

DECLARATION OF DARRAN CAIRNS,
UNDER 37 C.F.R. § 42.100 REGARDING U.S. PATENT NO. 11,281,338

Declaration

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

Date: October 05, 2023

By: _____

Darran Cairns

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I, Darran Cairns, do hereby declare:

1. I am making this declaration at the request of Chemtronics Co. Ltd. (“Chemtronics”) in the matter of the *Inter Partes* Review (“IPR”) of U.S. Patent No. 11,281,338 (“the ’338 patent”).

2. I am being compensated for my work in this matter at my standard hourly rate of \$390 for such consulting services. My compensation in no way depends on the outcome of this proceeding.

I. Qualifications

3. My qualifications generally are set forth in my *curriculum vitae*, which is submitted as Appendix A.

4. I received a Bachelor of Science degree in physics from University of Birmingham in the United Kingdom in 1995. I received a Ph.D. degree in metallurgy and materials from University of Birmingham in the United Kingdom in 1999, respectively. My Ph.D. dissertation, entitled “The Mechanical Reliability of Silica Optical Fibres” was done under the supervision Prof. Stephen Kukureka, who is well known in the field of materials science.

5. I have over twenty years of experience in the field of touch sensor materials, manufacturing, and measurement in both academia and industry at

Brown University, 3M Touch Systems, West Virginia University and University of Missouri – Kansas City. I have taught these topics at Brown University, West Virginia University, and the University of Missouri – Kansas City.

6. From 1998-2001, I was a postdoctoral research associate in engineering at Brown University under the direction of Professor Gregory Crawford who is well known in the field of liquid crystal displays and sensors. My work at Brown was focused on liquid crystal materials and optical sensors.

7. From 2001-2005, I was a research specialist at 3M Touch Systems in the Optical Systems Division. I worked on a variety of technologies, including touch sensors, polymer materials and manufacturing, glass materials and manufacturing, and high performance coatings for mechanical protections of display and touch sensors.

8. From 2006 to Present, I have also been an associate professor in mechanical engineering, where my teachings include liquid crystal polymers, plastic films based electronics, and composite materials. Additionally, beginning in 2014, I founded Tailored Surfaces, a company that develops solution-based processing of smart materials for devices such as touch screens and displays. I still currently serve as CEO for Tailored Surfaces.

9. From 2019 to Present, I have also been an Associate professor at the University of Missouri – Kansas City, teaching advanced manufacturing, plastics manufacturing, and material engineering. Additionally, I teach about sensors and touch screens, flexible laminate electronics, and wearable devices.

10. I have over 13 U.S. patents, a large number of which are directed to touch sensor technologies. The majority of my patents are in the area of touch sensor technologies and related nanoparticles. As such, I am intimately familiar with the manufacturing of touch sensor.

11. I have also authored several technical papers that have been published in well-respected, peer-reviewed journals, such as the Journal of Applied Physics, Journal of the Society for Information Display, and Proceedings of the IEEE. As an example, I worked on a project focused on integrating touch sensing with flexible electronics. This work was published in the book Flexible Flat Panel Displays, which I edited with Professor Greg Crawford and Professor Dick Broer for Wiley.

12. Taken as a whole, my academic and practical experience have given me a substantial basis upon which to evaluate the technology that is in question in the claims of the '338 patent. Based on my experience and education, and the acceptance of my publications and professional recognition by peers in my field, I

believe that I am qualified to opine as to the knowledge and level of skill of one of ordinary skill in the art at the time of the alleged invention of the '338 patent (which I further describe below) and what such a person would have understood at that time, and the state of the art during that time.

II. Relevant Legal Standards

13. I have been asked to provide my opinion as to whether the claims of the '338 patent would have been obvious to a person of ordinary skill in the art at the time of the invention, in view of the prior art.

14. I am an engineer by training and profession. The opinions I am expressing in this report involve the application of my knowledge and experience to the evaluation of certain prior art with respect to the '338 patent. My formal knowledge of patent law is no different than that of any lay person. Therefore, I have requested the attorneys from Jones Day, who represent Chemtronics, to provide me with guidance as to the applicable patent law in this matter. The paragraphs below express my understanding of how I must apply current principles related to patent validity to my analysis.

15. It is my understanding that in determining whether a patent claim is obvious in view of the prior art, the Patent Office must apply the *Phillips* standard

to construe the claim by giving the claim its plain and ordinary meaning, consistent with the specification and prosecution history. For the purposes of this review, I have construed each claim term in accordance with its plain and ordinary meaning under the *Phillips* standard, unless otherwise indicated.

16. It is my understanding that a claim is unpatentable under 35 U.S.C. § 103 if the claimed subject matter as a whole would have been obvious to a person of ordinary skill in the art at the time of the invention. I also understand that an obviousness analysis takes into account the scope and content of the prior art, the differences between the claimed subject matter and the prior art, and the level of ordinary skill in the art at the time of the invention.

17. In determining the scope and content of the prior art, it is my understanding that a reference is considered analogous prior art if it falls within the field of the inventor's endeavor. In addition, a reference is analogous prior art if it is reasonably pertinent to the particular problem with which the inventor was involved. A reference is reasonably pertinent if it logically would have commended itself to an inventor's attention in considering his problem. If a reference relates to the same problem as the claimed invention, that supports use of the reference as prior art in an obviousness analysis.

18. To assess the differences between prior art and the claimed subject matter, it is my understanding that 35 U.S.C. § 103 requires the claimed invention to be considered as a whole. This “as a whole” assessment requires showing that one of ordinary skill in the art at the time of invention, confronted by the same problems as the inventor and with no knowledge of the claimed invention, would have selected the elements from the prior art and combined them in the claimed manner.

19. It is my further understanding that the Supreme Court has recognized several rationales for combining references or modifying a reference to show obviousness of claimed subject matter. Some of these rationales include: combining prior art elements according to known methods to yield predictable results; simple substitution of one known element for another to obtain predictable results; a predictable use of prior art elements according to their established functions; applying a known technique to a known device (method or product) ready for improvement to yield predictable results; choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success; and some teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill in the art to modify the prior art reference or to combine prior art reference teachings to arrive at the claimed invention.

III. Person Of Ordinary Skill In The Art

20. It is my understanding that when interpreting the claims of the '338 patent, I must do so based on the perspective of one of ordinary skill in the art (a "POSA") as of the relevant priority date. My understanding is that the earliest claimed priority date of the '338 patent is March 28, 2017.

21. In my opinion, a person of ordinary skill in the art for the '338 patent would have been a person having at least a bachelor-of-science or comparable degree in mechanical engineering, or an equivalent discipline, and at least five years of experience designing touch sensors, provided that the educational level can offset the experience level, and vice versa. For example, a POSA includes a person with at least a master's degree in those disciplines and at least two years of design experience in the field.

22. As described in detail above in the "Qualifications" section, my own training and experience exceeds that of one of ordinary skill in the art.

IV. Background Information For The '338 Patent

A. Introduction

23. Touch sensors utilizing occlusion of light have been widely used for a number of years. Such sensors typically consist of sets of optical emitters and

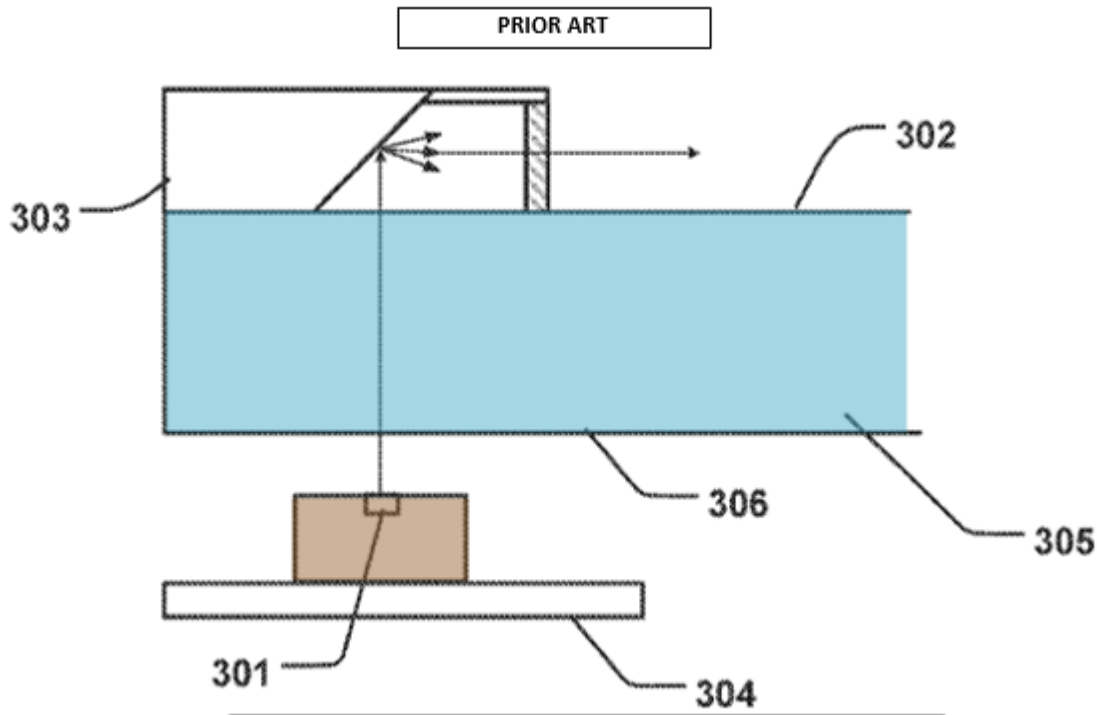
detectors arranged around the periphery of a touch surface. When an object touches the surface it attenuates light from one or more emitters and changes the amount of light received by one or more of the detectors. By analyzing the change in light received by the detectors, it is possible to determine the location of the touch. Attenuation of light can also result from contaminants on the detectors such as dust or moisture. Accordingly, techniques to mitigate the intrusion of such contaminants are common in the field. It is also common to use filters and other optical elements to select wavelengths of light to analyze and also to shape the light patterns emitted across the screens. This can reduce the impact of ambient light on the sensor.

B. Overview of the '338 Patent

24. The '338 patent describes a touch sensing apparatus 100 “that operate[s] by propagating light by diffusive light scattering above a panel.” '338 patent at 1:16-18, Fig. 2.

25. The '338 patent states that “above surface optical touch systems” are known in the prior art. *Id.* at 1:25-2:22, Figs. 1a-b. Figures. 1a-b are illustrations of a touch sensing apparatus according to the prior art. *Id.* at 6:18-21. Figure 1a is a top-down view, illustrating an “above surface optical touch system” with “emitters 301 [] arranged on a substrate 304, [where] light from the emitters

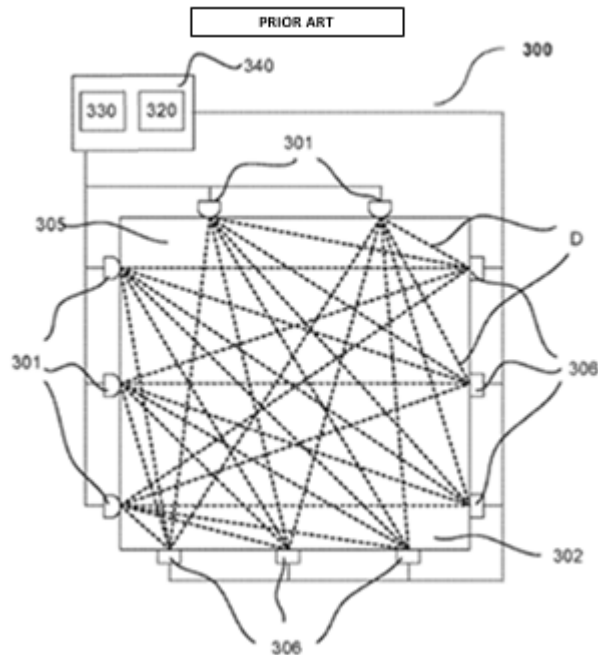
travel[s] above the touch surface 302 of the panel 305 via reflection or scattering on an edge reflector or scattering on a diffusor 303.” *Id.* at 1:37-41.



Id. at Fig. 1(a) (colors added). As shown above, the configuration in Figure 1(a) depicts the light emitter (colored brown) is located below the surface of the panel (colored blue) and uses “edge reflector or diffusor 303” to propagate light above the touch surface. *Id.* at Fig. 1a; 1:40-46.

26. Figure 1b shows a top-down view of detectors 306 distributed around a periphery of the touch surface that receive light from the emitters 301. *Id.* at 1:42-52, Fig. 1b. As shown in the figure below, light from each emitter 301

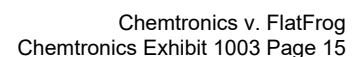
propagates inside the transmissive panel 305 to the detectors 306 via a plurality of light paths D:



Id. at Fig. 1(b), 1:47-50.

27. The '338 patent states that the prior art systems suffer from deficiencies, including “the cumbersome alignment between the components thereof, which makes assembly more difficult and costly,” and reliance on “coupling and propagation of collimated light across the light transmissive panel” that results “in a more expensive and less compact system.” *Id.* at 1:62-2:22. The '338 patent states that its objective is to “provide a touch-sensitive apparatus based

28. To allegedly address the problems of the prior art and achieve an apparatus that is “robust and easy to assemble ... with efficient use of light,” (*Id.* at 2:29-32), the ’338 patent discloses an apparatus 100 having “a plurality of light emitters 103 and detectors 103’ ... arranged along a perimeter 104 of [a] light transmissive panel 101.” *Id.* at 7:10-25.



Id. at Fig. 2 (colors added). “The plurality of light emitters and detectors [(colored brown)] are arranged above the touch surface and are connected to a substrate [(colored red)] extending in a direction 107’ parallel with a normal axis 107 of the plane 108 in which the light transmissive panel [(colored blue)] extends.” *Id.* at 7:55-62, Fig. 2. The substrate 106 is fixed to a carrier 110 (colored yellow) mounted around the perimeter 104 of the panel 101. *Id.* at 8:60-62, Fig. 2. The carrier 110 includes a cavity 116 to accommodate the width of the substrate 106 along the direction 107’. *Id.* at 9:3-7. The ’338 patent further states that the carrier 110 is arranged to partly enclose edges 111 of the panel 101. *Id.* at 9:19-21. A sealing window 126 (colored purple) “provides sealing around the perimeter 104 of the [] panel 101 and protects the emitters and detectors 103, 103’ and the display.” *Id.* at 8:11:20, Fig. 2.

29. The ’338 patent states that having “the substrate extending in the direction 107’ ... parallel with the normal axis 107,” and “the emitters and detectors 103, 103’, arranged above the touch surface 102” provide advantages, including “a less complex alignment to maximize the detection performance of the touch sensing apparatus 100.” *Id.* at 8:21-25. But as explained below, both of these features were known in the prior art, and the prior-art configurations thus achieved the same advantages as noted in the ’338 patent. *E.g.* U.S. Patent No. 8,

330,736 (“Klein”) at 2:59-62 (“[a] plurality of IR receivers is positioned ... generally *in direct alignment* with the IR transmitters, such that a single transmitter is *aligned* with a single receiver.”) (emphasis added).

C. The Claims

The ’338 patent has 15 claims. Claim 1 is independent. Claim 1 is directed to a “touch sensing apparatus” comprising the following elements:

- a panel comprising a top surface that includes a touch surface, a back surface, and an edge surface;

- a plurality of light emitters arranged along a periphery of the panel;

- a substrate configured to support at least one of the plurality of light emitters such that the at least one of the plurality of light emitters transmits a portion of light in a plane extending over the touch surface;

- a support structure configured to support the substrate, the support structure comprising:

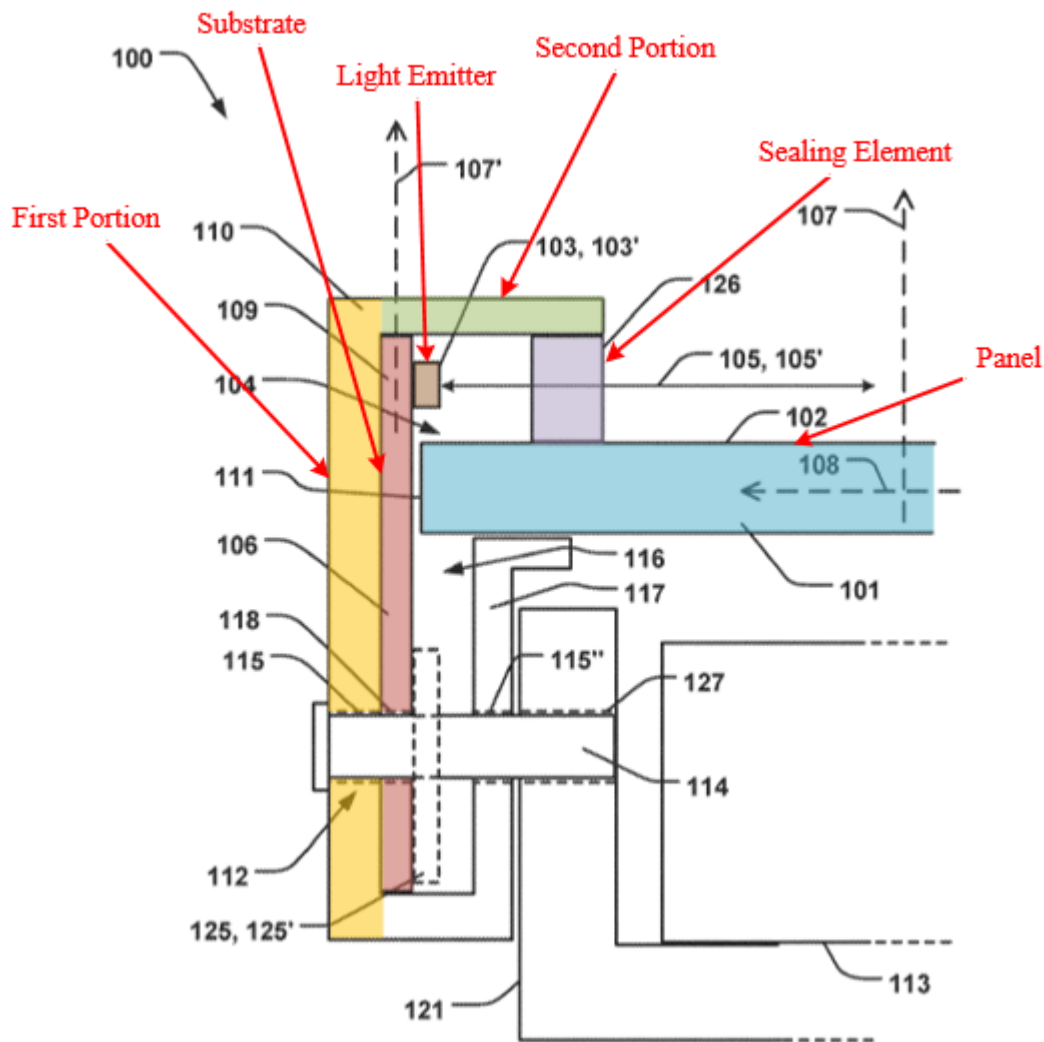
 - a first portion extending substantially parallel to the edge surface, wherein the substrate is configured to be supported by the first portion;

 - a second portion extending over an edge portion of the top surface of the panel; and

 - a sealing element configured to rest on the edge portion of the top surface and further configured to be fitted between the edge portion of the top surface and the second portion of the support structure.

’338 patent at 22:19-39.

30. The touch sensing apparatus of claim 1 includes six components: “a panel,” “a plurality of light emitters,” “a substrate,” “a first portion,” “a second portion,” and “a sealing element.” Each of these components is shown in the example of Figure 2:



Id. at Fig. 2 (colors and annotations added).

D. Prosecution History

31. U.S. Application No. 16/989,292, which ultimately issued as the '338 patent, was filed on August 10, 2020 and claims priority to a foreign application SE 1730085-6 that was filed on March 28, 2017. The '338 patent is a continuation of two other FlatFrog patents: U.S. Patent Nos. 10,739,916 (the '916 patent) and 10,606,416 (the '416 patent). *Id.*

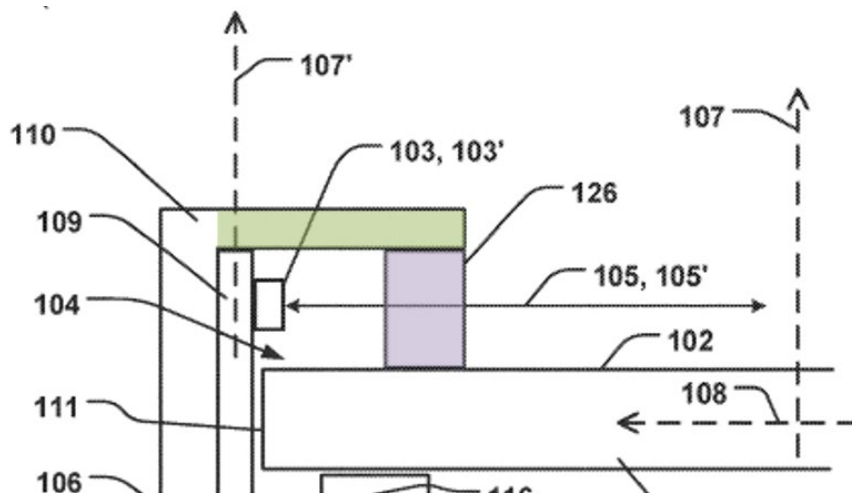
32. The prosecution history of the '338 patent ('338 File History) shows that the application for the '338 patent was filed on August 10, 2020 with just 5 claims. '338 File History at 1493. Before the PTO issued any office actions, these claims were canceled and replaced an entirely new claim set. *Id.* at 1298.

33. The Patent Office issued a single Office Action during prosecution, rejecting three of the claims on the ground of non-statutory double patenting as being obvious over claims of the '916 and '416 patents. *Id.* at 593-598. To overcome these rejections, the applicant filed a terminal disclaimer. *Id.* at 585.

34. An examiner-initiated interview was then conducted. *Id.* at 25. The summary of the interview discusses newly found prior art (WO20141312221) to Weishan) and explains that the Examiner suggesting amending around this reference. An appendix attached to the interview summary shows that Applicant suggested a number amendments at this time. *Id.* at 85-87. These amendments

match those that were later entered as Examiner's amendments in the subsequently issued notice of allowance. *Id.* at 19-22. Along with changes to the independent claim, Applicant suggested amendments to a number of dependent claims, including amending claim 8 (now claim 2) from "the substrate is *fixed* to the first portion of the support structure" to "the substrate is *affixed* to the first portion of the support structure." *Id.* at 86.

35. The Examiner agreed that the proposed amendments would overcome the prior art and subsequently issued a Notice of Allowance. *Id.* at 14. In this action, the Examiner noted that Weishan teaches "a touch sensing apparatus comprising a display and a plurality of emitters wherein the emitters transmit light in a plane extending over the touch surface." *Id.* at 23. The examiner's statement of reasons for allowance included the following limitations as those not taught by Weishan: "a second portion extending over an edge portion of the top surface of the panel; and a sealing element configured to rest on the edge portion of the top surface and further configured to be fitted between the edge portion of the top surface and the second portion of the support structure." *Id.* at 19-25.



Ex. 1001 at Fig. 2 (examples of the “second portion” and “sealing element” colored green and purple, respectively).

V. Claim Construction Of Terms In The '338 Patent

36. It is my opinion the claim terms of the '338 patent do not require construction beyond their ordinary and customary meaning at this time.

37. For my analysis, I have reviewed and considered the '338 patent's specification, claims, and prosecution history, along with various pieces of relevant extrinsic evidence, including my understanding of Patent Owner's construction of the claims as informed by its allegation in co-pending litigation with Chemtronics as well as prior litigation involving related patents. Based on this evidence, I have interpreted these terms as they would have been understood by a POSA as of the

time of the '338 patent's earliest claimed priority date and in light of Patent Owner's prior construction.

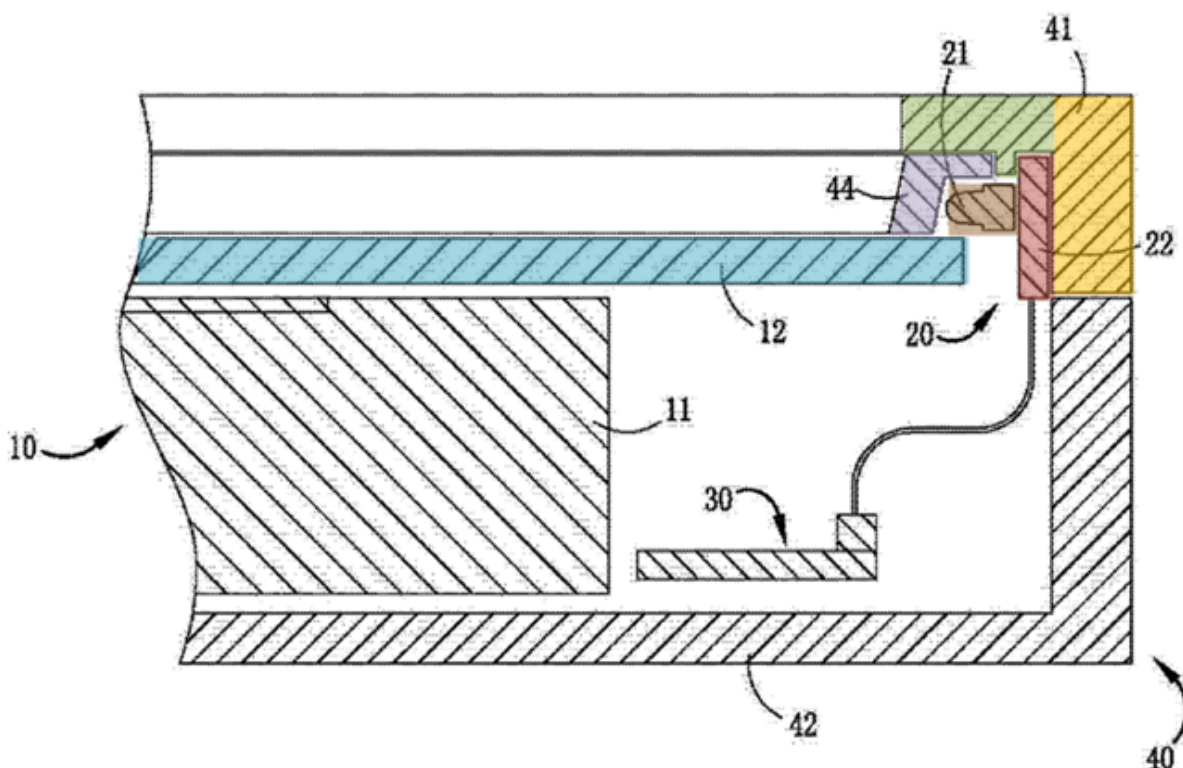
VI. Overview Of The Prior Art

A. Chen '975

38. Chinese Patent No. 202661975 was filed on April 27, 2012 and published January 9, 2013. I understand that this renders the document prior art to the '338 patent. A certified translation of Chen '975 ("Chen '975") is referred to herein.

39. Chen '975 seeks to resolve the following issue: "Conventional touch display apparatuses are limited by the width of printed circuit boards used to connect sensing signal transmitters and sensing signal receivers ... [making it] difficult to realize touch technology by using sensing signal transmission/reception on many ultra-thin, ultra narrow displays." Chen '975 at [0008]. The device of Chen '975 includes "sensing signal transmitters" and "sensing signal receivers" electrically connected to a printed circuit board and the printed circuit board is annularly disposed around a display. *Id.* at [0027]. Figure 4 of Chen '975, reproduced below, shows an example touch display apparatus, comprising a touch

panel 12 (colored in blue), a top casing 41 (colored in green and yellow), and a printed circuit board 22 (colored in red). *Id.* at [0028], [0031], [0040].



Id. at Fig. 4 (colors added).

40. As shown above, “sensing signal transceiver pairs 31 [(colored in brown)] compris[e] a sensing signal transmitter and a sensing signal receiver.” *Id.* at [0027]. Further, the printed circuit board “is annularly disposed around the [] display 11.” *Id.* at [0028]. Chen ’975 additionally discloses a filter strip (colored in purple), which “is provided in the light exit gap 43” and “is used to filter out

external light rays, so that the infrared transmitter and infrared receiver can selectively transmit and receive light.” *Id.* at [0039].

B. Klein

41. U.S. Patent No. 8,330,736 (“Klein”), entitled “Optical Overlay For An Electronic Display,” was filed on November 19, 2009, and published on May 19, 2011. I understand that Klein is therefore prior art to the ’338 patent.

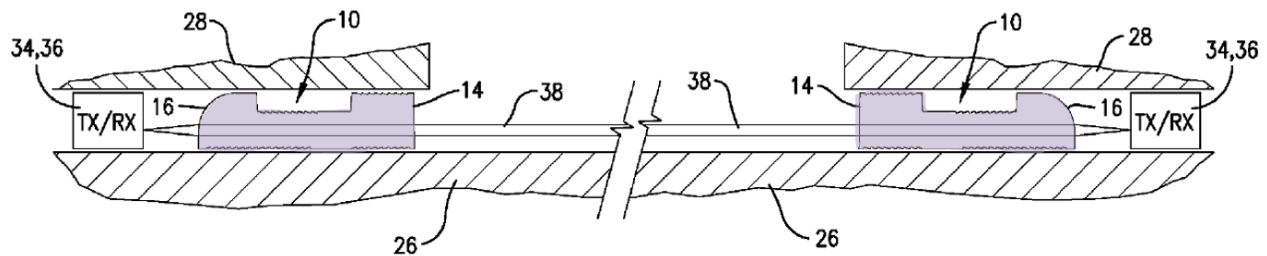
42. Klein “relate[s] to optical overlays that filter radiation.” Klein at cover, 1:6-7. The optical overlay of Klein “may be utilized in an electronic display system with touch detection ability that may include an electronic display, wherein a user interacts with the system by touching or physically contacting the display or areas in proximity to the display.” *Id.* at 2:51-55. Klein discloses that in such a system, “determining the touch position on the display ... involves the use of infrared (IR) transmitters and receivers.” *Id.* at 2:55-57.

43. Klein notes that the performance of such display systems may suffer when “undesirably exposed to IR radiation from sources other than the IR transmitters.” *Id.* at 3:6-7. This may cause the system to “detect contact on the electronic display either intermittently or perhaps not at all.” *Id.* at 3:15-16. To overcome this problem, Klein incorporates “an optical overlay configured to filter

radiation striking the optical overlay at a non-zero incidence angle while passing and focusing in-plane signals.” *Id.* at 2:36-38.

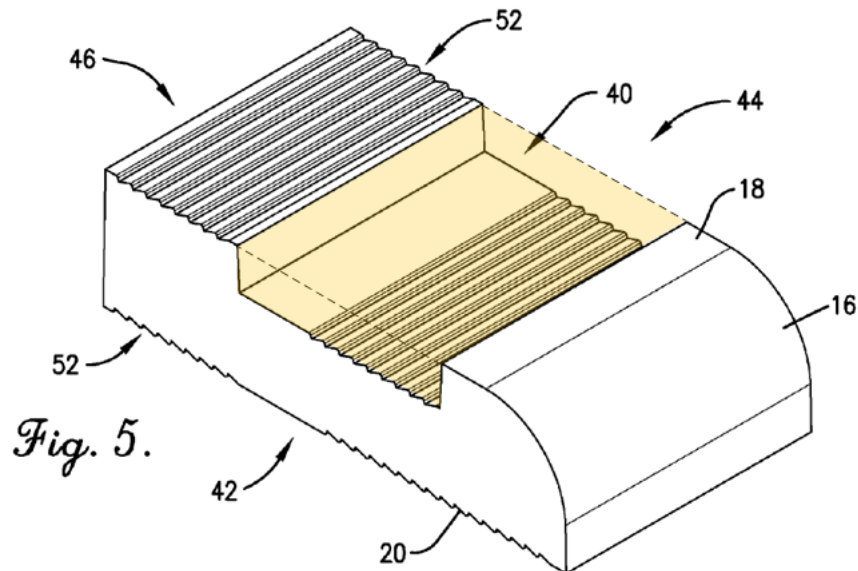
44. Figure 8 of Klein (shown below) depicts an example electronic display system comprising IR receivers/transmitters 34/36 arranged across from one another with an optical overlay 10 (shaded in purple) positioned therebetween.

Id. at 7:34-37.



Id. at Fig. 8 (color added). Specifically, signals 38 are passed from a transmitter toward a receiver and “may be collimated by [a] lens ... on one side of the overlay 10 and focused onto a receiver 36 by the lens 42 on the opposite side of the overlay 10.” *Id.* at 7:35-38. The optical overlay 10 may be sized and shaped so as to “reduc[e] the possibility that [radiation from other sources] strike the receivers 36.”

Id. at 8:44-45; *see also id.* at 7:43-45. The structure of an example optical overlay is shown in greater detail in Figure 5 of Klein, reproduced below. *Id.* at 1:64-66.



Id. at Fig. 5 (color added).

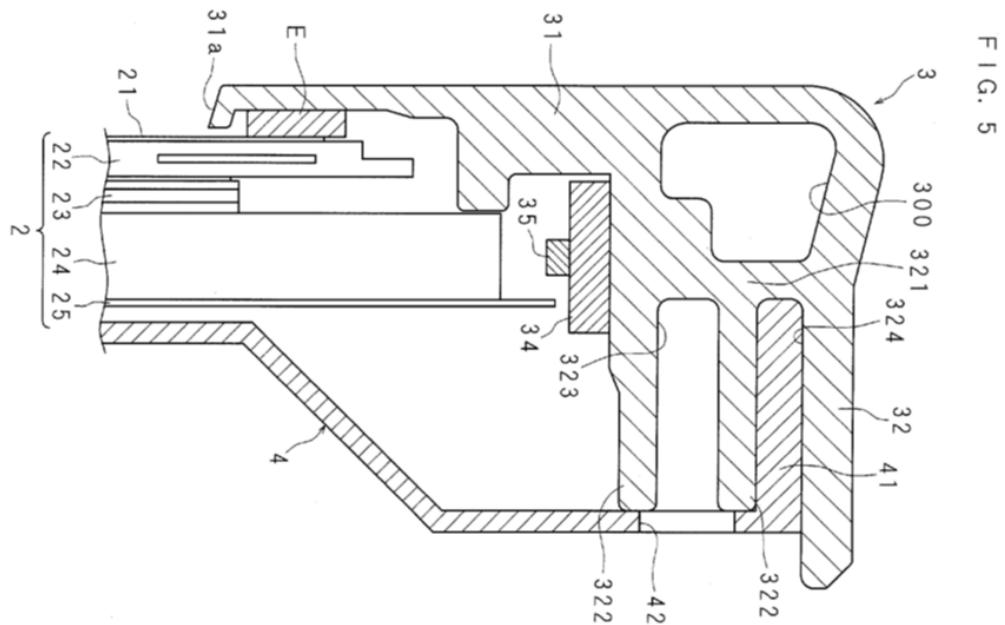
45. In addition to outer wall 16, which is shaped to provide the filtering function of the overlay (*id.* at 5:47-50), the optical overlay of Klein comprises a groove 40 that “is configured to retain a gasket for sealing or weatherproofing the display [] and the bezel [] of the electronic display system [].” *Id.* at 5:52-55. Thus, Klein’s optical overlay “provide[s] protection for the various electrical components of the electronic display system [] against the penetration of liquid, dust, dirt, or other possible system contaminants.” *Id.* at 5:60-63.

C. Nakamura

46. U.S. Patent Publication No. 2014/0111706 (“Nakamura”), entitled “Display Device and Television Receiver,” has an international filing date of April

2, 2012 and was published on April 24, 2014. Nakamura at (43). Nakamura is therefore prior art under at least 35 U.S.C. § 102(a)(1).

47. Nakamura describes mounting a “front cabinet” to a “back cabinet” to form a housing around a display. *Id.* at [0003]. The reference explains that when an extrusion-molding process is used to form the front cabinet, it may be expensive to form screw holes within the front cabinet for attachment to the back cabinet; however, in the absence of screw holes, the strength of the coupling may be insufficient. *Id.* at [0003]-[0004]. To overcome these issues, Nakamura provides a cabinet structure, shown in Fig. 5 reproduced below, that can be assembled in a reduced number of manufacturing processes while achieving an increase in strength. *Id.* at [0022].



48.

Id. at Fig. 5.

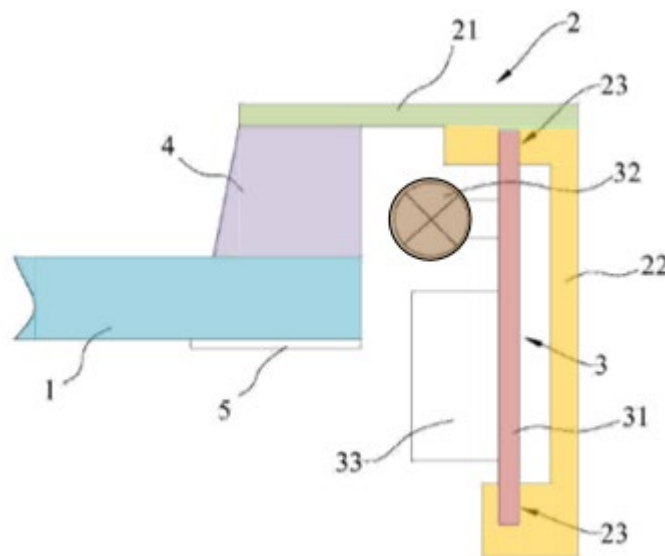
49. Specifically, in Nakamura, the back cabinet 4 is provided with an extension part 41 that fits into a peripheral surface groove 324 of the front cabinet 3. *Id.* at [0071]. By including these structures, “[t]he coupling strength of the front cabinet 3 and the back cabinet 4 can be increased.” *Id.*

D. Chen ’812

50. Chinese Patent No. CN203720812 (“Chen ’812”), entitled “New type of infrared touch screen,” was filed January 10, 2014, and published July 16, 2014. I understand Chen ’812 is therefore prior art to the ’338 patent. A certified

translation of Chen '812 ("Chen '812 translation") provided by Qiang Li and is referred to herein.

51. Chen '812 seeks to "overcome[] the problems of excessively wide frame[s] of the existing infrared touch screen[s] and the excessive[ly] long distance between the upper surface of the frame and the outer surface of the touch screen." Chen '812 translation at [0004]. The device of Chen '812 uses "infrared emitting tubes" located on one side of a frame and "infrared receiving tubes" located on an opposite side of the frame. *Id.* at [0019]. Figure 1 of Chen '812, reproduced below, shows an example touch screen "which includes a screen body 1 [(shaded in blue)], a rectangular frame 2 [(shaded in yellow)] in which the screen body 1 is embedded, and an infrared touch assembly 3." *Id.* at [0019].



Id. at Fig. 1 (colors added).

52. As shown above, “infrared tubes,” including infrared emitters and receivers, (shaded in brown) are “arranged on [a] PCB board 31” (shaded in red). *Id.* at [0019]. Chen ’812 further discloses that the “PCB board 31 [] is arranged in the rectangular frame 2 and parallel to the side wall 22.” *Id.* Specifically, the frame “forms a clamping slot 23 ... for mounting the PBC board 31. In this way ... the infrared touch assembly 3 forms an integral structure on the PCB board 31, and cooperates with the clamping slot on the inner side of the side wall 22 to facilitate rapid installation and debugging.” *Id.* at [0023].

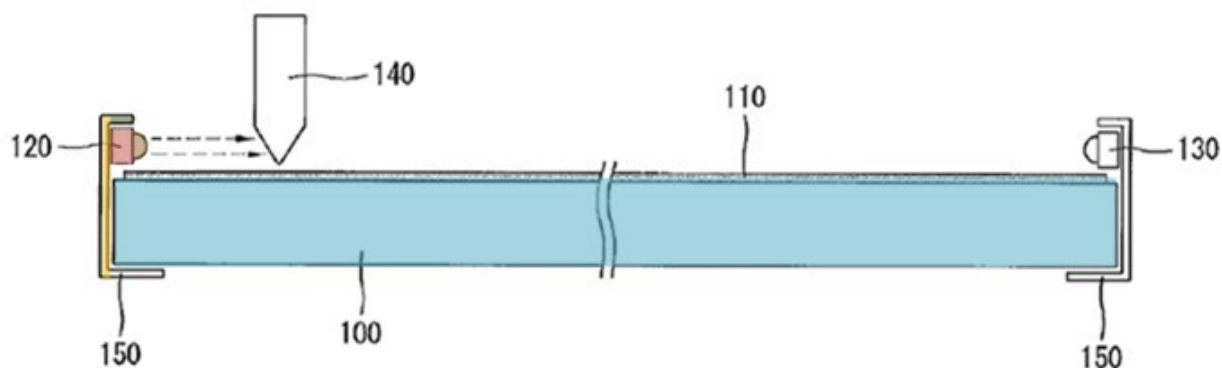
53. Chen ’812 additionally discloses a filter strip (shaded in purple) “adhesively connected” to both the screen body and the rectangular frame. *Id.* at [0024]. The filter strip “allows the infrared receiving tubes to receive stronger signals” and “achieves the effect of one infrared emitting tube emitting and multiple infrared receiving tubes receiving, so as to realize multi-point touch.” *Id.* at [0022].

E. Park

54. U.S. Patent Publication 2012/0146950 (“Park”), entitled “Touch Panel and Display Apparatus Having The Same,” was filed May 25, 2011, and published June 14, 2012. I understand that Park is therefore prior art to the ’338 patent.

55. Park “relates to a touch panel and a display apparatus having the same.” *Id.* at [0003]. Park discloses touch panels that can determine where a substrate has been touched by calculating where light beams between light emitting devices and light receiving devices have been blocked. *See Id.* at [0057].

56. Figure 2 of Park, reproduced below, shows a cross-sectional view of an example touch panel including a light receiving device 130 and a light emitting device 120 arranged above a substrate 100. *Id.* at [0057]. An input unit 140 is also shown to represent a point of touch on the substrate. *Id.*

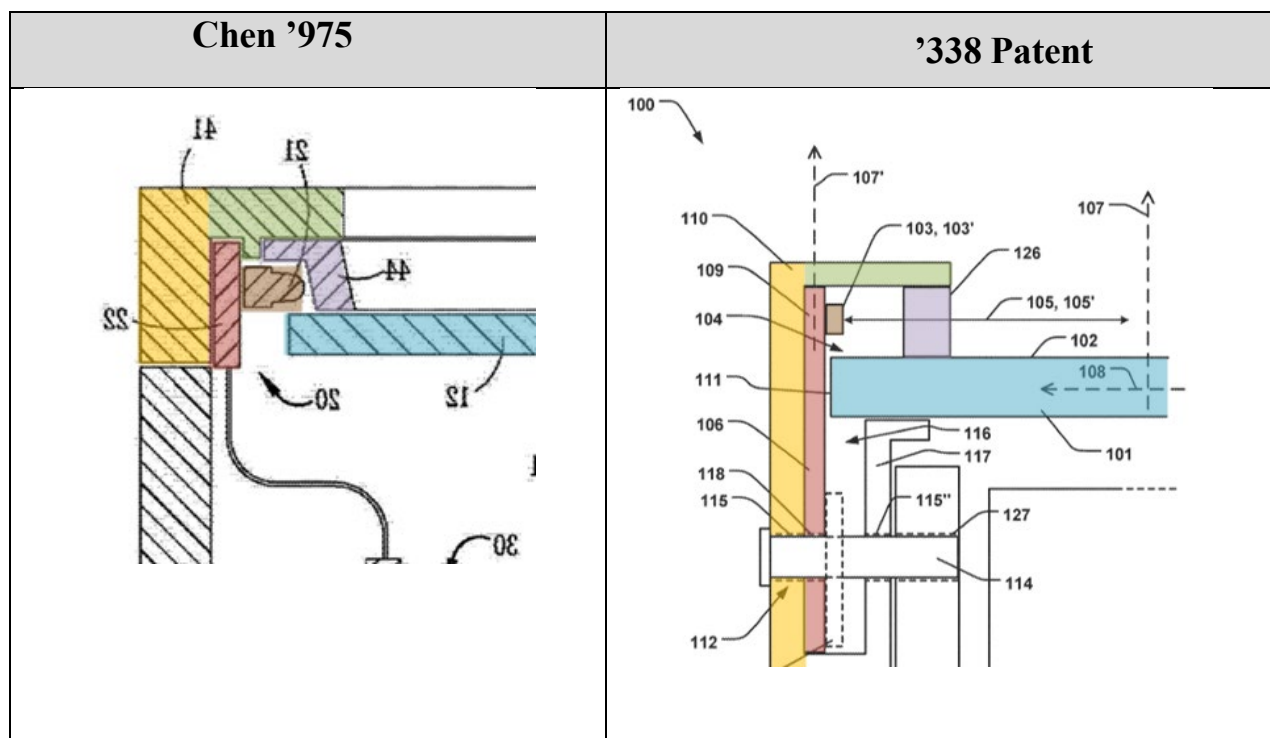


Id. at Fig. 2. In apparatuses according to Park, the light receiving devices are arranged on all sides of the substrate, and as such, “a position corresponding to the touch point can be detected more accurately to thereby enhance the accuracy of the touch panel.” *Id.* at [0063].

VII. Claims 1-15 Of The '338 Patent Are Unpatentable

A. Grounds 1A: Claims 1-3, 5-7, and 9-15 Would Have Been Obvious In View Of Chen '975 Alone or In Combination With Klein

57. It is my opinion that the teachings of Chen '975 are indistinguishable from those of the '338 patent in many aspects:



Chen '975 translation at Fig. 4 (flipped and colors added); '338 patent at Fig. 2 (colors added). As shown above, Chen '975 discloses “a panel” (colored in blue), “a plurality of light emitters” (colored in brown), “a substrate” (colored in red), “a first portion” (colored in yellow), “a second portion” (colored in green), and “a sealing element” (colored in purple) nearly identical to those of the '338 patent.

Chen '975 alone would have rendered obvious the majority of the '338 patent's claims.

58. Further, it is my opinion that a POSA would have been motivated to modify Chen '975 to include the sealing element of Klein (U.S. Patent No. 8,330,736), another reference not cited during prosecution. This combination further shows the obviousness of the '338 claims.

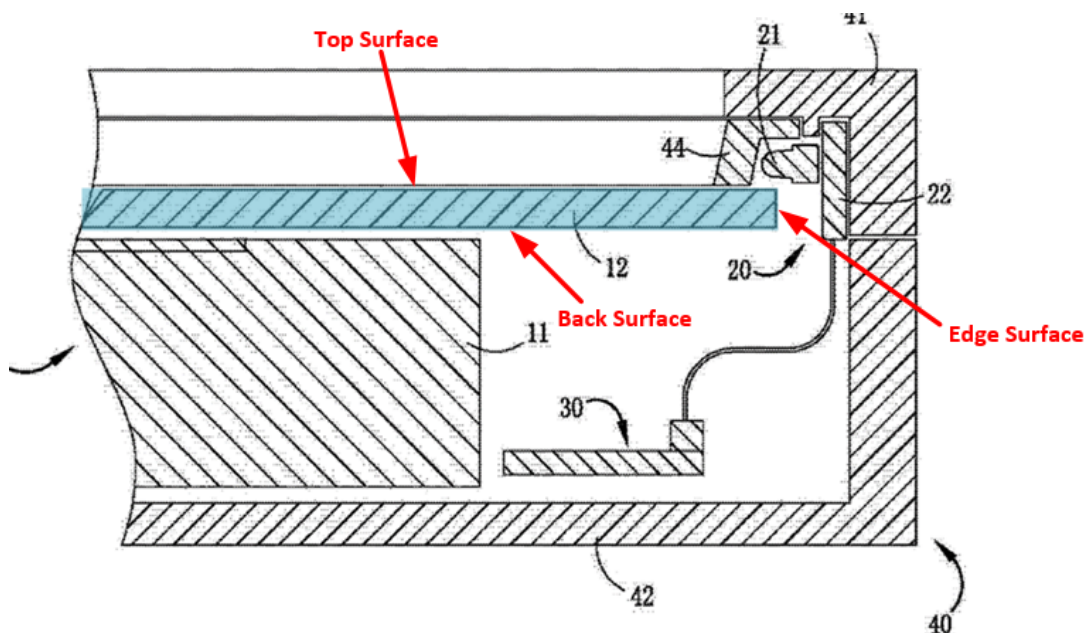
1. Claim 1

a) Preamble: “A touch sensing apparatus comprising:”

59. To the extent the preamble is limiting, Chen '975 discloses the preamble of claim 1. Chen '975 discloses a “display device using touch control” that “detects the position touched by [a] user.” Chen '975 translation at [0001], [0002]. Because the device “detects” a user’s touch, Chen '975 discloses “touch sensing apparatus,” as claimed.

b) “a panel comprising a top surface that includes a touch surface, a back surface, and an edge surface;”

60. Chen '975 discloses this element. The reference discloses a touch panel 12 (*i.e.*, “a panel,” as claimed) that includes a top surface, a back surface, and an edge surface:

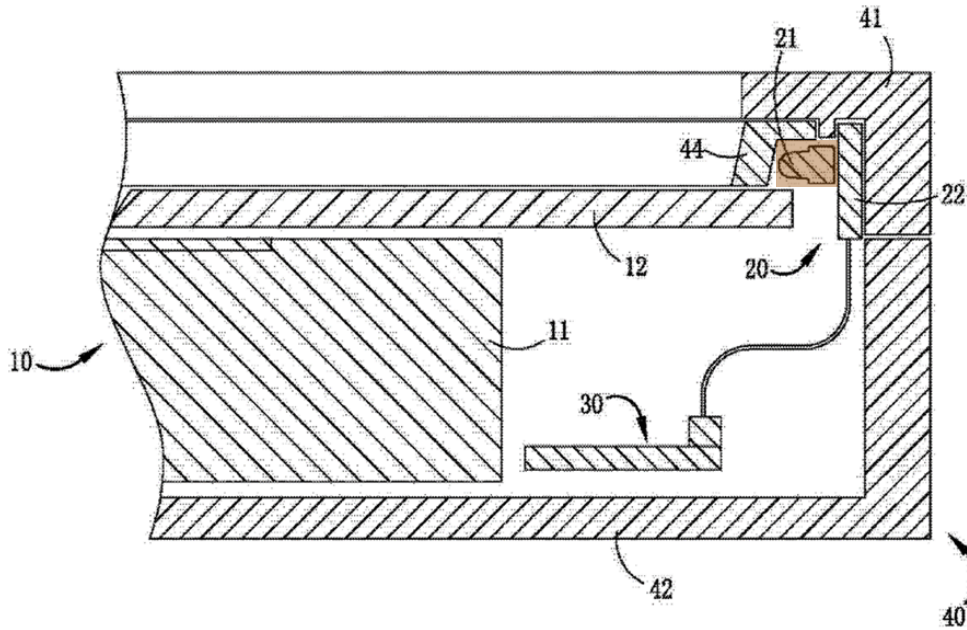


Chen '975 translation at Fig. 4 (annotations added); *see also id.* at [0040].

61. The top surface of Chen '975's panel "includes a touch surface," as recited in claim 1. Specifically, the touch surface is an area of the top surface that a user can touch (e.g., the portions of the top surface that are not obstructed by the filter strip 44 and the top casing 41). *See* Chen '975 translation at [0003] (describing a "touch operation"), [0008], [0009].

c) "a plurality of light emitters arranged along a periphery of the panel;"

62. Chen '975 discloses this element. The reference discloses surface-mounted LEDs (*i.e.*, "a plurality of light emitters," as claimed):



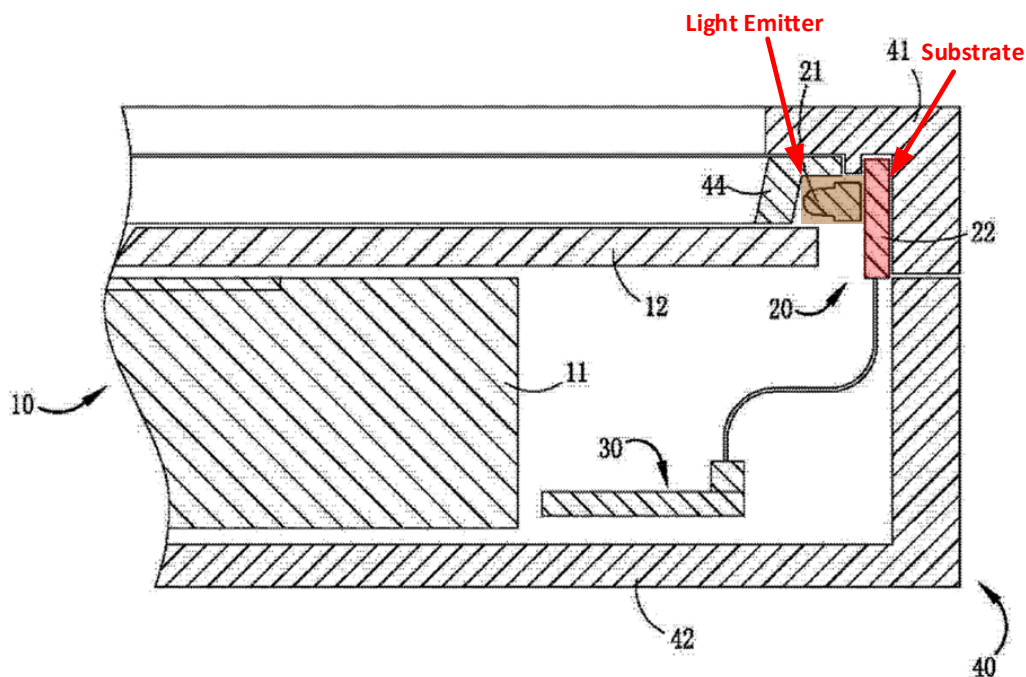
Chen '975 translation at Fig. 4 (color added); *see also id.* at [0037] (“the infrared transmitter is a surface-mount infrared LED”).

63. Each surface-mounted LED has a corresponding receiver for receiving light emitted from the LED, and Chen '975's device includes multiple LED/receiver pairs. *Id.* at [0009] (“the sensing signal transceiver module comprises sensing signal transmitter/receiver pairs ... sensing signals transmitted by the sensing signal transmitters form a sensing signal detection network at the front side of the display face of the liquid crystal display.”). Chen '975 therefore discloses “a plurality of light emitters.” Further, Chen '975's light emitters are “arranged along a periphery of the panel,” as seen above. *Id.* at [0025] (describing

the transmitters with LEDs as being “annularly disposed around the flat panel display component 10”).

d) “a substrate configured to support at least one of the plurality of light emitters such that the at least one of the plurality of light emitters transmits a portion of light in a plane extending over the touch surface;”

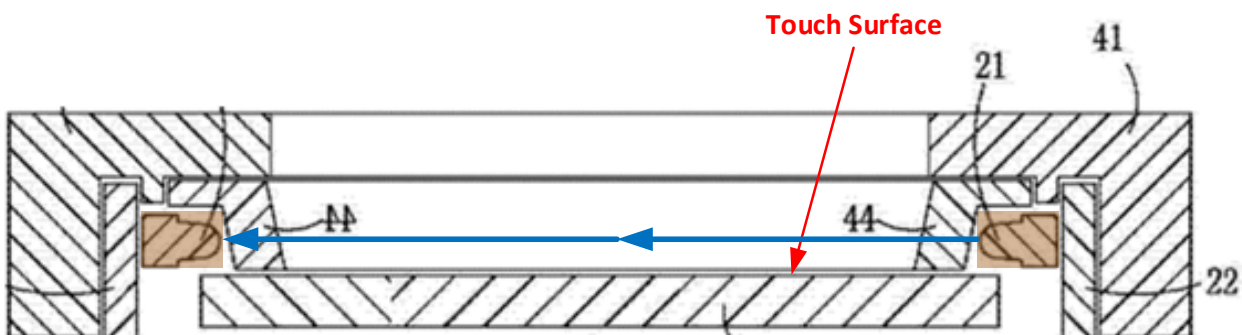
64. Chen '975 discloses this element. The reference discloses a printed circuit board (PCB) 22 (*i.e.*, “a substrate,” as claimed):



Chen '975 translation at Fig. 4 (annotations added); *see also id.* at [0027]-[0030], [0032]-[0036] (“the [PCB] 22 is a rigid PCB or a flexible PCB”). In the claim chart of the '338 patent against the accused product, which I have reviewed, Patent Owner argues that the accused product’s PCB is a “substrate.” Based on a review

of the '338 patent, it is also my opinion a PCB or other electric boards and circuits are “substrates” as claimed. The PCB 22 “support[s] at least one of the plurality of light emitters.” This can be seen in the figure above, and Chen '975 further discloses that its LEDs “are soldered to the [PCB] 22.” *Id.* at [0032].

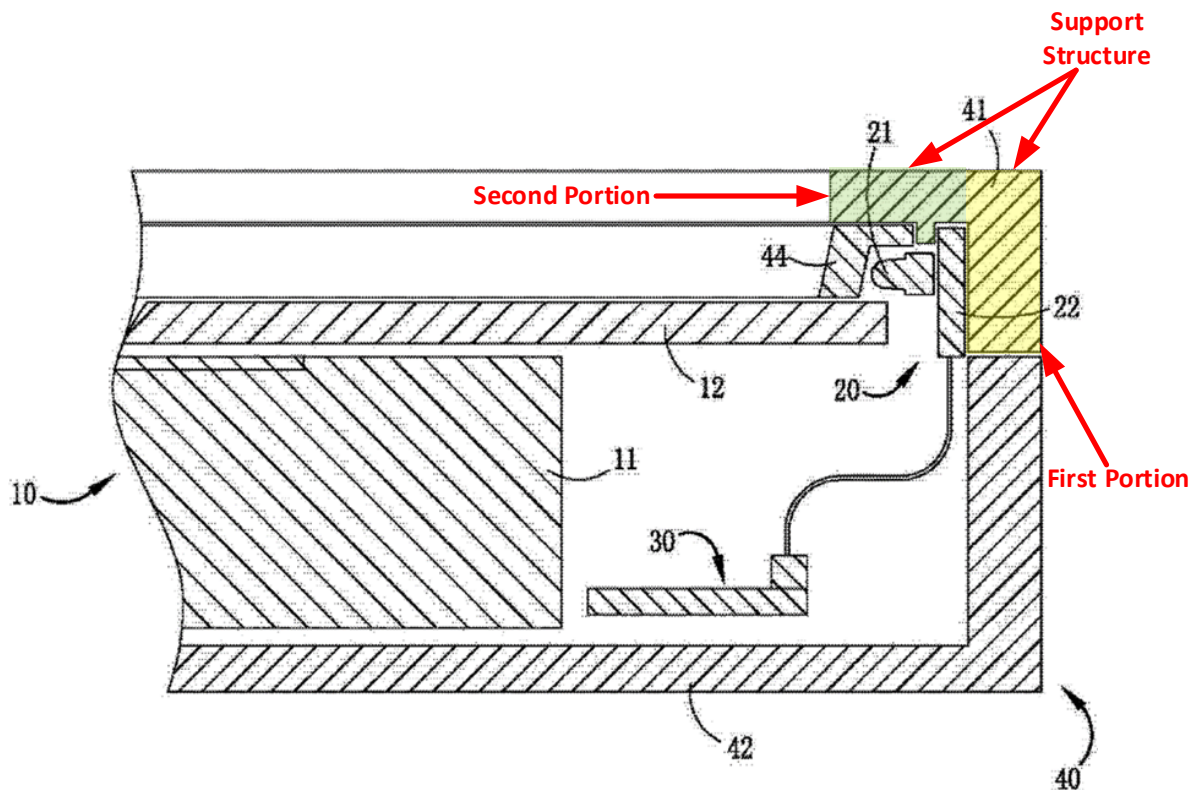
65. With the LEDs supported by the PCB 22 as shown above, “at least one of the plurality of light emitters transmits a portion of light in a plane extending over the touch surface.” Chen '975 uses LEDs and receivers arranged opposite from each other (Chen '975 translation at [0029]), thus enabling light emitted from an LED to be received by a receiver:



Id. at Fig. 4 (modified, annotations added). With the LEDs and receivers arranged as such and supported by the PCB 22, “at least one of the plurality of light emitters transmits a portion of light in a plane extending over the touch surface,” as seen above (blue arrows representing emitted light transmitted over the touch surface).

e) “a support structure configured to support the substrate, the support structure comprising:”

66. Chen '975 discloses this claim element. The reference discloses a top casing 41 (*i.e.*, “a support structure,” as claimed):



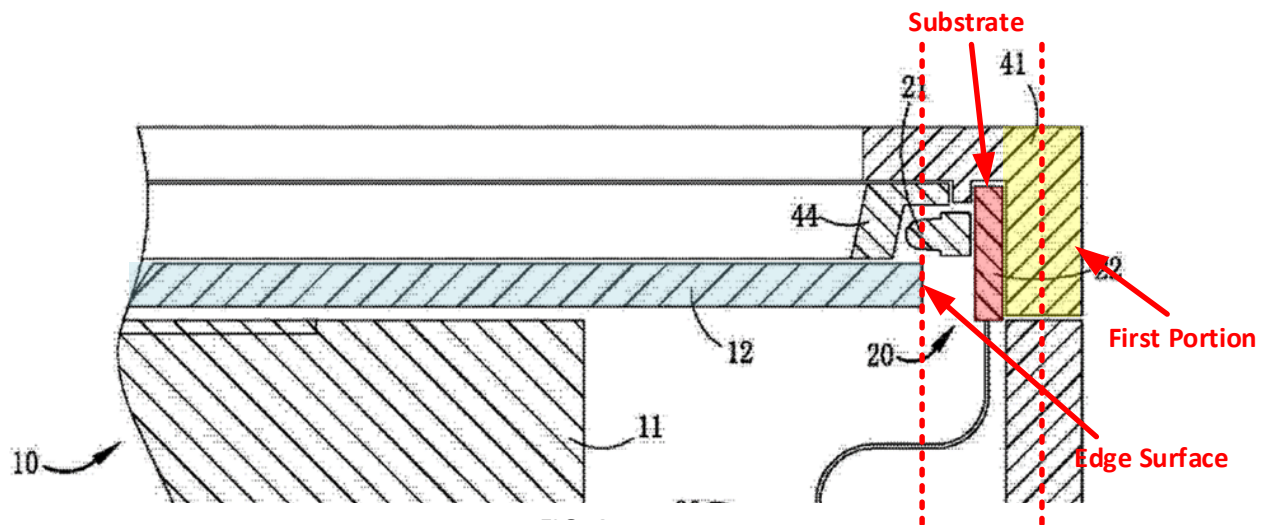
Chen '975 translation at Fig. 4 (annotations added).

67. As shown above, the top casing 41 (*i.e.*, the “support structure,” as claimed) supports the PCB 22 (*i.e.*, the “substrate,” as claimed). *See also id.* at [0036] (the top casing 41 includes “engagement grooves,” and “the [PCB] 22 ...

is engaged in the engagement grooves ... [and] is fixed by means of the engagement grooves”).

f) “a first portion extending substantially parallel to the edge surface, wherein the substrate is configured to be supported by the first portion;”

68. Chen ’975 discloses this claim element. As shown below, the top casing 41 (*i.e.*, the “support structure,” as claimed) includes “a first portion extending substantially parallel to the edge surface”:

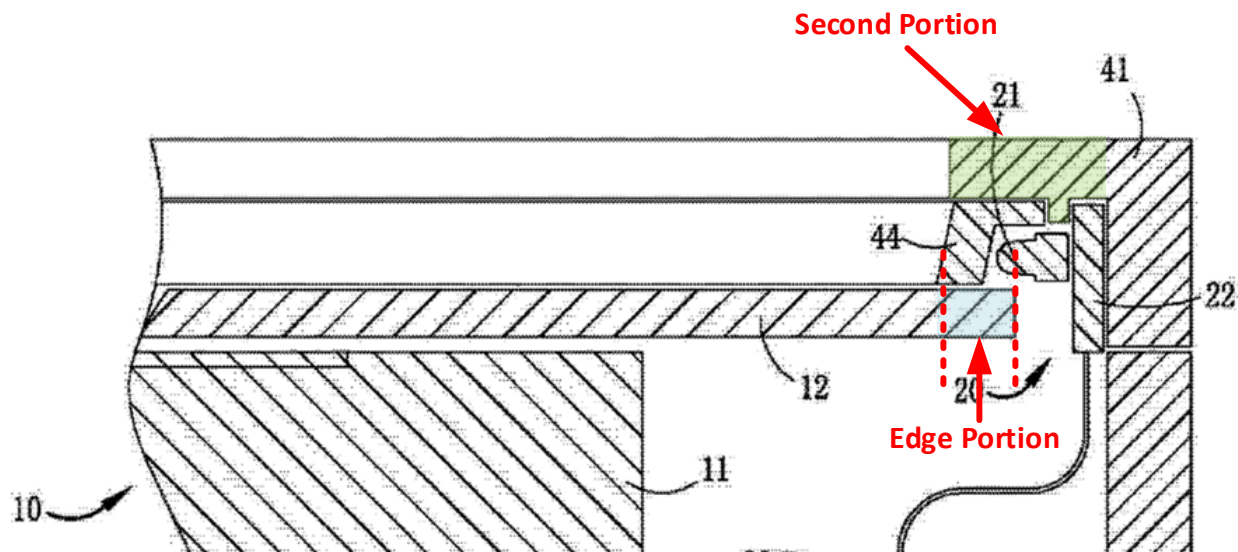


Chen ’975 translation at Fig. 4 (annotations added).

69. As shown above, the first portion of the top casing 41 supports the PCB 22 (*i.e.*, the “substrate,” as claimed). *See also id.* at [0036] (the top casing 41 includes “engagement grooves” that receive the PCB 22, thus enabling the PCB 22 to be supported by the first portion in the manner depicted).

g) “a second portion extending over an edge portion of the top surface of the panel; and”

70. Chen '975 discloses this claim element. As shown below, the top casing 41 (*i.e.*, the “support structure,” as claimed) includes “a second portion extending over an edge portion of the top surface of the panel”:

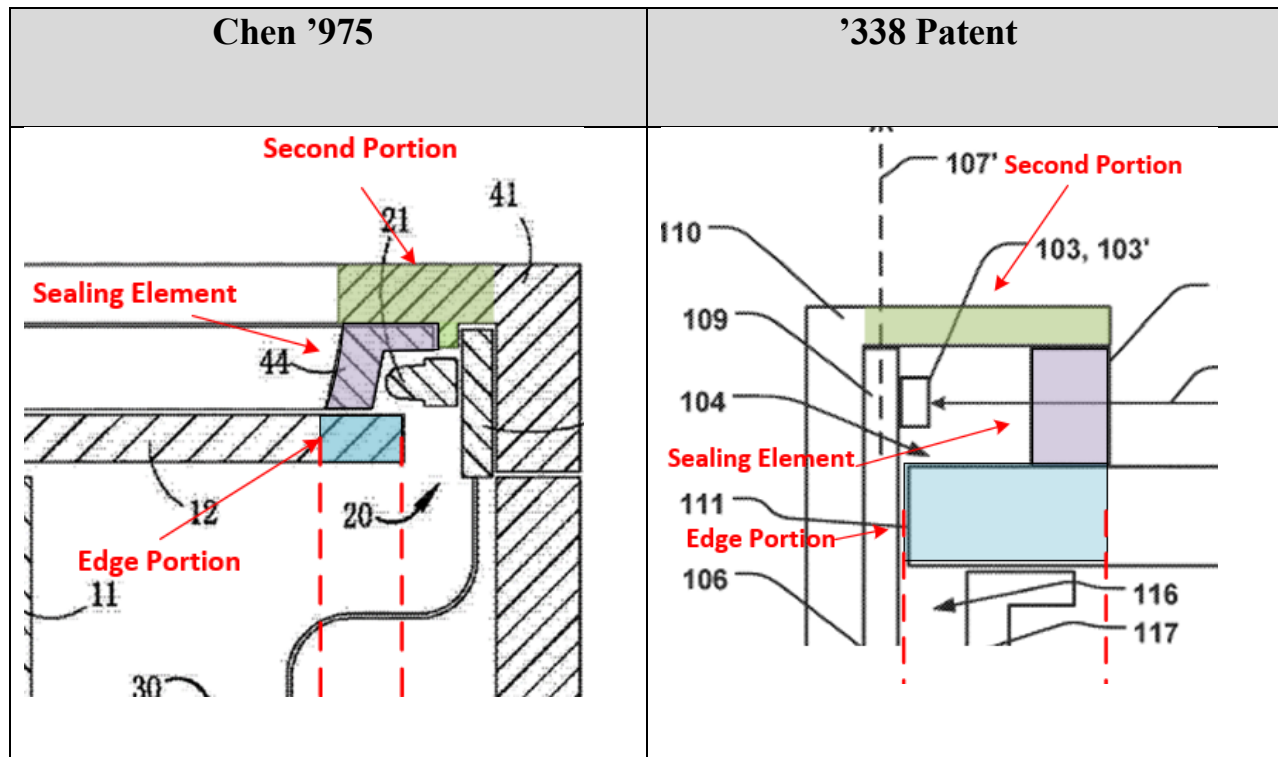


Chen '975 translation at Fig. 4 (annotations added).

h) “a sealing element configured to rest on the edge portion of the top surface and further configured to be fitted between the edge portion of the top surface and the second portion of the support structure.”

71. Chen '975 discloses this claim element. The reference discloses a filter strip 44 that is “configured to rest on the edge portion of the top surface and further configured to be fitted between the edge portion of the top surface and the

second portion of the support structure,” exactly like the sealing window 26 of the ’338 patent:



Chen ’975 translation at Fig. 4; ’338 patent at Fig. 2 (annotations added).

72. Further, the filter strip 44 is a “sealing element,” as claimed. It is my opinion that plain meaning of “sealing element” in view of the patent and file history is *“an element that provides protection from some, but not necessarily all dirt, water, and other contaminants.”* I have reviewed documents from earlier, related litigation, in which FlatFrog acknowledged that a similar claim term “seal ... from contaminants” did not need construction and “does not require perfect

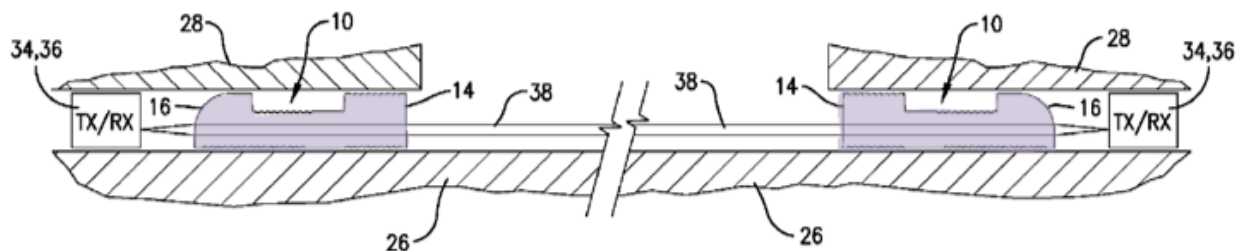
sealing.” Joint Claim Construction Brief Flatfrog v. Promethean at 71. In this case, FlatFrog agreed that the sealing element described in the ’916 and ’338 patents need only “prevent[] the ingress of some, but not necessarily all, dirt, water, and other contaminants.” *Id.* Consistent with FlatFrog’s position, it is my opinion that a POSA would have understood the term “sealing element” to mean “an element that provides protection from some, but not necessarily all, dirt, water and other contaminants.” *See* Ex. 1001 at 8:12-19, 16:27-34, 16:61-66.

73. Although Chen ’975 describes the filter strip 44 as being “used to filter out external light rays” (Chen ’975 translation at [0039]), the POSA would have understood that the filter strip 44 also inhibits dirt, water, and other contaminants from reaching the LEDs. The filter strip 44 of Chen ’975 is a solid object that is positioned such that it acts as a barrier between the external environment and the LEDs, thus providing the light emitters of the device with protection from at least some dirt, water, and other contaminants. Chen ’975 therefore discloses the claimed “sealing element.”

74. As shown above, the filter strip 44 is positioned such that it acts as a barrier between the external environment and the LEDs, thus protecting these light emitters from at least some dirt, water, and other contaminants. The filter strips used in these types of touch sensing devices are generally solid and made out of

some type of plastic. A solid, plastic strip in the position of filter strip 44 would provide a barrier against at least some contaminants. Chen '975 therefore discloses the claimed “sealing element.”

75. Alternatively, the “sealing element” claim term would have at least been rendered obvious by the combination of Chen '975 and Klein. Klein discloses an “optical overlay” for use in a device similar to that of Chen '975, stating that this optical overlay advantageously provides “sealing or weatherproofing” that protects “against the penetration of liquid, dust, dirt, or other possible system contaminants”:



Klein at Fig. 8 (color added to highlight the optical overlay 10).

76. Like Chen '975, Klein uses transmitters 34 (*e.g.*, LEDs) and receivers 36 arranged opposite from each other, thus enabling light emitted from an LED to be received by a receiver. *Id.* at 4:42-43 (“The plurality of transmitters 34 generally transmit signals 38 to be received by the plurality of receivers 36.”). With the optical overlay 10 positioned as shown above and configured to provide

“sealing or weatherproofing,” the optical overlay 10 protects the transmitters from dirt, water, and other contaminants. *Id.* at 5:53; 5:60-63. The optical overlay 10 therefore discloses the claimed “sealing element.”

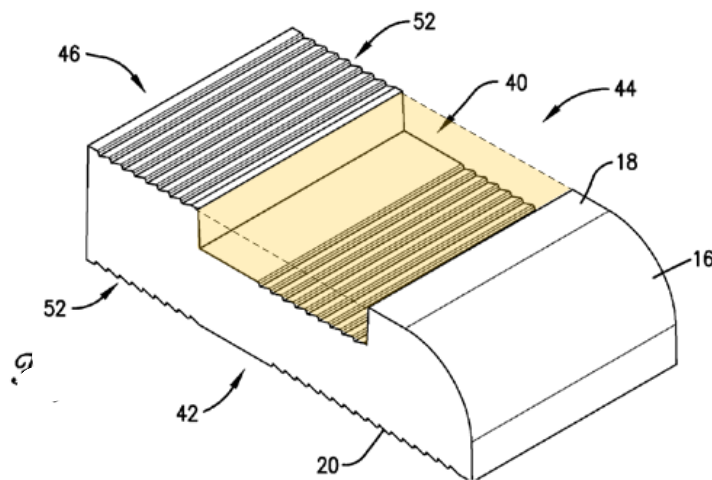
77. It is my opinion that a POSA would have been motivated to use Klein’s optical overlay 10 in the touch display of Chen ’975 for a variety of reasons. Chen ’975 does not describe the degree of effectiveness of the filter strip 44 as a barrier to contaminants, and the reference provides minimal details on how to implement the filter strip 44. *Id.* at [0039]. The reference does not describe, for instance, materials suitable for the filter strip 44 nor how the filter strip 44 is kept in place. *Id.* The POSA therefore would have looked to Klein, which provides extensive details on the optical overlay 10.

78. Among other details, Klein describes materials suitable for the optical overlay 10:

The optical overlay 10 may be manufactured from a polycarbonate material, such as LEXAN 121R from GENERAL ELECTRIC, and may be monolithically formed using an injection molding process. The material may be generally transparent or transmissive to visible and IR wavelengths of radiation, particularly radiation with a wavelength ranging from approximately 780 nm to approximately 1050 nm.

Id. at 3:39-45. Klein also provides solutions for keeping the optical overlay 10 in place: “the optical overlay 10 may also include mounting and assembly features such as alignment tabs and pegs, holes, or the like.” *Id.* at 3:37-39. The optical overlay 10 of Klein also functions such that “[s]ignals from the transmitters 34 may be collimated by the lens 42 of the outer wall 16 on one side of the overlay 10 and focused onto a receiver 36 by the lens 42 on the opposite side of the overlay 10. *Id.* at 7:34-38. These implementation details—all of which are missing from Chen ’975—would have motivated the POSA to implement Chen ’975’s filter strip 44 using the optical overlay 10 of Klein.

79. Additionally, the optical overlay 10 includes a groove 40 “configured to retain a gasket” (*id.* at 5:52-53):



Id. at Fig. 5.

80. The groove and gasket used in implementing the optical overlay 10 advantageously provides “sealing or weatherproofing” that protects “against the penetration of liquid, dust, dirt, or other possible system contaminants.” *Id.* at 5:52-63. Based on the nature of materials described above, which are solid and non-porous, and the optical overlay’s positioning, the optical overlay of Klein is an element that provides the emitters and detectors protection from some, but not necessarily all dirt, water, and other contaminants. It is my opinion that a POSA would have understood this structure, itself, to be a sealing element. By including the groove and gasket, Klein provides an extra layer of protection, improving the seal of the sealing element.

81. It is my opinion that a POSA would have been motivated to implement Chen ’975’s filter strip 44 with the features of Klein’s optical overlay 10 to achieve this “sealing or weatherproofing.” The POSA would have recognized that this sealing/weatherproofing would have advantageously enabled Chen ’975’s filter strip 44 to provide: (1) a more robust system that would last longer and/or require less maintenance (e.g., putting in new emitters/detectors when the old ones break), (2) usability in less hospitable environments that may have more contaminants (e.g., outdoors), (3) better performance (e.g., detectors/emitters operating at peak performance without contaminants that could

affect detection accuracy), and (4) the ability to collimate the light from the emitters and focus to at the detectors (e.g., assuring the light detection net functions accurately).

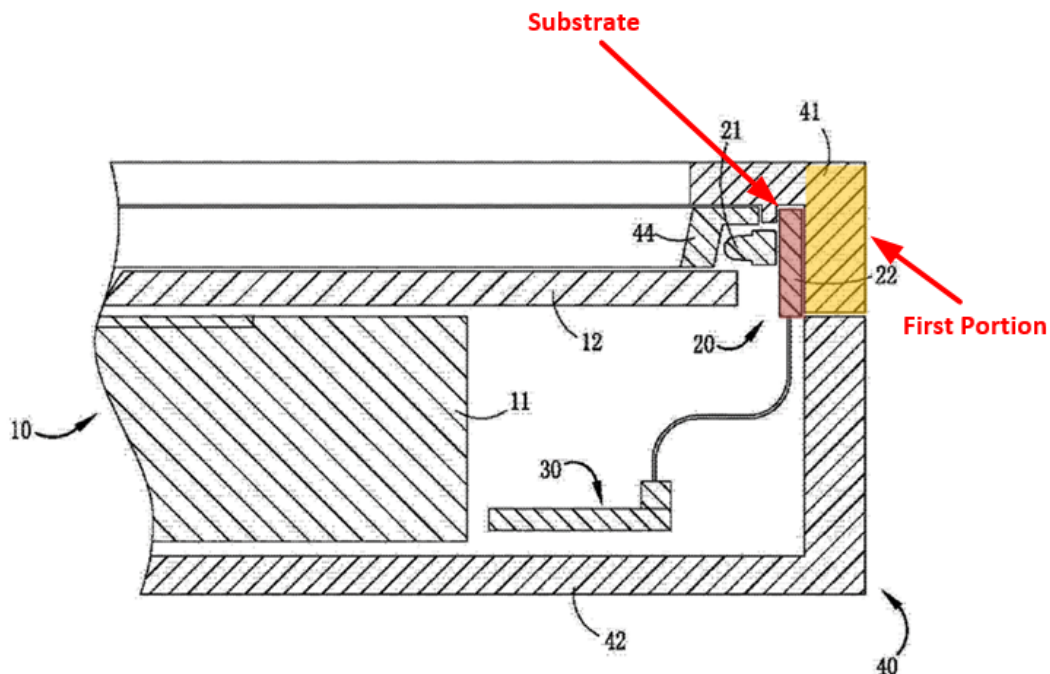
82. It is my opinion that a POSA would have had a reasonable expectation of success in implementing Chen '975's filter strip 44 using Klein's optical overlay 10. As detailed above, Klein provides extensive details on how to implement the optical overlay 10, and any modifications necessary for achieving this combination would have been trivial, requiring only mechanical modifications that would have been well within the POSA's skill. Additionally, in the combination of Chen '975 and Klein, the sealing element "rest[s] on the edge portion of the top surface," as depicted in Figure 4 of Chen '975. Chen '975 translation; *see also* Klein at Figs. 8 and 9 (depicting the optical overlay 10 as resting on the panel of Klein's display). Further, the POSA would have been motivated to implement the sealing element such that it rests on the top surface of the touch panel 12 because to achieve the "sealing or weatherproofing" advancement of Klein, the sealing element has to interface with the edge portion of the top surface.

83. Claim 1 therefore would have been obvious over Chen '975 alone or in combination with Klein.

2. Claim 2

84. Claim 2 depends from claim 1 and further recites “wherein the substrate is affixed to the first portion of the support structure.”

85. Chen '975 discloses or renders obvious this claim element. Chen '975 describes printed circuit board 22 (*i.e.*, “the substrate,” as claimed) comprising “four or more small circuit boards annularly disposed around” the device and “fixedly connected together head-to-tail.” Chen '975 translation at [0035]. The reference further discloses that top casing 41 (*i.e.*, “the first portion of the support structure,” as claimed) is “able to receive the length of ... the printed circuit board 22”:



Id. at Fig. 4 (annotations added); *id* at [0032]. The printed circuit board 22 of Chen '975 is disposed “annularly” around a perimeter of the device against the first portion of the top casing. *Id.* at [0035]. This, in turn, positions the light emitters and detectors above the touch panel 12, effectuating the passage of light over the panel that is necessary for touch sensing by the device. To ensure that the positioning of the sensors does not change, it is my opinion that the printed circuit board 22 is attached, or “affixed,” to the top casing 41.

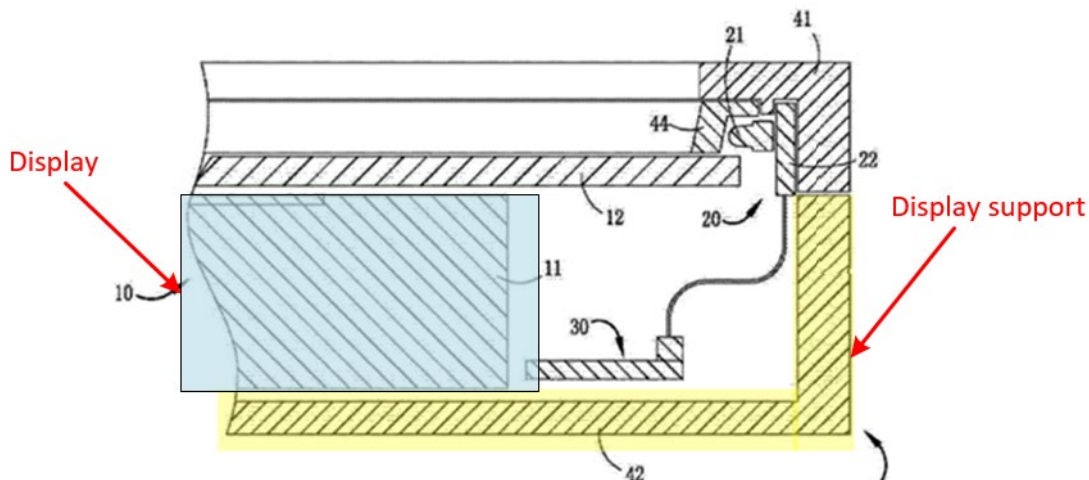
86. Chen '975 therefore discloses “the substrate is affixed to the first portion of the support structure,” as claimed

87. Claim 2 therefore would have been obvious over Chen '975 alone, or in combination with Klein.

3. Claim 3

88. Claim 3 depends from claim 1 and further recites “wherein the support structure is configured to be attached to a display support, and wherein the display support is configured to support a display.”

89. Chen '975 discloses this claim element. The reference describes a bottom casing 42 (*i.e.*, “a display support,” as claimed) configured to support a liquid crystal display 11:



Chen '975 at Fig. 4 (annotations added); *id.* at [0031]. Further, the top casing 41 (*i.e.*, the “support structure,” as claimed) is configured to be attached to the bottom casing 42 (*i.e.*, the “display support”). For example, Chen '975 discloses that top casing 41 and bottom casing 42 together form an outer casing 40 into which components of the display device are all packaged. Chen '975 translation at [0031]. Further, Chen '975 explains that the “top casing 41 is a four-cornered frame body matched in size to the bottom casing 42, and ... covers the bottom casing 42” thereby creating a “four-cornered spaced enclosed by the four-cornered frame body.” *Id.* This enclosure is created by attaching the top casing 41 to the bottom casing 42.

90. Claim 3 therefore would have been obvious over Chen '975 alone or in combination with Klein.

4. Claim 5

91. Claim 5 depends from claim 1 and further recites “wherein the support structure is formed from an extrusion process, a drawing process, a rolling process, or a molding process.”

92. I understand that the validity of this claim is determined by the claimed product, not the process used to make it. I was asked to evaluate whether the processes claimed impart a structural or functional different in the claimed product.

93. Based on my review of the claim and the specification of the '338 patent, the claimed processes (*i.e.*, “an extrusion process, a drawing process, a rolling process, or a molding process”) do not impart a structural or functional difference in the claimed product. These are common processes in the art that can create products having an innumerable variety of structural and functional features and do not impart a particular structural or functional difference over products created by other processes. Other methods, such as machining or printing, can be used to obtain an identical support structure. A machining process, for example, could be used to form the support structure as a single monolithic piece of material having mechanical properties that are as good, if not better, than the processes mentioned in the claim.

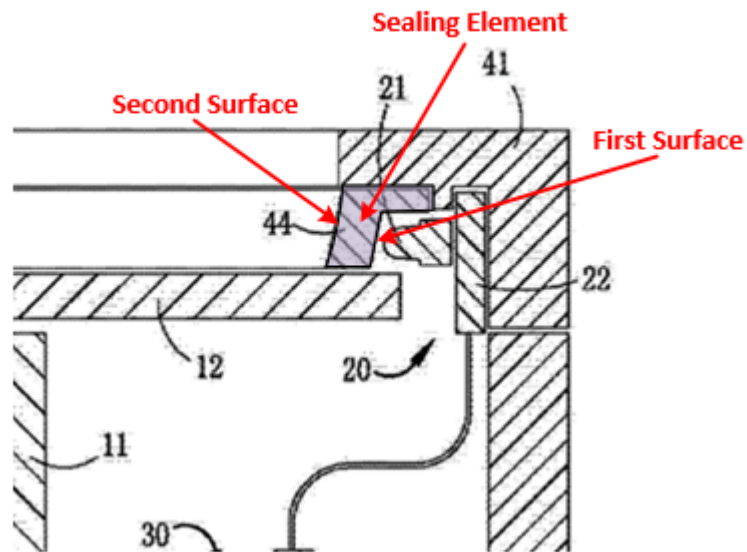
94. Further, the processes recited in claim 5 were well known in the art at the time of the '338 patent. In my opinion, it would have been obvious to the POSA to choose from known prior-art processes in forming the support structure of Chen '975, and implementing the support structure in this manner would have yielded nothing more than predictable results to the POSA.

95. Therefore, Chen '975 alone or in combination with Klein would have rendered obvious claim 5.

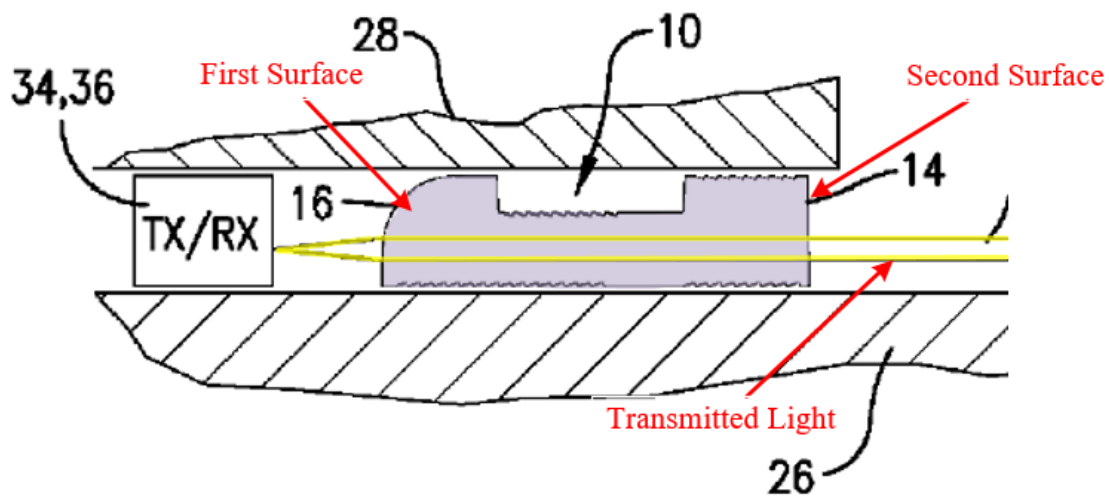
5. Claim 6

96. Claim 6 depends from claim 1 and further recites “wherein the sealing element comprises a first surface facing the at least one of the plurality of light emitters and being configured to receive the transmitted light from that emitter and a second surface configured to receive light propagating in the plane extending over the touch surface.”

97. Each of Chen '975 and Klein discloses the limitations added in claim 6. Specifically, the filter strip 44 and optical overlay 10 of these respective references satisfy the limitations of claim 6 as shown below:



Chen '975 translation at Fig. 4 (annotations added).



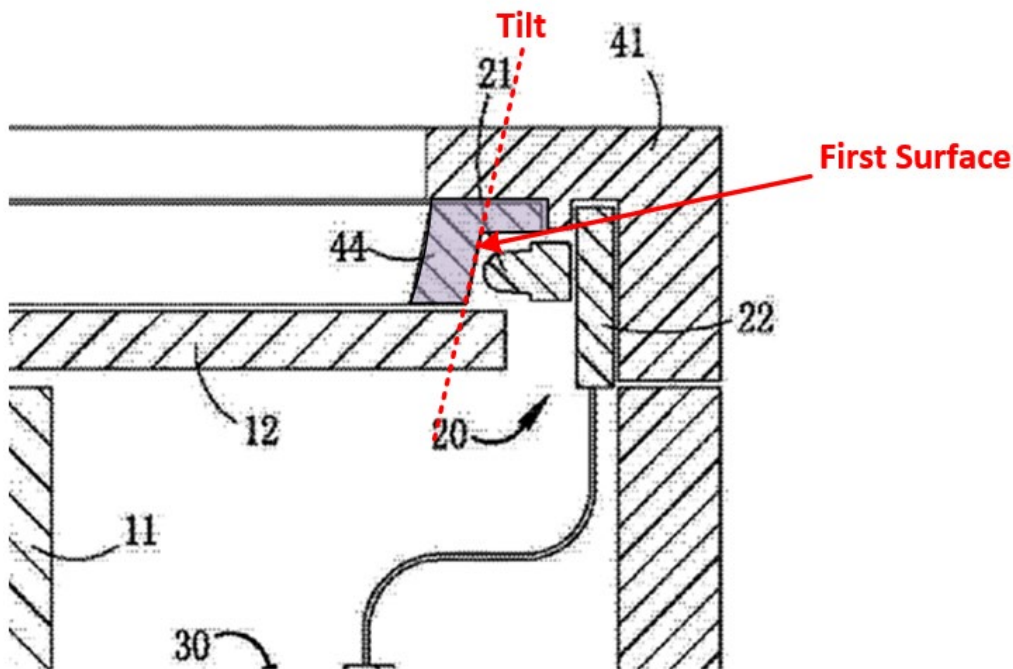
Klein at Fig. 8 (annotations added).

98. Claim 6 therefore would have been obvious over Chen '975 alone or in combination with Klein.

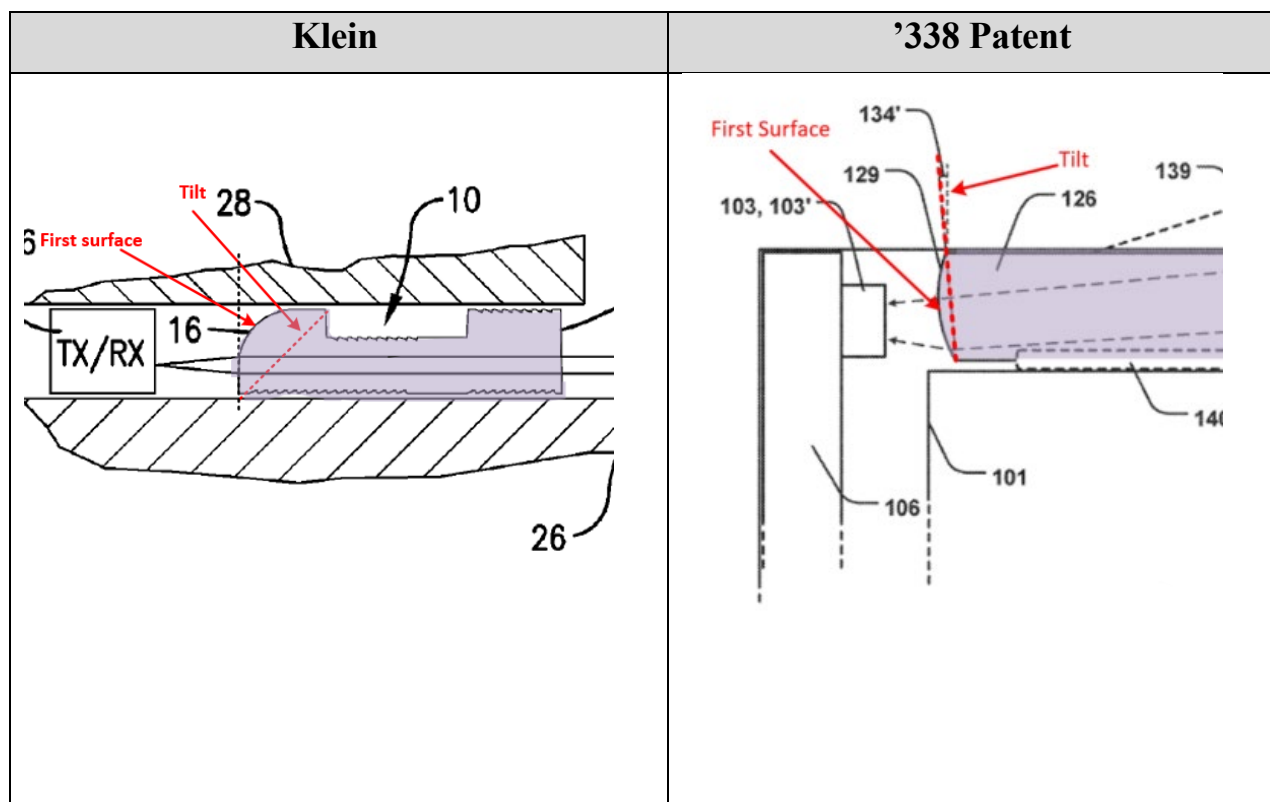
6. Claim 7

99. Claim 7 depends from claim 6 and further recites “wherein the first surface is tilted relative to the at least one of the plurality of light emitters.”

100. Each of Chen '975 and Klein discloses the limitations added in claim 7. Specifically, the “first surface[s]” of the filter strip 44 and optical overlay 10 of the respective references satisfy the limitations of claim 7 as shown below:



Chen '975 at Fig. 4 (annotations added). Klein discloses the first surface having a convex shape and a tilted configuration in the same way shown and described in the '338 patent:



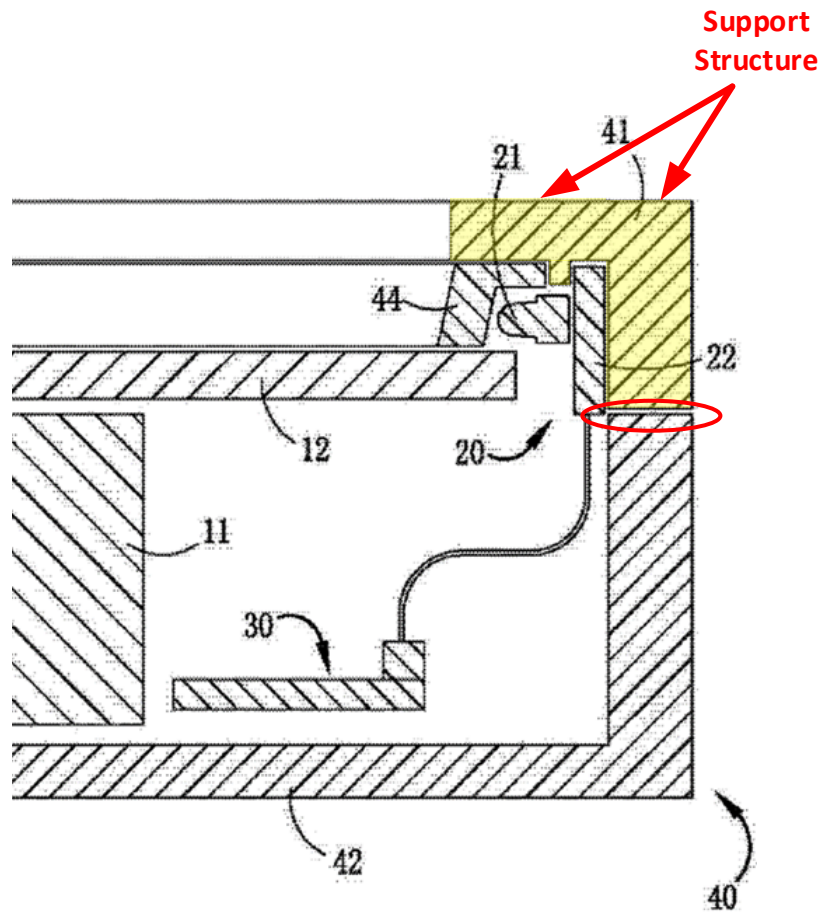
Klein at Fig. 8 (annotations added); '338 patent at Fig. 5a. *See also id.* at Fig. 5b, 13:66-14:2 (describing a “tilted configuration” of the sealing element).

101. Claim 7 therefore would have been obvious over Chen '975 alone or in combination with Klein.

7. Claim 9

102. Claim 9 depends from claim 1 and further recites “wherein the support structure is formed from a single monolithic piece of a material.”

103. Chen '975 discloses this limitation. Chen discloses a top casing 41 that is a “four-cornered frame body”:



Chen '975 translation at Fig. 4 (annotations added). Chen '975's top casing (*i.e.*, “the support structure,” as claimed) is described as a “frame” and shown as a single structure. It is my opinion that although only a cross-section of the top casing is shown, the entire top casing, or “frame,” is a single piece of monolithic material as claimed. First the description of a “four cornered frame body” indicates it is one structure having four corners that fully surrounds the device, rather than a number of structures joined together. Further, it is common in the art to form these structures using a machining or molding process so as to create a structure of

sufficient mechanical strength to protect the device. Additionally, an important goal in the design of touch sensing devices is reducing the amount of ambient light that reaches the detectors. To achieve this goal, it is common in the art to form the frame as a single piece in order to remove the potential for ambient light to pass through gaps in the structure. Therefore, Chen '975 therefore discloses “the support structure is formed from a single monolithic piece of a material.”

104. Furthermore, as shown above, Chen '975 shows a break (surrounded by the red oval above) on the casing 40 between top casing 41 and bottom casing 40, while there are no breaks shown within top casing 41 itself. *See* Chen '975 translation at Fig. 4. Because the top casing 41 is a continuous, unbroken structure, and therefore a “single monolithic” piece of material.

105. Claim 9 therefore would have been obvious over Chen '975 alone, or in combination with Klein.

8. Claim 10

106. Claim 10 depends from claim 1 and further recites “wherein the sealing element is formed from a single monolithic piece of a material.”

107. Chen '975 in view of Klein renders obvious this claim element. Klein's optical overlay is “monolithically formed using an injection molding process.” Klein at 3:41-42. It would have been obvious to a POSA to apply the

optical overlay of Klein as the filter strip of Chen '975 in order to achieve the benefits described above.

108. Claim 10 therefore would have been obvious over Chen '975 in combination with Klein.

9. Claim 11

109. Claim 11 depends from claim 1 and further recites “wherein the sealing element comprises an optically active element or an optically passive element.”

110. Each of Chen '975 and Klein discloses the limitations added in claim 11.

111. Chen '975's filter strip 44 “is used to filter out external light rays, so that the infrared transmitter and infrared receiver can selectively transmit and receive light.” Chen '975 translation at [0039]. Because the filter strip 44 is used to deflect or divert external light rays, the filter strip 44 “comprises an optically active element,” as claimed. *See* '338 patent at 16:38-40 (explaining that embodiments of the sealing window 126 comprise “optical elements for refracting, deflecting, diverting or focusing the light beams therethrough”). Similarly, Klein's optical overlay 10 includes a lens 42 that collimates signals on one side of the

overlay 10 and focuses the signals on the opposite side of the overlay. Klein at 5:64-64, 7:34-38. The lens 42 is therefore an optically active element, as claimed.

112. Claim 11 therefore would have been obvious over Chen '975 alone or in combination with Klein.

10. Claim 12

113. Claim 12 depends from claim 1 and recites “wherein the sealing element is configured to inhibit ingress of a contaminant toward the at least one of the plurality of light emitters.”

114. Each of Chen '975 and Klein discloses the limitations added in claim 12 for the reasons provided above with respect to claim 1.

115. Claim 12 therefore would have been obvious over Chen '975 alone or in combination with Klein.

11. Claim 13

116. Claim 13 depends from claim 1 and recites “wherein the sealing element comprises one or more optical elements that refract, deflect, divert or focus light beams.”

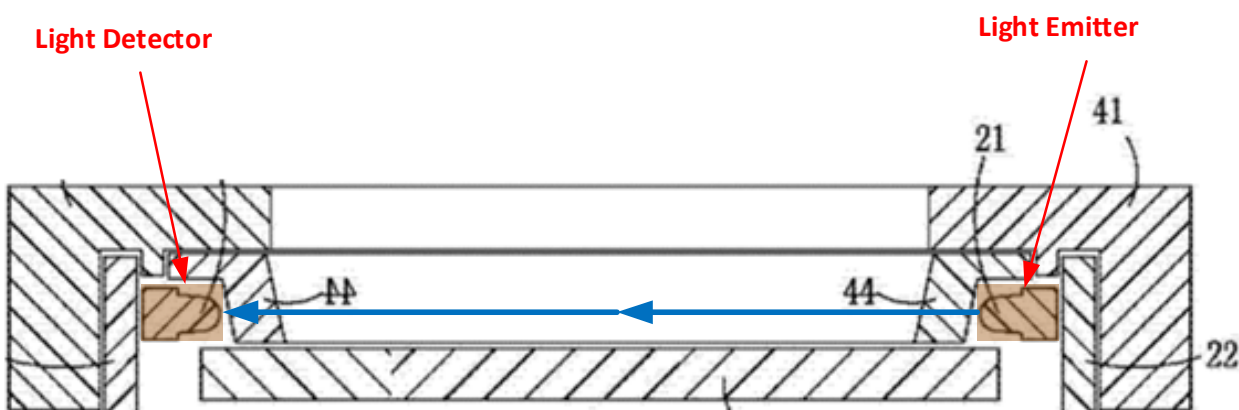
117. Each of Chen '975 and Klein discloses the limitations added in claim 13 for the reasons provided above with respect to claim 11.

118. Claim 13 therefore would have been obvious over Chen '975 alone or in combination with Klein.

12. Claim 14

119. Claim 14 depends from claim 1 and recites “further comprising a plurality of light detectors arranged along the periphery of the panel.”

120. Chen '975 discloses the limitations added in claim 14. Chen '975 uses LEDs and receivers (*i.e.*, “a plurality of light detectors,” as claimed) arranged opposite from each other (Chen '975 translation at [0029]):



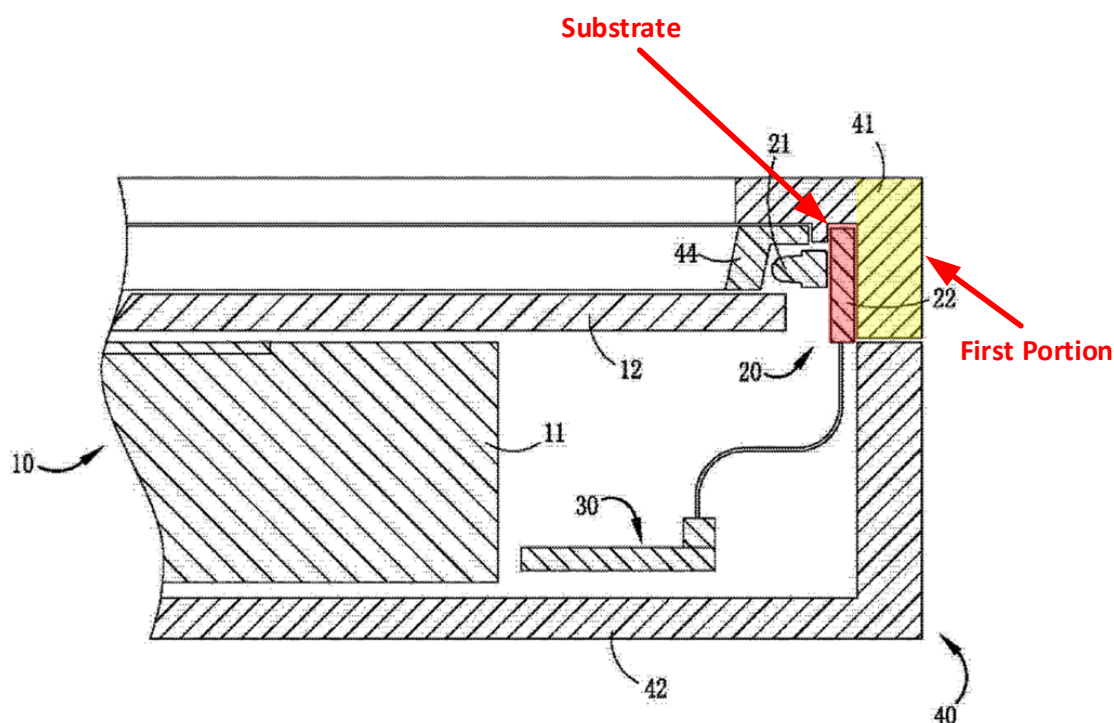
Chen '975 translation at Fig. 4 (modified, with annotations added). Further, Chen '975's light detectors are “arranged along a periphery of the panel,” as seen above. *See also id.* at [0025].

121. Claim 14 therefore would have been obvious over Chen '975 alone or in combination with Klein.

13. Claim 15

122. Claim 15 depends from claim 1 and further recites “wherein the substrate is directly joined to the first portion of the support structure.”

123. Chen '975 discloses this limitation. Chen '975 describes printed circuit board 22 (*i.e.*, “the substrate,” as claimed) positioned on a vertically extending portion of front casing 41 (*i.e.*, “the first portion of the support structure,” as claimed):



Id. at Fig. 4 (annotations added), [0036] (“engagement grooves ... provided on the top casing ... the printed circuit board 22 is fixed by means of the engagement grooves”). As shown above, the printed circuit board of Chen '975 is disposed on

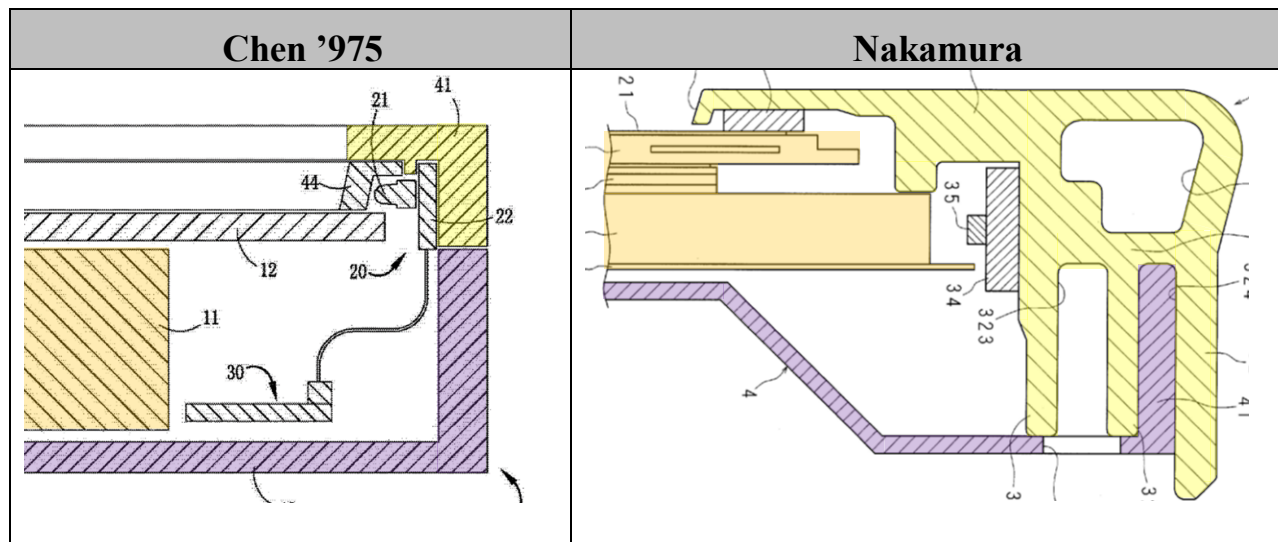
the first portion of the front casing without the presence of intervening structures.

Id. Chen '975 therefore discloses the substrate is directly joined to the first portion of the support structure.

124. Claim 15 therefore would have been obvious over Chen '975 alone, or in combination with Klein.

B. Ground 1B: Claims 4 And 5 Would Have Been Obvious In View Of Chen '975 Alone Or In Combination With Klein, And Further In View Of Nakamura

125. Nakamura, would have rendered obvious claims 4 and 5 of the '338 patent when considered with Chen '975 alone, or with the combination of Chen '975 and Klein described above. Starting with claim 4, while Chen '975 does not explicitly disclose “the support structure [(shown in yellow below)] comprises a recess configured to interlock with a corresponding mating feature of the display support [(shown in purple below)], a POSA would have been motivated to apply this feature as taught by Nakamura:



Chen '975 translation at Fig. 4 (colors added); Nakamura at Fig. 5 (colors added). The POSA would have found it obvious to include the grooves and corresponding mating features of Nakamura in the support structure and display structure, respectively, of Chen '975 to increase the coupling strength between the two structures (*id.* at [0071]) and improving heat transfer out of the device (*id.* at [0072]).

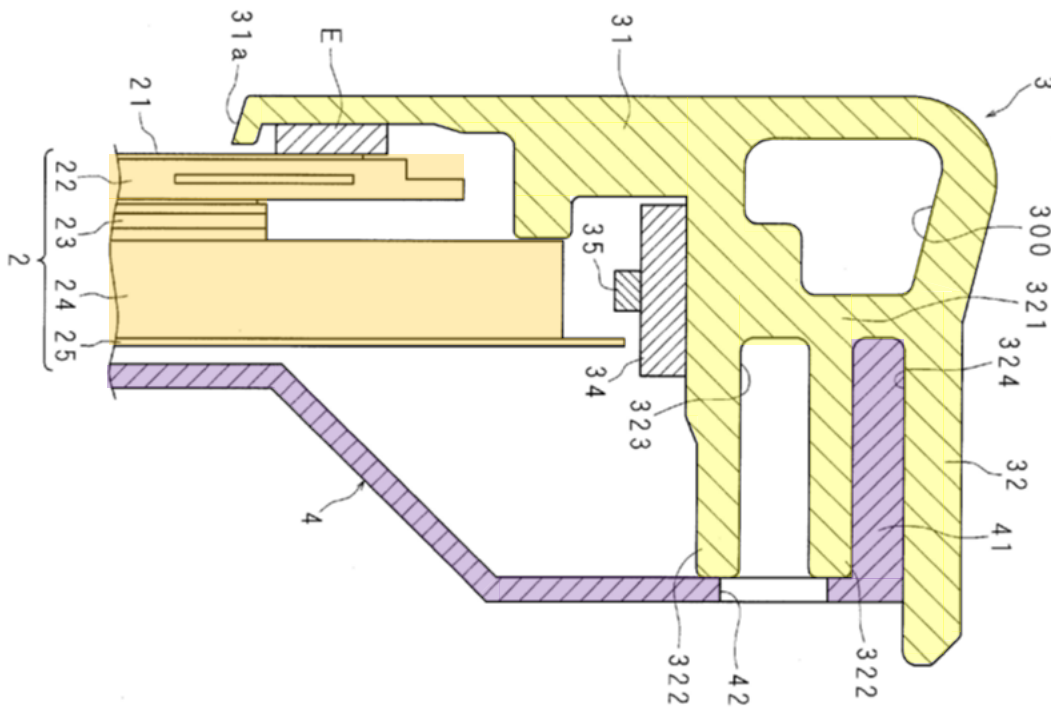
126. To the extent the Board does not agree that claim 5 is a product-by-process limitation as described above, a POSA would have found this claim obvious. While Chen '975 does not describe the specific process used to form the front casing 41, a POSA would have been motivated to use the extrusion process of Nakamura in order to reduce costs (*id.* at [0068]) and to facilitate easy fabrication of a complex structure (*id.* at [0122]).

1. Claim 4

127. Claim 4 depends from claim 1 and further recites “wherein the support structure further comprises a recess configured to interlock with a corresponding mating feature of the display support.”

128. Chen '975 alone or in combination with Klein, and further in view of Nakamura renders this obvious. Chen '975 describes a front casing (*i.e.*, the “support structure,” as claimed) that covers a bottom casing (*i.e.*, the “display

support,” as claimed) to form an outer casing. Chen ’975 translation at [0031]. Nakamura similarly describes a front cabinet 3 (*i.e.*, the “support structure,” as claimed) that is coupled to a back cabinet 4 (*i.e.*, the “display support,” as claimed). Nakamura at [0102]. As shown below, this coupling is accomplished by “fitting the extension part 41 in the peripheral surface of groove 324”:



Id. at Fig. 5 (rotated and colors added). The groove 324 of Nakamura is a recess within the front casing 3 that interlocks with extension 41 which is a mating feature of the back casing 4 that correspond to the groove. *See id.* at Fig. 5, [0102]. Accordingly, Nakamura discloses a support structure comprising a recess configured to interlock with a corresponding mating feature of the display support.

129. It is my opinion that a POSA would have been motivated to use Nakamura's interlocking components in the casing of Chen '975 for a variety of reasons. For example, the addition of grooves and extensions can increase the coupling strength between the support structure and display support (Nakamura at [0071]) and improving heat transfer out of the device (*id.* at [0072]).

130. A POSA would also have had a reasonable expectation of success in implementing this modification. The combination requires just only minor adjustments to the shapes of the casing elements of Chen '975. Plus, Nakamura provides guidance on the processes that can be used to form this structure (*e.g., id.* at [0068]) such that a POSA would expect success in forming the same.

2. Claim 5

131. Claim 5 depends from claim 1 and further recites “wherein the support structure is formed from an extrusion process, a drawing process, a rolling process, or a molding process.”

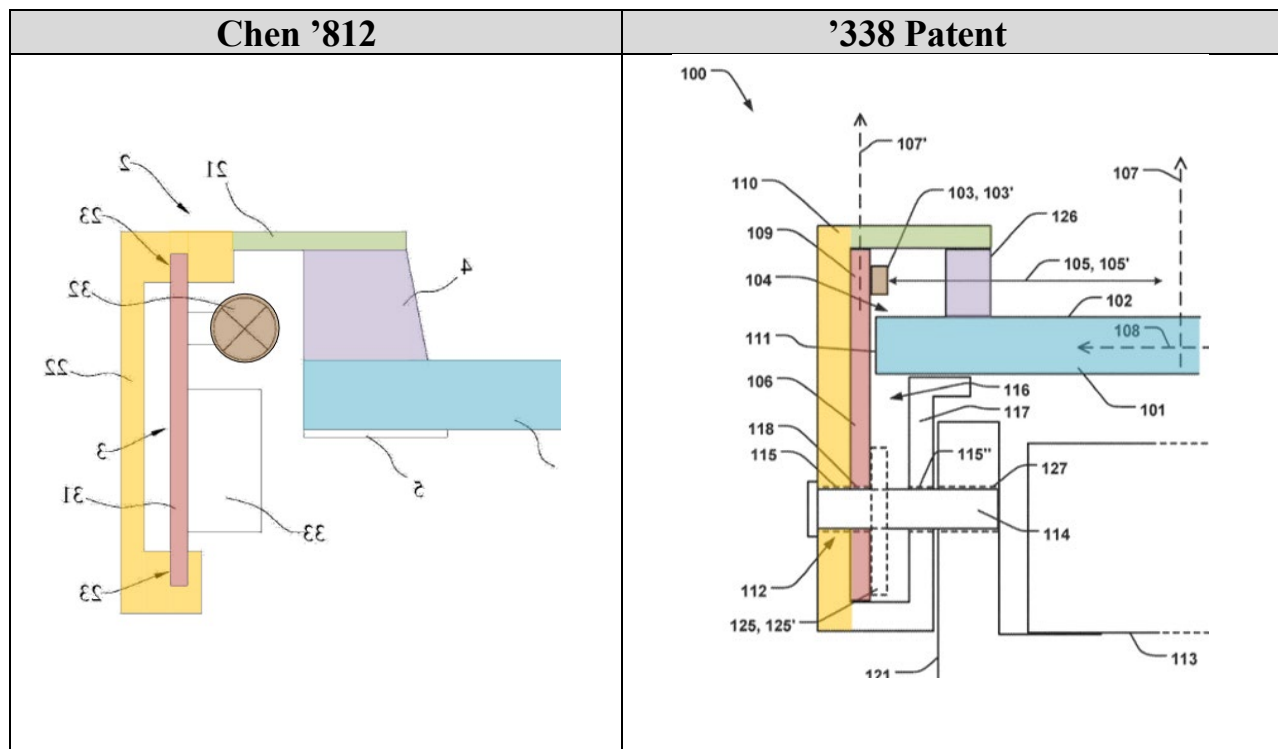
132. This claim is obvious as described above with respect to claim 1.

133. Furthermore, this claim is rendered obvious by the additional teachings of Nakamura, which discloses forming the front cabinet (*i.e.*, “the support structure,” as claimed) “by extrusion molding.” Nakamura at [0068]. “Extrusion molding” is both an “extrusion process” and a “molding process.”

134. A POSA would have been motivated to form the support structure of Chen '975 by the extrusion molding process of Nakamura for multiple reasons, including reduce costs (Nakamura at [0068]) and to easily fabricate grooves and other complex structures (*id.* at [0122]). The POSA would have a reasonable expectation of success in in doing so as extrusion molding is a well-known process in the art, the performance of which is well within the skill of a POSA.

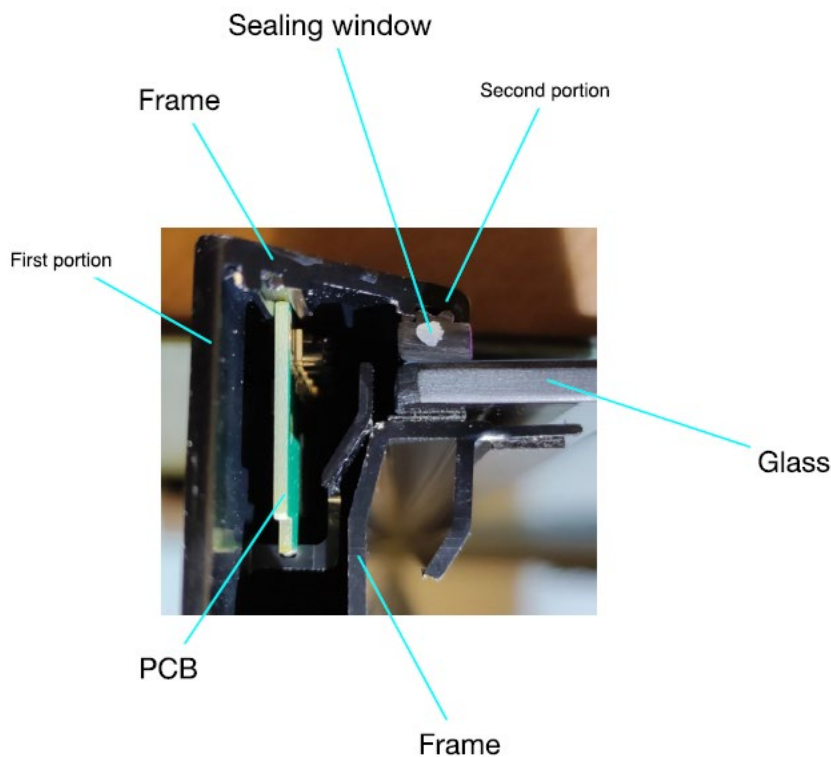
C. Ground 2: Claims 1, 2, 5, 6, 8, and 11-15 Would Have Been Obvious In View of Chen '812

135. Like Chen '975, Chen '812 contains disclosure nearly identical to that of the '338 patent and would have rendered obvious many of its claims:



Chen '812 translation at Fig. 1 (Flipped and color added); '338 patent at Fig. 2 (color added).

136. Further, I understand that in litigation involving the '338 patent, Patent Owner FlatFrog has interpreted claim 1 as encompassing an air gap between parts of the substrate (labeled "PCB" below) and the first portion:



FlatFrog Claim Chart for '338 patent at 2. For these reasons and those below, claims 1, 2, 5, 6, 8, 9, and 11-15 of the '338 patent would have been obvious over Chen '812.

1. Claim 1

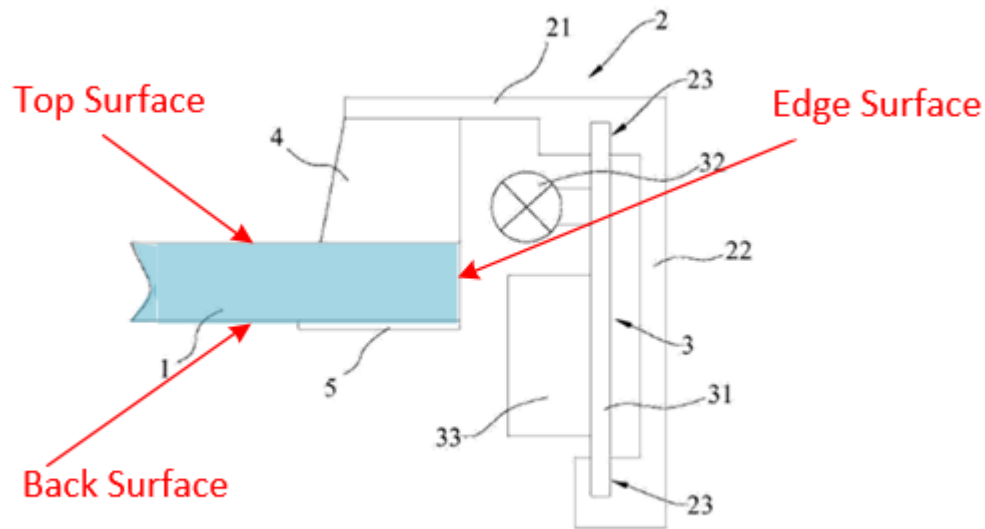
a) Preamble: “A touch sensing apparatus comprising:”

137. To the extent limiting, Chen ’812 discloses the preamble of claim 1. reference discloses “a new type of infrared touch screen” that “reduces the occurrence of false touches.” Chen ’812 translation at [0004]-[0005]; *see also id.* at [0014], [0020] (describing the infrared touch screen as enabling higher “accuracy” in touch sensing). Because the infrared touch screen of Chen ’812 can sense a user’s touch, it is a “touch sensing apparatus,” as claimed.

b) “a panel comprising a top surface that includes a touch surface, a back surface, and an edge surface;”

138. Chen ’812 discloses this element.

139. The reference discloses a screen body 1 made of glass (*i.e.*, “a panel,” as claimed) that includes a top surface, a back surface, and an edge surface (Chen ’812 translation at [0019]):



Id. at Fig. 1 (annotations added).

140. The top surface of Chen '812's panel "includes a touch surface," as recited in claim 1. A touch surface is an area of the top surface that a user can touch (*e.g.*, the portions of the top surface that are not obstructed by the filter strip 4 and the front wall 21). *See* Chen '812 translation at cover ("New Type of Infrared Touch Screen").

c) "a plurality of light emitters arranged along a periphery of the panel;"

141. Chen '812 discloses "a plurality of light emitters arranged along a periphery of the panel."

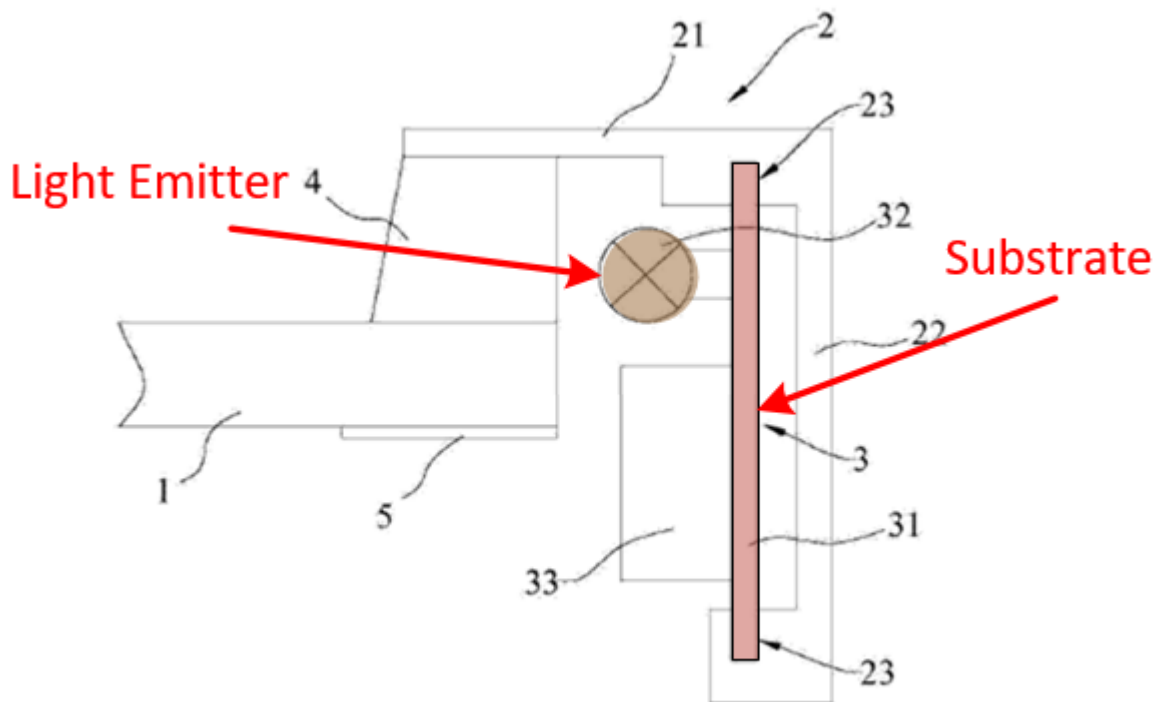
A cross-sectional view of a light-emitting device. The device includes a substrate (2) and a light emitter (4). The light emitter is positioned on a substrate (2) and is surrounded by a structure (3). The structure (3) is composed of a top layer (31) and a bottom layer (32). The light emitter (4) is shown as a circular component with a cross-hatch pattern. The substrate (2) is a rectangular block. The light emitter (4) is positioned on the top surface of the substrate (2). The structure (3) is positioned around the light emitter (4). The top layer (31) is a thin layer on top of the light emitter (4). The bottom layer (32) is a thicker layer below the top layer (31). The light emitter (4) is shown as a circular component with a cross-hatch pattern. The substrate (2) is a rectangular block. The light emitter (4) is positioned on the top surface of the substrate (2). The structure (3) is positioned around the light emitter (4). The top layer (31) is a thin layer on top of the light emitter (4). The bottom layer (32) is a thicker layer below the top layer (31).

143. Further, Chen '812's light emitters are "arranged along a periphery of the panel," as seen above. *See also id.* at [0019] (describing the infrared emitting tubes as being part of "an infrared touch assembly 3, which is located in the rectangular frame 2 and arranged around the screen body 1").

d) “a substrate configured to support at least one of the plurality of light emitters such that the at least one of the plurality of light emitters transmits a portion of light in a plane extending over the touch surface;”

144. Chen '812 discloses “a substrate configured to support at least one of the plurality of light emitters such that the at least one of the plurality of light emitters transmits a portion of light in a plane extending over the touch surface.”

145. The reference discloses a PCB board 31 (*i.e.*, “a substrate,” as claimed):



Chen '812 translation at Fig. 1 (annotations added). The PCB board 31 “support[s] at least one of the plurality of light emitters.” This can be seen in the

figure above, and Chen '812 further discloses that its infrared emitting tubes “are arranged on the PCB board 31.” *Id.* at [0019].

146. With the infrared emitting tubes supported by the PCB board 31 as shown above, Chen '812 discloses “at least one of the plurality of light emitters transmits a portion of light in a plane extending over the touch surface.” Chen '812 uses infrared emitting tubes and infrared receiving tubes arranged opposite from each other (Chen '812 translation at [0019]), thus enabling light emitted from an emitting tube to be received by a receiving tube:

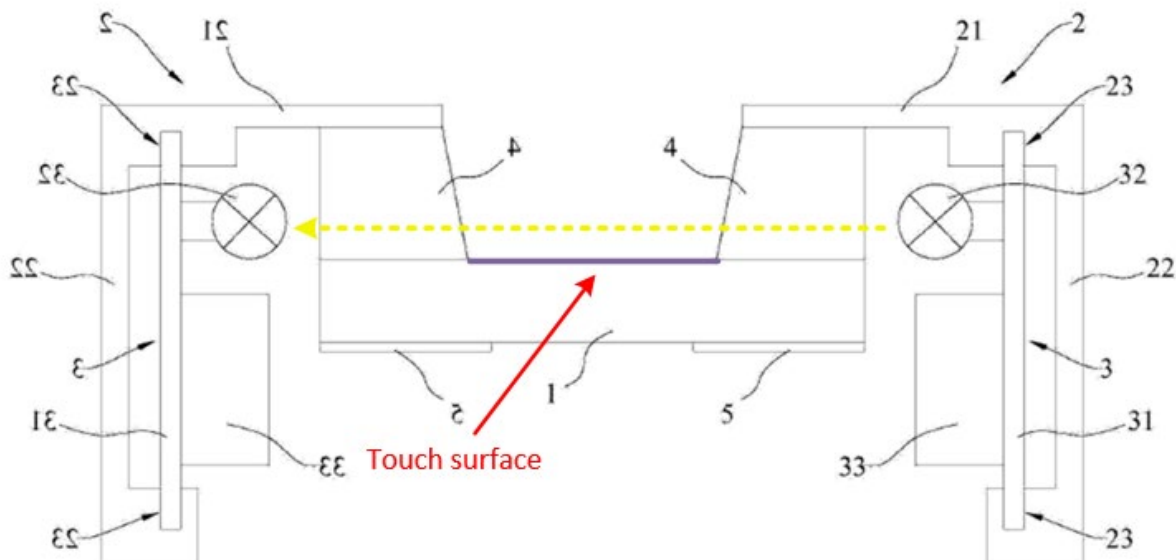


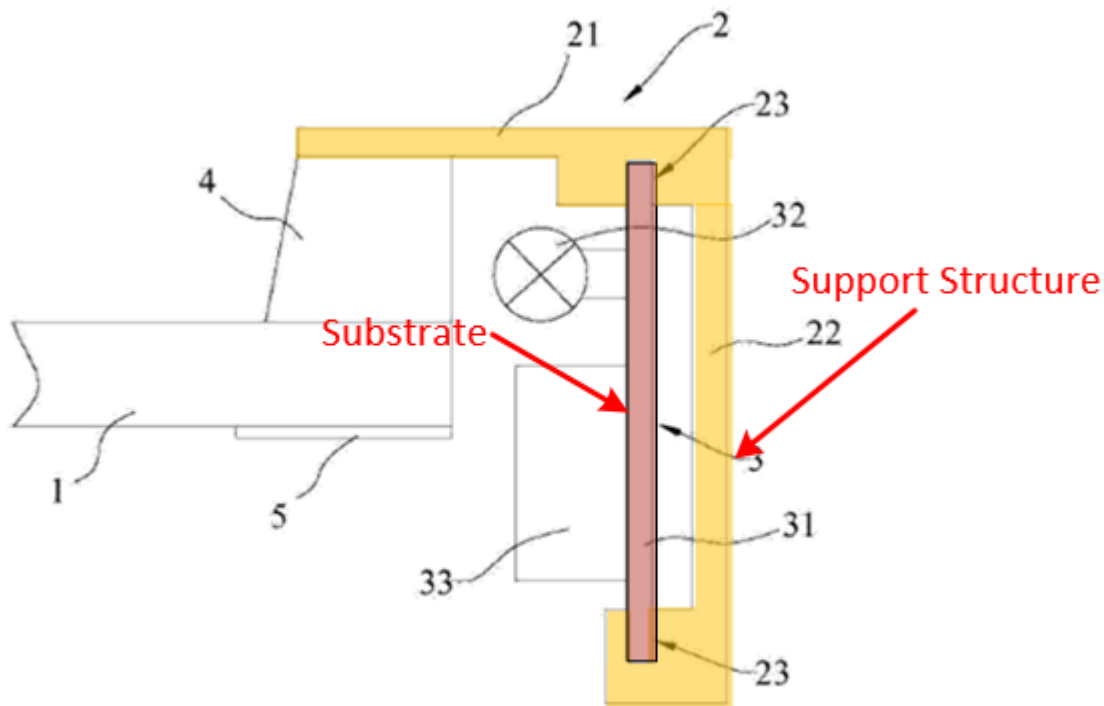
FIG. 4

Id. at Fig. 4 (modified, annotations added). As shown above, this arrangement provides the light emitters and receivers such that light is transmitted “in a plane extending over the touch surface.”

e) “a support structure configured to support the substrate, the support structure comprising:”

147. Chen '812 discloses “a support structure configured to support the substrate.”

148. The reference discloses a rectangular frame 2 (*i.e.*, “a support structure,” as claimed):



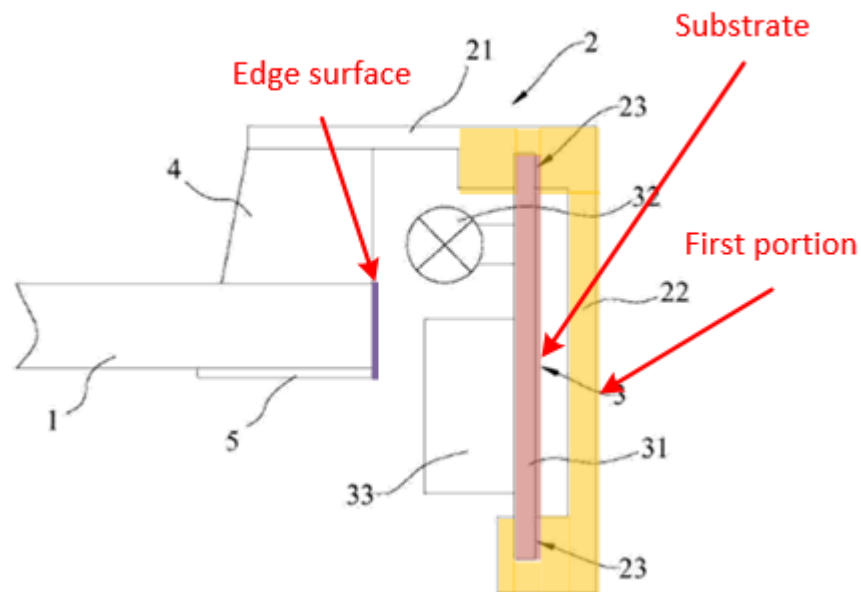
Chen '812 translation at Fig. 1 (annotations added).

149. As shown above, the rectangular frame 2 (*i.e.*, the “support structure,” as claimed) supports the PCB board 31 (*i.e.*, the “substrate,” as claimed). *See also id.* at [0032] (“[t]he rectangular frame 2 forms a clamping slot 23 ... for mounting the PCB board 31”).

f) “a first portion extending substantially parallel to the edge surface, wherein the substrate is configured to be supported by the first portion;”

150. Chen '812 discloses this claim element.

151. As shown below, the rectangular frame 2 (*i.e.*, the “support structure,” as claimed) includes “a first portion extending substantially parallel to the edge surface”:

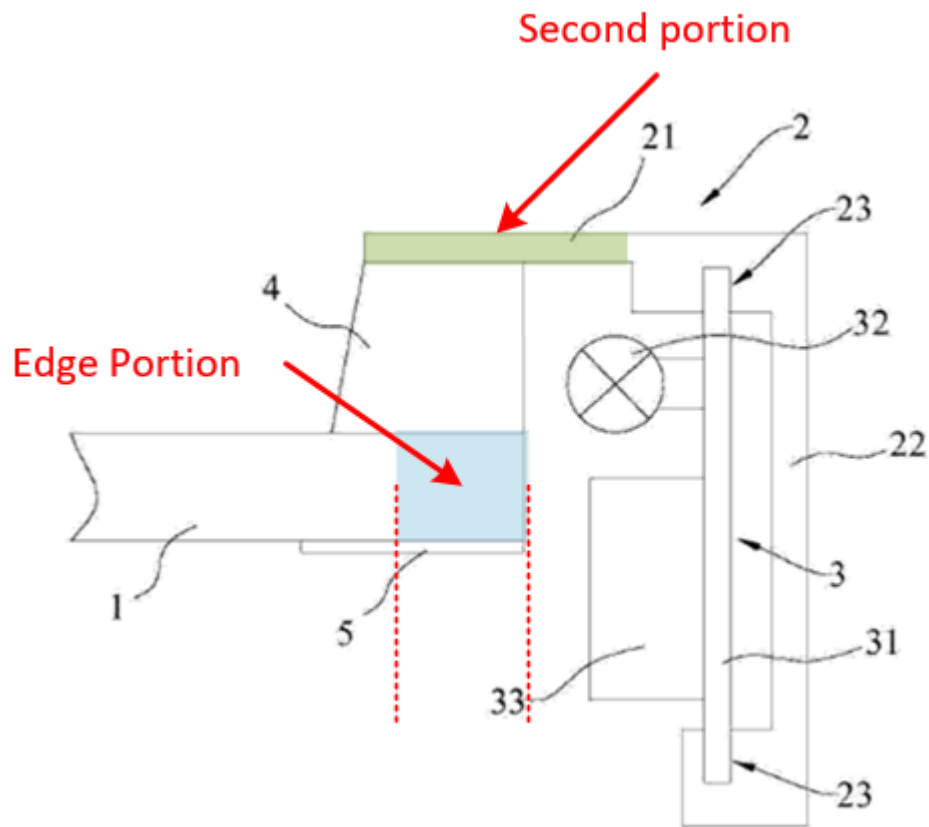


Chen '812 translation at Fig. 1 (annotations added).

152. As shown above, the first portion of the rectangular frame 2 supports the PCB board 31 (*i.e.*, the “substrate,” as claimed). *See also Id.* at [0023] (the rectangular frame 2 includes “a clamping slot 23 ... for mounting the PCB board 31,” thus enabling the PCB board 31 to be supported by the first portion in the manner depicted).

g) “a second portion extending over an edge portion of the top surface of the panel; and”

153. Chen '812 discloses this claim element. As shown below, the rectangular frame 2 (*i.e.*, the “support structure,” as claimed) includes “a second portion extending over an edge portion of the top surface of the panel”:

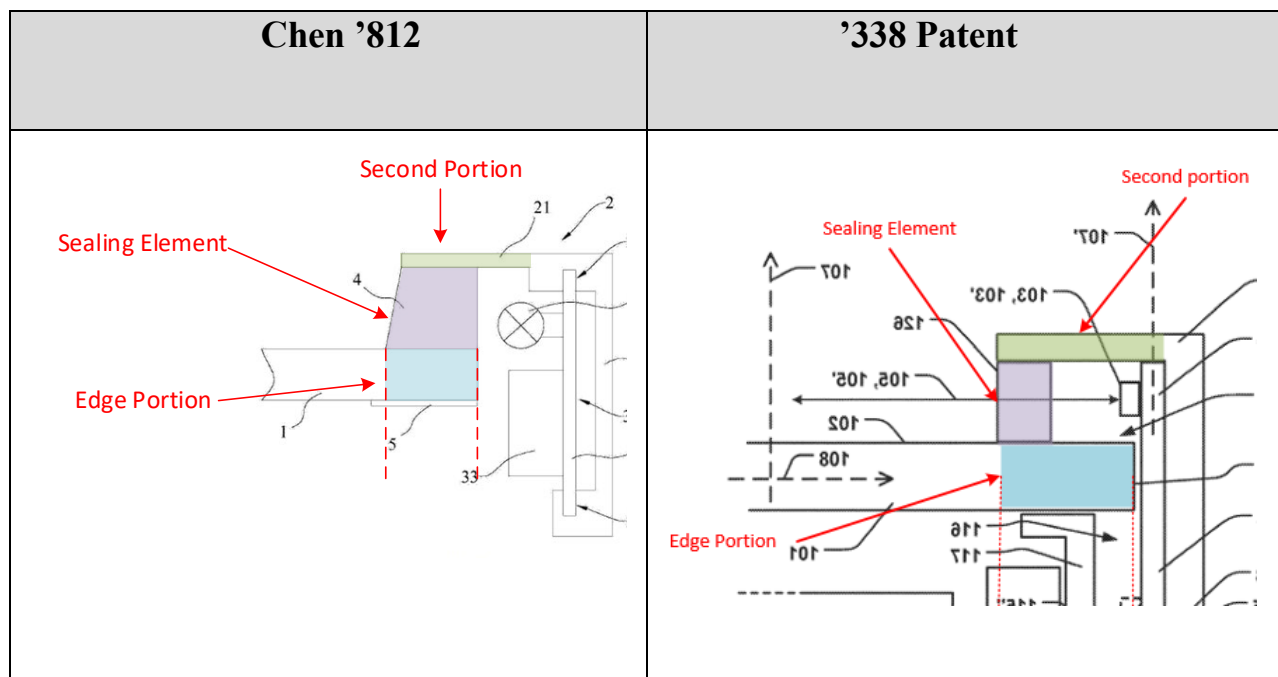


Chen '812 translation at Fig. 1 (annotations added). Chen '812 refers to the second portion as a “front wall 21,” stating that it “reaches to the front of the edge of the screen body 1.” *Id.* at [0019].

h) “a sealing element configured to rest on the edge portion of the top surface and further configured to be fitted between the edge portion of the top surface and the second portion of the support structure.”

154. Chen '812 discloses “a sealing element configured to rest on the edge portion of the top surface and further configured to be fitted between the edge portion of the top surface and the second portion of the support structure.”

155. The reference discloses a filter strip 4 that is “configured to rest on the edge portion of the top surface and further configured to be fitted between the edge portion of the top surface and the second portion of the support structure,” like the sealing window 26 of the '338 patent:



Chen '812 translation at Fig. 4 (annotations added); '338 patent at Fig. 1 (annotations added); *see also* Chen '812 translation at [0019] (“The front wall 21 reaches to the front of the edge of the screen body 1 and is connected to the screen body 1 via a filter strip 4.”), [0024] (the filter strip 4 is “adhesively connected to the front wall 21 of the rectangular frame 2 and the front surface of the screen body 1”).

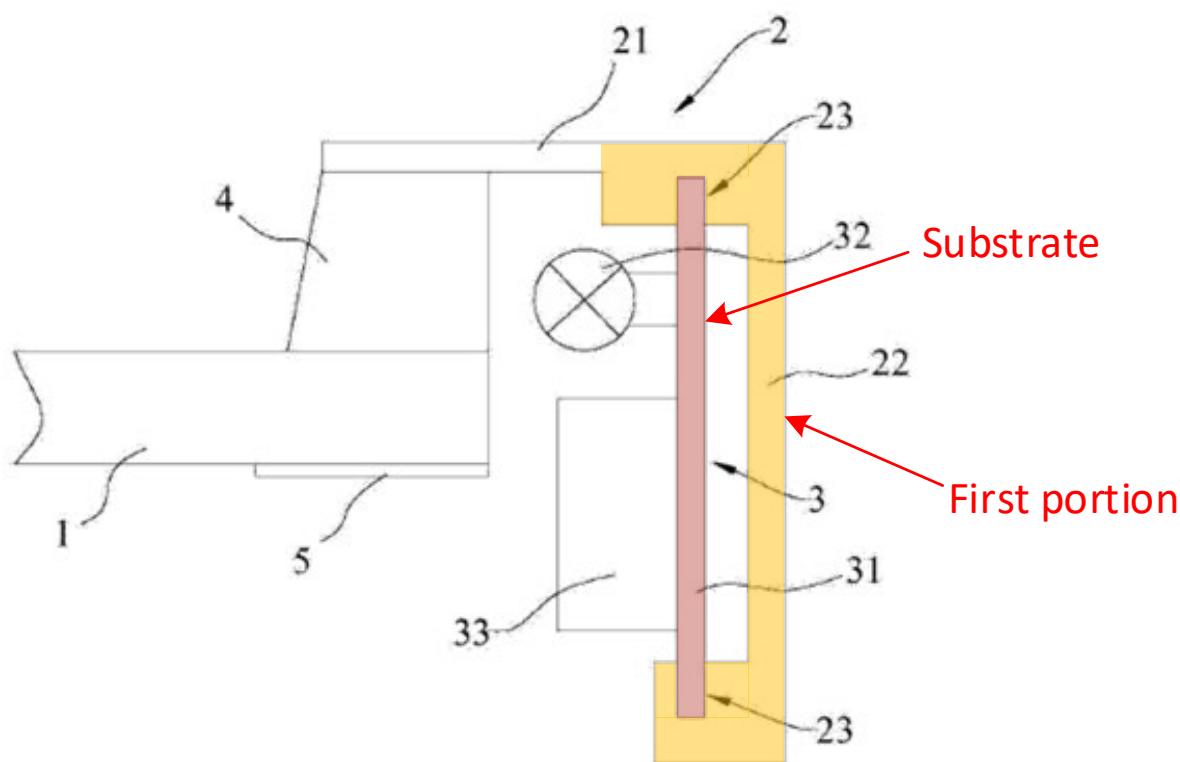
156. The filter strip 4 is a “sealing element,” as claimed. As explained above, it is my opinion that this claim term should be interpreted to mean “an element that protects the plurality of light emitters from some, but not necessarily all, dirt, water, and other contaminants.” Although Chen '812 describes the filter strip 4 as having optical properties that allow the receiving elements to “to receive stronger signals” (Chen '812 translation at [0022]), the POSA would have understood that the filter strip 4 also inhibits dirt, water, and other contaminants from reaching the infrared emitting tubes (*i.e.*, the “light emitters,” as claimed). Filter strips, such as those described in Chen '812, are generally solid structures, and, as seen above, the filter strip 4 of Chen '812 is positioned such that it acts as a barrier between the external environment and the infrared emitting tubes, thus protecting these light emitters from at least some dirt, water, and other contaminants. Chen '812 therefore discloses the claimed “sealing element.”

157. Claim 1 therefore would have been obvious over Chen '812.

2. Claim 2

158. Claim 2 depends from claim 1 and recites “wherein the substrate is affixed to the first portion of the support structure.”

159. Chen '812 discloses the limitations added in claim 2. Specifically, the reference discloses the limitations of claim 2 as shown below:



Chen '812 translation at Fig. 1 (annotations added); *see also id.* at [0023].

160. Chen '812 describes a “PCB board located in the rectangular frame [such that it] is arranged parallel to the side wall”, allowing the light emitters and

detectors to be “arranged close to the plane of the front surface of the screen body.” This configuration allows the light emitters to emit light above the panel, allowing the touch sensing aspect of the device to function as necessary. It is my opinion that the PCB board 31 is attached, or “affixed” to the rectangular frame 2 to allow the position light emitters to not change.

161. Claim 2 therefore would have been obvious over Chen ’812.

3. Claim 5

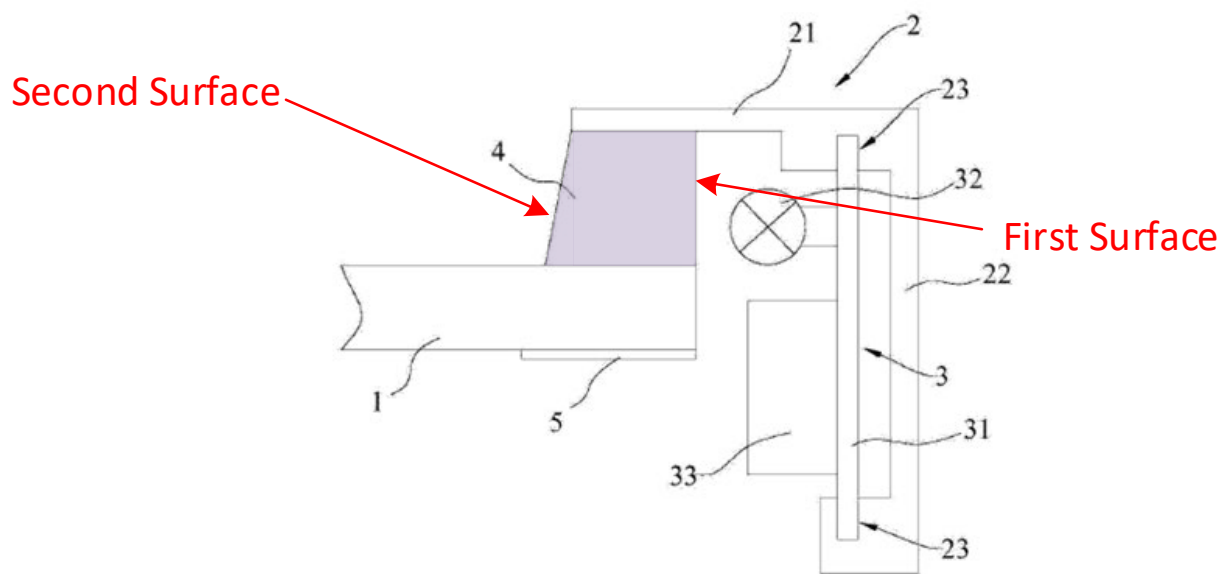
162. As explained above with reference to ground 1, the ’338 patent does not demonstrate that the processes recited in this claim (*i.e.*, “an extrusion process, a drawing process, a rolling process, or a molding process”) impart a structural or functional difference in the claimed product. Because Chen ’812 discloses the claimed “support structure” of claim 1, Chen ’812 would have rendered obvious claim 5.

4. Claim 6

163. Claim 6 depends from claim 1 and recites “wherein the sealing element comprises a first surface facing the at least one of the plurality of light emitters and being configured to receive the transmitted light from that emitter and a second surface configured to receive light propagating in the plane extending over the touch surface.”

-

164. Chen '812 discloses the limitations added in claim 6. Specifically, the reference's filter strip 4 discloses the limitations of claim 6 as shown below:



Chen '812 translation at Fig. 1 (annotations added); *see also id.* at [0019].

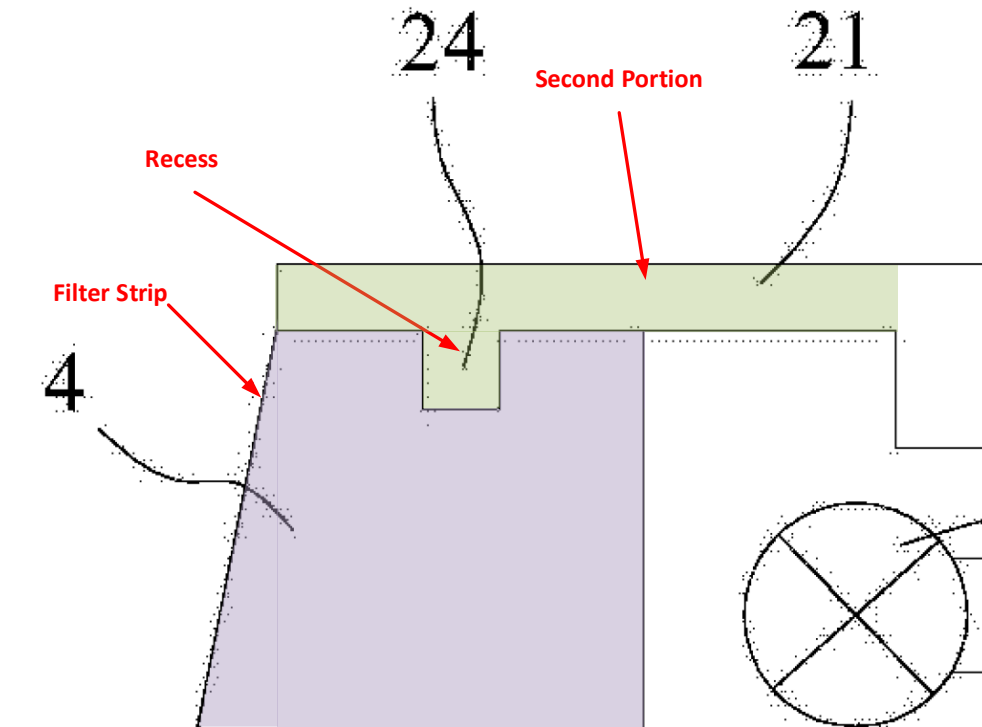
165. Claim 6 therefore would have been obvious over Chen '812.

5. Claim 8

166. Claim 8 depends from claim 6 and recites “wherein the sealing element comprises a protrusion or a recess to interlock with a corresponding mating feature on the second portion of the support structure.”

167. Chen '812 discloses the limitations added in claim 8. Specifically, the reference describes that the filter strip 4 (*i.e.*, the “sealing element,” as claimed)

can include a recess that interlocks with a convex rib 24 (*i.e.*, the “the mating feature on the second portion of the support structure,” as claimed):



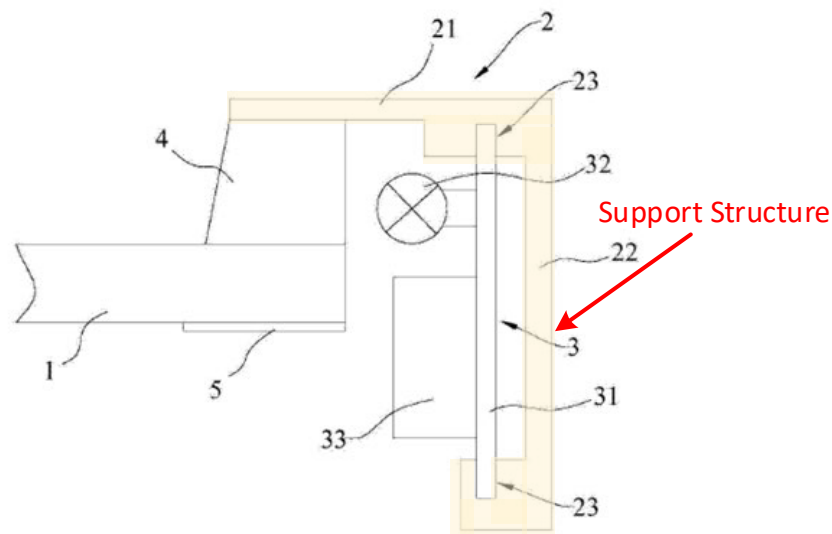
Chen '812 translation at Fig. 3 (annotations added), [0025].

168. Claim 8 therefore would have been obvious over Chen '812.

6. Claim 9

169. Claim 9 depends from claim 1 and recites “wherein the support structure is formed from a single monolithic piece of a material.” Chen '812 discloses this claim element. The reference discloses a rectangular frame 2 (*i.e.*, “the support structure,” as claimed) including a front wall 21 and a side wall 22:

-



Id. at Fig. 1 (annotations added); *see also Id.* at [0019]. Chen '812 further notes that the rectangular frame can further include a bottom frame “formed into one unit through an integral molding process.” *Id.* at [0012]. A POSA would have understood that the rectangular frame 2 is, itself, an integral structure and a single monolithic piece of a material as claimed.

170. Claim 9 therefore would have been obvious over Chen '812.

7. Claim 11

171. Claim 11 depends from claim 1 and recites “wherein the sealing element comprises an optically active element or an optically passive element.”

172. Chen '812 discloses the limitations added in claim 11. The reference’s filter strip 4 includes a condensing filter that focuses light to enable

receipt of a stronger signal. Chen '812 translation at [0022]. Because the filter strip 4 is used to focus light, the filter strip 4 “comprises an optically active element,” as claimed. *See* '338 patent at 16:36-40 (explaining that embodiments of the sealing window 126 comprise “optical elements for refracting, deflecting, diverting or focusing the light beams therethrough”).

173. To the extent that the filter strip does not comprise an optically active element, the filter strip of Chen '812 comprises an optically passive element. *See* '338 patent at 16:40-43 (explaining that in embodiments, “the sealing window is optically passive and does not comprise any optical elements for refracting, deflecting, diverting, or focusing the light beams therethrough”).

174. Claim 11 therefore would have been obvious over Chen '812.

8. Claim 12

175. Claim 12 depends from claim 1 and recites “wherein the sealing element is configured to inhibit ingress of a contaminant toward the at least one of the plurality of light emitters.”

176. Chen '812 discloses the limitations added in claim 12 for the reasons provided above with respect to claim 1.

177. Claim 12 therefore would have been obvious over Chen '812.

9. Claim 13

178. Claim 13 depends from claim 1 and recites “wherein the sealing element comprises one or more optical elements that refract, deflect, divert or focus light beams.”

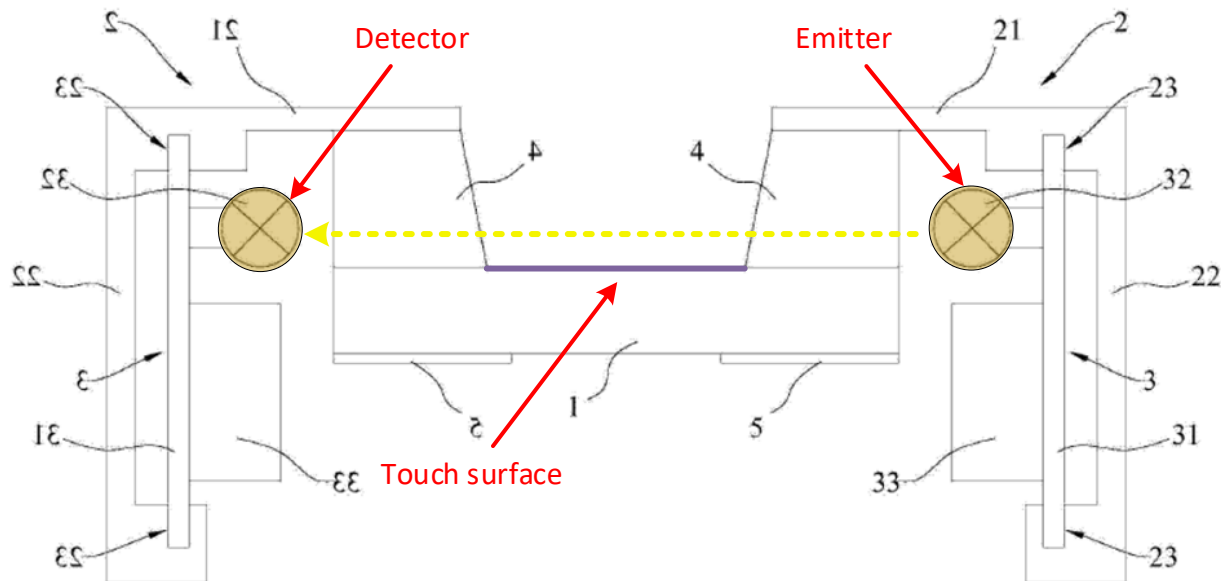
179. Chen ’812 discloses the limitations added in claim 13 for the reasons provided above with respect to claim 11.

180. Claim 13 therefore would have been obvious over Chen ’812.

10. Claim 14

181. Claim 14 depends from claim 1 and recites “further comprising a plurality of light detectors arranged along the periphery of the panel.”

182. Chen ’812 discloses the limitations added in claim 14. The reference uses infrared emitting tubes and infrared receiving tubes (*i.e.*, “a plurality of light detectors,” as claimed) arranged opposite from each other (Chen ’812 translation at [0019]):



Id. at Fig. 4 (modified and annotations added). Further, Chen '812's light detectors are "arranged along a periphery of the panel," as seen above. *See also id.* at [0019] (describing the infrared receiving tubes as being part of "an infrared touch assembly 3, which is located in the rectangular frame 2 and arranged around the screen body 1").

183. Claim 14 therefore would have been obvious over Chen '812.

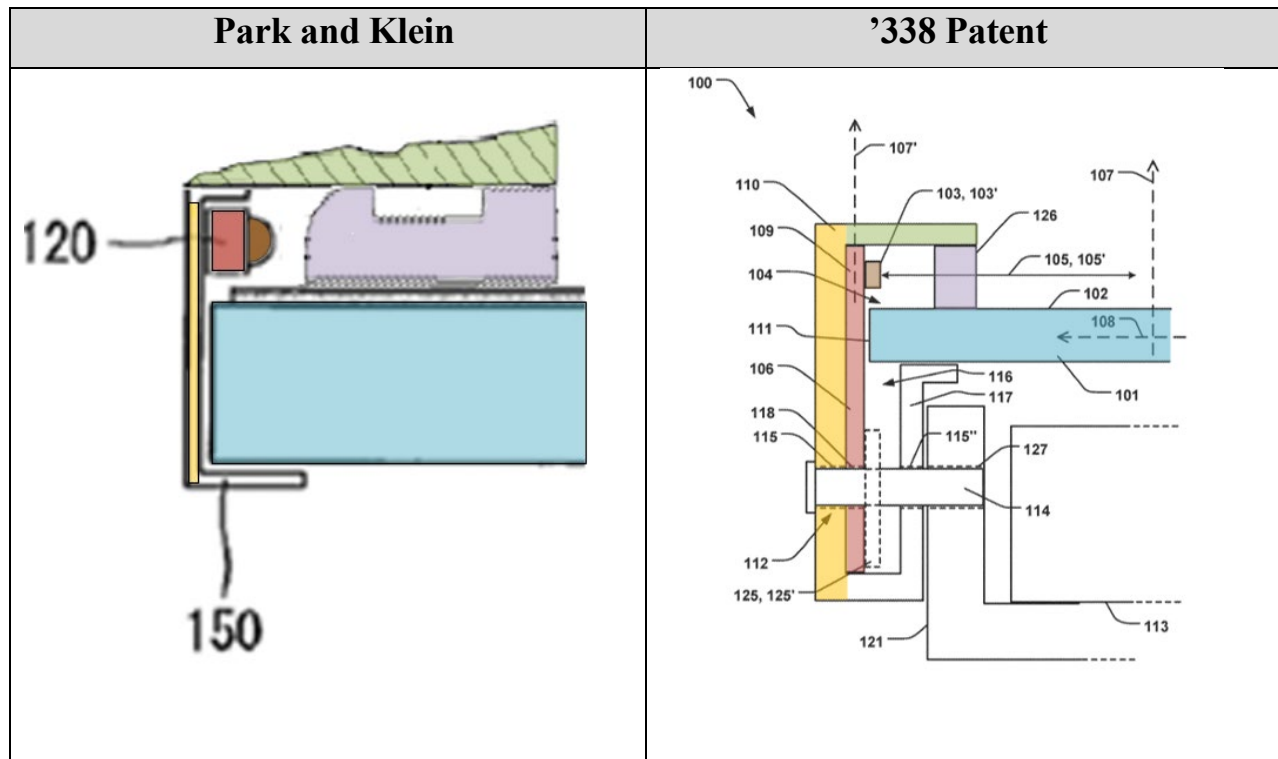
11. Claim 15

184. Claim 15 depends from claim 1 and recites "wherein the substrate is directly joined to the first portion of the support structure."

186. Claim 15 therefore would have been obvious over Chen '812.

187. Park and Klein would have rendered obvious claims 1, 2-7, 10-15 of the '338 patent. Starting with claim 1, Park discloses all of the limitations except for the “sealing element.” However, the POSA would have been motivated to use

Klein's optical overlay in the device of Park to provide "sealing or weatherproofing" (Klein at 5:53-54), advantageously enabling a more robust device:



Park at Fig. 2 (modified, color added); '338 patent at Fig. 2 (color added).

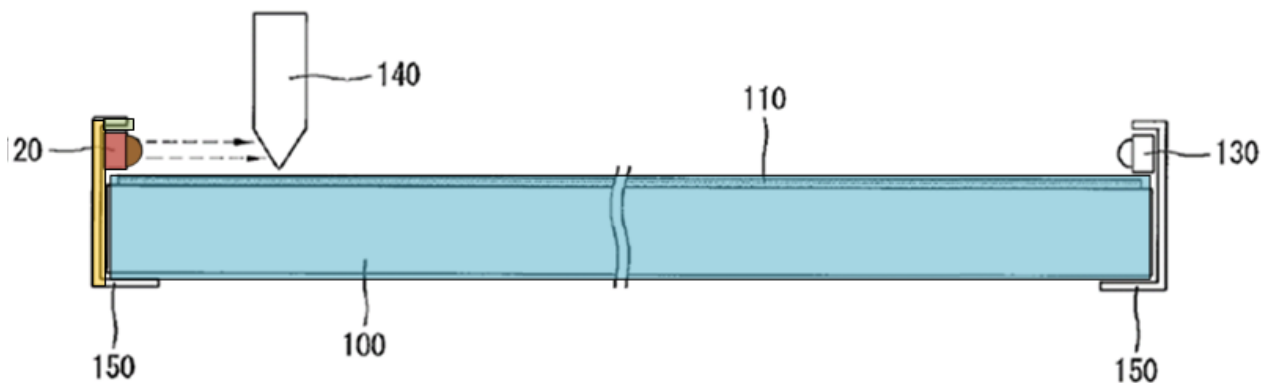
188. The POSA would have had a reasonable expectation of success in implementing this simple combination: It would have involved adding Klein's optical overlay 10 to the device of Park, a trivial mechanical modification well within the POSA's skill. For these reasons and those below, Park and Klein would have rendered obvious claims 1, 2, 5-7, and 10-15 of the '338 patent.

1. Claim 1

a) Preamble: “A touch sensing apparatus comprising:”

189. To the extent limiting, Park discloses the preamble of claim 1.

190. The reference discloses a “touch panel and a display apparatus,” where “the user touches ... a screen of the display panel with his or her finger or a pen, [and] a predetermined command corresponding the user’s touch is executed.” Park at [0003], [0005].

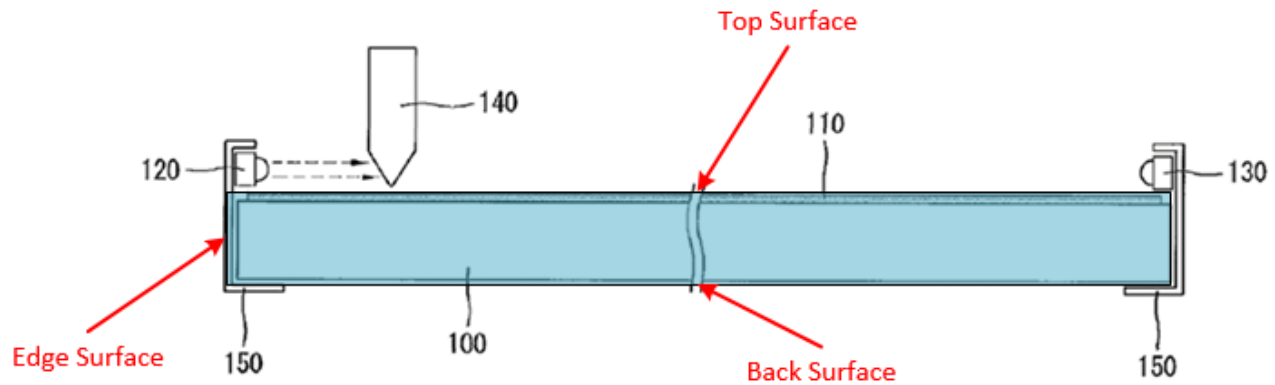


Id. at Fig. 2. Because the touch panel and display apparatus of Park senses a user’s touch and executes a command based on the sensed touch, it is a “touch sensing apparatus,” as claimed.

b) “a panel comprising a top surface that includes a touch surface, a back surface, and an edge surface;”

191. Park discloses this element.

192. The reference discloses a substrate 100 made of glass or plastic (*i.e.*, “a panel,” as claimed) that includes a top surface, a back surface, and an edge surface (Park at [0046]-[0047]):



Id. at Fig. 2 (annotations added).

193. The top surface of Park’s substrate 100 includes a “touch surface,” as claimed. The touch surface is an area of the top surface that a user can touch (*e.g.*, the portions of the top surface that are not obstructed by the light emitting devices or protection cover 150). *Id.* at [0056] (“[w]hen an input unit 140, for example, a pen or a finger, is located in a certain point on the surface of the substrate 100, the input unit 140 blocks the beam emitted from the light emitting devices at the corresponding point”).

c) “a plurality of light emitters arranged along a periphery of the panel;”

194. Park discloses this element.

195. The reference describes a plurality of light emitting devices 120, such as those depicted in the example arrangement of Figure 11:

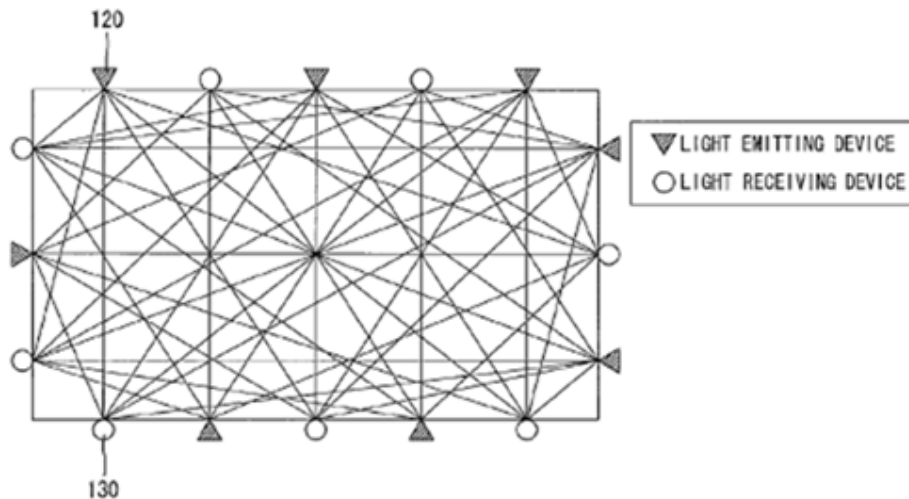
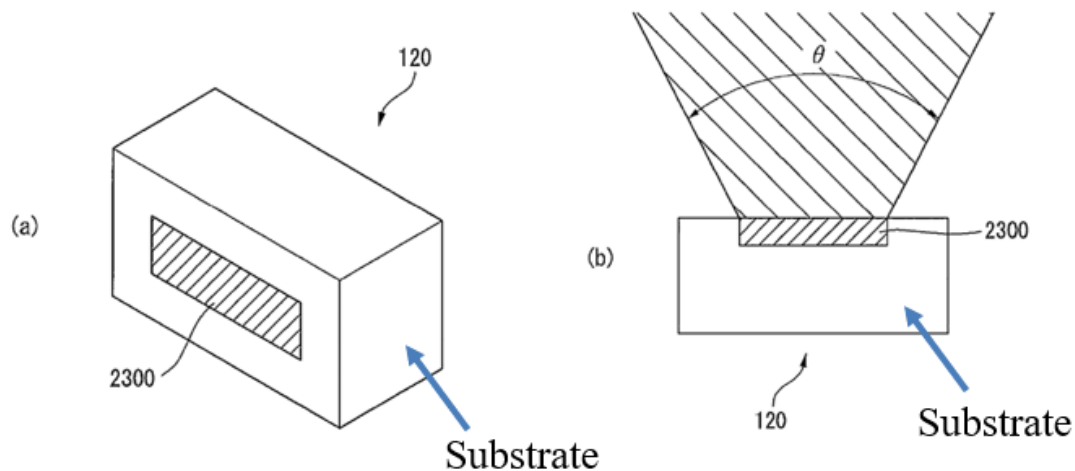


FIG. 11

Park at Fig. 11, [0051]. Park’s light emitting devices 120 are “arranged along a periphery of the panel,” as seen in Figure 11 (reproduced above).

196. Figures 23(a) and (b) of Park provide further details on the light emitters 120, showing that each of them includes “a light emitting surface 2300” supported by a substrate:

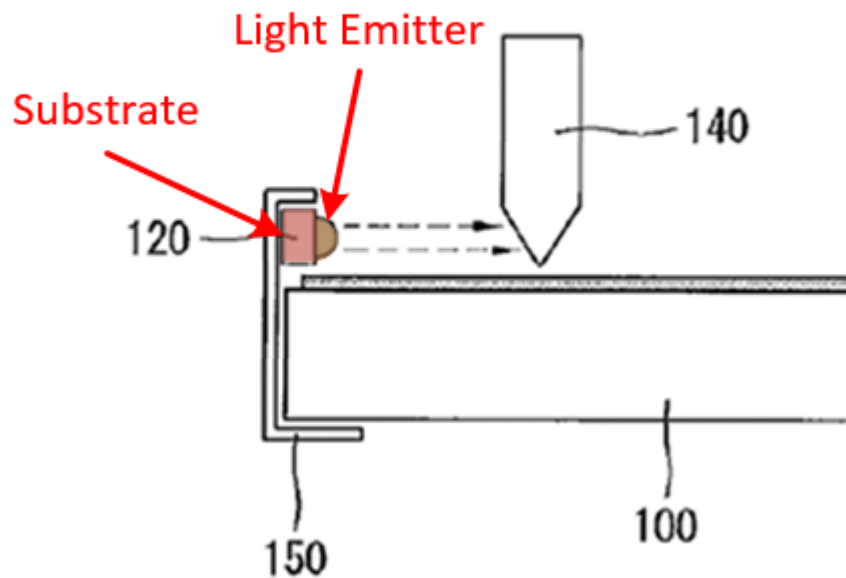


Id. at Figs. 23(a), (b); [0053]-[0054].

d) “a substrate configured to support at least one of the plurality of light emitters such that the at least one of the plurality of light emitters transmits a portion of light in a plane extending over the touch surface;”

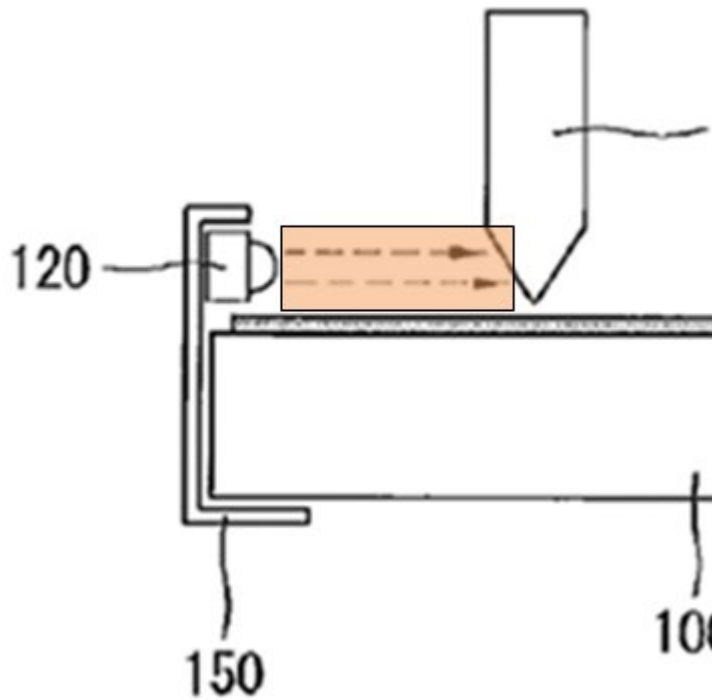
197. Park discloses this element.

198. As explained above for the preceding claim element, each of Park’s light emitting devices 120 includes a substrate configured to support the light emitting surface 2300. The substrate used to support each of the plurality of light emitters is depicted in Figure 2:



Park at Fig. 2 (annotations added); *see also id.* at [0179]-[0181] (describing that the substrate may be a PCB that connects the light emitting device 120 to a controller). Park therefore discloses “a substrate configured to support at least one of the plurality of light emitters.”

199. With the light emitters supported by the substrate as shown above, “at least one of the plurality of light emitters transmits a portion of light in a plane extending over the touch surface.”

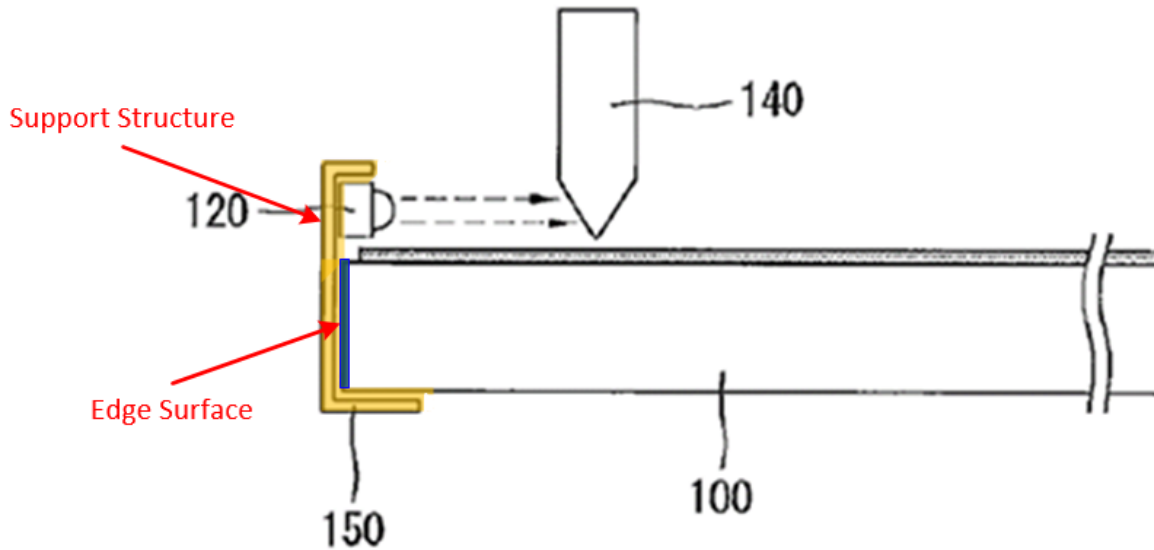


Id. at Fig. 2 (colors added); *see also id.* at [0056].

e) “a support structure configured to support the substrate, the support structure comprising:”

200. Park discloses this claim element.

201. The reference discloses a protection cover 150 (*i.e.*, “a support structure,” as claimed) that “cover[s] the outside of the limit emitting devices” (Park at [0058]):

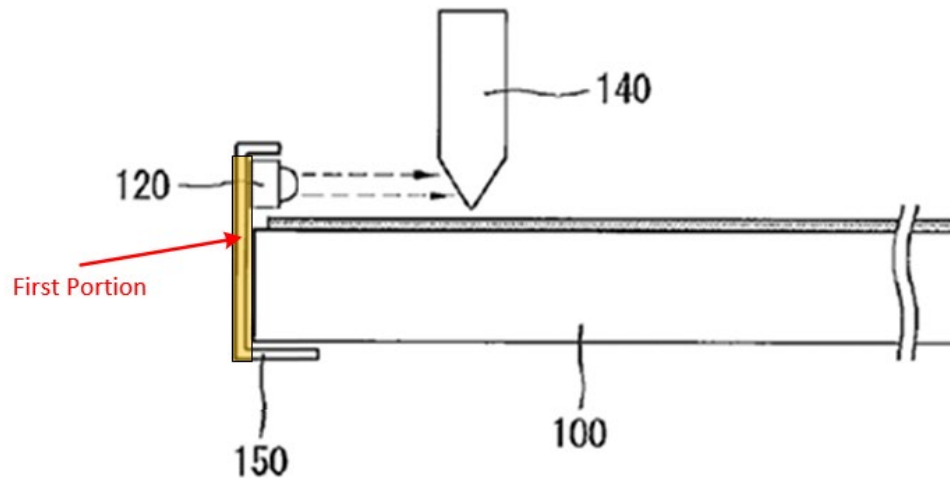


Id. at Fig. 2 (annotations added). As shown above, the protection cover 150 (*i.e.*, the “support structure,” as claimed) supports the substrate of the light emitting device 120.

f) “a first portion extending substantially parallel to the edge surface, wherein the substrate is configured to be supported by the first portion;”

202. Park discloses this claim element.

203. As shown below, the protection cover 150 (*i.e.*, the “support structure,” as claimed) includes “a first portion extending substantially parallel to the edge surface”:

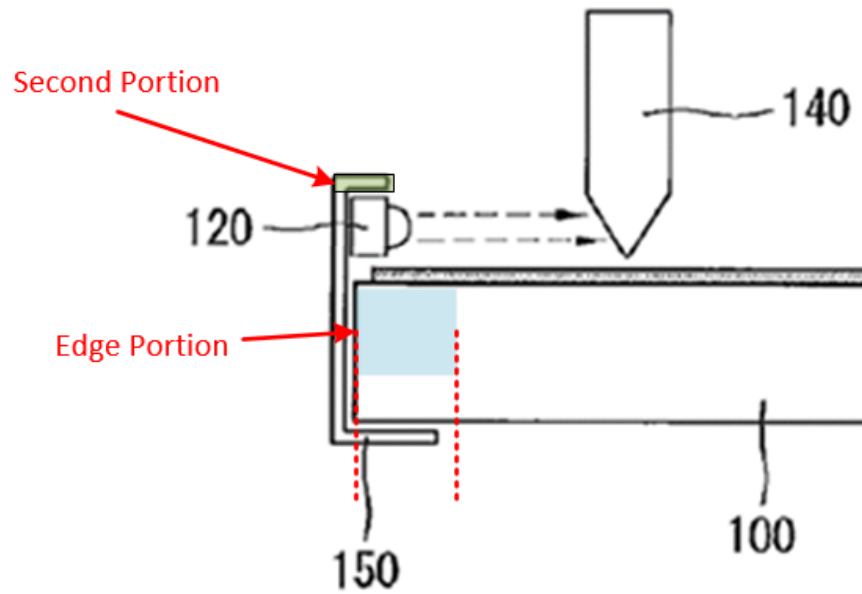


Park at Fig. 2 (annotations added). As shown above, the first portion of the protection cover 150 supports the substrate of the light emitting device 120.

g) “a second portion extending over an edge portion of the top surface of the panel; and”

204. Park discloses this claim element.

205. As shown below, the protection cover 150 (*i.e.*, the “support structure,” as claimed) includes a horizontal portion (*i.e.*, the “second portion,” as claimed) that extends over an edge portion of the top surface of the panel:

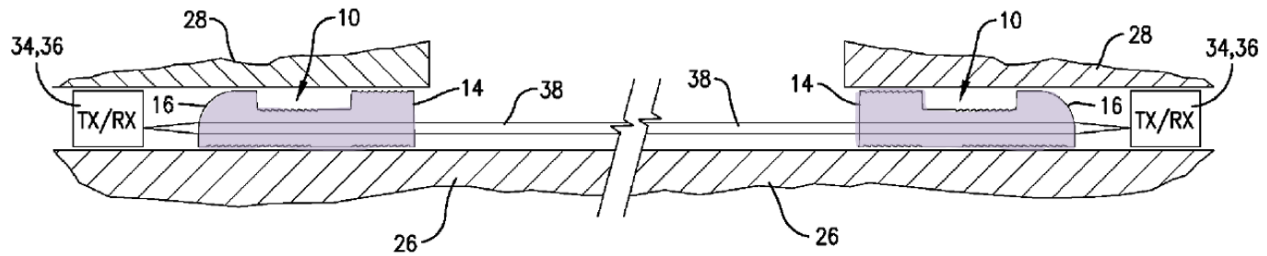


Park at Fig. 2 (annotations added).

h) “a sealing element configured to rest on the edge portion of the top surface and further configured to be fitted between the edge portion of the top surface and the second portion of the support structure.”

206. The combination of Park and Klein would have rendered obvious this element.

207. Klein discloses an “optical overlay” for use in a device similar to that of Park, stating that this optical overlay advantageously provides “sealing or weatherproofing” that protects “against the penetration of liquid, dust, dirt, or other possible system contaminants”:

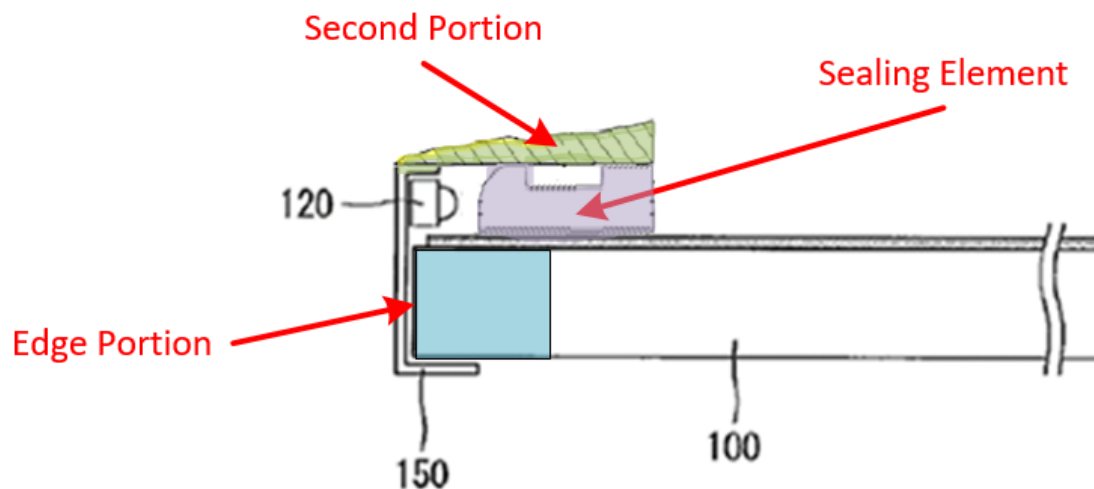


Klein at Fig. 8 (color added to highlight the optical overlay 10).

208. Like Park, Klein uses transmitters 34 (*e.g.*, LEDs) and receivers 36 arranged opposite from each other, thus enabling light emitted from an LED to be received by a receiver. *Id.* at 4:42-43. (“The plurality of transmitters 34 generally transmit signals 38 to be received by the plurality of receivers 36.”). With the optical overlay 10 positioned as shown above and configured to provide “sealing or weatherproofing,” the optical overlay 10 protects the transmitters from dirt, water, and other contaminants. The optical overlay 10 therefore discloses the claimed “sealing element.”

209. It is my opinion that a POSA would have been motivated to use Klein’s optical overlay 10 in the device of Park. Specifically, the POSA would have recognized that Park’s light emitting devices 120 and light receiving devices 130 would be negatively affected by dirt, dust, water, and other contaminants present on the substrate 100, resulting in a device that is less reliable and subject to failures (*e.g.*, short circuits caused by the light emitting devices 120 being

exposed to water on the substrate 100). Accordingly, the POSA would have been motivated to modify Park's device to include the optical overlay 10 of Klein and to extend the second portion of Park's support structure to create the sealing function of Klein:



Park at Fig. 2 (modified and annotations added).

210. As described above, Klein's optical overlay 10 includes a groove 40 "configured to retain a gasket," thus enabling the overlay 10 to advantageously provide "sealing or weatherproofing" that protects "against the penetration of liquid, dust, dirt, or other possible system contaminants." Klein at 5:50-63. The POSA would have been motivated to modify Park's device to include the optical overlay 10 to achieve this "sealing or weatherproofing." The POSA would have

recognized that this sealing or weatherproofing would have advantageously enabled Park's device to achieve advantages including: (1) more robust system that would last longer and/or require less maintenance (e.g., putting in new emitters/detectors when the old ones break), (2) usable in less hospitable environments that may have more contaminants (e.g., outdoors), (3) better performance (e.g., detectors/emitters operating at peak performance without contaminants that could affect detection accuracy), (4) ability to colligate the light from the emitters and focus to at the detectors (e.g., assuring the light detection net functions accurately).

211. In combining Park and Klein as described above, the optical overlay 10 (*i.e.*, the claimed "sealing element") would have been "configured to rest on the edge portion of the top surface and further configured to be fitted between the edge portion of the top surface and the second portion of the support structure," as shown in the annotations added drawing above. The POSA would have been motivated to implement the optical overlay 10 as such because achieving the "sealing or weatherproofing" advancement of Klein would require this arrangement. If the optical overlay 10 did not rest on the edge portion and/or was not fitted between the edge portion and the second portion, then there would have

been air gaps hindering the optical overlay's ability to provide "sealing or weatherproofing."

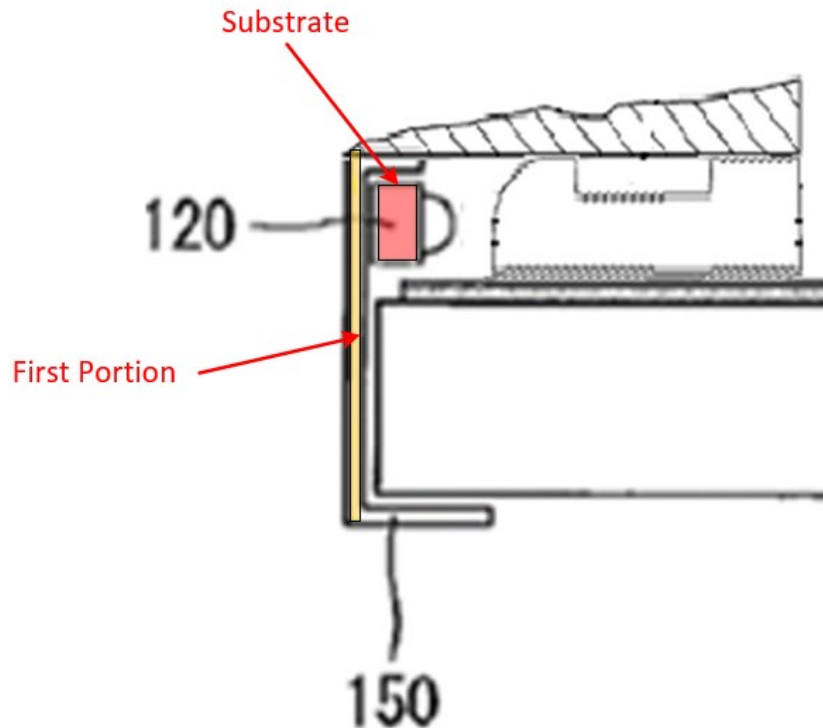
212. A POSA would have had a reasonable expectation of success in implementing the combination of Park and Klein detailed above. The combination would have involved (i) adding Klein's optical overlay 10 to Park as shown above, and (ii) extending Park's second portion such that it covers the optical overlay 10 and enables the optical overlay 10 to be fitted as shown above to provide "sealing or weatherproofing." These are trivial mechanical modifications well within the POSA's skill.

213. Claim 1 therefore would have been obvious over Park in combination with Klein.

2. Claim 2

214. Claim 2 depends from claim 1 and recites "wherein the substrate is affixed to the first portion of the support structure."

215. Park discloses the limitations added in claim 2. Specifically, the reference discloses the limitations of claim 2 as shown below:



Park at Fig. 1 (annotations added); *see also id.* at [0181].

216. Park explains that “a PCB may be arranged on the protection cover 1820”, allowing the emitters and detectors to be “substantially arranged at the end of the display panel 1801.” *Id.* at [0180]. As described above, this is a common configuration for a substrate in touch sensing devices as it positions the emitters and detectors above panel, which is necessary for touch sensing by the device. Based on Figure 1 and specification of Park, it is my opinion that that the substrate of Park is attached, or “affixed,” to the protection cover, ensuring that the positions of the light emitters and sensors do not change.

217. Claim 2 therefore would have been obvious over Park and Klein

3. Claim 5

218. As explained above with reference to ground 1, the '338 patent does not demonstrate that the processes recited in this claim (*i.e.*, “an extrusion process, a drawing process, a rolling process, or a molding process”) impart a structural or functional difference in the claimed product. Because Park discloses the claimed “support structure” of claim 1, the combination of Park and Klein would have rendered obvious claim 5.

4. Claim 6

219. Claim 6 depends from claim 1 and recites “wherein the sealing element comprises a first surface facing the at least one of the plurality of light emitters and being configured to receive the transmitted light from that emitter and a second surface configured to receive light propagating in the plane extending over the touch surface.”

220. Klein discloses the limitations added in claim 6 as explained above with respect to Ground 1.

221. Claim 6 therefore would have been obvious over Park and Klein.

5. Claim 7

222. Claim 7 depends from claim 6 and recites “wherein the first surface is tilted relative to the at least one of the plurality of light emitters.”

223. Klein discloses the limitations added in claim 7 as explained above with respect to Ground 1.

224. Claim 7 therefore would have been obvious over Park and Klein.

6. Claim 10

225. Claim 10 depends from claim 1 and recites “wherein the sealing element is formed from a single monolithic piece of a material.” Klein discloses the limitations added in claim 10 as explained above with respect to Ground 1.

226. Claim 10 therefore would have been obvious over Park and Klein.

7. Claim 11

227. Claim 11 depends from claim 1 and recites “wherein the sealing element comprises an optically active element or an optically passive element.”

228. Klein discloses the limitations added in claim 11 as explained above with respect to Ground 1.

229. Claim 11 therefore would have been obvious over Park and Klein.

8. Claim 12

230. Claim 12 depends from claim 1 and recites “wherein the sealing element is configured to inhibit ingress of a contaminant toward the at least one of the plurality of light emitters.”

231. Klein discloses the limitations added in claim 12 for the reasons provided above with respect to claim 1 (Ground 3) and claim 12 (Ground 1).

232. Claim 12 therefore would have been obvious over Park and Klein.

9. Claim 13

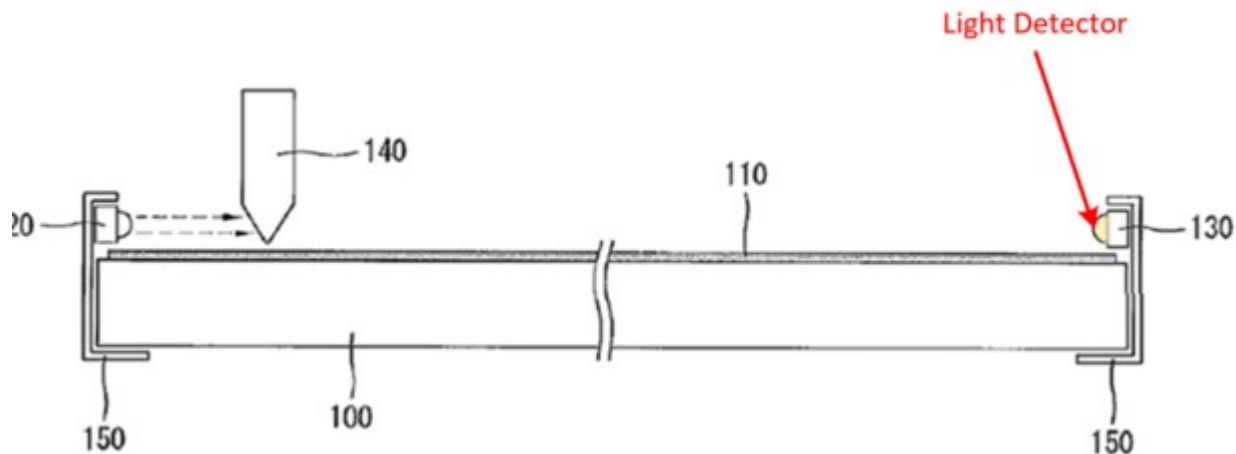
233. Claim 13 depends from claim 1 and recites “wherein the sealing element comprises one or more optical elements that refract, deflect, divert or focus light beams.”

234. Klein discloses the limitations added in claim 13 as explained above with respect to Ground 1.

235. Claim 13 therefore would have been obvious over Park and Klein.

10. Claim 14

236. Claim 14 depends from claim 1 and recites “further comprising a plurality of light detectors arranged along the periphery of the panel.” Park discloses this limitation. Park describes light receiving devices 130 that “receive light emitted by the light emitting devices 120.” Park at [0053].



Id. at Fig. 2 (annotations added). There are a plurality of light receiving devices.

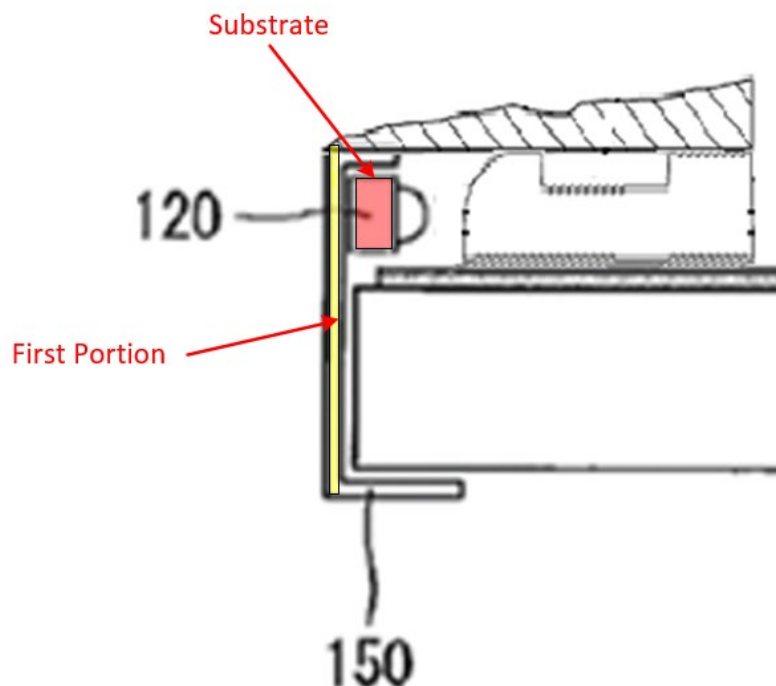
Id. at [0065]. Park further states that the light receiving devices 130 are arranged around the edge of the substrate 100 (*i.e.*, the “the panel,” as claimed), similar to the light receiving devices. *Id.* at [0051].

237. Claim 14 therefore would have been obvious over Park and Klein.

11. Claim 15

238. Claim 15 depends from claim 1 and recites “wherein the substrate is directly joined to the first portion of the support structure.”

239. Park discloses the limitations added in claim 15. Specifically, the reference discloses the substrate disposed on the support structure without intervening structures:



Park at Fig. 1 (annotations added); *see also Id.* at [00181].

240. Claim 15 therefore would have been obvious over Park and Klein.

VIII. Conclusion

241. For the reasons and rationales described above, it is my opinion that claims 1-3 and 5-15 of '338 patent would have been obvious over Chen '975 alone or in combination with Klein. It is also my opinion that claims 4 and 5 would have been obvious over Chen '975 alone or over Chen '975 in combination with Klein, and further in view of Nakamura. It is my opinion that claims 1, 2, 5, 6, 8, and 11-15 would have been obvious of Chen '812. Finally, it is my opinion that claims 1, 2, 5-7, and 10-15 would have been obvious over Park in combination with Klein.