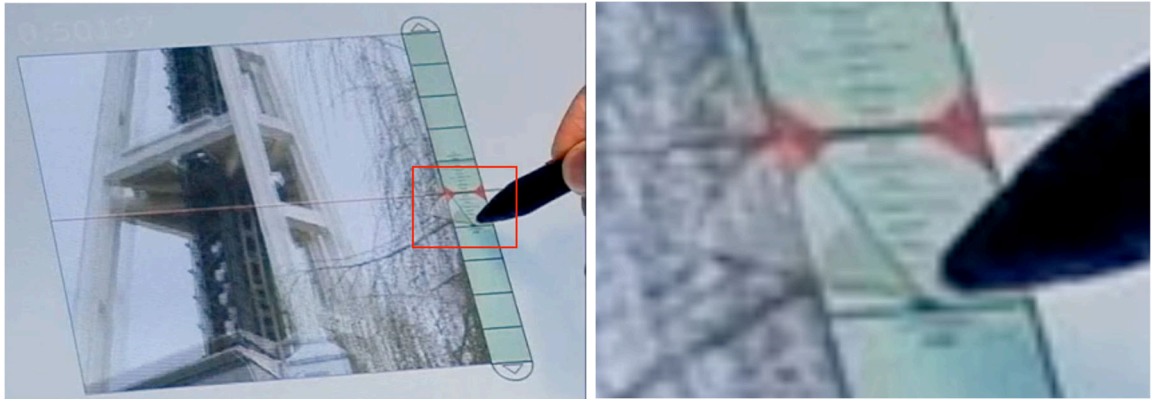
ordinary skill at the time of the invention was made (not today). I have been informed by Counsel that I should use August 5, 2011 as the point in time for claim interpretation purposes.

VI. The RROD Renders Obvious Claims 1-4, 6-10, 17, 19, 22-26, 28-30, 32-33, 36, 41, 58-62, 64-65, 67, 69-70, 73, 77, and 82

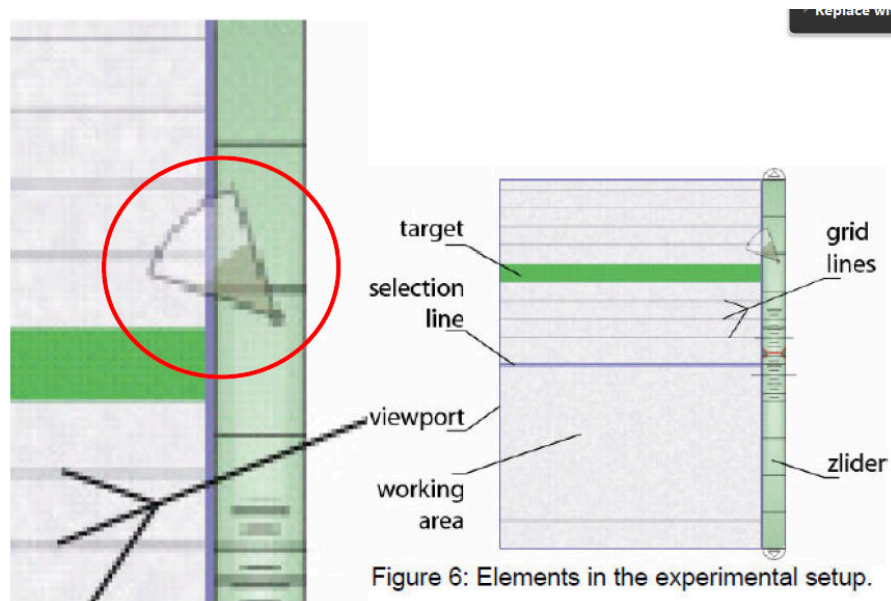
A. The Petition Clearly Supports the Combination of Ramos Paper, Ramos Video, and Ording

16. Smith's arguments concerning motivation to combine are limited to an argument that the motivations presented in the Petition do not relate to translucency. Preliminarily, Smith broadly states that "Petitioner fails to support its purported combination of the Ramos Paper, Ramos Video, and Ording" (POR, 10) despite Petitioner offering several reasons for the combination—some not directly related to semitransparency. Rather, Smith only attacks Petitioner's reasons for combining with Ording as it relates to translucency. Smith does not independently attack the Petition's first and second reasons for the combination for any reason except that they allegedly do not support transparency—despite the Petition's argument that Ramos Paper and Ramos Video independently provide this feature by way of the Zlider's pressure cursor, discussed below. Pet., 54-57. Thus, for at least the un rebutted first two reasons in the Petition, a POSITA would have been motivated to combine Ramos Paper, Ramos Video, and Ording.

17. Second, as to supporting a combination that renders obvious translucency, Petitioner establishes that the Zlider of Ramos Paper and Ramos Video itself provides translucency, so one need not necessarily incorporate Ording's teachings relating to transparency to teach or render [1i]/[1.h] obvious. Specifically, the Petition establishes that "Ramos Paper teaches or suggests that the Zlider is at least partially translucent, showing an example Zlider in Figure 6 (below) where its 'pressure cursor' (circled below in red) is semi-translucent, as evidenced by the grid lines visible through the cursor." Pet., 55 (citing APPLE-1004, 6, FIG. 6; APPLE-1003, ¶90). Smith agrees that the Zlider's pressure cursor is translucent. POR, 28 ("The translucency of the pressure cursor is seen"). Ramos Video shows a Zlider "in which translucent markings (a wedge connecting the cursor location with a box top-left) appear on a second layer in response to an aspect of a touch." Pet., 56 (citing APPLE-1005, 3:57-4:15). For example, the figure below (from APPLE-1005, 3:18) shows tree branches visible through the translucent pressure cursor. Additionally, Figure 6 of Ramos Paper shows "the 'pressure cursor' of the Zlider is displayed in a second layer (i.e., it is always above, for example, the image being displayed and manipulated by the Zlider) along with the other components of the Zlider (e.g., working area and Vernier)." *Id.* (citing APPLE-1004, FIG. 6; APPLE-1003, ¶91).

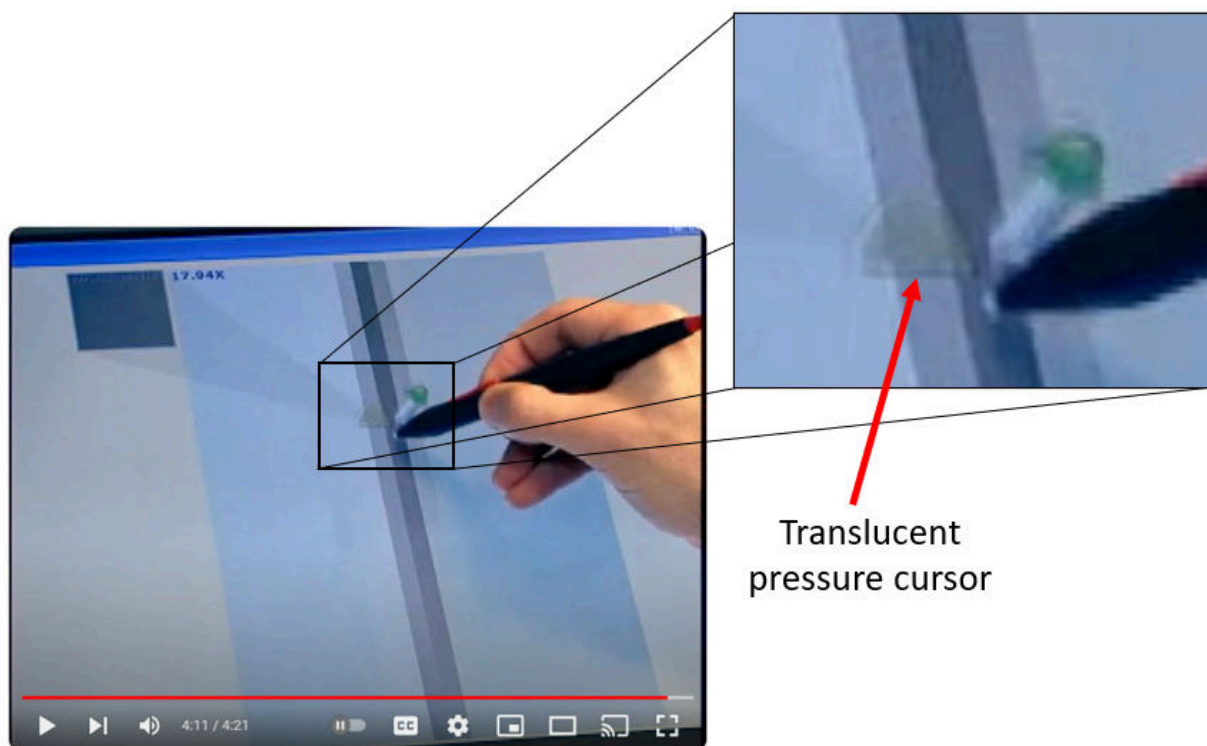


APPLE-1005, 3:18.



APPLE-1004, 127 (Figure 5-16) (annotated, zoomed in on left)

Pet., 56 (citing APPLE-1004, 127 (Figure 5-16)).



Pet., 57 (citing APPLE-1005, 4:11) (zoomed in; annotated).

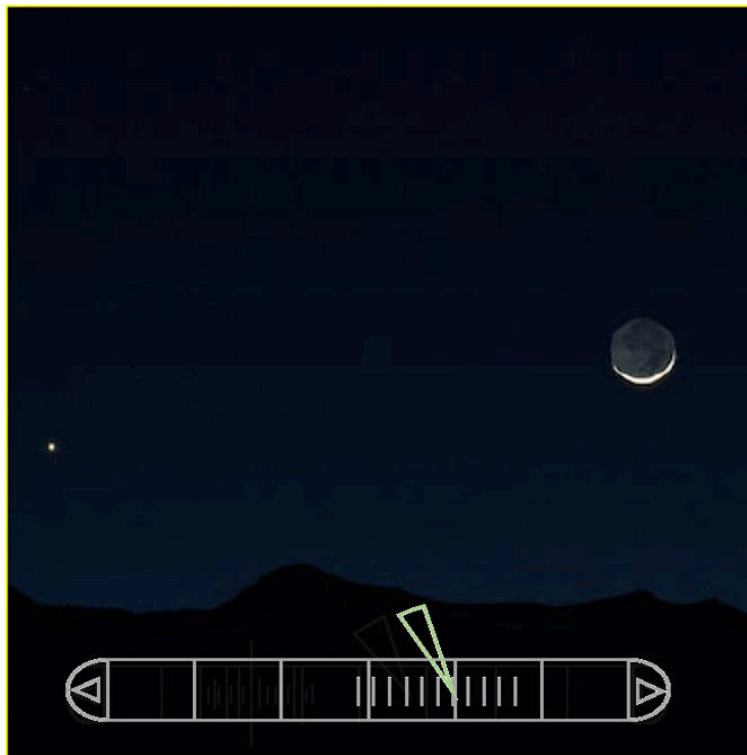
18. Additionally, a finite number of options exist for the Zlider’s working area—either it is adjacent to the underlying image or it overlays it, so it would have been “obvious to try this finite number of identified predictable solutions, with a reasonable expectation of success,” as argued in the Petition. Pet., 57 (citing APPLE-1003, ¶92). Ording offers additional corroboration that it was well-known to use widgets that were at least semi-transparent. Pet., 57-58; APPLE-1006, [0045]. Notably, Smith does not argue against the translucency of the Zlider’s pressure cursor. Rather, Smith only argues as to whether the Zlider’s pressure cursor is in a different virtual display layer than the contents (POR, 24), which is wrong, as explained in §VI.B.

19. Third, to the extent that the Zlider itself does not offer the requisite transparency – though, in my opinion, it does, Ordering renders the transparency of [1i]/[1.h] obvious, as the Institution Decision observes, where such a combination incorporates Ordering’s teaching of a “semitransparent object” to render, for example, the majority of the Zlider at least partially translucent. ID, 31; Pet., 57-59; APPLE-1006, [0045], [0094]. As I previously stated, “the Zlider widget of the combined disclosures would offer a UI widget that is at least partially transparent such that content below is visible, resulting in a widget that is minimally intrusive and reduces the amount of the underlying content that is blocked or not visible.” APPLE-1003, ¶60 (citing APPLE-1005, 3:16-3:19, 3:28); *see also id.*, ¶59.

20. Smith’s arguments that modifying Ramos’ Zlider to be semitransparent would make the Zlider “more intrusive” or “unusable” is largely based on a willfully ignorant example scenario. POR, 17-19. That is, Smith offers a scenario where the underlying content depicts a night sky. POR, 18. But, ignoring the level of ordinary skill of a POSITA—who would have “at least a bachelor’s degree in computer science, computer engineering, electrical engineering, human-computer interaction, or a related field, and would have had at least two years of relevant work experience in the design and development of graphical user interfaces (GUIs), human-computer interfaces, or equivalents thereof”—Smith

purposefully fails to adjust the outline of the Zlider in this example such that the Zlider is not easily seen. POR, 19.

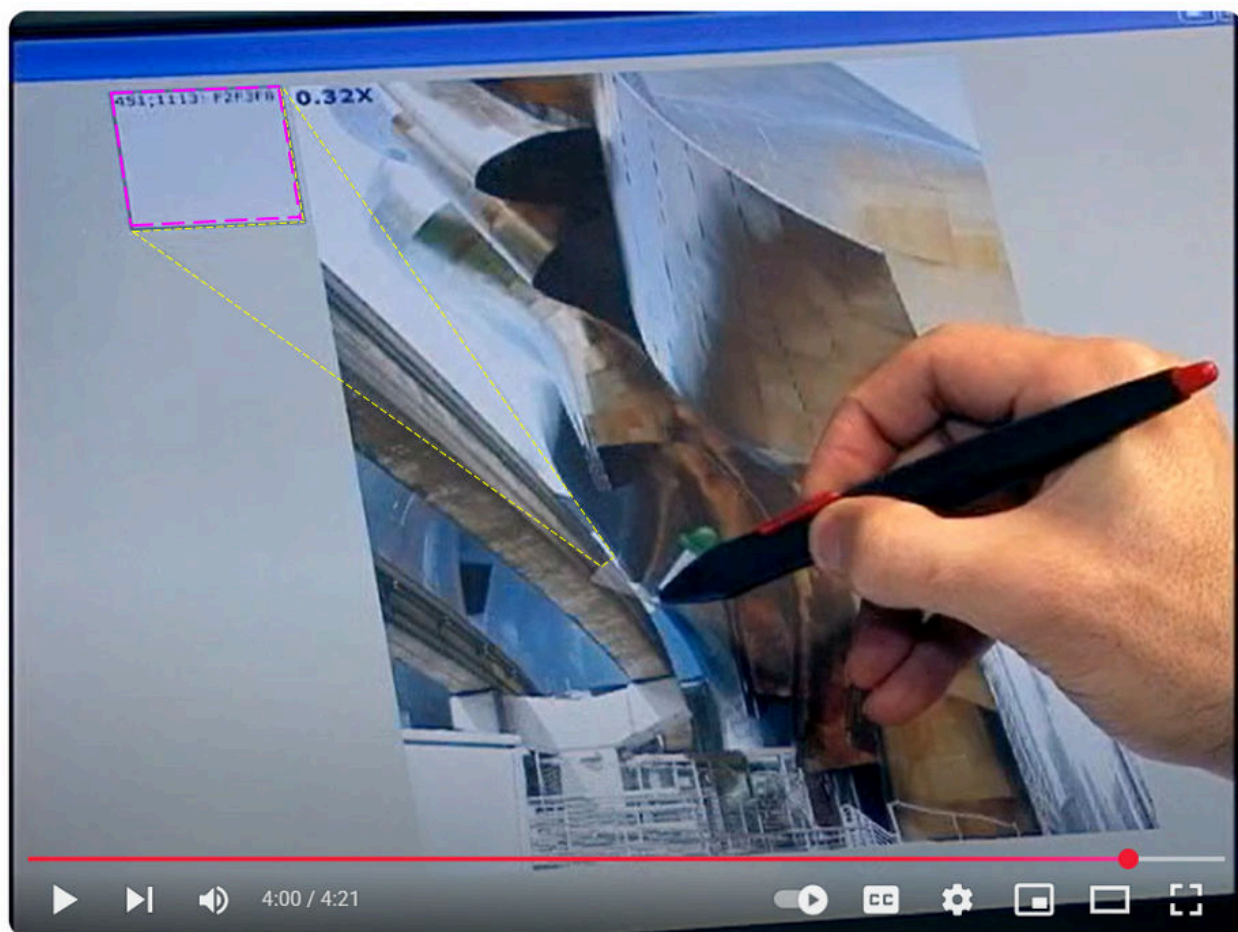
21. It would have been well within the skill of a POSITA to make such a straightforward adjustment to the Zlider in such a scenario as shown below, based on the content of the underlying layer, as I have shown below.



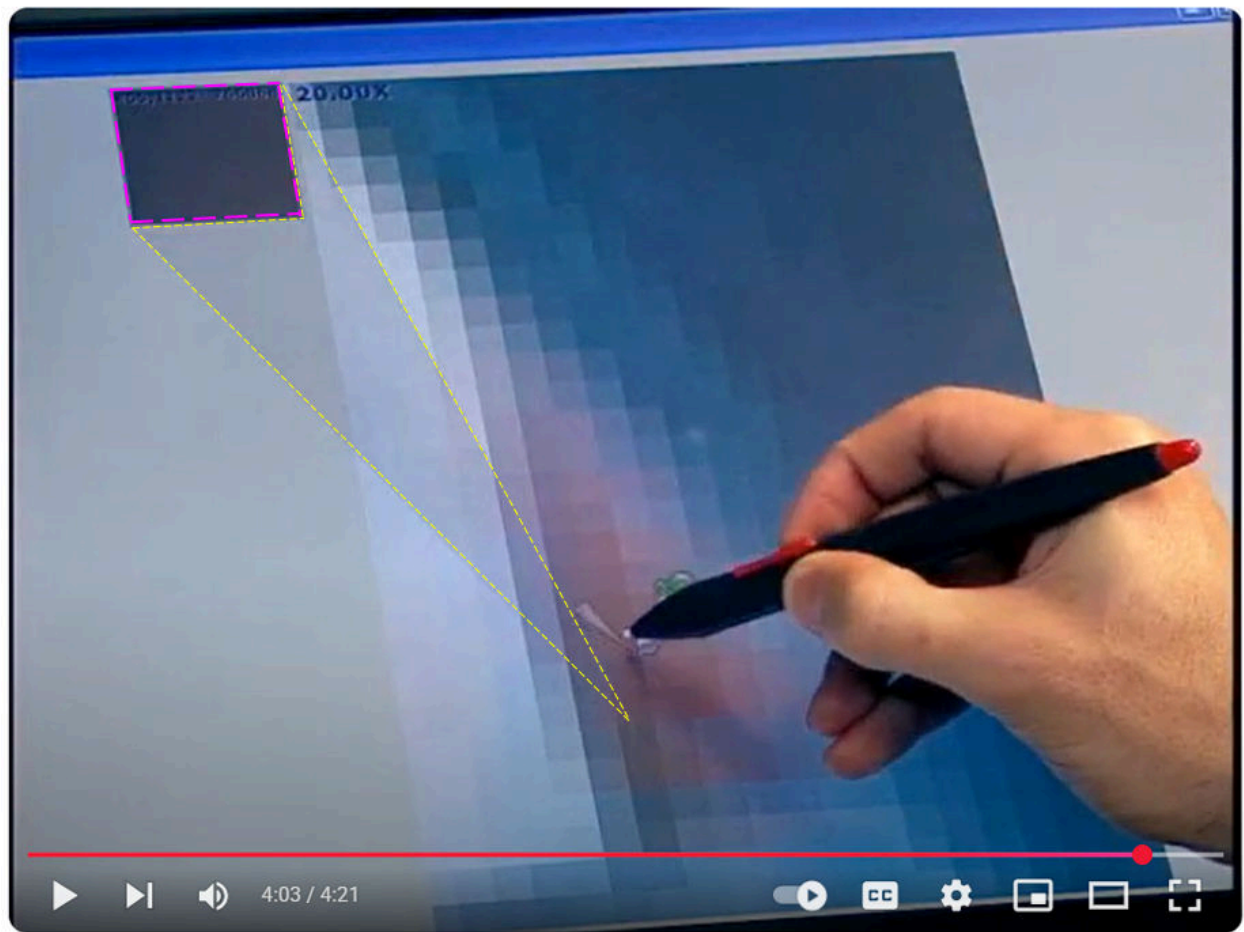
22. In fact, Dr. Mahon testified to the “use [of] standard graphics techniques for meeting the requirements of the end user.” APPLE-1033, 93:8-14; *see id.*, 92:8-93:6 (explaining that, in his previous research work and experience relating “interacting with and displaying data that appeared to have depth associated with it,” “object[s] could be represented in many different ways”).

Thus, Smith's argument against the combination's semitransparent Zlider is not credible.

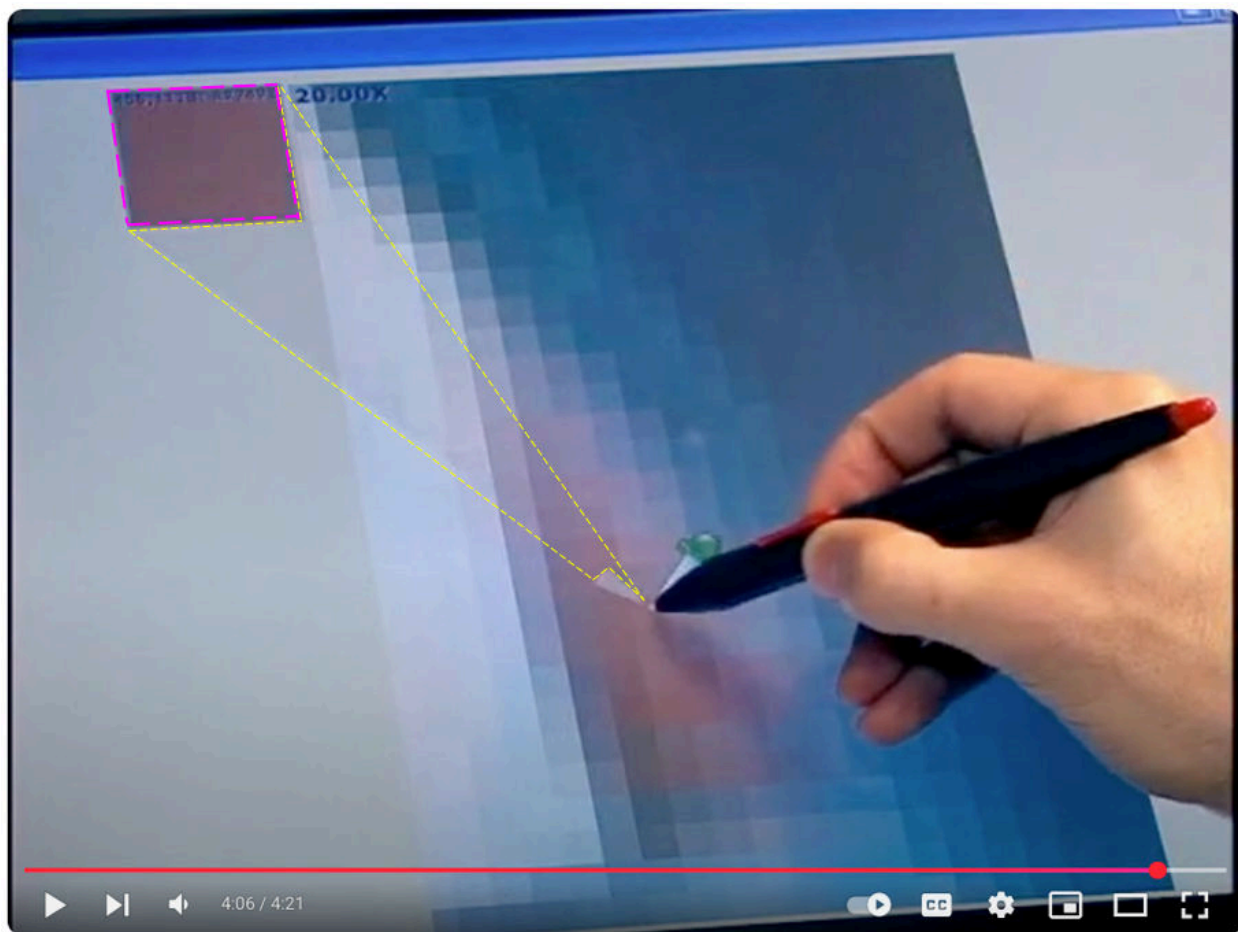
23. The Ramos Video offers further evidence as to the commonplace practice of adjusting transparency effects. In particular, Ramos Video at 4:00-4:18 shows a pressure cursor used in conjunction with an eyedropper tool that is used to identify the particular color the user is selecting in the underlying image. APPLE-1005, 4:00-4:18. The identified color is displayed at the top left (annotated below in a dashed magenta line), connected to the pressure cursor/eyedropper tool with a semi-translucent polygon shape (annotated below in a dashed yellow line). *Id.* As shown below, Ramos Video shows modifications of the transparency effects of the polygon shape, depending on the user's selection. *Id.*



APPLE-1005, 4:00 (annotated)



APPLE-1005, 4:03

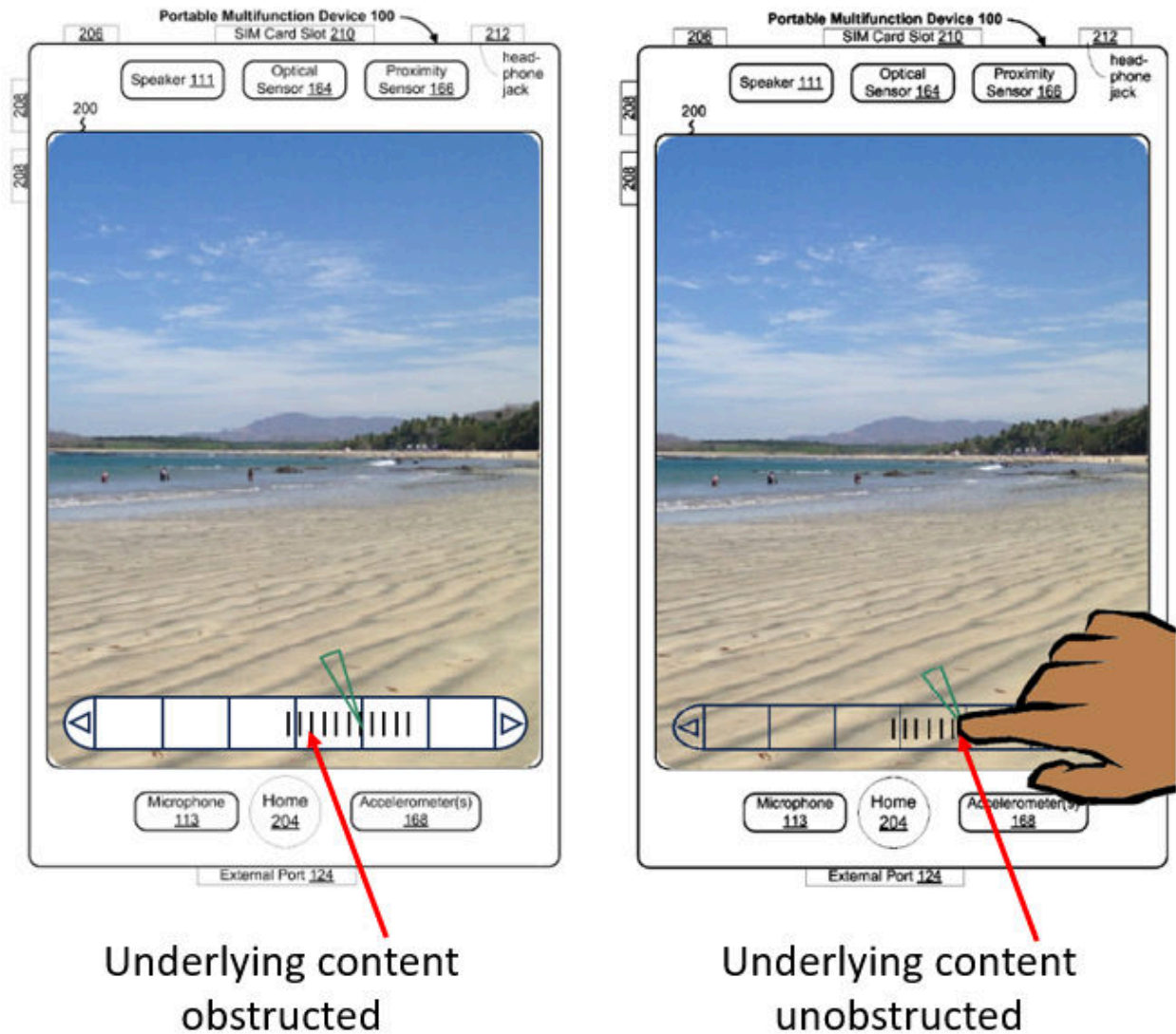


APPLE-1005, 4:06 (annotated)

Thus, Ramos Video, too, shows the adjustment of transparency effects in response to a particular selection or context, which a POSITA would have understood to be a routine practice that Smith and Dr. Mahon ignore. Dr. Mahon’s admission that he “didn’t discuss an analysis based on Dr. Cockburn’s assertions of this particular section of the video” (APPLE-1033, 79:19-80:3) and the absence of any mention of this portion of the Ramos Video in Dr. Mahon’s declaration (*see, generally*, EX2012) confirms that Dr. Mahon did not consider the straightforward and well-known methods for adjusting transparency effects that existed prior to the Critical

Date in offering his opinion. Smith's Response is also silent. *See, generally*, POR.

24. Petitioner argues that displaying UI objects as being “semitransparent” was well-known, as Ording illustrates. Pet., 58; APPLE-1003, ¶93. Moreover, a POSITA would have found it obvious to modify the Zlider to make it semitransparent, as needed, which would result in a “less intrusive” widget because it minimizes the obstruction on the image content. *Id.* A POSITA would have understood that, if only part of the Zlider is translucent (e.g., the pressure cursor), per Ramos Paper and Ramos Video, the working area of the Zlider would obstruct the underlying content that is otherwise visible through the modified Zlider (shown in the Petition at 59), as illustrated below in the comparison below.



Comparison of unmodified Zlider (left) with Zlider modified with semitransparency, per Ording (right)

25. Indeed, the benefit of applying Ording's teaching of semitransparency is clearly seen in the images above, where a significant portion of the underlying image (in the example at left) is obstructed by the Zlider's working area. Notably, a Zlider that was only adjacent to an image would have obscured, for example, an entire bottom portion of the image. Modifying the Zlider to make it at least

partially translucent, however, would allow the full image to be viewed in an unobstructed manner. In particular, for the unmodified Zlider to display the full image as displayed with the modified Zlider (at right) but in an unobstructed manner, the size of the image would need to be reduced since the touchscreen has a finite size. A POSITA would have understood that as much of the display as possible should be employed to display information content, rather than dedicating limited display space to user interface controls. Indeed, a 2008 video review of the iPhone user interface (by Edward Tufte, a renowned pioneer in the field of data visualization) makes exactly this point when describing the use of transparent user interface controls in the iPhone photo browsing app at 3:18 in the video:

“Computer administrative debris reduces information resolution and steals content space away from the user. The iPhone brilliantly suppresses much admin debris.”
APPLE-1035.

26. Finally, to the extent that Smith argues that the Petition fails to show that the Ramos Paper and Ramos Video disclose the translucency limitations because the *entirety* of the Ramos Zlider is not translucent, they are wrong. Specifically, the independent claims require that “*at least a portion* of the second virtual layer is at least partially translucent.” The pressure cursor disclosed by the Ramos Paper and Ramos Video is a translucent portion of the Zlider and it therefore satisfies the limitation. Furthermore, dependent claims of the ’580 Patent

confirm that the “at least a portion of the second virtual layer is at least partially translucent” limitation should be interpreted to cover only a portion of the second virtual layer being translucent. For example, claim 21 recites “the at least portion of the second virtual display layer is at least partially translucent, by only a portion of the second virtual display layer being at least partially translucent.” APPLE-1001, 105:4-8.

B. The RROD Renders Obvious a Second Virtual Display Layer that Appears to have a Lesser Depth than the First Virtual Display Layer

27. Smith admits that the pressure cursor of Ramos’ Zlider is translucent. POR, 28 (“The translucency of the pressure cursor is seen”); EX2012, ¶91; APPLE-1033, 65:11-66:5 (“Q. Is the portion of the pressure cursor that extends within the image region of the freeze frame [at 3:16 of the Ramos Video] at least partially translucent? A. The change in appearance of the pressure cursor, as I said, does give the appearance that it is -- the image is underlying content of the pressure cursor, based upon this freeze frame and to someone viewing this freeze frame. Q. So, to clarify, does the pressure cursor appear at least partially translucent over the underlying content that is the image? ... A. Well, the pressure cursor is certainly changing the appearance of what is underneath it, and that does include the image.”). In the absence of any argument that the Zlider’s pressure cursor fails to satisfy the translucency requirement of second virtual display layer, Smith can only

attempt to argue that the uncontested translucent pressure cursor of the Zlider (and/or the Vernier of the Zlider) is not part of the second virtual display layer, but rather, that it is in the same virtual layer as the contents. POR, 21-26. But this argument is wrong.

28. First, a POSITA would have understood that the Zlider—including all of its components—are in the same virtual display layer. EX2007, 65:2-11. Indeed, Ramos Paper itself teaches that the Zlider includes multiple components, referring to Figure 1 as the Zlider, and showing the Zlider as including the working area, the markings, and the pressure cursor. APPLE-1004, 1, FIG. 1. Dr. Mahon agrees that all of these components are part of the Zlider. APPLE-1033, 52:10-53:3. Ramos Paper further states that the Zlider widget includes “a rectangular working area” and can include “a pressure cursor (Figure 2)” that “provides users with a real-time indicator of the pressure they are applying with the input transducer.” APPLE-1004, 3. “The Zlider also displays a Vernier” that “adapts its grid spacing depending on the widget’s current scale factor.” APPLE-1004, 3.

29. A POSITA would have naturally considered those components that make up the Zlider to exist on the same virtual display layer. A POSITA would have understood that when user interface widgets, such as the Zlider, are placed within a graphical user interface, they exist within a single layer of that interface. This is the case even when a widget consists of multiple sub-components that are

drawn using a particular placement order such that some sub-components appear on top of others. For example, scrollbar widgets have been well-known since at least the early 1980s, and scrollbars are well-known to be comprised of multiple sub-components, including a scroll-trough, a scroll-knob (or thumb), and scroll up/down or left/right arrows. While it would be clear to a POSITA that a scrollbar widget would require that the scroll-knob appear above the scroll-trough (the user would not be able to see (absent transparency effects) or directly operate the scroll-knob if that were not the case), a POSITA would also have understood that when inserting a scrollbar widget into a user interface, it would be inserted into a single layer of that interface. As another example, the 2010 Android “DatePicker”¹ widget consisted of multiple components (shown below) supporting the display and input of data relating to month, day, and year. This single widget consisted of many layered sub-components, including a background, a darkened panel, buttons, text display regions, etc. Regardless of the many components within a DatePicker widget, when a DatePicker widget was inserted into a user interface, it would appear in a single layer of that interface.

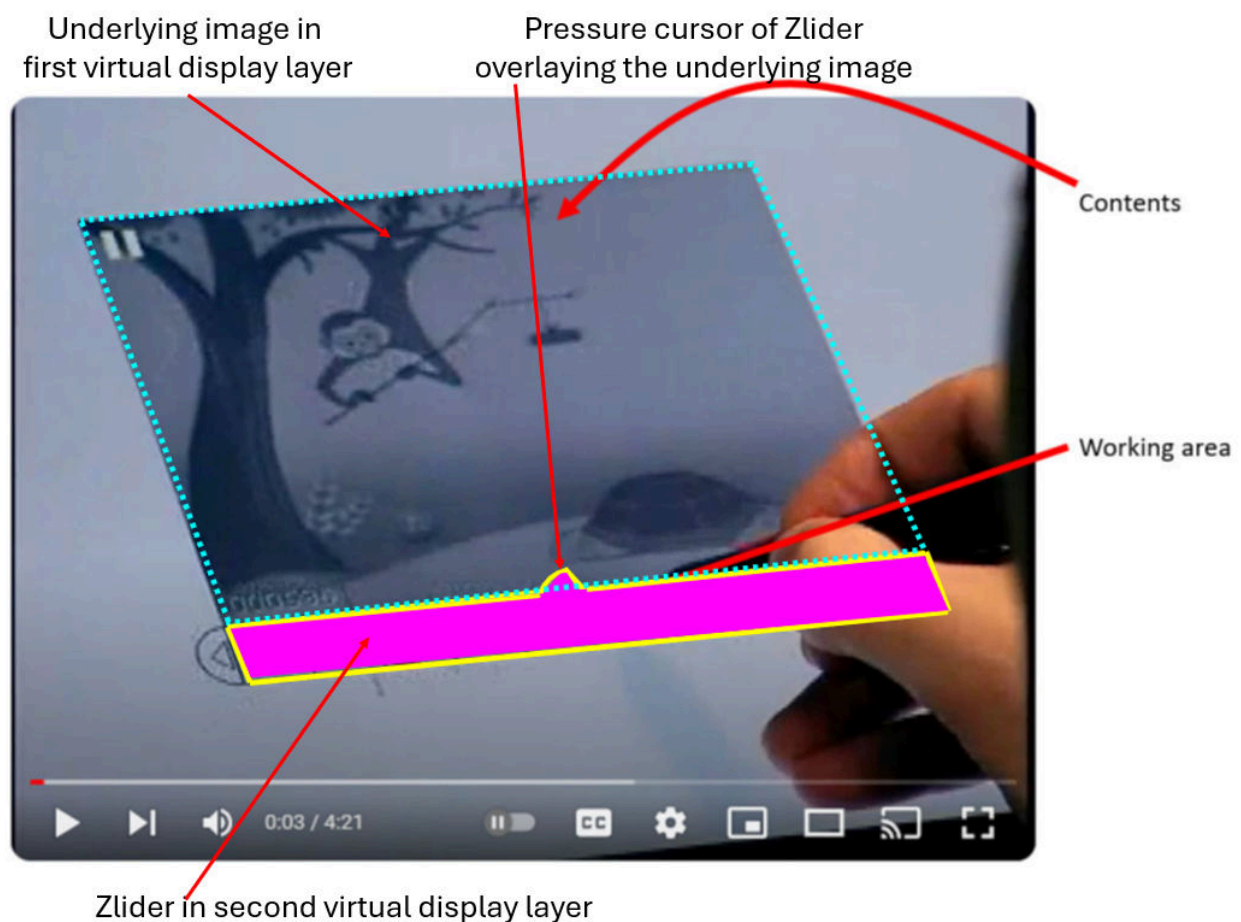
¹ APPLE-1036.



30. Smith asks the Board to accept that Ramos' Zlider comprises separate components divorced from one another that must necessarily exist on separate planes rather than accepting, more reasonably, that the components of Ramos' Zlider (e.g., the working area, the pressure cursor, and the markings) are collective parts of the Zlider and should thus be considered to be on the same apparent "plane"—one that exists above the image below. POR, 27-33. To separate these components of the Zlider or consider them otherwise located on different "planes" would be counter to the overall idea that these are simply parts of a whole widget. APPLE-1004, 1, FIG. 1.

31. Second, because a POSITA would have considered the components of the Zlider to be in the same virtual display layer and because at least a portion of the Zlider (e.g., the pressure cursor) is partially translucent, a POSITA would have further understood that the entirety of the virtual display layer comprising the Zlider is in a *different display layer than the content that can be seen through the pressure cursor*—specifically, the underlying content, or image. The Petition is

clear that the image being viewed (i.e., contents) exists on a first virtual display layer and RROD's Zlider exists on a second virtual display layer. Pet., 39-41, 49-59; APPLE-1003, ¶¶74-75, 83-93. As I have shown below from an image from the Ramos Video, because the Zlider includes the pressure cursor, which is *semitranslucent over the underlying image* (underlying image outlined in dashed cyan line), the entirety of the Zlider (including the region outlined in yellow and filled in magenta) appears in a virtual display layer that appears to have a lesser depth than the underlying image.



Pet., 40 (citing APPLE-1005, 0:03) (annotated)

32. Smith’s argument about playing “whack-a-mole” inaccurately characterizes the Petition and is also inconsistent with the claims of the ’580 Patent. *See* POR, 25.

33. First, Smith argues that, “if everything in the Ramos Paper and Ramos Video are in the same virtual layer, then there is no second virtual display layer.” POR, 25-26. This is not the argument presented in the Petition. Rather, Petitioner argues that the underlying content is in a first virtual display layer, while the Zlider (including its components) are in a second virtual display layer that appears to have a lesser depth than the first display layer. Pet., 50-59 (showing and describing the RROD as including a widget, i.e., Zlider, that is at least partially translucent).

34. Second, Smith argues that if “the pressure cursor is above the markings, and the markings are above the content, then the alleged translucency of the pressure cursor cannot satisfy the requirement ... of at least partial translucency in the second virtual display layer.” POR, 26. This is also wrong. Smith’s argument hinges on the assumption that the second virtual display layer cannot itself comprise multiple layers, or more specifically, that the pressure cursor and the markings cannot both be in the second virtual display layer—a possibility that Smith does not fully address. *See* POR, 24-26.

35. Notably, the ’580 Patent’s claim 21 (dependent on claim 1) explicitly describes scenarios where the second virtual display layer comprises more than one

layer. For instance, claim 21 recites “the second virtual display layer includes at least one of: an operation layer, an emphasis layer, or a clipboard layer,” thus contemplating the second virtual display layer including more than a single layer. APPLE-1001, 104:42-43; *see also id.*, 106:47-48 (“only a portion of the second virtual display layer appears to have a less depth than the first virtual display layer”); *see* APPLE-1034, 44:18-45:9 (Dr. Mahon admitting he “didn’t recall citing to Claim 21” in his declaration); EX2012, *generally* (no reference to claim 21). Because claim 21 indicates that the second virtual display layer includes “at least one of” a number of layers, then the second virtual display layer can include more than a single layer—thus permitting the Zlider as whole to exist on the second virtual display layer despite components of it residing on different layers of the second virtual display layer.

36. And, because the Zlider’s pressure cursor is shown as being translucent over the underlying contents (see, e.g., APPLE-1004, FIG. 6; APPLE-1005, 3:57-4:15), at least a portion of the second virtual display layer—that portion including the Zlider’s pressure cursor—is at least partially translucent so that at least a portion of the contents of the virtual display layer is visible through the Zlider’s pressure cursor that overlays the underlying content. APPLE-1003, ¶¶57, 90-91.

37. Additionally, where the majority of the Zlider is translucent, as in the example combination shown in the Petition at page 59, a POSITA would have again understood that all of the components of the Zlider are on the same (e.g., second) virtual display layer.

C. The RROD Renders Obvious at Least a Portion of the Second Virtual Display Layer Being at Least Partially Translucent

38. As discussed above in §VI.B, at least a portion of the second virtual layer of the RROD (e.g., the pressure cursor of the Zlider) is at least partially translucent. Smith and Dr. Mahon both concede the translucency of the pressure cursor. POR, 28-29 (“The translucency of the pressure cursor is seen”); EX2012, ¶91; APPLE-1033, 64:19-66:5 (“the pressure cursor is certain changing the appearance of what is underneath it, and that does include the image”). As discussed in §VI.B, a POSITA would have considered the pressure cursor and the extended markings to be in the same (second) virtual display layer as the other parts of the Zlider. §VI.B.

39. Moreover, the Petition and my previous declaration further cite to Ording, which supports the concept of at least a portion of the Zlider being semitransparent. Pet., 51-59 (citing APPLE-1006, [0045]); APPLE-1006, [0045] (“virtual click wheel ... may be either an opaque or semitransparent object”); ID,

18 (“Petitioner also relies on Ording’s description of using a semitransparent virtual click wheel as an input control device.”); APPLE-1003, ¶¶87-93.

D. The RROD Renders Obvious “Perform[ing] a Zoom Operation on the At Least Portion of the Contents of the First Virtual Display Layer without Performing the Zoom Operation on the Plurality of Markings in the Second Virtual Display Layer” ([1l](i)-(iii)/[1.k], [22h](i)-(iii)/[22.g], [58g(i)-(iii)]/[58.f], [82]²)³

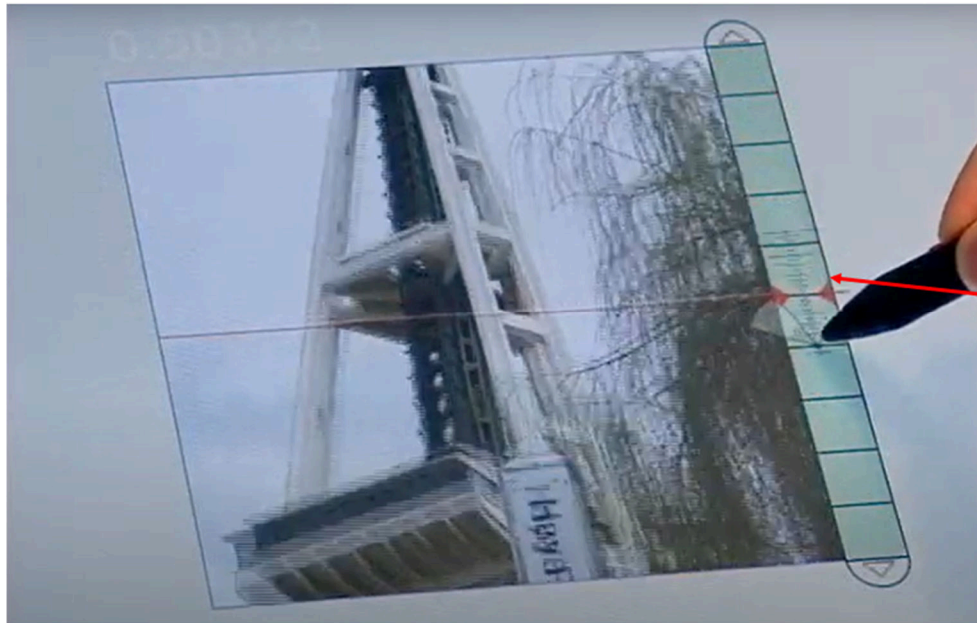
40. Each of independent claims 1, 22, and 58 recites “perform[ing] *a zoom operation* on the at least portion of the contents of the first virtual display layer,” while later reciting (in claims 1, 22, 58, and 82) “without performing *the*

² The Petition and my previous declaration inadvertently included claim 83 as a Challenged Claim. This was not intended, as indicated by the Petition’s and my previous declaration’s reference to claim 47 in its discussion of claim 83 where claim 47 was not a Challenged Claim.

³ The claim reference numbers separated by a slash (/) mark refer to claim limitations that have different reference numbers, per the Updated Listing of Challenged Claims in Petitioner’s Reply. For clarity, I refer first to the claim limitation reference number as indicated in the Board’s Institution Decision followed by Petitioner’s reference number provided in the Updated Listing of Challenged Claims in Petitioner’s Reply, which is consistent with the reference numbers I provided in my earlier declaration (APPLE-1003).

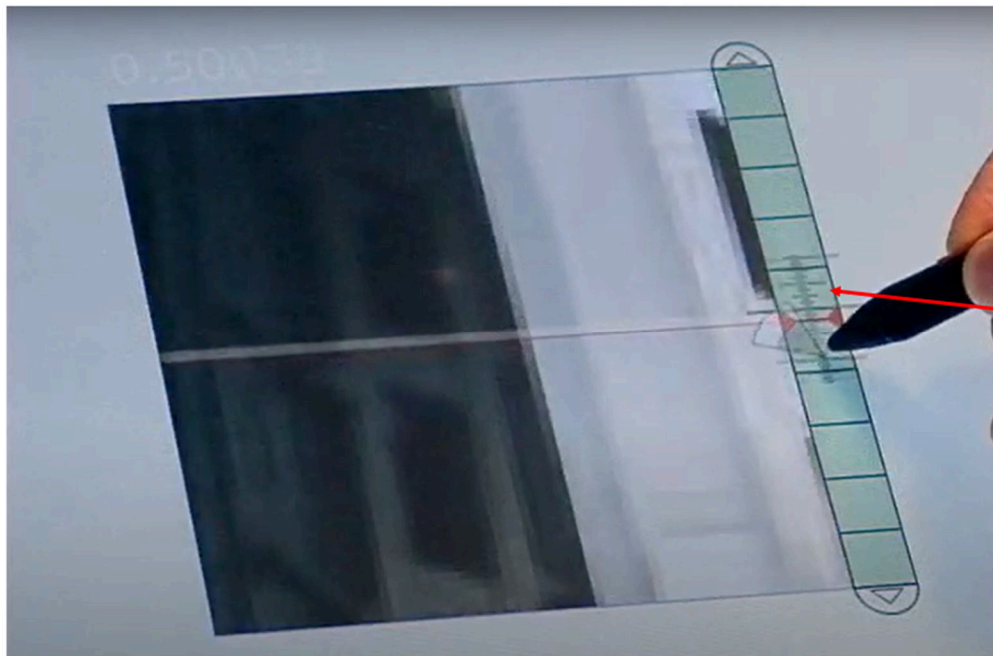
zoom operation on the plurality of markings in the second virtual display layer.”

As such, the Petition and my previous declaration explain that performing the zoom operation does not cause ***the same zoom operation*** on the plurality of markings of the Zlider since the later recitation of a zoom operation is to ***the*** zoom operation (i.e., the one previously referenced in the claim). Pet., 69 (“the zoom operation applied to the content is not applied to the Vernier”), 70 (“any change in scale of the Vernier is not the ‘zooming’ function applied to the content”), 71-72. That any change in the spacing of the Vernier is not the same zooming operation applied to the underlying image is abundantly clear in the Ramos Video, as shown below in “pre-zoom” and “post-zoom” images. APPLE-1005, 3:17-3:20. In particular, while the underlying image is zoomed in at a large scale, that same scale of zooming is not reflected in the Vernier in the “post-zoom” images, where the spacing and size of the Vernier shows minimal change. *Id.*



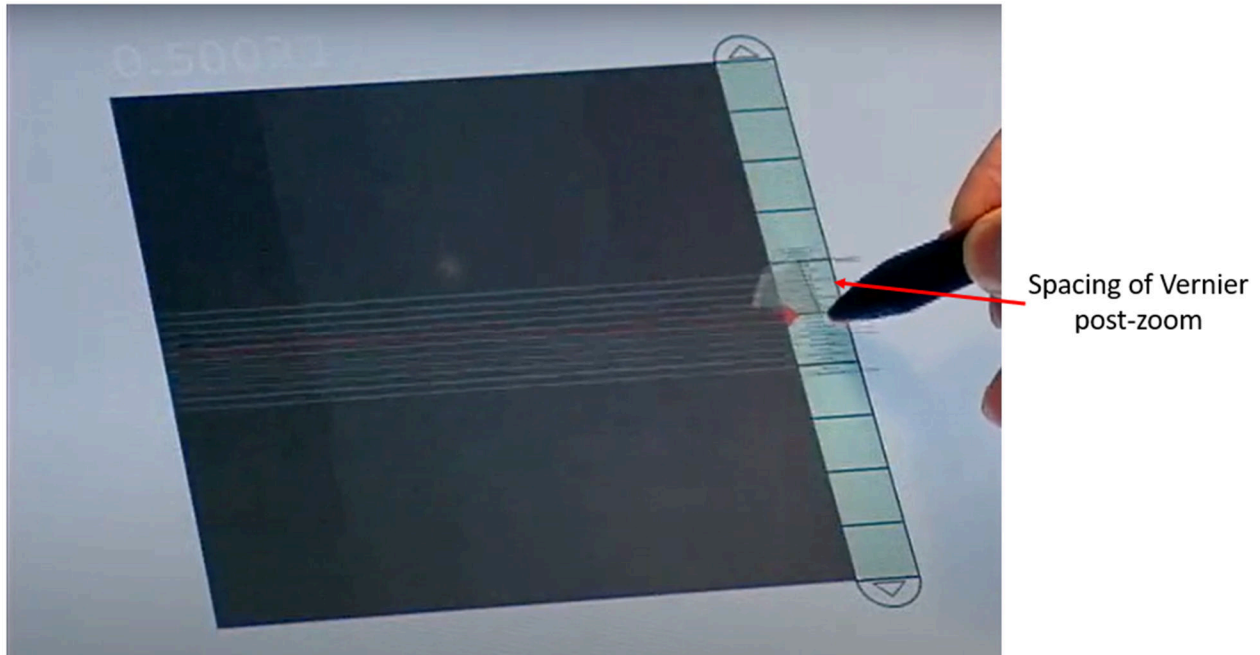
Spacing of Vernier
pre-zoom

APPLE-1005, 3:17 (annotated)



Spacing of Vernier
post-zoom

APPLE-1005, 3:18 (annotated)



APPLE-1005, 3:20 (annotated)

41. Smith alleges that the Vernier markings “progressive[ly] expand as the user zooms in” is zooming. POR, 37-38. Specifically, Smith alleges that “[t]he Ramos Video shows its Zlider zooming in on its marking as a portion of image is enlarged (zoomed), that it ‘adapts its grid spacing’ according to the zoom is just another way of saying that it also zooms in on the grid spacing.” POR, 38 (citing EX2012, ¶114). As shown above, the zoom operation on the image is not the same zoom operation that affects the grid spacing of the Vernier. APPLE-1005, 3:17-3:20. Instead, Smith appears to argue that *any* zoom operation is not permitted on the Vernier. Smith’s argument, however, ignores the antecedent basis of “*the* zoom operation”—that is, claims 1, 22, 58, and 82 (by its dependency on claim 58) require that *the specific zoom operation performed on the content* is not also

performed on the Vernier markings. Pet., 69-72. This interpretation of the claims is further supported by claims 46, 47, 83, and 98, each of which differentiates claims 1, 22, 58, and 82, by instead more generally reciting “without performing *any* zoom operation on the plurality of markings in the second virtual display layer.” APPLE-1001, 109:15-21.

E. The RROD Renders Obvious “[When/In Response to] An Aspect of the Touch [Is/Being] Detected to Surpass a Threshold, Display[ing], Via the Touch Screen, a Plurality of Markings in a Second Virtual Display Layer” ([1.h], [22.d], [58.c])

42. The Petition’s mapping of a user’s stylus hovering within a threshold from the touchscreen to display the Zlider satisfies the claims. *See* Pet., 50 (citing APPLE-1003, ¶86). Smith’s arguments that a hover cannot satisfy the claims are wrong for several reasons.

43. First, a POSITA would have understood “*an aspect of a touch*” to include “hover.” Pet., 47 (citing APPLE-1003, ¶80). Contrary to Smith’s mischaracterization of Petitioner’s argument (e.g., “But ‘touch’ is not the same as ‘no touch’ or a ‘hover.’”), the Petition does not equate a hover with a touch, nor do I. *See* POR, 41. Rather, as the Board correctly recognizes (ID, 26), the Petition and my previous declaration explain that a hover is an “aspect” or “portion” or type of a touch. APPLE-1003, ¶80 (“A POSITA would have understood that a touch in the

Ramos Paper and Ramos Video includes both contact with the touch screen and meeting a threshold proximity between the stylus and the touch screen.”).

44. The ’580 Patent supports this position, explaining that “the contact pressure level may be represented by a touch state,” which “refers to a predefined subset of the range of measurable contact pressures.” APPLE-1001, 17:22-25. Additionally, when discussing an example, the ’580 Patent further states that “contact pressure levels may be represented as one of four *predefined touch states*: *no touch*, light touch, medium touch, and heavy touch. As an option, *the lowest touch state may require some form of proximity*.” APPLE-1001, 17:25-29. That is, the lowest touch state (i.e., “no touch”) may require some form of proximity (e.g., a threshold relating to hovering). The ’580 Patent further describes a “touch event” as having attributes that “refer to one or more measurable aspects of the user interaction,” where “measurable aspects” include “touch uncertainty.” APPLE-1001, 52:55-64. Indeed, a POSITA would have understood that a capacitive touch sensor has no knowledge of physical contact (e.g., a touch) or lack thereof. Rather, a capacitive touch sensor measures electrical induction responsive to a measurable user interaction. For example, the ’580 Patent describes a device with “a capacitive touch sensor” that includes “two layers of parallel conductive lines, separated by an insulator,” where, “when an implement of interaction is *placed over* the conductive lines, there is a change in capacitance.” APPLE-1001,

36:27-39 (“This current may be used to sense the touch *or proximity* of an implement of interaction”). That is, a capacitive sensor senses measurable aspects, which include electrical induction from proximity, not just touch. *Id.* As such, it follows that the ’580 Patent’s recitation of, for example, “four predefined touch states” can include, among those touch states, “no touch,” which is also considered to be a part or aspect of a touch because, while physical contact may not have yet occurred, the requisite “proximity,” e.g., in the form of a threshold relating to hovering, is met by a measurable aspect of the user interaction.

45. Moreover, the ’580 Patent incorporates by reference U.S. Patent Publication No. 2008/0122796 (APPLE-1034, “Jobs2”), which further supports Petitioner’s position and not Smith’s. *See* APPLE-1001, 100:52-60 (“Additional description of heuristics can be found in ... [Jobs2] ... the content of which is hereby incorporated by reference in its entirety”). In particular, Jobs2 offers clear disclosure of how a capacitive touchscreen responds to the approach and contact of touch data. APPLE-1034, [1188]-[1197], FIGS. 59A-59H, 60A-60F. Through a series of examples, illustrated with reference to Figures 59A-E, Jobs2 “illustrate[s] how a finger tap gesture activates a soft key icon on a touch screen display.”

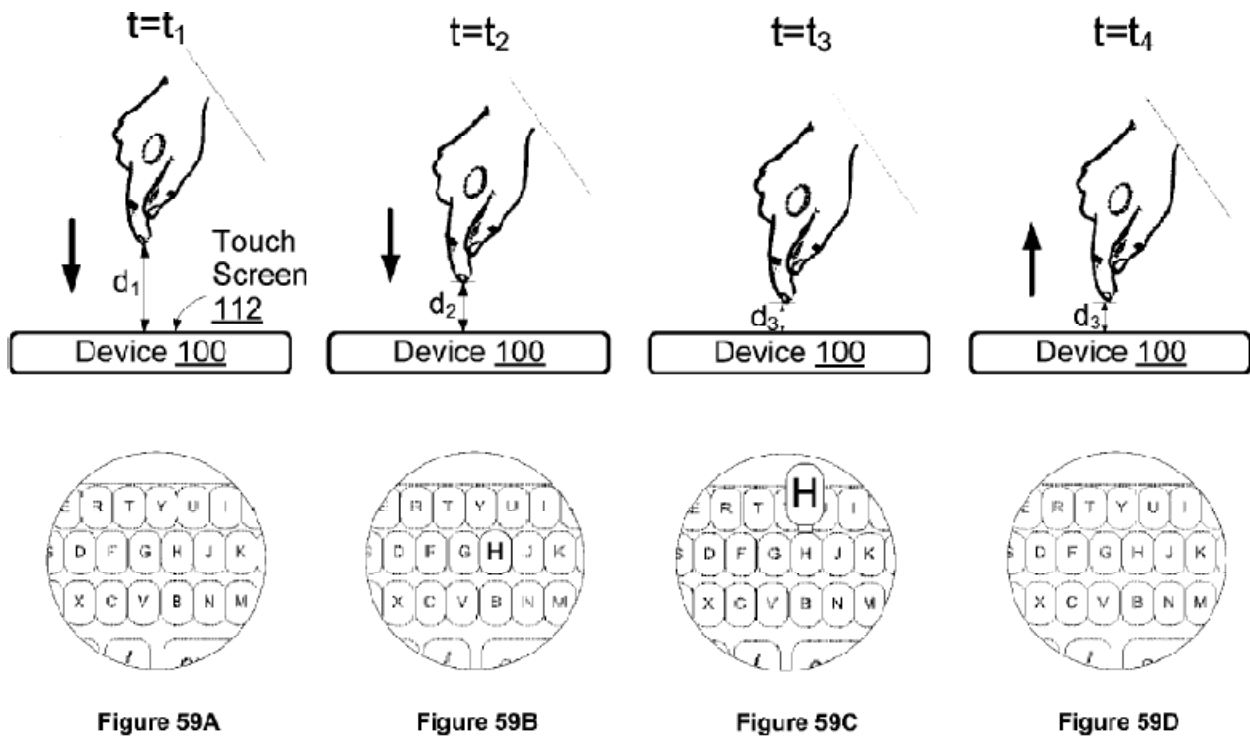
APPLE-1034, [1191]. Jobs2 explains:

At $t=t_1$ (FIG. 59A), a user’s finger moves down to a distance d_1 away from the touch screen display **112** of the device **100**. As shown in FIG. 59E, this distance d_1 is beyond

the in-range distance threshold. Therefore, no key icon on the touch screen display gets highlighted.

At $t=t_2$ (FIG. 59B), the finger moves further down to a distance d_2 away from the touch screen display. As shown in FIG. 59E, this distance d_2 is at or slightly below (i.e., within) the in-range distance threshold. At this distance the user's finger is in-range of the touch screen display. As a result, the key icon "H" that is close to the finger on the touch screen display is highlighted. In some embodiments, an icon is highlighted by altering its color or altering its shape (e.g., magnifying the icon) or both to give an indication to the user of its status change.

At $t=t_3$ (FIG. 59C), the finger is distance d_3 away from the touch screen display. As shown in FIG. 59E, this distance d_3 is at or slightly below the in-contact distance threshold. At this distance, the user's finger is in-contact with the touch screen display. As a result, the key icon "H" is further highlighted. In some embodiments, an icon is further highlighted by displaying a magnified instance of the icon next to the icon. As shown in FIG. 59C, the magnified instance (which may have an appearance like a balloon) has a visual link with the key icon "H" on the soft keyboard.



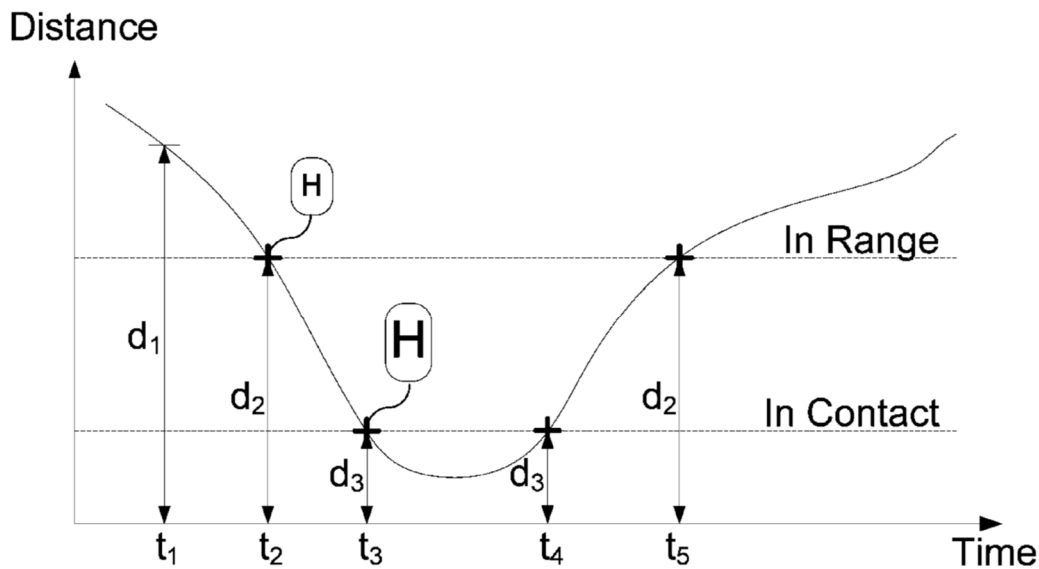


Figure 59E

APPLE-1034, FIGS. 59A-3. Thus, as these figures illustrate, proximity over a threshold distance (“in-range distance threshold”) may be required for the touch screen display to respond, but physical contact may not be required. *Id.* Moreover, to further drive home the point that capacitive touch screens react to proximity rather than necessitating physical contact, Jobs2 states that “the finger may be **deemed in contact** with the screen if the capacitance between the two reaches the in-contact threshold **while the finger has not physically touched the screen.**”

APPLE-1034, [1197].

46. Dr. Mahon testified that claim 1’s recitation of “when an **aspect of the touch** is detected to surpass a threshold” requires “a specific characteristic of the touch that is the **physical contact** surpass[ing] a threshold.” APPLE-1033, 28:20-29:9. I note that Dr. Mahon testified that he did not specifically recall reviewing

Jobs2 or any other application referenced in the '580 Patent. APPLE-1033, 16:13-17:13, 18:21-21:5 (“if it is not cited in my declaration, I don’t recall going and reviewing a specific citation here”); *see* EX2012, *generally* (including no reference to Jobs2). As such, Dr. Mahon formed his conclusions regarding the relationship between a hover and a touch without the benefit of Jobs2’s helpful teachings. *Id.*

47. For additional support of this position, the Petition and my previous declaration further cite to Ording at [0141], as the Board recognized, “describing finger contact with a touch screen to be ‘a process involving multiple actions including the finger approaching the display, the finger being in contact with the display, and the finger leaving the display.’” ID, 26 (citing APPLE-1006, [0141]); *see* Pet., 47-48 (quoting APPLE-1006, [0141]); APPLE-1003, ¶80.

48. Smith cites nothing that prevents a touch from including, as an aspect or portion of that touch, approach or hovering. The '580 Patent’s statement that “a touch event refers to an event in which an implement of interaction comes into contact with an interaction surface” (APPLE-1001, 52:48-50) does not prevent hovering or proximity from simply being “an aspect of that touch” or “a portion of touch,” especially in light of the '580 Patent’s broader discussion of a touch event, referenced above. Smith’s arguments that the “at least portion of touch” is detected “on the at least one user interface element” further does not preclude reliance on a hover. *See* POR, 41. Significantly, the device does not consider “on” in the

physical sense, but rather in terms of x-y coordinates and the inputs, flags, and signals that represent the input. If a user input is within the x-y coordinates and measurable, then “over” suffices for “on.” See APPLE-1034, [1197] (“the finger may be deemed in contact with the screen if the capacitance between the two reaches the in-contact threshold while the finger has not physically touched the screen”). Ording’s teaching that, “[a] *finger contact with the touch screen display (e.g., a finger tap) is a process involving multiple actions including the finger approaching the display, the finger being in contact with the display, and the finger leaving the display*” further supports this understanding. APPLE-1006, [0141]. Smith’s arguments inject a physical understanding of “on” that is not consistent with how an apparatus would detect a touch “on” an object on a touch screen. APPLE-1034, [1197].

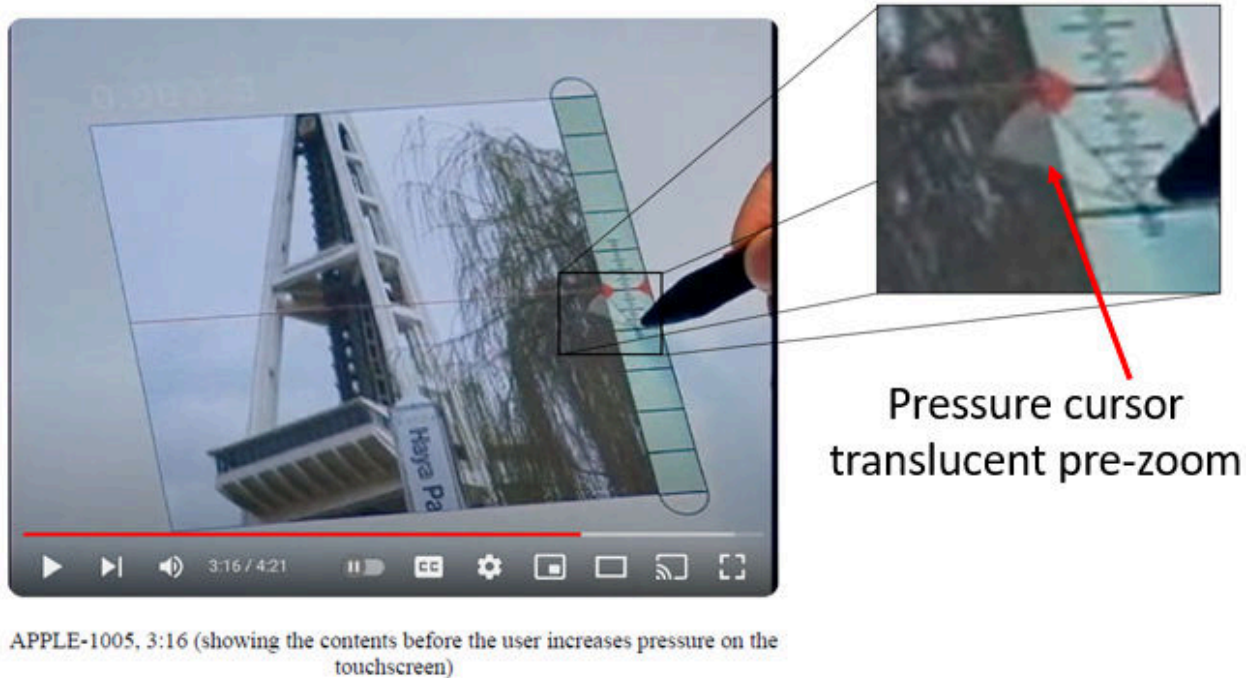
49. As the Petition explains, Ramos Paper and Ramos Video disclose displaying the Vernier in response to a hover, which is an aspect of a touch, for the reasons discussed above. Pet., 43-48. Since hover is a portion or an aspect of touch, Petitioner’s reliance on Ramos Paper and Ramos Video’s hover threshold is entirely proper.

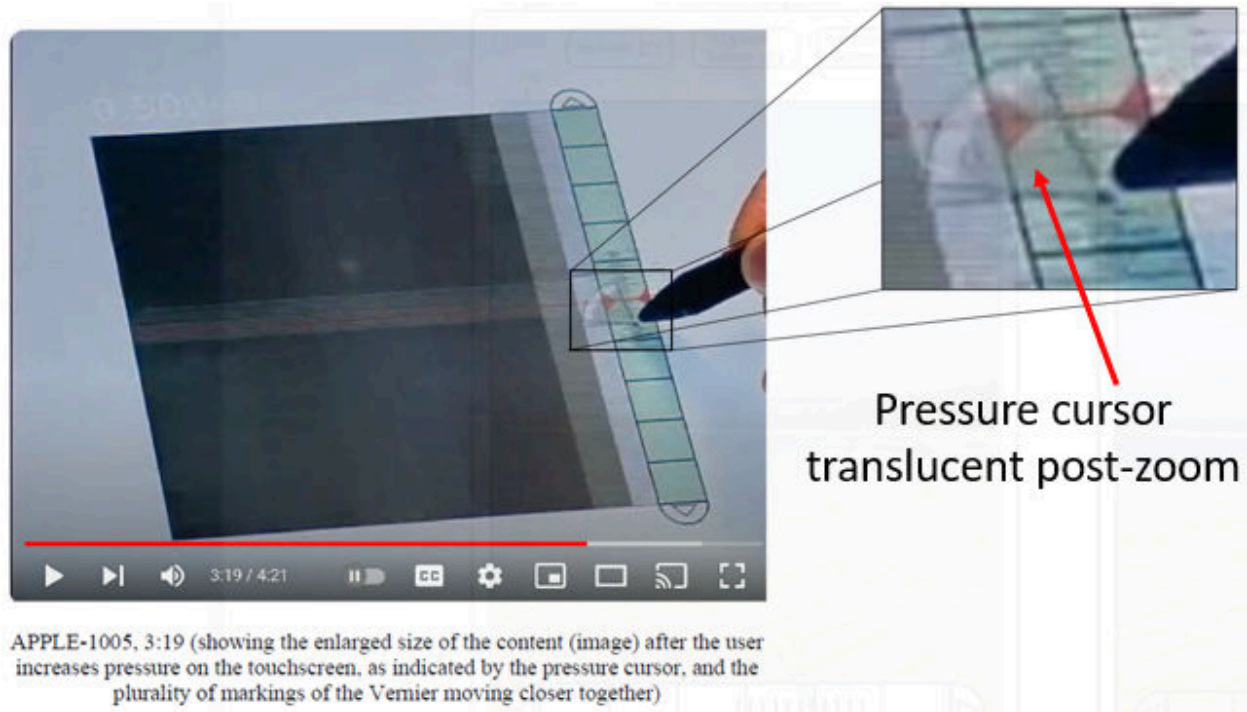
F. The RROD Renders Obvious “the At Least Portion of the Second Virtual Display Layer is At Least Partially Translucent So That a Result of the Zoom Operation on the At Least Portion of the Contents of the First Virtual Display Layer is Visible Through the At Least Portion of the Second Virtual Display Layer”

50. The Petition addresses [11(iii)]/[1.k] with sufficient particularity. As the Board correctly noted, “[a]fter discussing the zooming function in the Ramos Paper and the Ramos Video, Petitioner presents two images from Ramos Video,” where the Petition describes the first Ramos Video image as “showing the contents before the user increases pressure on the touchscreen” and the second Ramos Video image as “showing the enlarged size of the content (image) after the user increases pressure on the touch screen, as indicated by the pressure cursor, and the plurality of the markings of the Vernier moving closer together.” ID, 33 (citing Pet., 68-70, 71 (citing Ex. 1005, 3:16), 72 (citing Ex. 1005, 3:19)). With respect to earlier limitation [1i]/[1.h] (“...where at least a portion of the second virtual display layer is at least partially translucent...”), the Petition discusses and shows various examples of such partial translucency, including the Zlider’s pressure cursor and the majority of the Zlider in the RROD. APPLE-1003, ¶¶87-93. Again, the Board correctly notes that [11(iii)]/[1.k] “uses antecedent basis to indicate that the limitation [11(iii)] is the same partially translucent portion of the second virtual display layer recited in limitation [1i].” ID, 32-33.

51. Smith’s confusion as to Petitioner’s mapping is refuted by the Board’s clear understanding of the Petition’s mapping, Smith’s ability to respond to the Petition’s mapping (though its reasoning is not correct), and the Petition’s presentation of evidence. Indeed, as illustrated below, the Petition’s before-zoom

and after-zoom images, referenced in the Institution Decision (ID, 33), clearly show the recited partial translucency of the Zlider's pressure cursor in the second virtual display layer both before and after the "zoom operation on the at least portion of the contents of the first virtual display layer." Pet., 71-72.





Pet., 71-72 (modified; annotated)).

G. The RROD Renders Obvious “Wherein the Touch and the Another Touch are Detected to be Part of a Single Continuous Gesture with Constant Contact with the Electronic Device” (claims 29, 65)

52. Smith alleges that “Petitioner’s mapping fails because the Petitioner cannot show that the RROD prior art references disclose two independent touches that are detected to be part of a *single continuous* gesture in constant contact with the electronic device.” POR, 48. Smith’s allegation mischaracterizes the nature of the “first touch” (“touch” in claims 29 and 65) and the “second touch” (“another touch” in claims 29 and 65) to which the Petition maps the prior art. In particular, Smith refers to the “first touch” as “the user moving the stylus within proximity of the touch screen (causing display of the Vernier on the working area)” and the

“second touch” as “when the stylus ‘continue[s] moving on the touchscreen along the Zlider and during the continuous touch movement,” but this is not correct. *See* POR, 49.

53. As to the “first touch,” the Petition explicitly states that “[a] POSITA would have understood that a *touch* in the Ramos Paper and Ramos Video includes *both contact with the touch screen and meeting a threshold proximity* between the stylus and the touch screen.” Pet., 47; *see id.*, 43-48, 88, 92. Notably, Smith’s characterization of the “first touch” omits contact itself and focuses solely on proximity. POR, 49. As to the “second touch,” the Petitioner references a “touch movement” along the markings, or Vernier, of the Zlider. Pet., 59-62; *see id.*, 88, 92. With this corrected understanding of the Petition’s mapping, it is clear that both the “first touch” and the “second touch” are part of the same “single continuous gesture with constant contact with the electronic device.” Indeed, the state-transition diagram shown in Figure 5 of the Ramos Paper shows that the Zlider’s “Ready” and “Sliding” states require that the x,y coordinates of the cursor are within the rectangle R of the working area. APPLE-1004, FIG. 5. The Ramos Video similarly shows that the Vernier’s markings are not shown until the cursor moves within the working area. *See* APPLE-1005, 0:42-0:43, 1:09-1:11, 1:33-1:35, 2:01-2:03, 2:20-2:23, 2:47-2:48, 3:10-3:13. A POSITA would therefore have understood that a physical contact of the stylus on the touchscreen that begins

outside of the Zlider's working area, then moves within it ("the touch"), and subsequently moves along it ("the another touch") would result in, first, the initial display of the Vernier's markings, and second, the moving of the markings, while both touches are part of a single continuous gesture with constant contact.

H. The RROD Renders Obvious "the Aspect of the Touch Includes a Duration Aspect and the Threshold Includes a Duration Magnitude Threshold" (claims 9, 32, 69)

54. Smith's argument that a POSITA would not have been motivated to use duration, as Ording discloses, because "the Zlider in the Ramos Paper and Video is not using duration" is odd. Indeed, one of the reasons a POSITA would have been motivated to modify Ramos Paper and Video to use a well-known characteristic, such as time, to determine whether a touch is intentional is that the Ramos Paper and Video do not mention or otherwise foreclose the use of time/duration when discussing the Zlider. *See* APPLE-1003, ¶114 ("Ording recognizes a 'time period' associated with a finger's contact with a touch screen, and using such information to identify a touch was well known by the Critical Date.") (citing APPLE-1006⁴, [0141]; APPLE-1020, [0033]). My previous declaration explained the obviousness of using "at least a duration and a length," per Ording, "to recognize the type of gesture (e.g., a tap or a swipe)." APPLE-1003, ¶84. Additionally, I stated in my previous declaration, "Ording explains that

⁴ EX2007, 16:8-13.

a swipe gesture would not register as a tap, at least suggesting that the gesture was determined to have too long of a distance (as compared to a distance threshold) and/or too long of a duration (as compared to a time threshold) to be identified as a tap,” and “use of such thresholds was well-known by the Critical Date.” *Id.* (citing APPLE-1006, [0096], [0141]; APPLE-1020, [0031], [0033] (“ignore or reject any touches that have a duration that is less than a predetermined minimum amount of time, to ignore or reject touches that do not traverse a predetermined minimum portion of the touch element”); APPLE-1023, [0019], [0060]-[0062]). Thus, a POSITA would have been amply motivated to incorporate a duration magnitude threshold in RROD. APPLE-1003, ¶¶85-86.

I. Smith Offers No Independent Arguments Against the Obviousness of Claims 2, 4, 6-10, 23, 25-26, 28-30, 32-33, 59, 61-62, 64-65, 67, 69-70, or 73

55. Smith offers no independent argument regarding claims 2, 4, 6-10, 23, 25-26, 28-30, 32-33, 59, 61-62, 64-65, 67, 69-70, or 73. *See, generally*, POR. Because claims 1, 22, and 58 are obvious, these dependent claims are also obvious. *See* §II, *supra*.

VII. The RROHD Renders Obvious Claim 48

A. The Petition Argues that a POSITA Would Have Been Motivated to Modify RROD with Hayward, Not the Other Way Around, as Smith Alleges

56. Smith’s criticism of the inclusion of Hayward appears to be misplaced. Smith argues that “Hayward already discloses and illustrates a gesture

(see Pet., 95) to accomplish what Petitioner seeks to make more complicated by adding Ramos' Zlider." See POR, 56. Based on my understanding of Smith's argument, this analysis is flawed. The proper analysis does not ask whether "Hayward's approach to adjusting contrast was lacking" (POR, 56), but rather whether a POSITA would have modified the *Ramos's Zlider*—or more specifically, the *RROD*—which did not previously use the Zlider for image-capturing related parameters.

57. The Petition provides precisely this proper reasoning. Pet., 96-99. Indeed, Ramos Paper contemplates scenarios, such as those described in Hayward, where its Zlider could be deployed (e.g., graphic applications), thus providing the motivation for extending use of the Zlider to further graphic applications, such as the image-capturing related parameters disclosed in Hayward. APPLE-1004, 1 ("Interactions such as identifying and then picking a single pixel from a high resolution image, seeking a particular frame in a long video stream, or adjusting a continuous image color parameter are examples of parameter manipulation tasks where more interactive direct manipulation techniques can be preferable since the user may not be certain a-priori as to what value to enter."), 2.

VIII. CONCLUSION

58. I declare that all statements made in this Declaration of my own knowledge are true and that all statements made on information and belief are

believed to be true. I further declare that these statements are made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both (under Section 1001 of Title 18 of the United States Code).

Executed this 22nd day of August, 2025.

A handwritten signature in black ink, appearing to read 'Andrew Cockburn', written over a horizontal line.

Andrew Cockburn