

PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 11,281,338

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the *Inter Partes* Review of U.S. Patent No. 11,281,338

Trial No.: Not Yet Assigned

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Inventors: Daniel Skagmo, Robert Ehn, Hakan Bergstrom

Assignee: FlatFrog Laboratories AB

Title: TOUCH SENSING APPARATUS AND METHOD FOR ASSEMBLY

MAIL STOP PATENT BOARD

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United States Patent & Trademark Office

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PETITION FOR *INTER PARTES* REVIEW
UNDER 37 C.F.R. § 42.100

On behalf of Chemtronics USA, Inc. (“Chemtronics” or “Petitioner”) and in accordance with 35 U.S.C. § 311 and 37 C.F.R. § 42.100, *inter partes* review (“IPR”) is respectfully requested for claims 1-15 of U.S. Patent No. 11,281,338 (“the ’338 Patent”) (Ex. 1001).

The undersigned representative of Chemtronics authorizes the Office to charge the \$41,500 Petition and Post-Institution Fees, and any additional fees, to Deposit Account 503013, ref: 103656-000002.

PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 11,281,338

Table of Contents

I.	INTRODUCTION	1
II.	REQUIREMENTS FOR IPR UNDER 37 C.F.R. § 42.104	3
A.	Grounds For Standing Under 37 C.F.R. § 42.104(a)	3
B.	Identification Of Challenge Under 37 C.F.R. § 42.104(b) And Relief Requested	3
III.	BACKGROUND INFORMATION FOR THE '338 PATENT	4
A.	Overview Of The '338 Patent	4
B.	The Claims	8
C.	Prosecution History	10
D.	Level of Skill in the Art	12
IV.	CLAIM CONSTRUCTION	12
V.	CLAIMS 1-15 OF THE '338 PATENT ARE UNPATENTABLE	13
A.	Brief Overview Of The Prior Art	13
1.	Chen '975	13
2.	Klein	15
3.	Nakamura	17
4.	Chen '812	19
5.	Park	21
B.	Ground 1A: Claims 1-3, 5-7, And 9-15 Would Have Been Obvious In View Of Chen '975 Alone Or In Combination With Klein	22
1.	Claim 1	23
2.	Claim 2	36
3.	Claim 3	38
4.	Claim 5	39
5.	Claim 6	40
6.	Claim 7	42
7.	Claim 9	43
8.	Claim 10	45
9.	Claim 11	45
10.	Claim 12	46
11.	Claim 13	46
12.	Claim 14	47

PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 11,281,338

13.	Claim 15	47
C.	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	49
1.	Claim 4	50
2.	Claim 5	52
D.	Ground 2: Claims 1, 2, 5, 6, 8, 9 And 11-15 Would Have Been Obvious In View Of Chen '812	53
1.	Claim 1	55
2.	Claim 2	64
3.	Claim 5	65
4.	Claim 6	66
5.	Claim 8	67
6.	Claim 9	68
7.	Claim 11	69
8.	Claim 12	69
9.	Claim 13	70
10.	Claim 14	70
11.	Claim 15	71
E.	Ground 3: Claims 1, 2, 5-7, and 10-15 Would Have Been Obvious In View Of Park In Combination With Klein	72
1.	Claim 1	74
2.	Claim 2	84
3.	Claim 5	85
4.	Claim 6	86
5.	Claim 7	86
6.	Claim 10	86
7.	Claim 11	87
8.	Claim 12	87
9.	Claim 13	87
10.	Claim 14	88
11.	Claim 15	88
VI.	MANDATORY NOTICES PURSUANT TO 37 C.F.R. § 42.8(A)(1).....	89
A.	37 C.F.R. § 42.8(b)(1): Real Parties-in-Interest.....	90

PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 11,281,338

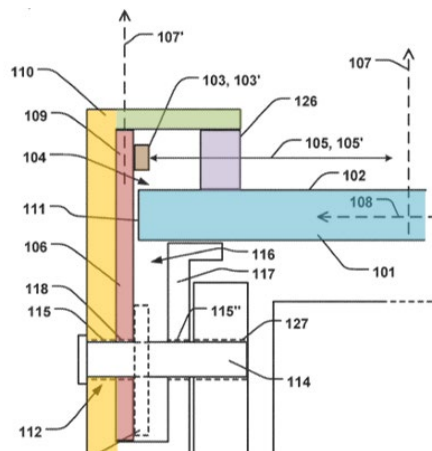
B. 37 C.F.R. § 42.8(b)(2): Related Matters 90

C. 37 C.F.R. § 42.8(b)(3), (4): Lead and Back-Up Counsel and Service
Information..... 90

CERTIFICATE OF WORD COUNT UNDER 37 C.F.R. § 42.24(a)..... 93

I. INTRODUCTION

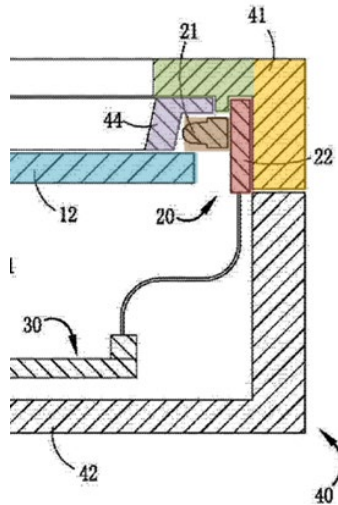
The '338 patent is currently being wielded by the patentee, FlatFrog Laboratories AB (“FlatFrog”), in an attempt to cover long-known touch sensing apparatuses. Such apparatuses use light emitters and detectors arranged around a touch surface to determine the “location (coordinates), shape or area of [an] object” that touches the touch surface. Ex. 1001 at 1:26-36. The '338 patent purports to improve touch detection by “provid[ing] for a very precise and improved alignment” of the light emitters and detectors that “allows for ... an increase in signal strength.” *Id.* at 13:39-47. The claims challenged here most resemble the touch sensing apparatus shown below in the '338 patent's Figure 2:



Id. at Fig. 2 (excerpted, colors added).

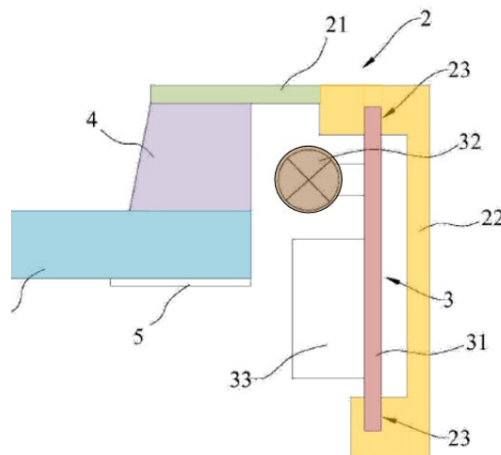
The claimed touch sensing apparatuses were disclosed in the prior art. For example, Chinese Patent No. 202661975 (“Chen ’975,” Ex. 1004) was filed nearly half a decade before the '338 patent's earliest claimed priority date and taught essentially the same touch sensing apparatus:

PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 11,281,338



Ex. 1004 at Fig. 4 (excerpted, colors added).

Likewise, Chinese Patent No. CN203720812 (“Chen ’812,” Ex. 1009) was filed years before the ’338 patent and discloses touch sensing apparatuses like those claimed in the ’338 patent:



Ex. 1009 at Fig. 1 (excerpted, colors added).

Accordingly, and for the reasons explained below, Chemtronics asks the Board to institute review and find the challenged claims unpatentable.

PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 11,281,338

II. REQUIREMENTS FOR IPR UNDER 37 C.F.R. § 42.104

A. Grounds For Standing Under 37 C.F.R. § 42.104(a)

Chemtronics certifies the '338 patent is available for *inter partes* review (IPR) and Chemtronics is not barred or estopped from requesting IPR challenging the patent claims on the grounds identified herein.

B. Identification Of Challenge Under 37 C.F.R. § 42.104(b) And Relief Requested

IPR is requested for claims 1-15 of the '338 patent ("the Challenged Claims"). In view of the prior art and evidence presented herein, IPR of the Challenged Claims should be instituted, and they should be found unpatentable and cancelled based on the following grounds:

Grounds of Unpatentability	Exhibits
<u>Ground 1A:</u> Claims 1-3, 5-7, and 9-15 would have been obvious under 35 U.S.C. § 103 over Chinese Patent No. 202661975 ("Chen '975") alone or in combination with U.S. Patent No. 8,330,736 ("Klein").	1004, 1006
<u>Ground 1B:</u> Claims 4 and 5 would have been obvious under 35 U.S.C. § 103 over Chen '975 alone or in combination with Klein and further in view of U.S. Patent Publication No. 2014/0111706 ("Nakamura").	1004, 1006, 1007

PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 11,281,338

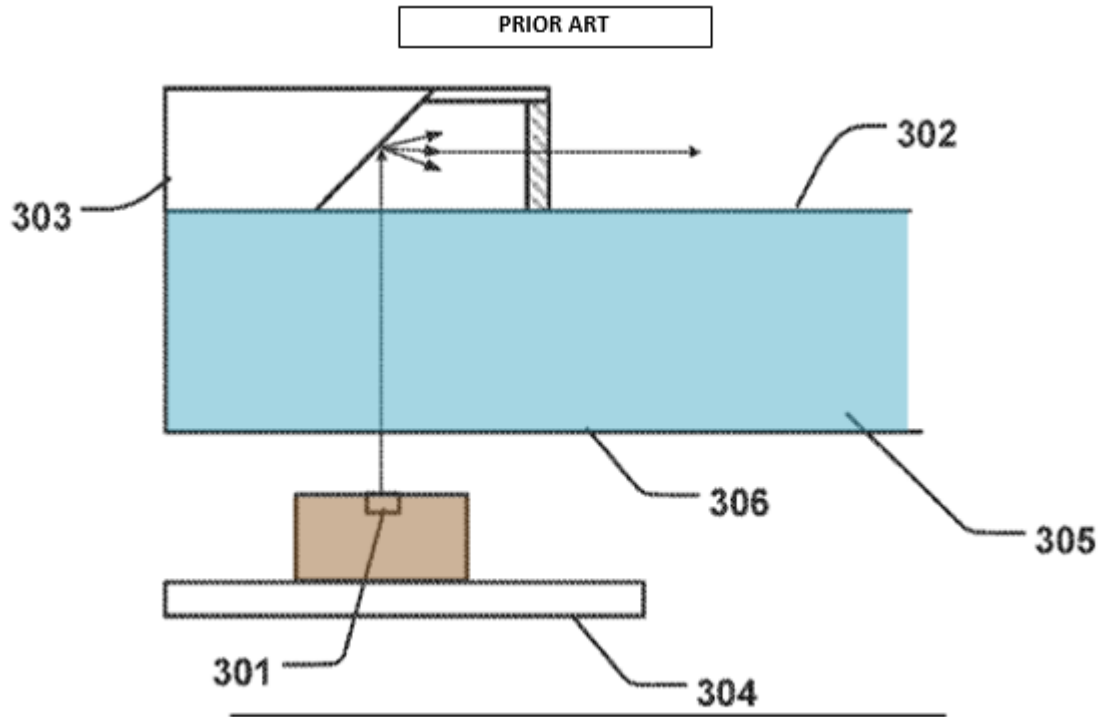
<u>Ground 2</u> : Claims 1, 2, 5, 6, 8, 9 and 11-15 would have been obvious under 35 U.S.C. § 103 over Chinese Patent No. CN203720812 (“Chen ’812”).	1008
<u>Ground 3</u> : Claims 1, 2, 5-7, and 10-15 would have been obvious under 35 U.S.C. § 103 over U.S. Patent Publication No. 2012/0146950 (“Park”) in combination with U.S. Patent No. 8,330,736 (“Klein”).	1006, 1010

III. BACKGROUND INFORMATION FOR THE ’338 PATENT

A. Overview Of The ’338 Patent

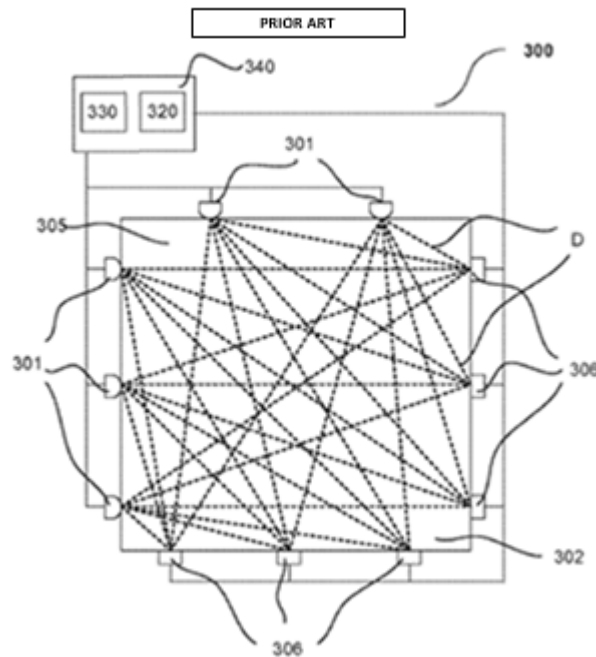
The ’338 patent describes a touch sensing apparatus 100 “that operate[s] by propagating light by diffusive light scattering above a panel.” Ex. 1001 at 1:16-18, Fig. 2; Ex. 1003 at ¶24.

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. Specifically, Figs. 1a-b are illustrations of a touch sensing apparatus according to the prior art. *Id.* at 6:18-21. Fig. 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, in this configuration the light emitter (brown above) is located below the surface of the panel (blue above) and uses “edge reflector or diffusor 303” to propagate light above the touch surface. *Id.* at 1:40-46.

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:

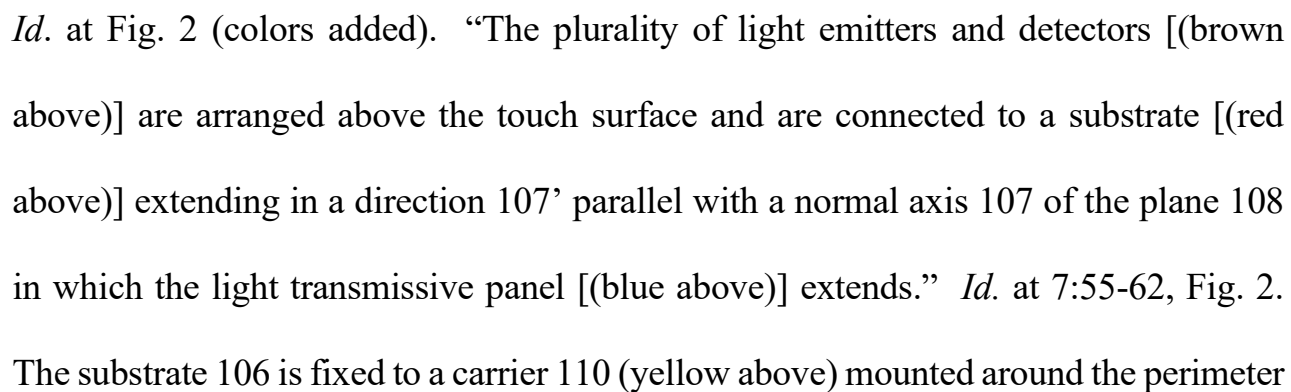


Id. at Fig. 1(b), 1:47-50.

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 on ‘above-surface’ light propagation which is robust and easy to assemble ... [and] with efficient use of light.” *Id.* at 2:26-32.

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), Figure 2 of 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.



PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 11,281,338

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 (purple above) "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.

The '338 patent states that having (i) "the substrate extending in the direction 107' ... parallel with the normal axis 107," and (ii) "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.* Ex. 1006 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).

B. The Claims

The '338 patent has 15 claims, of which 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;

PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 11,281,338

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:

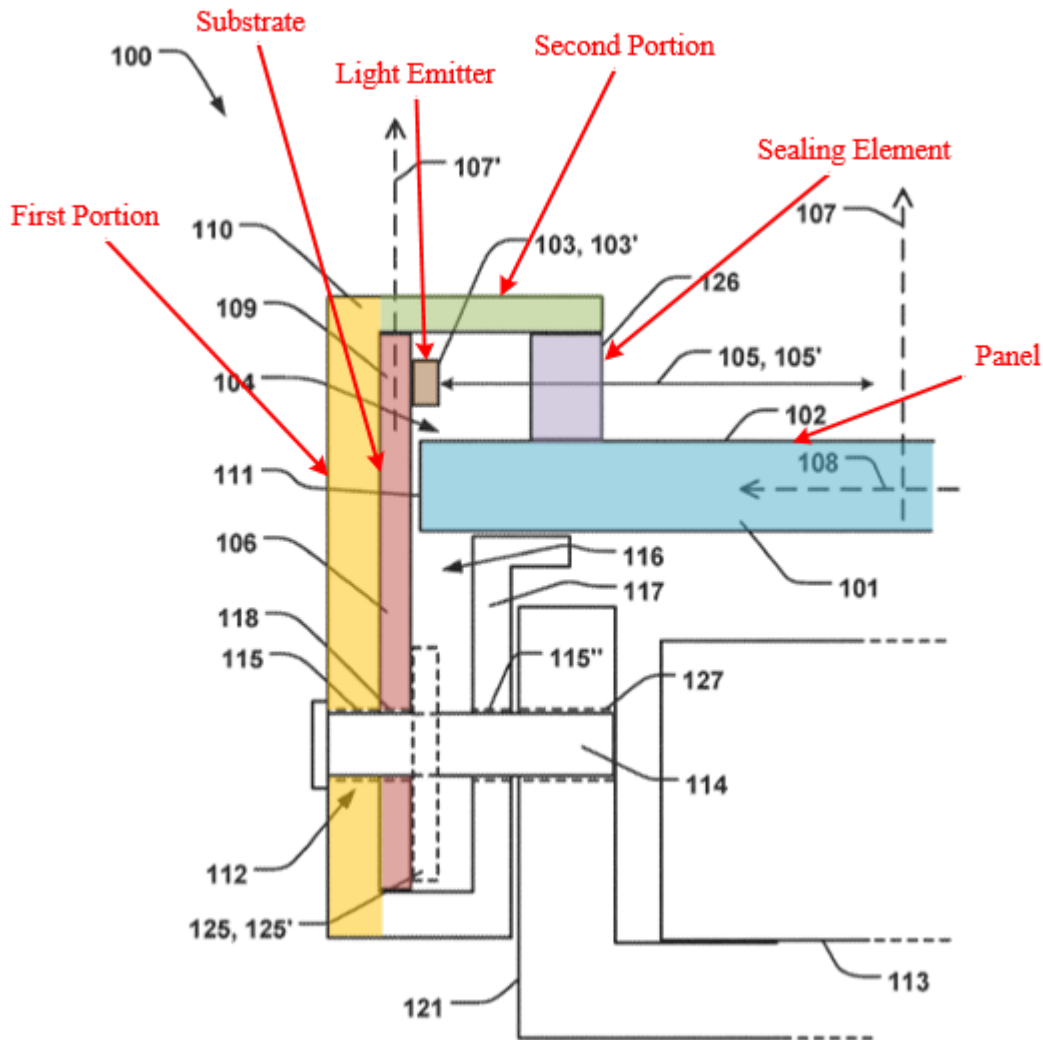
a first portion extending substantially parallel to the edge surface, wherein the substrate is configured to be supported by the first portion;

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.

Ex. 1001 at 22:19-39.

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:



Ex. 1001 at Fig. 2 (colors and annotations added).

C. Prosecution History

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 filed on March 28, 2017. Ex. 1001 at cover. For purposes of this proceeding, Chemtronics applies March 28, 2017 as the priority date for the Challenged Claims, but reserves its right to challenge priority in this or other proceedings. The '338 patent is a

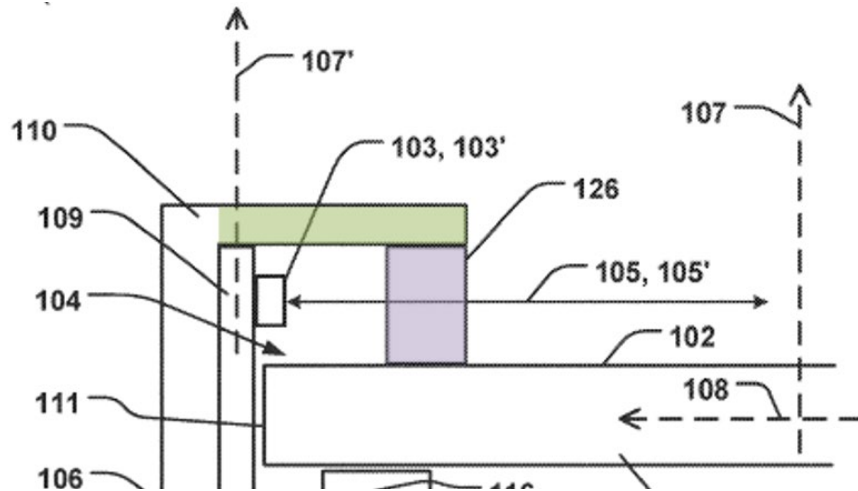
PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 11,281,338

continuation of two other FlatFrog patents: U.S. Patent Nos. 10,739,916 (the '916 patent) and 10,606,416 (the '416 patent). *Id.*

The prosecution history of the '338 patent (Ex. 1002) shows that the application for the '338 patent was filed on August 10, 2020 with just 5 claims. Ex. 1002 at 1493. These claims were subsequently canceled and replaced with an entirely new claim set. *Id.* at 1298.

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.

The applicant also conducted an examiner interview, and a summary for the interview cites WO2014131221 to Weishan as teaching “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 and applicant agreed upon the following amendment to overcome 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. The application was thereafter allowed. *Id.* at 14-25.



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

D. Level of Skill in the Art

A person having ordinary skill in the art (“POSA”) at the time of 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. Ex. 1003 at ¶¶20-21. 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. *Id.*

IV. CLAIM CONSTRUCTION

In this proceeding, claims are interpreted under the same standard applied by Article III courts. See 37 C.F.R. § 42.100(b); see also 83 Fed. Reg. 197 (Oct. 11, 2018); *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312 (Fed. Cir. 2005) (en banc). Under this standard, words in a claim are given their plain meaning, which is the meaning

PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 11,281,338

understood by a person of ordinary skill in the art (POSA) in view of the patent and file history. *Phillips*, 415 F.3d 1303, 1312-13. Petitioner interprets the meaning of the claims herein based on Petitioner's understanding of patentee's construction of the claims as informed by its allegation in co-pending litigation with Chemtronics as well as prior litigation involving related patents. *See* Exs. 1011, 1012, 1013. Petitioner does not waive, and expressly reserves, the claim scope arguments, constructions, and evidence it may raise in other proceedings.

V. CLAIMS 1-15 OF THE '338 PATENT ARE UNPATENTABLE

A. Brief Overview Of The Prior Art

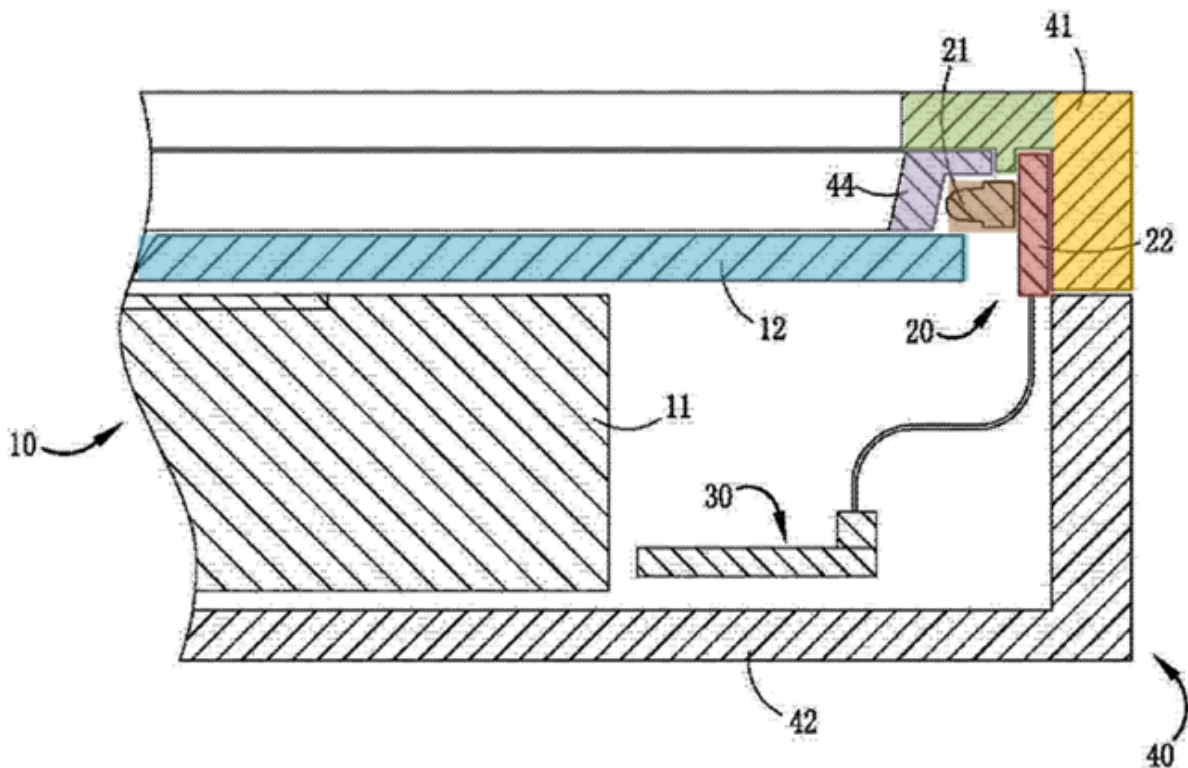
1. Chen '975

Chinese Patent No. 202661975 ("Chen '975," Ex. 1004), entitled "Touch Control Displaying Device," was filed on April 27, 2012, and published January 9, 2013. Chen '975 is therefore prior art to the '338 patent under at least 35 U.S.C. § 102(a)(1). A certified translation of Chen '975 (Ex. 1005) was provided by Stephen Robert Murray and is referred to herein.

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." Ex. 1005 at [0008]. The device of Chen '975 includes "sensing signal transmitters" and "sensing signal receivers" electrically connected to a printed

PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 11,281,338

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



Id. at Fig. 4 (annotations added).

As shown above, “sensing signal transceiver pairs 21 [(shaded 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 (shaded in purple), which “is provided in the light exit gap 43” and “is used to filter out external light rays, so that

PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 11,281,338

the infrared transmitter and infrared receiver can selectively transmit and receive light.”

Id. at [0039].

2. Klein

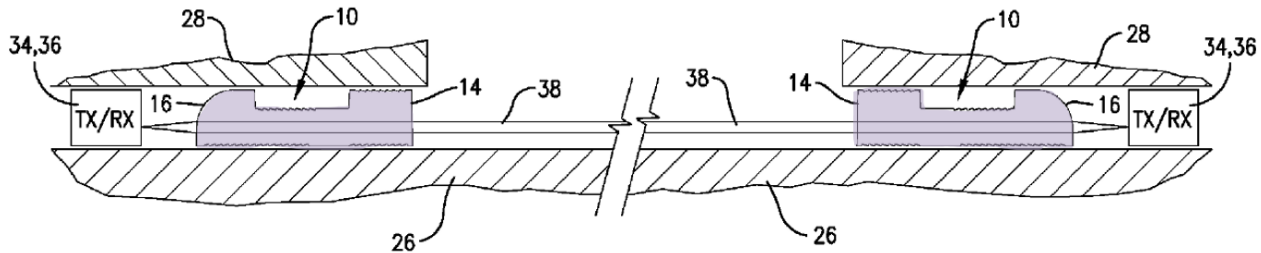
U.S. Patent No. 8,330,736 (“Klein,” Ex. 1006), entitled “Optical Overlay For An Electronic Display,” was filed on November 19, 2009, and published May 19, 2011. Klein is therefore prior art to the ’338 patent under at least 35 U.S.C. § 102(a)(1).

Klein “relate[s] to optical overlays that filter radiation.” Ex. 1006 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.

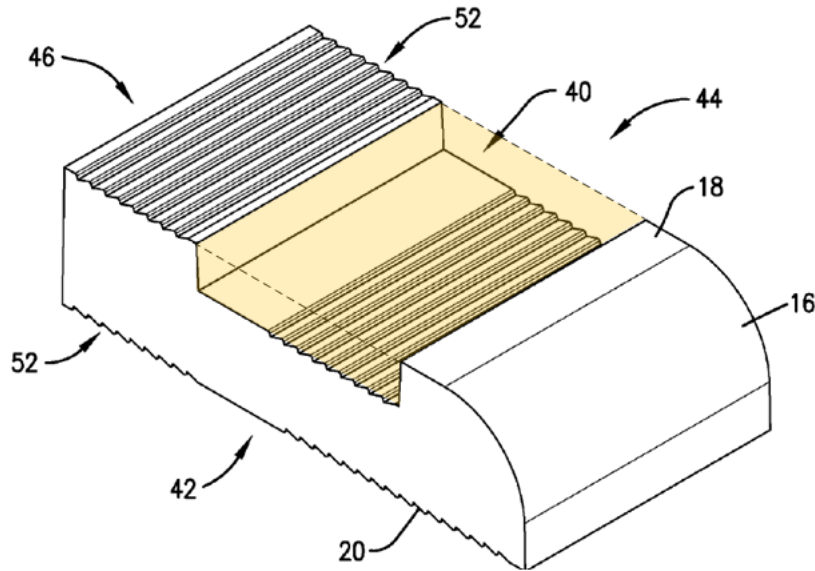
Klein notes that the performance of such display systems may suffer when “undesirably exposed to IR radiation from sources other than the IR transmitters.” *Id.* at 3:6-7. This may cause the system to “detect contact on the electronic display either intermittently or perhaps not at all.” *Id.* at 3:15-16.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

PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 11,281,338

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).

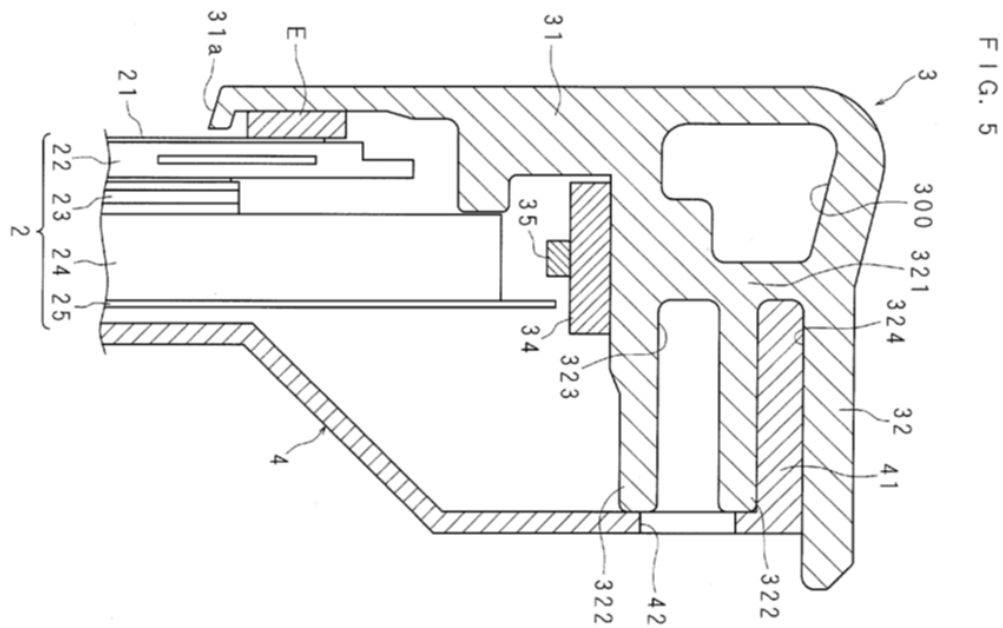
In addition to outer wall 16, which is shaped to provide the filtering function of the overlay (*id.* at 5:47-50), the optical overlay of Klein comprises a groove 40 that “is configured to retain a gasket for sealing or weatherproofing the display [] and the bezel [] of the electronic display system [].” *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.

3. Nakamura

U.S. Patent Publication No. 2014/0111706 (“Nakamura,” Ex. 1007), entitled “Display Device and Television Receiver,” has an international filing date of April 2, 2012 and was published on April 24, 2014. Ex. 1007 at (43). Nakamura is therefore prior art under at least 35 U.S.C. § 102(a)(1).

PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 11,281,338

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].



Id. at Fig. 5.

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

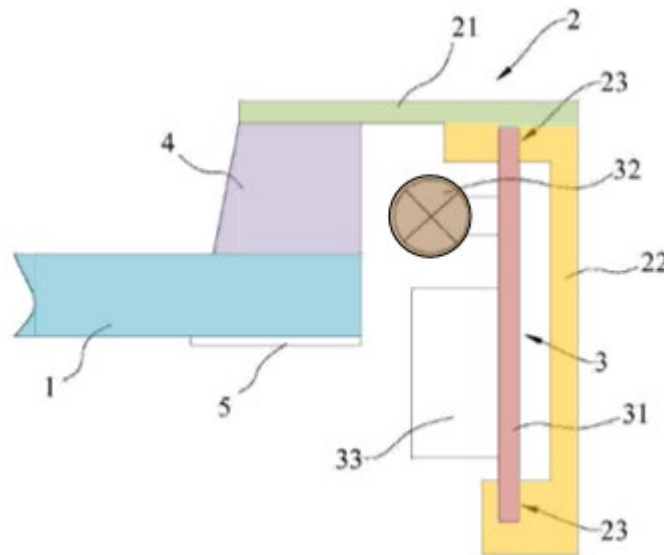
PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 11,281,338

including these structures, “[t]he coupling strength of the front cabinet 3 and the back cabinet 4 can be increased.” *Id.*

4. Chen ’812

Chinese Patent No. CN203720812 (“Chen ’812,” Ex. 1008), entitled “New type of infrared touch screen,” was filed January 10, 2014, and published July 16, 2014. Chen ’812 is therefore prior art to the ’338 patent under at least 35 U.S.C. § 102(a)(1). A certified translation of Chen ’812 (Ex. 1009), provided by Qiang Li in connection with previous litigation on a related patent, is referred to herein.

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.” Ex. 1009. 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).

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].

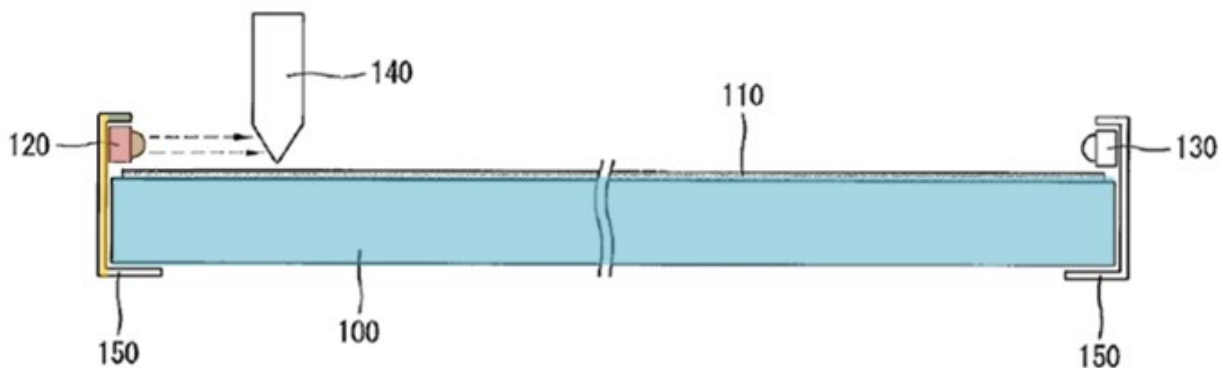
Chen ’812 additionally discloses a filter strip (shaded in purple) “adhesively connected” to both the screen body and the rectangular frame. *Id.* at [0024]. The filter strip “allows the infrared receiving tubes to receive stronger signals” and “achieves the effect of one infrared emitting tube emitting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

5. Park

U.S. Patent Publication No. 2012/0146950 (“Park,” Ex. 1010), entitled “Touch Panel and Display Apparatus Having The Same,” was filed May 25, 2011, and published June 14, 2012. Park is prior art under at least 35 U.S.C. § 102(a)(1).

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].

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

PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 11,281,338

Further, the POSA would have been motivated to modify Chen '975 to include the sealing element of Klein (Ex. 1006, U.S. Patent No. 8,330,736), another reference not cited during prosecution. Ex. 1003 at ¶¶57-58. This combination further shows the obviousness of the '338 claims. Had the Patent Office applied Chen '975 and Klein during prosecution, claims 1-3, 5-7, and 9-14 of the '338 patent would not have issued.

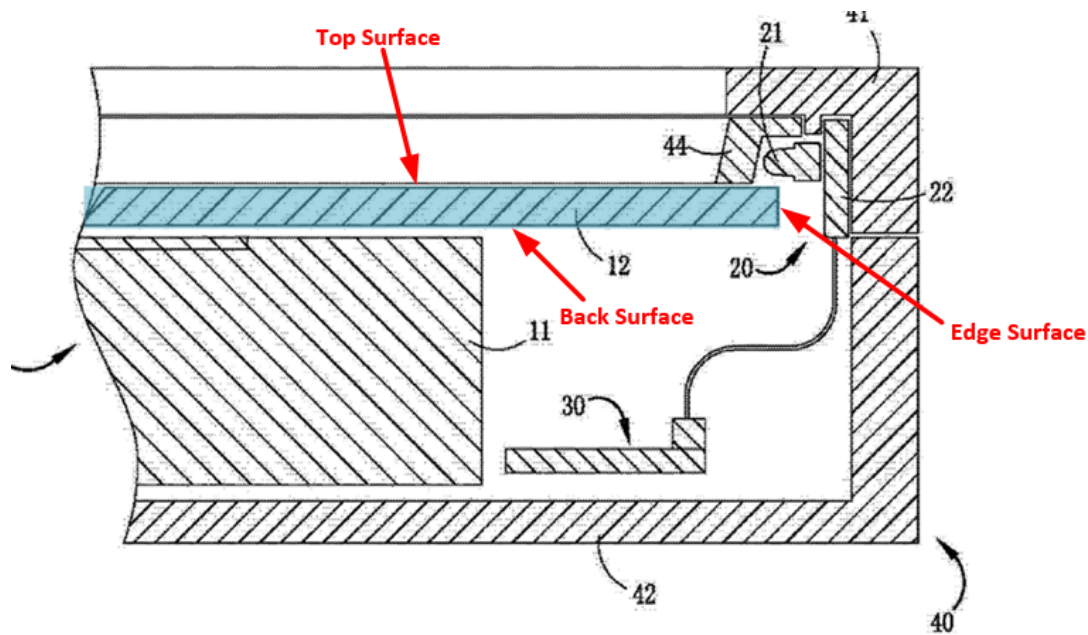
1. Claim 1

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

To the extent the preamble is limiting, Chen '975 discloses the preamble of claim 1. Ex. 1003 at ¶59. Chen '975 discloses a “display device using touch control” that “detect[s] the position touched by [a] user.” Ex. 1005 at [0001], [0002]. Because the device “detects” a user’s touch, Chen '975 discloses “touch sensing apparatus,” as claimed. Ex. 1003 at ¶59.

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

Chen '975 discloses this element. Ex. 1003 at ¶60. 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:

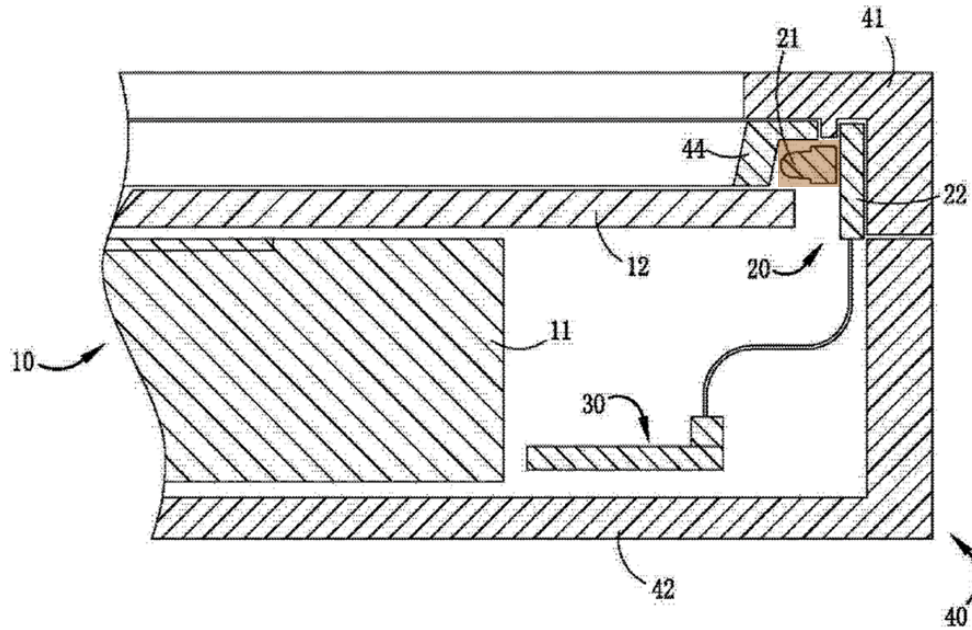


Ex. 1005 at Fig. 4 (annotations added); *see also id.* at [0040].

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). Ex. 1003 at ¶61; *see also* Ex. 1005 at [0003] (describing a "touch operation"), [0008], [0009].

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

Chen '975 discloses this element. Ex. 1003 at ¶¶62-63. The reference discloses surface-mounted LEDs (*i.e.*, "a plurality of light emitters," as claimed):

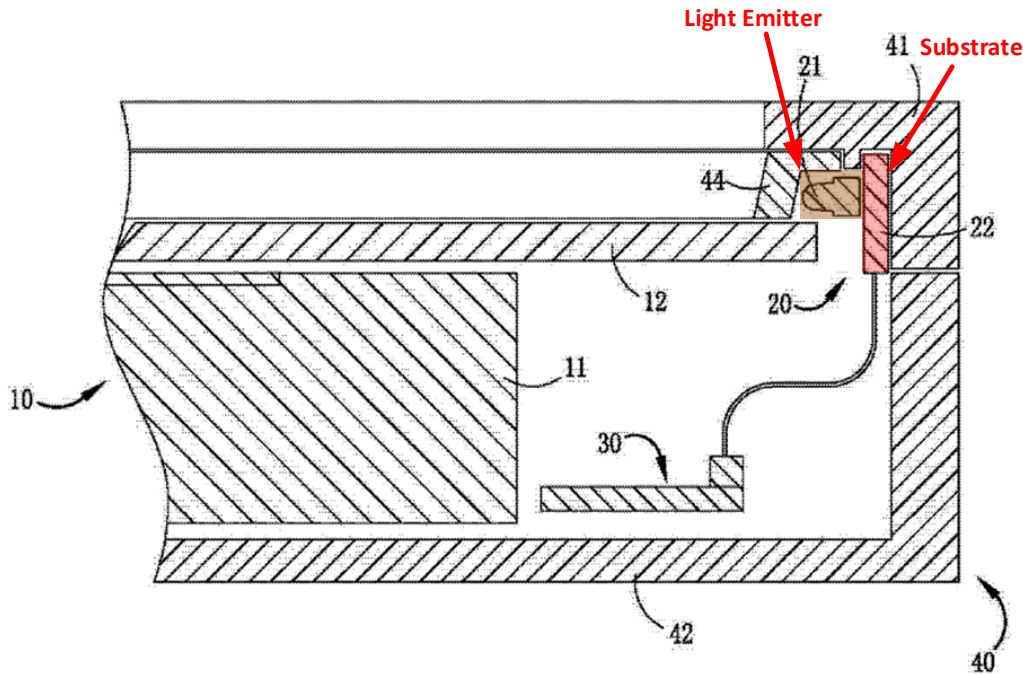


Ex. 1005 at Fig. 4 (color added); *see also id.* at [0037] (“the infrared transmitter is a surface-mount infrared LED”).

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;”

Chen '975 discloses this element. Ex. 1003 at ¶¶64-65. The reference discloses a printed circuit board (PCB) 22 (*i.e.*, “a substrate,” as claimed):

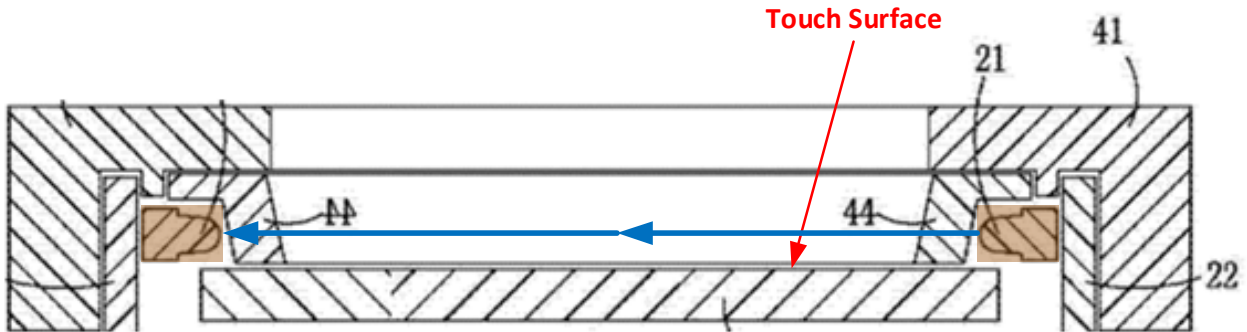


Ex. 1005 at Fig. 4 (annotations added); *see also id.* at [0027]-[0030], [0032]-[0036] (“the [PCB] 22 is a rigid PCB or a flexible PCB”). *See also* Ex. 1012 at 3 (patentee FlatFrog arguing that the accused product’s PCB is a “substrate,” as claimed). The PCB 22 “support[s] at least one of the plurality 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.” Ex. 1005 at [0032].

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

PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 11,281,338

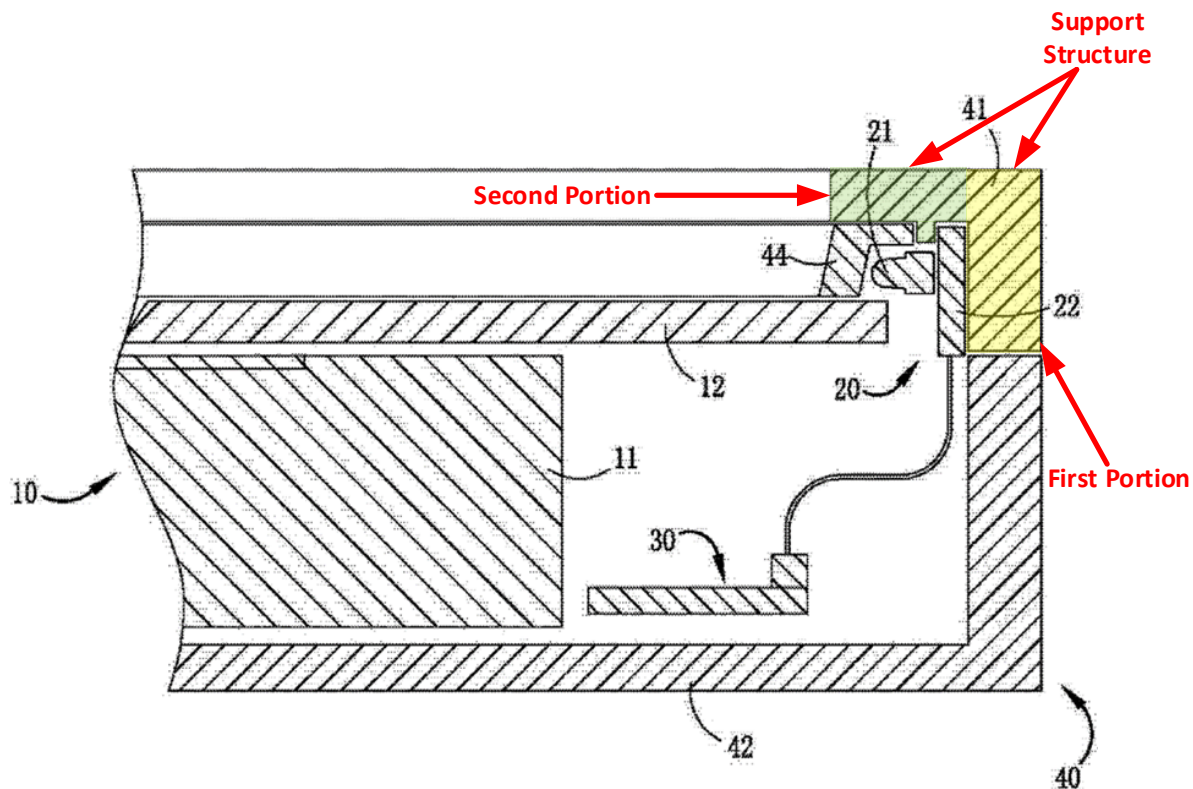
surface.” Ex. 1003 at ¶65. Chen ’975 uses LEDs and receivers arranged opposite from each other (Ex. 1005 at [0029]), thus enabling light emitted from an LED to be received by a receiver:



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:”

Chen ’975 discloses this claim element. Ex. 1003 at ¶¶66-67. The reference discloses a top casing 41 (*i.e.*, “a support structure,” as claimed):

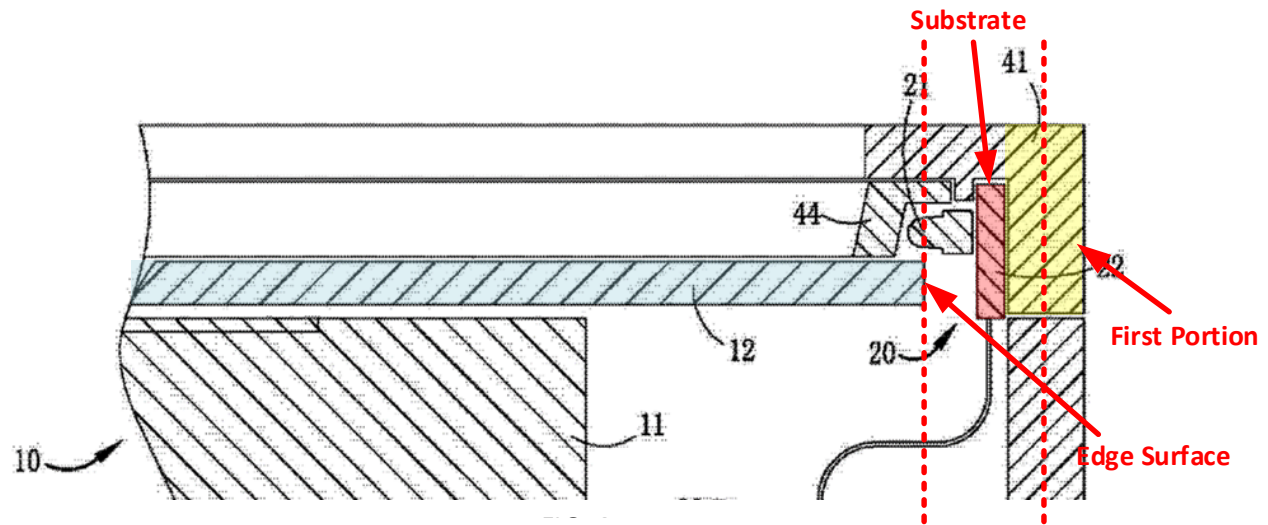


Ex. 1005 at Fig. 4 (annotations added).

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”); Ex. 1003 at ¶67.

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

Chen '975 discloses this claim element. Ex. 1003 at ¶¶68-69. 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”:

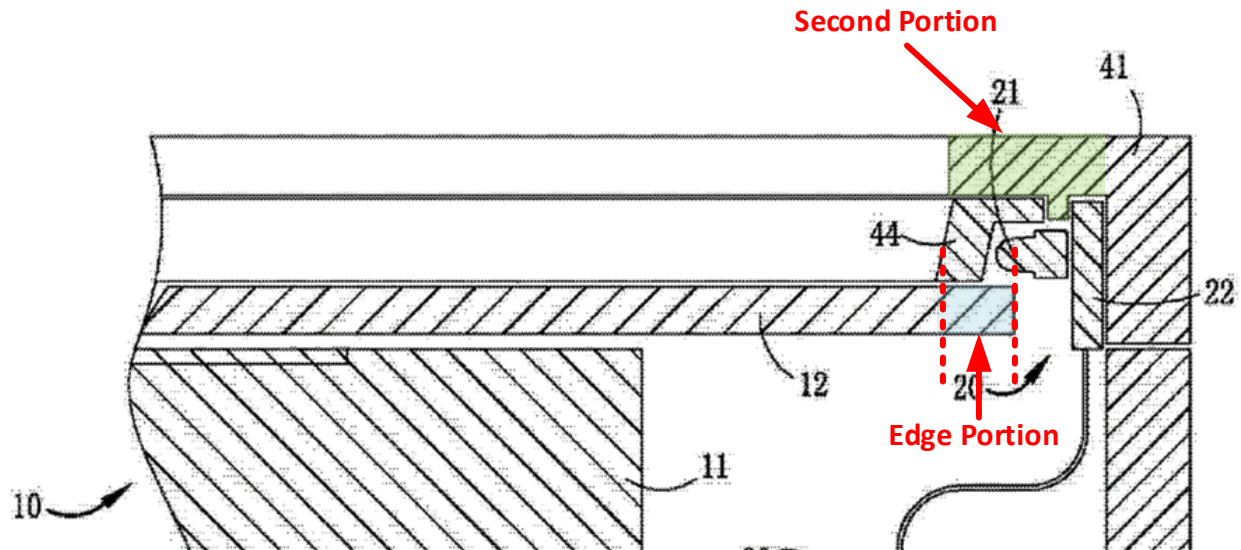


Ex. 1005 at Fig. 4 (annotations added).

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); Ex 1003 at ¶69.

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

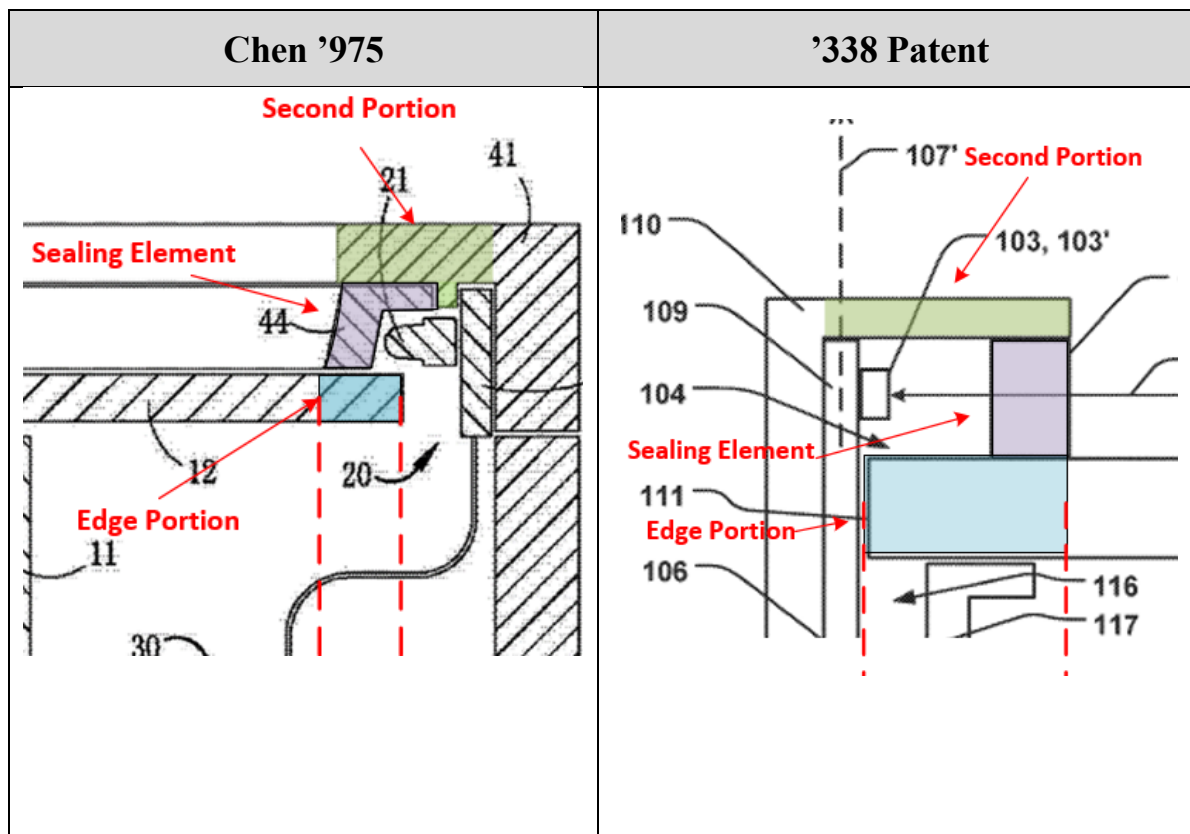
Chen ’975 discloses this claim element. Ex. 1003 at ¶70. As shown below, the top casing 41 (*i.e.*, the “support structure,” as claimed) includes “a second portion extending over an edge portion of the top surface of the panel”:



Ex. 1005 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.”

Chen '975 discloses this claim element. Ex. 1003 at ¶¶71-83. 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:



Ex. 1005 at Fig. 4 (left); Ex. 1001 at Fig. 2 (right) (colors and annotations added).

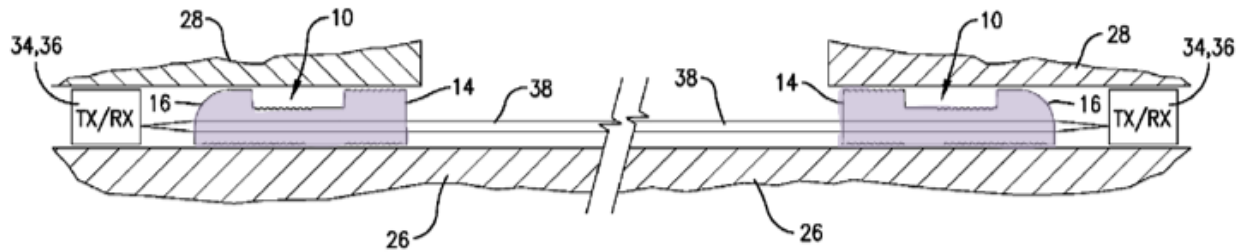
Further, the filter strip 44 is a “sealing element,” as claimed. Ex. 1003 at ¶72. The plain meaning of “sealing element” in view of the patent and file history is “*an element that provides protection from some, but not necessarily all, dirt, water and other contaminants.*” *Id.* In litigation related to the related '916 patent (of which the '338 patent is a continuation), FlatFrog acknowledged that a similar claim term “seal ... from contaminants” did not need construction and “does not require perfect sealing.” Ex. 1011 at 71. Rather, 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, a POSA would have understood the term “sealing element” to mean “an element that provides

PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 11,281,338

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; Ex. 1003 at ¶72.

Although Chen ’975 describes the filter strip 44 as being “used to filter out external light rays” (Ex. 1005 at [0039]), the POSA would have understood that the filter strip 44 also inhibits dirt, water, and other contaminants from reaching the LEDs. Ex. 1003 at ¶73. As explained by Dr. Darran R. Cairns, who holds a Ph.D. from the University of Birmingham (U.K.) in materials science and engineering and has over twenty years of experience with touch sensor technology (*see* Ex. 1014), 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. *Id.* at ¶74. Chen ’975 therefore discloses the claimed “sealing element.” *Id.*

Should the Board disagree, the “sealing element” claim term would have at least been rendered obvious by the combination of Chen ’975 and Klein. Ex. 1003 at ¶75. 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”:



Ex. 1006 at Fig. 8 (color added to highlight the optical overlay 10).

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.”

The POSA would have been motivated to use Klein’s optical overlay 10 in the touch display of Chen '975 for a variety of reasons. Ex. 1003 at ¶77. 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. Ex. 1005 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. Ex. 1003 at ¶77.

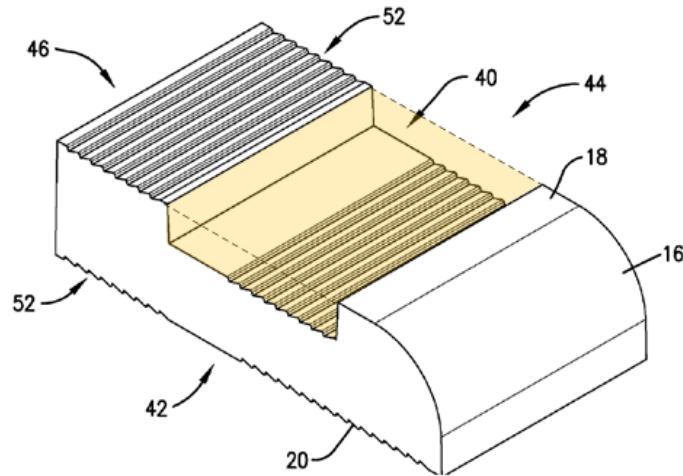
PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 11,281,338

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. Ex. 1003 at ¶78.

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



Id. at Fig. 5.

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. The 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.” Ex. 1003 at ¶81. 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

PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 11,281,338

and focus to at the detectors (*e.g.*, assuring the light detection net functions accurately).

Id.

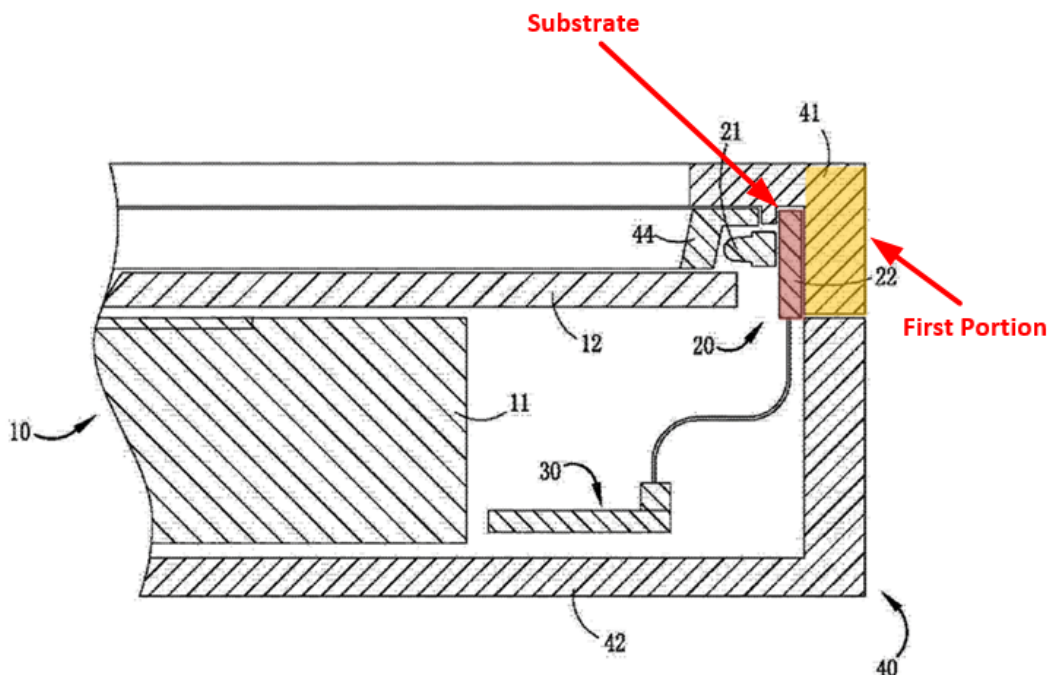
A POSA would have had a reasonable expectation of success in implementing Chen '975's filter strip 44 using Klein's optical overlay 10. *Id.* at ¶82. As detailed above, Klein provides extensive details on how to implement the optical overlay 10, and any modifications necessary for achieving this combination would have been trivial, requiring only mechanical modifications that would have been well within the POSA's skill. *Id.* 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. *Id.*; *see also* Ex. 1006 (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. *Id.*

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

2. Claim 2

Claim 2 depends from claim 1 and further recites "wherein the substrate is affixed to the first portion of the support structure." Chen '975 discloses or renders obvious this claim element. Ex. 1003 at ¶¶84-87. 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.” Ex. 1005 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”:

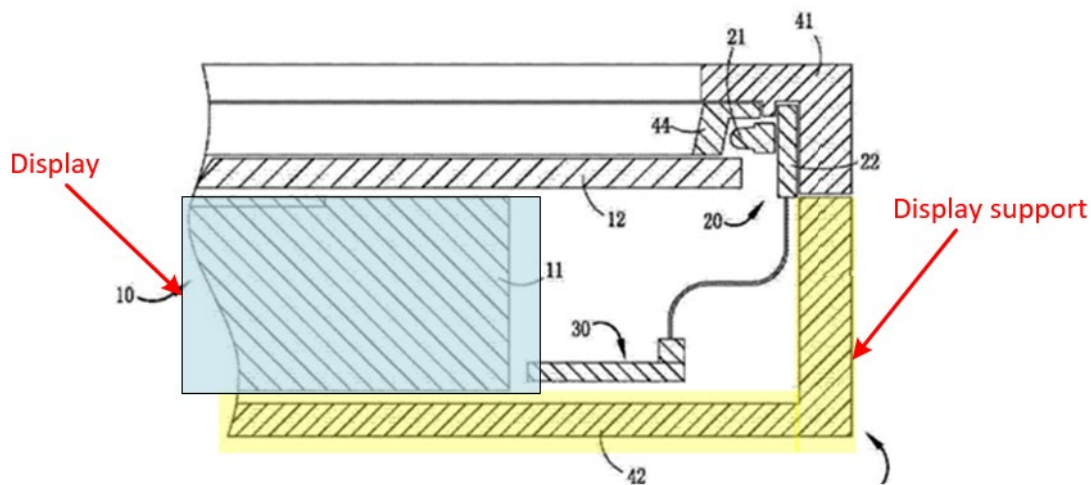


Id. at Fig. 4 (annotations added); *id.* at [0032]. As shown above and as described by Dr. Cairns, Chen '975 therefore discloses “the substrate is affixed to the first portion of the support structure,” as claimed. Ex. 1003 at ¶85-86.

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

3. Claim 3

Claim 3 depends from claim 1 and 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.” Chen ’975 discloses this claim element. Ex. 1003 at ¶¶88-90. The reference describes a bottom casing 42 (*i.e.*, “a display support,” as claimed) configured to support a liquid crystal display 11:



Ex. 1005 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”). Ex. 1003 at ¶89. 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. Ex. 1005 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-

PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 11,281,338

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. Ex. 1003 at ¶89.

Claim 3 therefore would have been obvious over Chen ’975 alone or in combination with Klein. Ex. 1003 at ¶90.

4. Claim 5

Claim 5 depends from claim 1 and recites “wherein the support structure is formed from an extrusion process, a drawing process, a rolling process, or a molding process.” This is a product-by-process claim, the validity of which is determined by the product, not the process of making it. *See Kamstrup A/S v. Axioma Metering UAB*, 43 F.4th 1374, 1381 (Fed. Cir. 2022) (quoting *Greenliant Sys., Inc. v. Xicor LLC*, 692 F.3d 1261, 1268 (Fed. Cir. 2012)). Where the specification does not evidence that the process imparts a structural or functional difference in the claimed product, the process limitations are not limiting. *Greenliant Sys.*, 692 F.3d at 1268-69.

Here, the specification of the ’338 patent does not demonstrate that the processes recited in claim 5 (*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. Ex. 1003 at ¶93. 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. *Id.* Further, unclaimed methods such as machining or printing can result in the same features as those imparted by the claimed processes. *Id.* Therefore, the process

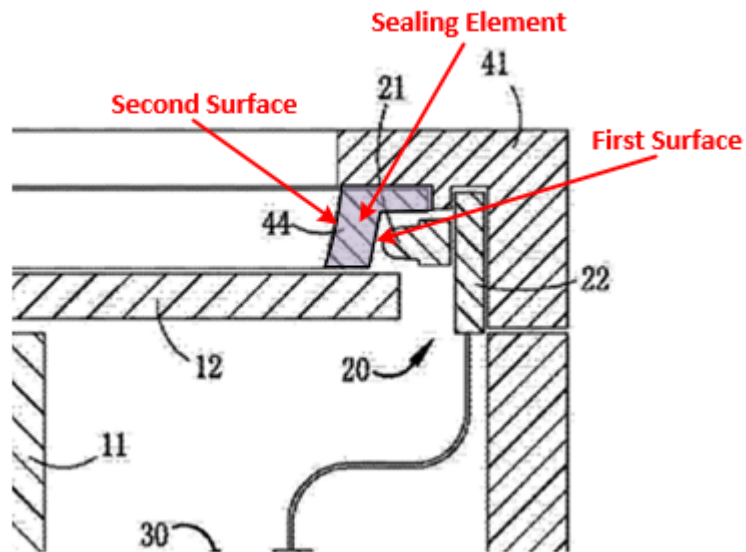
PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 11,281,338

limitations of claim 5 are not limiting. Because Chen '975 discloses the claimed “support structure” of claim 1, Chen '975 alone or in combination with Klein would have rendered obvious claim 5. Ex. 1003 at ¶¶91-93.

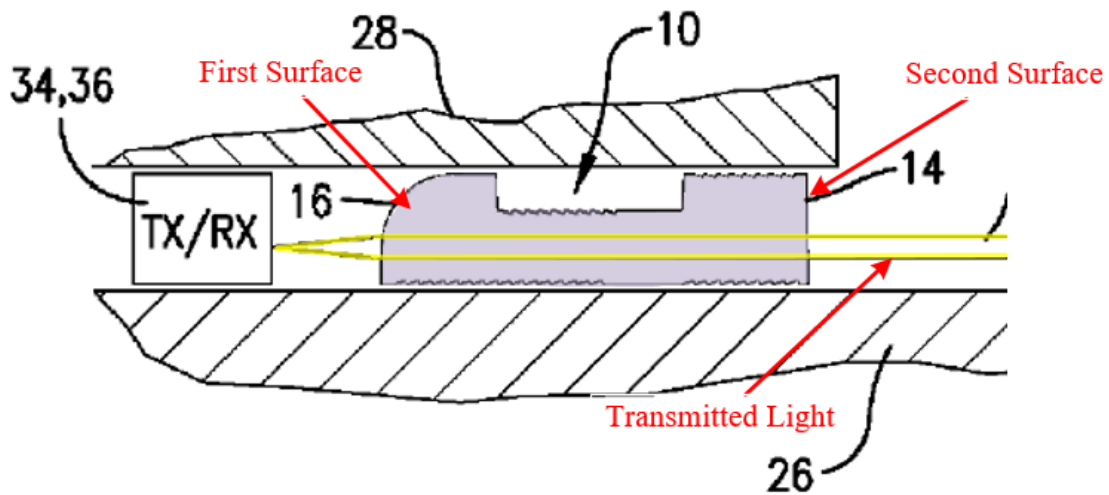
Further, the processes recited in claim 5 were well known in the art at the time of the '338 patent. *Id.* at ¶94. It would have been obvious to the POSA to choose from known prior-art processes in forming the support structure of Chen '975, and implementing the support structure in this manner would have yielded nothing more than predictable results to the POSA. *Id.* The selection of well-known prior-art processes to achieve the predictable results would have been obvious to the POSITA. *See KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 401 (2007) (“If a person of ordinary skill can implement a predictable variation, § 103 likely bars its patentability.”).

5. Claim 6

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.” Each of Chen '975 and Klein discloses the limitations added in claim 6. Ex. 1003 at ¶¶96-98. Specifically, the filter strip 44 and optical overlay 10 of these respective references satisfy the limitations of claim 6 as shown below:



Ex. 1005 at Fig. 4 (annotations added).

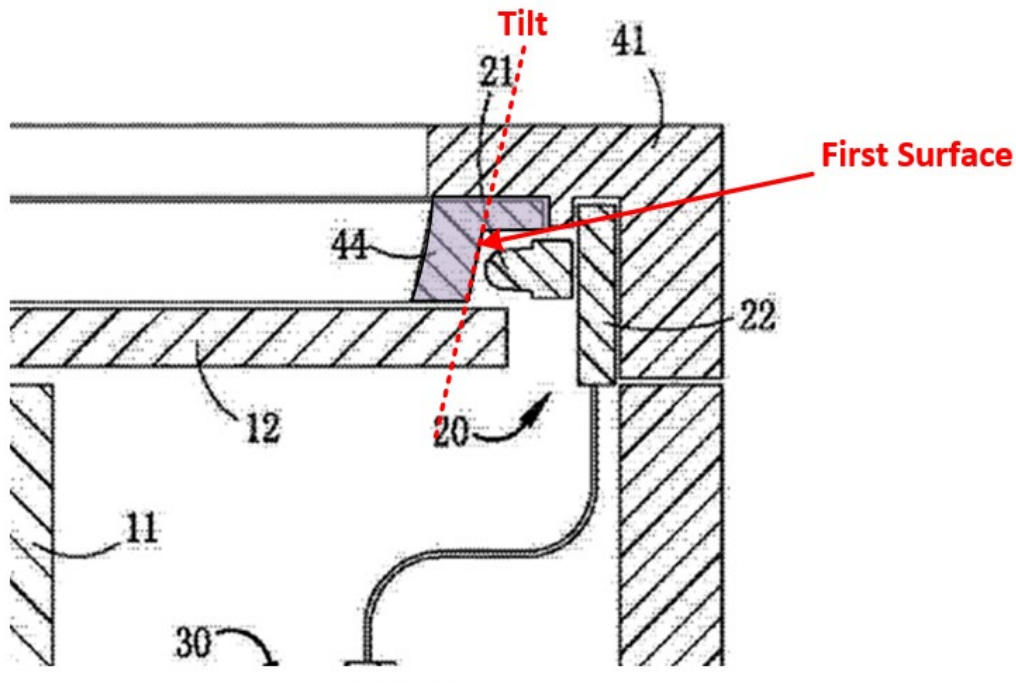


Ex. 1006 at Fig. 8 (annotations added).

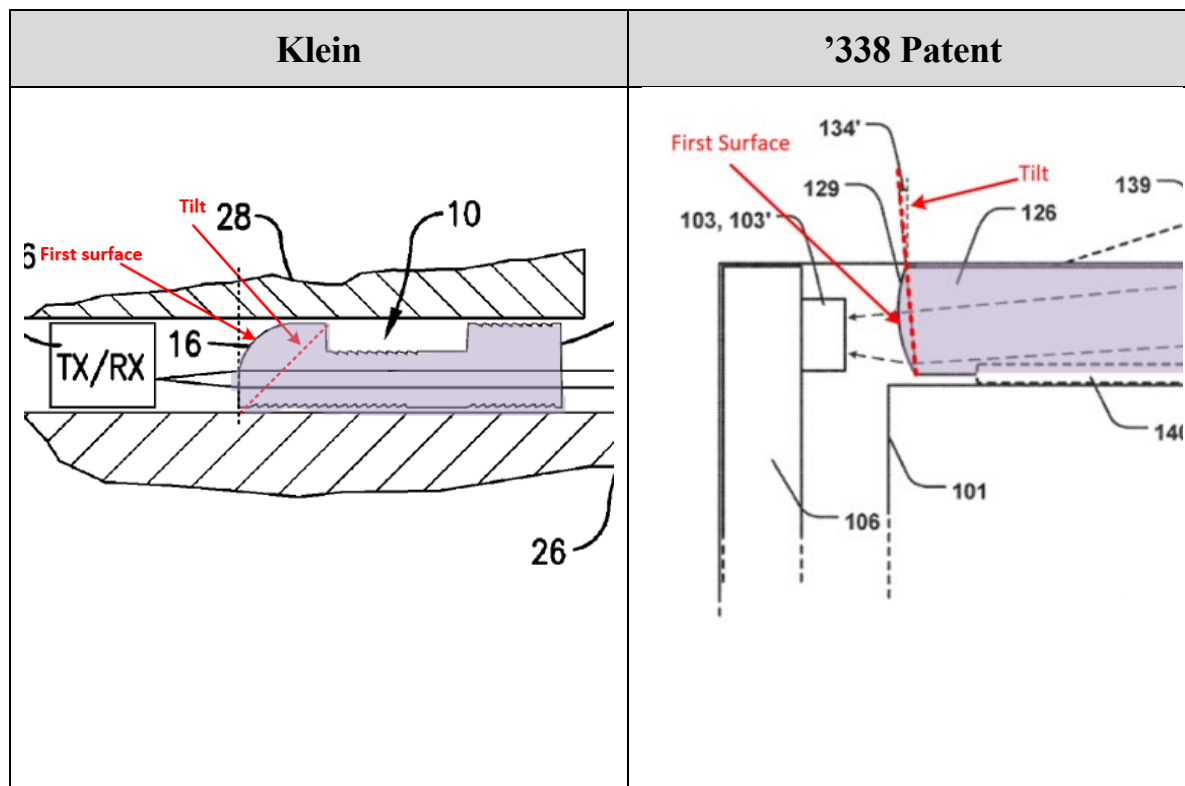
Claim 6 therefore would have been obvious over Chen '975 alone or in combination with Klein. Ex. 1003 at ¶98.

6. Claim 7

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.” Each of Chen '975 and Klein discloses the limitations added in claim 7. Ex. 1003 at ¶¶99-101. 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:



Ex. 1005 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:

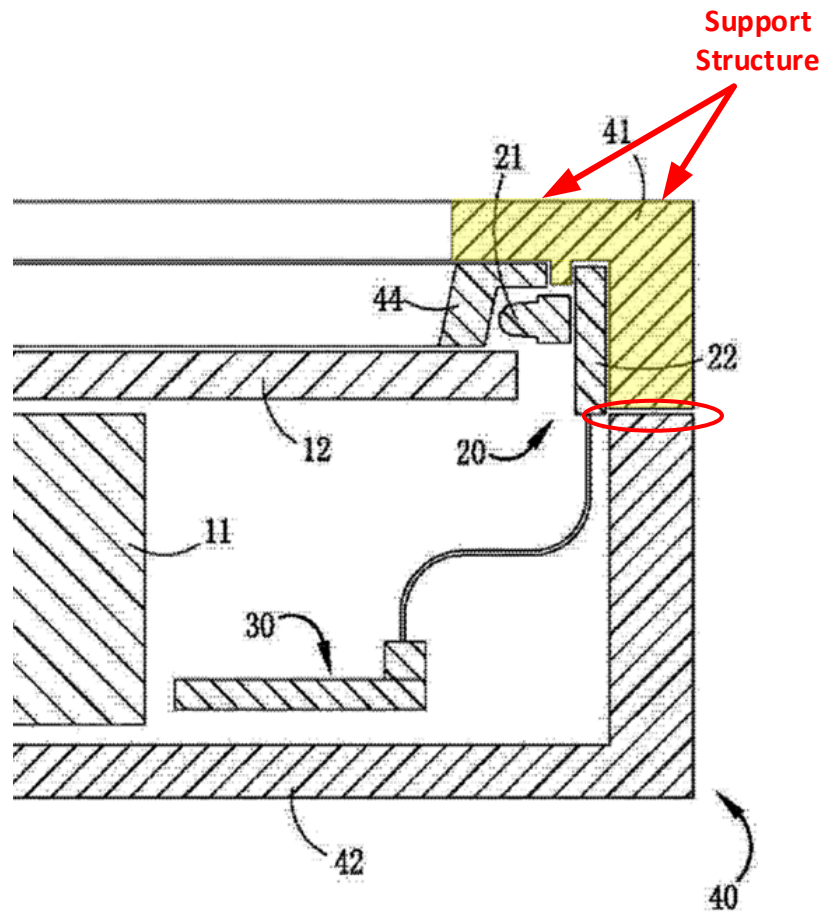


Ex. 1006 at Fig. 8 (annotations added); Ex. 1001 at Fig. 5a. *See also id.* at Fig. 5b, 13:66-14:2 (further describing a “tilted configuration” of the sealing element).

Claim 7 therefore would have been obvious over Chen '975 alone or in combination with Klein. Ex. 1003 at ¶101.

7. Claim 9

Claim 9 depends from claim 1 and recites “wherein the support structure is formed from a single monolithic piece of a material.” Chen '975 discloses this limitation. *Id.* at ¶¶102-105. Chen discloses a top casing 41 that is a “four-cornered frame body”:



Ex. 1005 at Fig. 4 (annotations added). Chen '975's top casing (*i.e.*, "the support structure," as claimed) is described as a "frame," which, as explained by Dr. Cairns is a single structure. Ex. 1003 at ¶¶103. Chen '975 therefore discloses "the support structure is formed from a single monolithic piece of a material." *Id*

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* Ex. 1005 at Fig. 4. Because the top casing 41 is a continuous, unbroken structure, it is a "single monolithic piece of material." Ex. 1003 at ¶104.

PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 11,281,338

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

8. Claim 10

Claim 10 depends from claim 1 and recites “wherein the sealing element is formed from a single monolithic piece of a material.” Chen '975 in view of Klein renders obvious this claim element. Ex. 1003 at ¶¶106-108. 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. Ex. 1003 at ¶107.

Claim 10 therefore would have been obvious over Chen '975 in combination with Klein. Ex. 1003 at ¶108.

9. Claim 11

Claim 11 depends from claim 1 and recites “wherein the sealing element comprises an optically active element or an optically passive element.” Each of Chen '975 and Klein discloses the limitations added in claim 11. Ex. 1003 at ¶109-112.

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 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. Ex. 1003 at ¶111; *see also* Ex. 1001 ('338 patent) at 16:38-40 (explaining that embodiments of the sealing window 126 comprise “optical elements for refracting, deflecting, diverting

PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 11,281,338

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. Ex. 1006 at 5:64-64, 7:34-38. The lens 42 is therefore an optically active element, as claimed. Ex. 1003 at ¶111.

Claim 11 therefore would have been obvious over Chen ’975 alone or in combination with Klein. Ex. 1003 at ¶112.

10. Claim 12

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.” Each of Chen ’975 and Klein discloses the limitations added in claim 12 for the reasons provided above with respect to claim 1. Ex. 1003 at ¶113-115.

Claim 12 therefore would have been obvious over Chen ’975 alone or in combination with Klein. Ex. 1003 at ¶115.

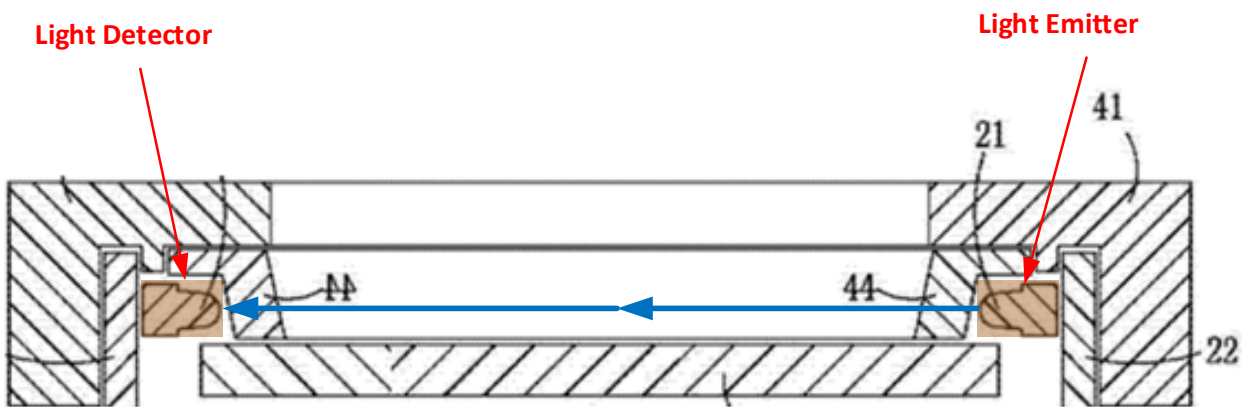
11. Claim 13

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.” Each of Chen ’975 and Klein discloses the limitations added in claim 13 for the reasons provided above with respect to claim 11. Ex. 1003 at ¶¶116-118.

Claim 13 therefore would have been obvious over Chen ’975 alone or in combination with Klein. Ex. 1003 at ¶118.

12. Claim 14

Claim 14 depends from claim 1 and recites “further comprising a plurality of light detectors arranged along the periphery of the panel.” Chen ’975 discloses the limitations added in claim 14. Ex. 1003 at ¶¶119-121. Chen ’975 uses LEDs and receivers (*i.e.*, “a plurality of light detectors,” as claimed) arranged opposite from each other (Chen ’975 at [0029]):



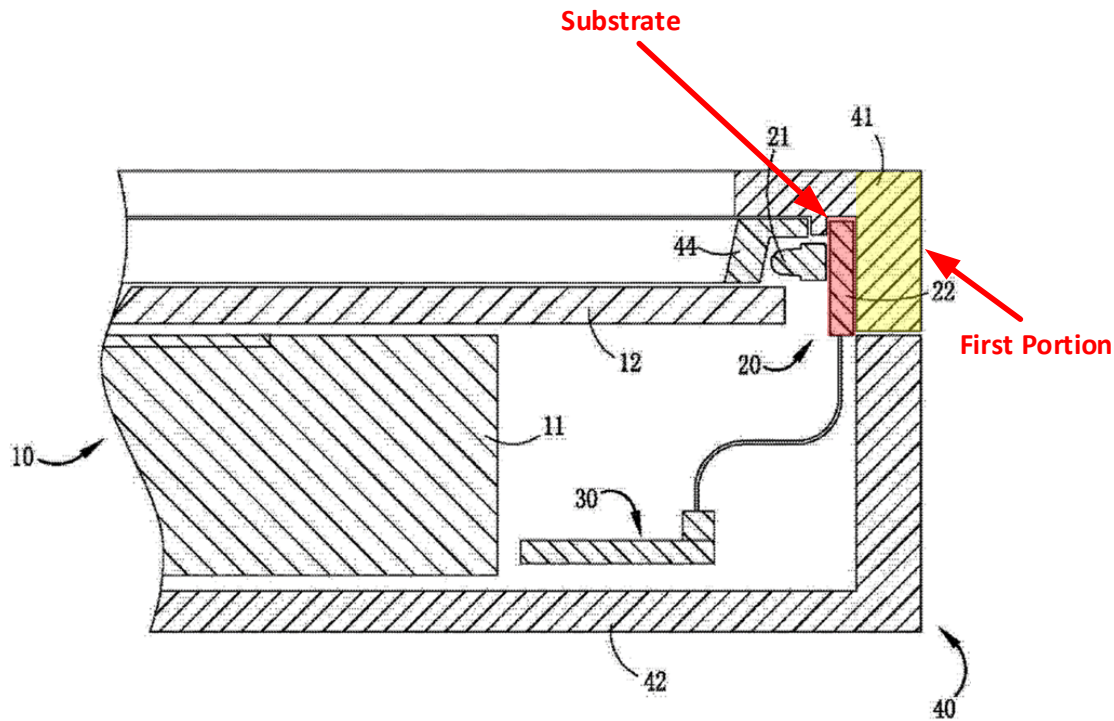
Ex. 1005 at Fig. 4 (modified, with annotations added). Further, Chen ’975’s light detectors are “arranged along a periphery of the panel,” as seen above. *See also id.* at [0025] (“the sensing transceiver module [] is annularly disposed around the flat panel display component”).

Claim 14 therefore would have been obvious over Chen ’975 alone or in combination with Klein. Ex. 1003 at ¶121.

13. Claim 15

Claim 15 depends from claim 1 and further recites “wherein the substrate is directly joined to the first portion of the support structure.” Chen ’975 discloses this

limitation. Ex. 1003 at ¶¶122-124. 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):



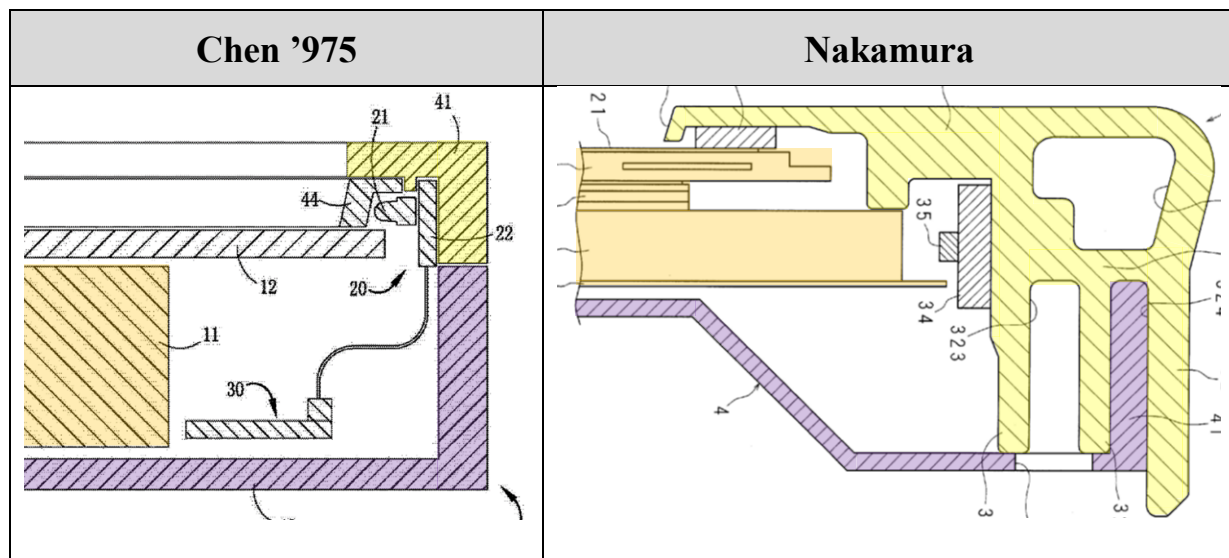
Id. at Fig. 4 (annotations added), [0036] (“engagement grooves are ... provided on the top casing ... the printed circuit board 22 is fixed by means of the engagement grooves”). As shown above, the printed circuit board of Chen '975 is disposed on the first portion of the front casing without the presence of intervening structures. Ex. 1003 at ¶123. Chen '975 therefore discloses the substrate is directly joined to the first portion of the support structure. *Id.*

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

PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 11,281,338

C. 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

Nakamura, which was not cited during prosecution of the '338 patent, *see* Ex. 1002, 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. Ex. 1003 at ¶125. 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:



Ex. 1005 at Fig. 4 (colors added); Ex. 1007 at Fig. 5 (colors added); Ex 1003 at ¶125. 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,

PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 11,281,338

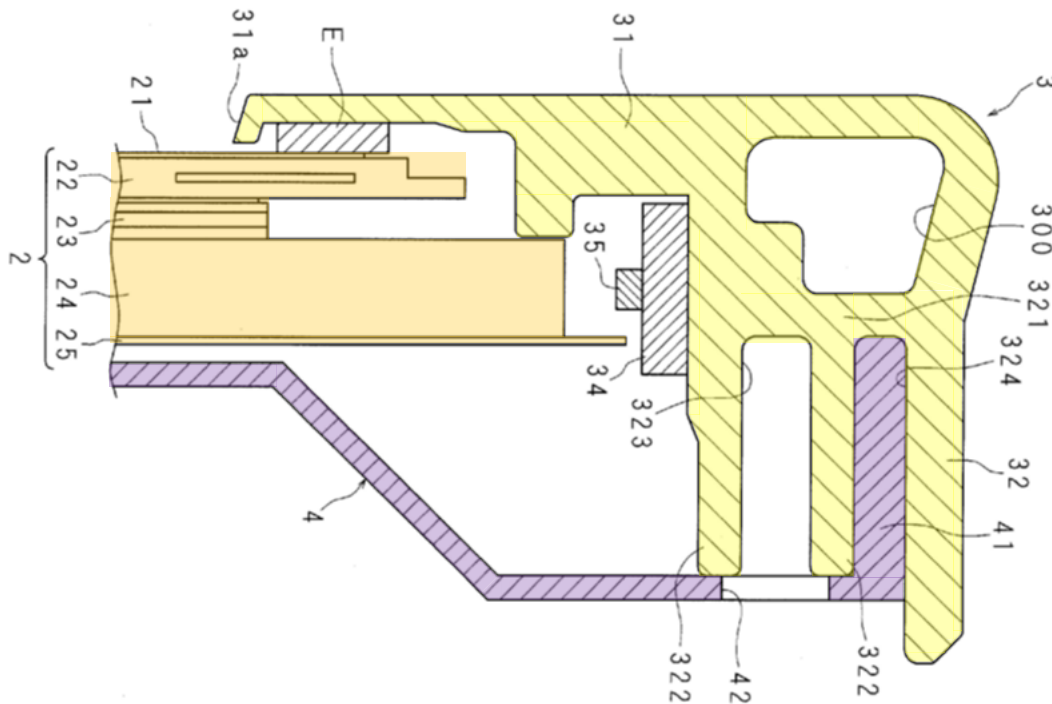
of Chen '975 to increase the coupling strength between the two structures (Ex. 1007 at [0071]) and improving heat transfer out of the device (*id.* at [0072]). Ex. 1003 at ¶125.

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. Ex. 1003 at ¶126. 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 (Ex. 1007 at [0068]) and to facilitate easy fabrication of a complex structure (*id.* at [0122]). Ex. 1003 at ¶126.

1. Claim 4

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.”

Chen '975 alone or in combination with Klein, and further in view of Nakamura renders this obvious. Ex. 1003 at ¶¶127-130. 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. Ex. 1005 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). Ex. 1007 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]; *see also* Ex. 1003 at ¶128. Accordingly, Nakamura discloses a support structure comprising a recess configured to interlock with a corresponding mating feature of the display support. Ex. 1003 at ¶128.

The POSA would have been motivated to use Nakamura's interlocking components in the casing of Chen '975 for a variety of reasons. *Id.* at ¶129. For example, the addition of grooves and extensions can increase the coupling strength between the support structure and display support (Ex. 1007 at [0071]) and improving heat transfer out of the device (*id.* at [0072]). *See also* Ex. 1003 at ¶129.

PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 11,281,338

Additionally, a POSA would have had a reasonable expectation of success in implementing this modification. Ex. 1003 at ¶130. The combination requires just only minor adjustments to the shapes of the casing elements of Chen '975. *Id.* Plus, Nakamura provides guidance on the processes that can be used to form this structure (*e.g.*, Ex. 1007 at [0068]) such that a POSA would expect success in forming the same. Ex. 1003 at ¶130.

2. Claim 5

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.”

As described above, in Section V(B)(4), claim 5 is a product-by-process limitation, the validity of which should be determined by the product itself and not the process of making it. Under such a construction, Chen '975 alone or in combination with Klein renders this claim obvious for the reasons set forth above.

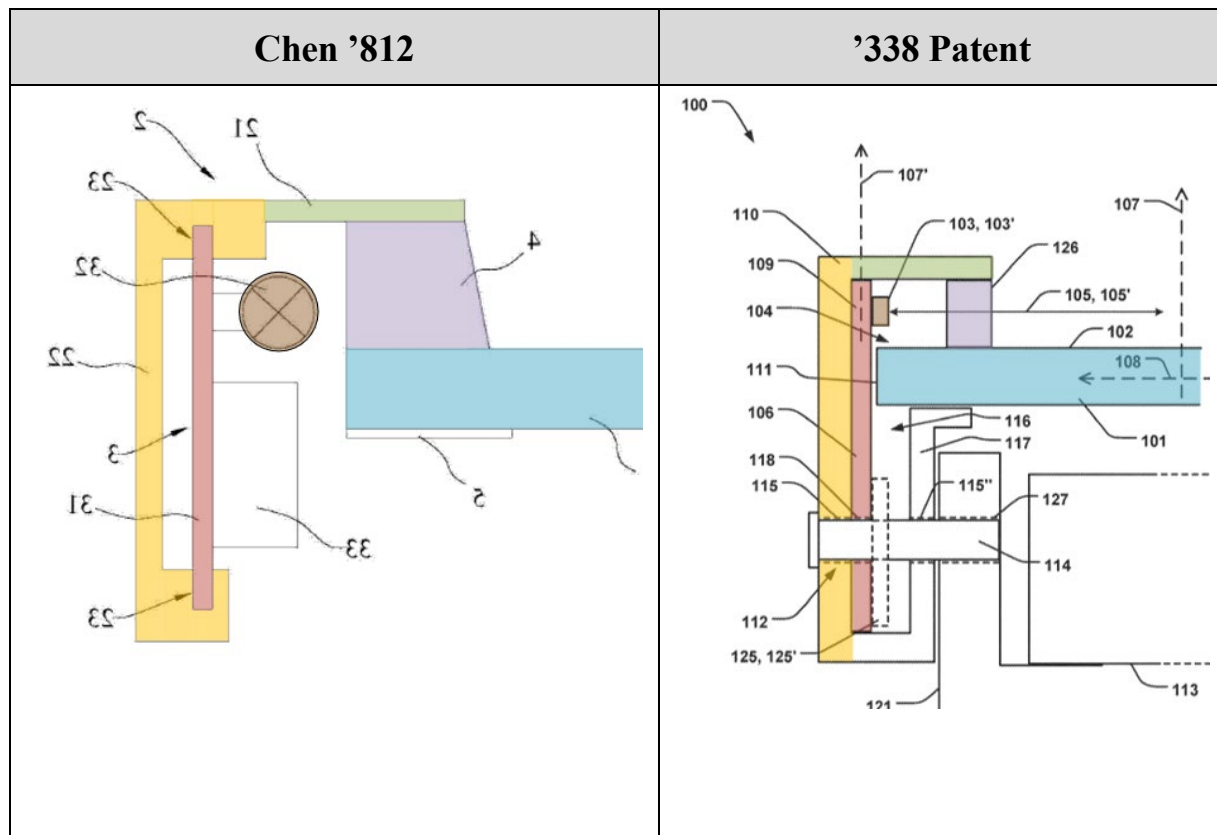
However, should the Board disagree that the process limitations of claim 5 are not limiting, this claim is rendered obvious by the additional teachings of Nakamura. Ex. 1003 at ¶133. Nakamura discloses forming the front cabinet (*i.e.*, “the support structure,” as claimed) “by extrusion molding.” *E.g.*, Ex. 1007 at [0068]-[0069]. “Extrusion molding” is both an “extrusion process” and a “molding process.” Ex. 1003 at ¶133.

PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 11,281,338

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 (Ex. 1007 at [0068]) and to easily fabricate grooves and other complex structures (*id.* at [0122]). *See also* Ex. 1003 at ¶134. 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. *Id.*

D. Ground 2: Claims 1, 2, 5, 6, 8, 9 And 11-15 Would Have Been Obvious In View Of Chen '812

Like Chen '975, Chen '812 (Ex. 1009) contains disclosure similar to that of the '338 patent and would have rendered obvious many of its claims:

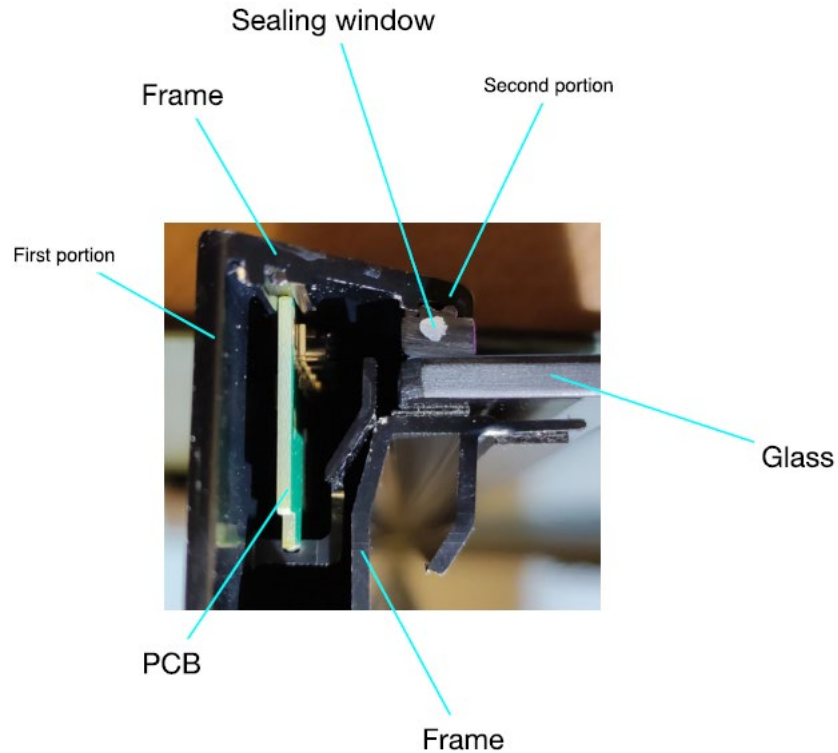


Ex. 1009 at Fig. 1 (flipped and color added); Ex. 1001 at Fig. 2 (color added).

PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 11,281,338

Chen '812 was disclosed to the PTO after a first Office Action in an IDS containing 64 references (this after Applicant had already filed a previous IDS containing 847 references). Ex. 1002 at 108, 700. Chen '812 was not used in any rejections or otherwise addressed by the examiner, and there is no evidence suggesting that the examiner substantively considered this reference. *See generally* Ex. 1002; *Amgen Inc. v. Alexion Pharms., Inc.*, IPR2019-00740, Paper 15 at 65-66 (Aug. 30, 2019) (“[t]he Board has consistently declined exercising its discretion under Section 325(d) when the only fact a Patent Owner can point to is that a reference was disclosed to the Examiner during the prosecution”).

To the extent the examiner considered Chen '812 and determined that it does not disclose the claimed “first portion” configured to “support the substrate” (*e.g.*, because of the air gap between parts of the substrate colors added red above and the first portion colors added yellow), this is inconsistent with patentee’s interpretation of the claims. Specifically, in litigation involving the '338 patent, patentee FlatFrog has interpreted claim 1 as encompassing an air gap between parts of the substrate (labeled “PCB” below) and the first portion of the support structure:



Ex. 1012 at 3. Claims 1, 2, 5, 6, 8, 9, and 11-15 of the '338 patent would have been obvious over Chen '812 for these reasons and those below.

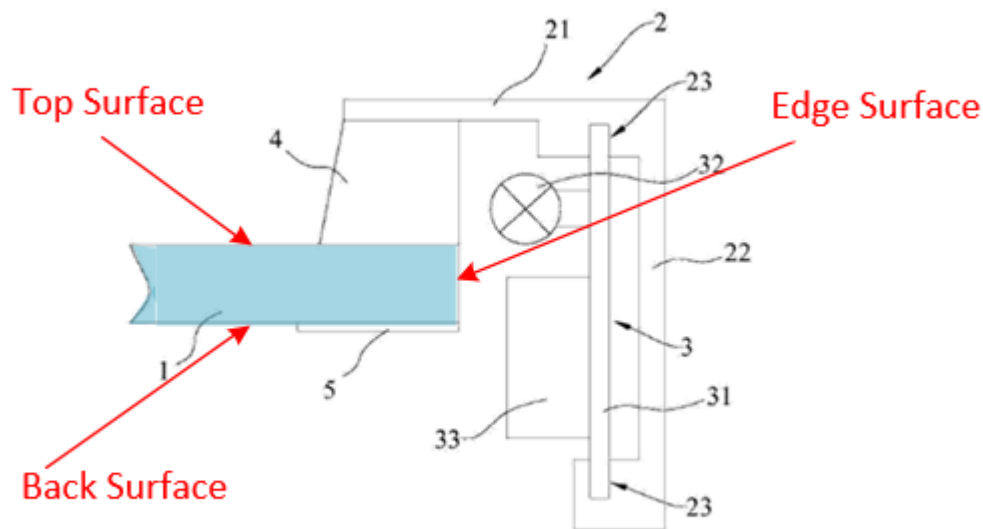
1. Claim 1

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

To the extent limiting, Chen '812 discloses the preamble of claim 1. Ex. 1003 at ¶137. The reference discloses “a new type of infrared touch screen” that “reduces the occurrence of false touches.” Ex. 1009 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. Ex. 1003 at ¶137.

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

Chen '812 discloses this element. Ex. 1003 at ¶¶138-140. 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 (Ex. 1009 at [0019]):

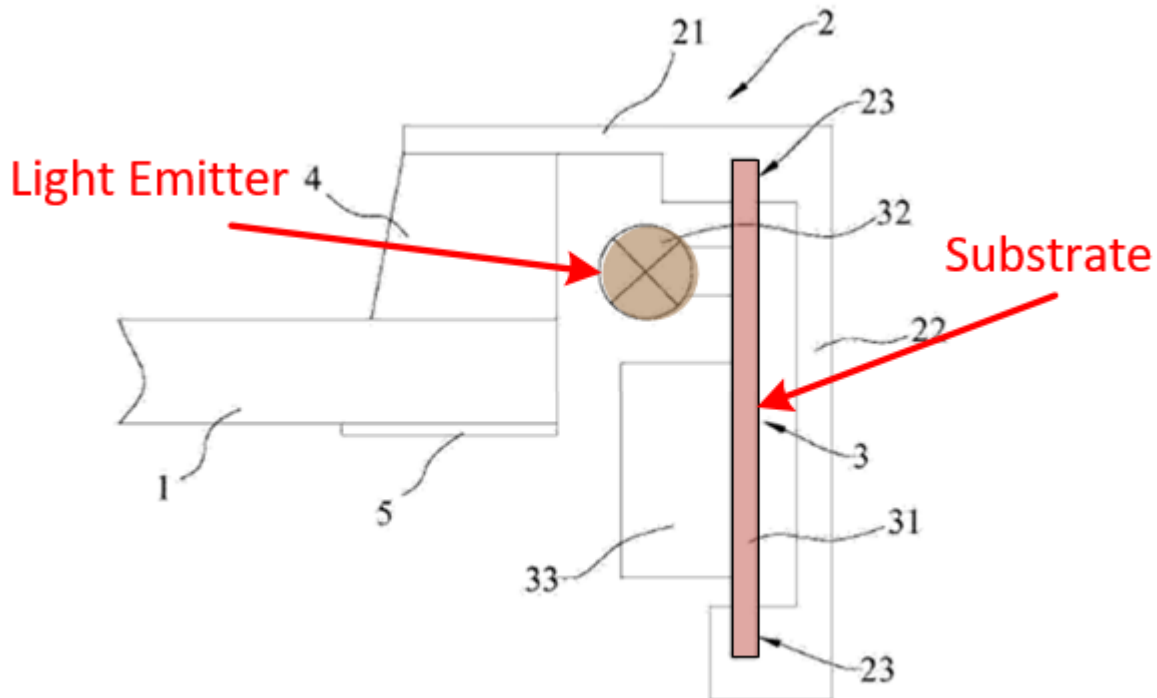


Id. at Fig. 1 (annotations added).

The top surface of Chen '812'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 4 and the front wall 21). Ex. 1003 at ¶140; *see also* Ex. 1009 at cover (“New Type of Infrared Touch Screen”).

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

Chen '812 discloses this element. Ex. 1003 at ¶¶141-143. The reference discloses “a plurality of infrared tubes ... arranged on the PCB board,” and that this plurality of infrared tubes “include infrared emitting tubes” (*i.e.*, “a plurality of light emitters,” as claimed). Ex. 1009 at [0019]. An example light emitting tube is shown below:



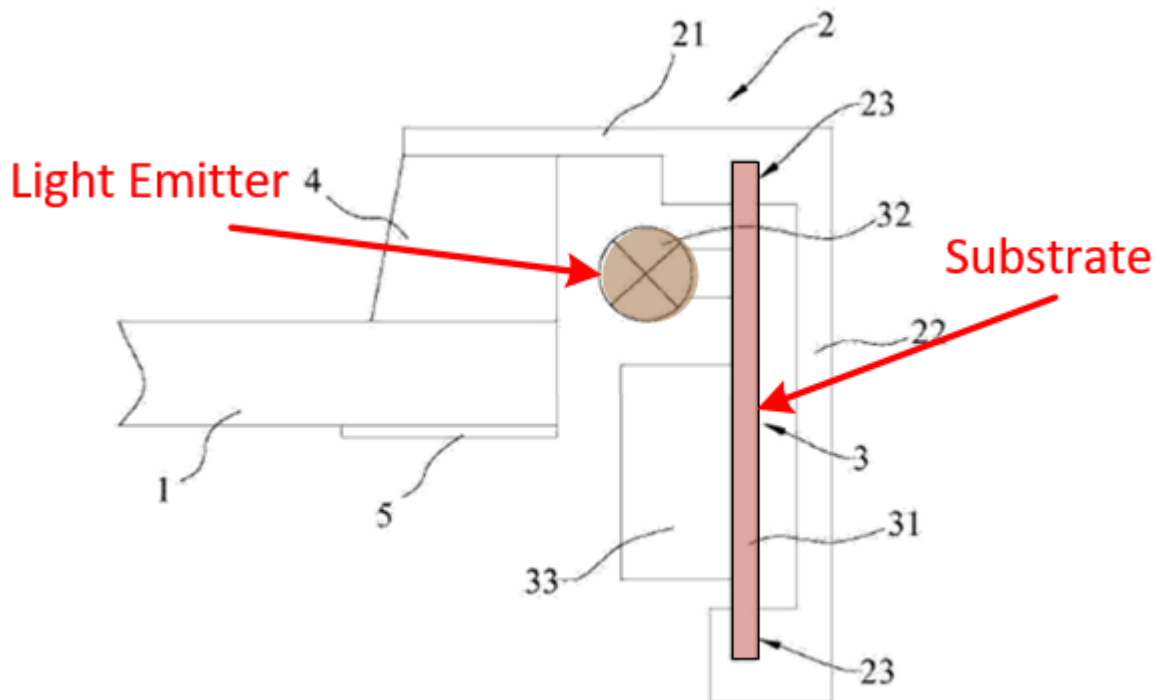
Id. at Fig. 1 (annotations added).

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;”

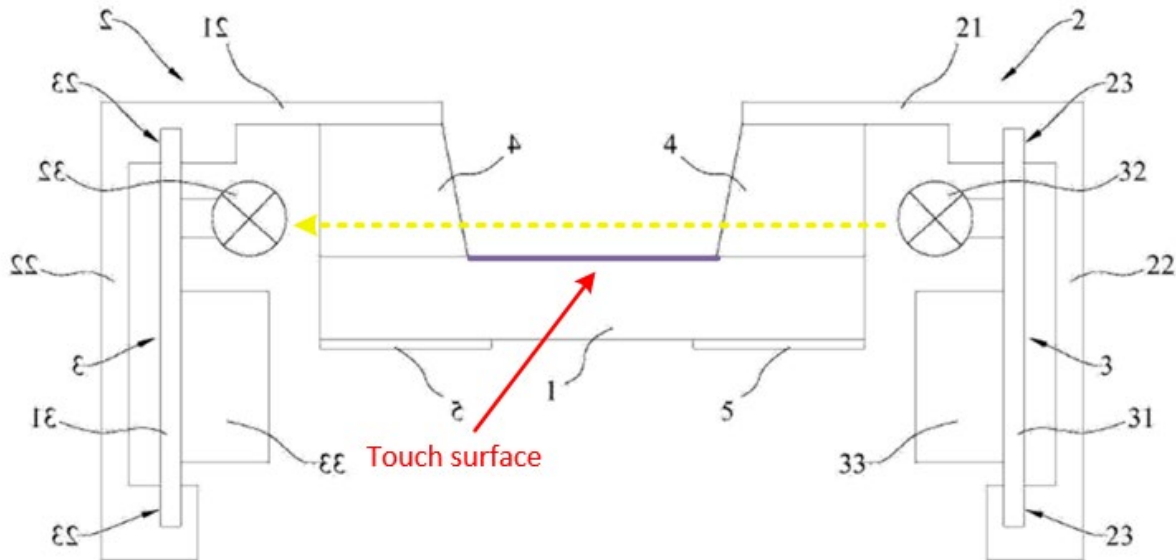
Chen '812 discloses this element. Ex. 1003 at ¶¶144-146. The reference discloses a PCB board 31 (*i.e.*, “a substrate,” as claimed):



Ex. 1009 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].

PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 11,281,338

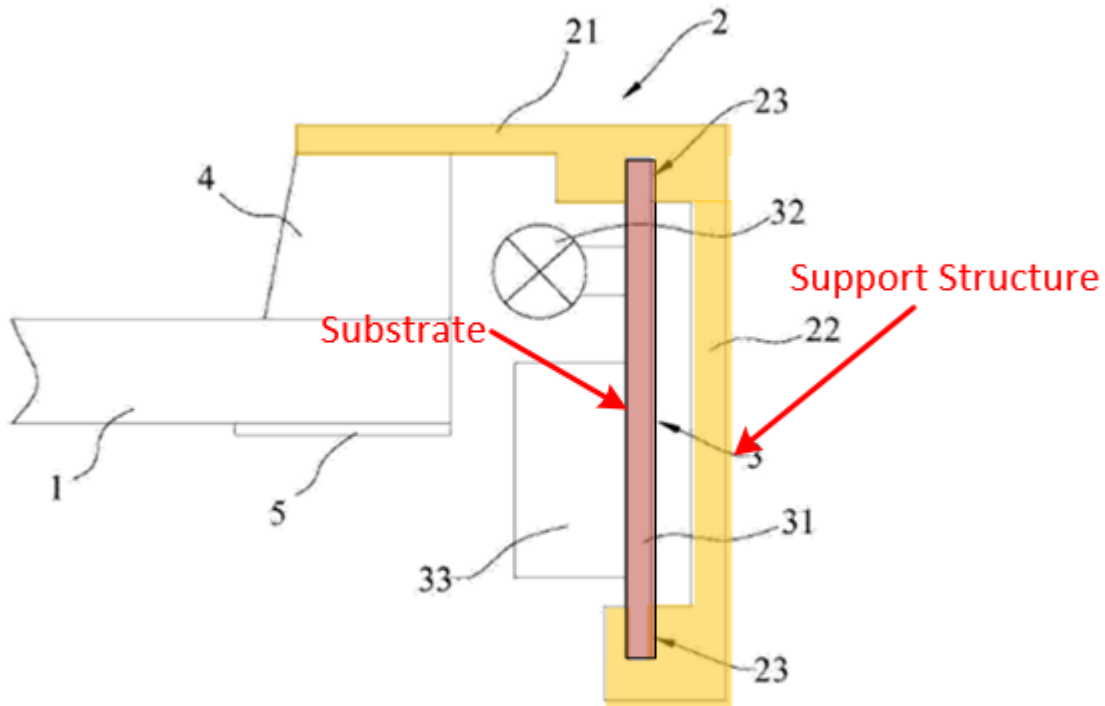
With the infrared emitting tubes supported by the PCB board 31 as shown above, “at least one of the plurality of light emitters transmits a portion of light in a plane extending over the touch surface,” as claimed. Ex. 1003 at ¶146. Chen ’812 uses infrared emitting tubes and infrared receiving tubes arranged opposite from each other (Ex. 1009 at [0019]), thus enabling light emitted from an emitting tube to be received by a receiving tube:



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.” Ex. 1003 at ¶146.

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

Chen ’812 discloses this claim element. Ex. 1003 at ¶147-149. The reference discloses a rectangular frame 2 (*i.e.*, “a support structure,” as claimed):



Ex. 1009 at Fig. 1 (annotations added).

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”); Ex. 1003 at ¶149. Further, patentee FlatFrog has interpreted claim 1 as encompassing an air gap between parts of the substrate and the support structure. *See, e.g.*, Ex. 1012 at 3.

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

Chen '812 discloses this claim element. Ex. 1003 at ¶¶150-152. 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”:

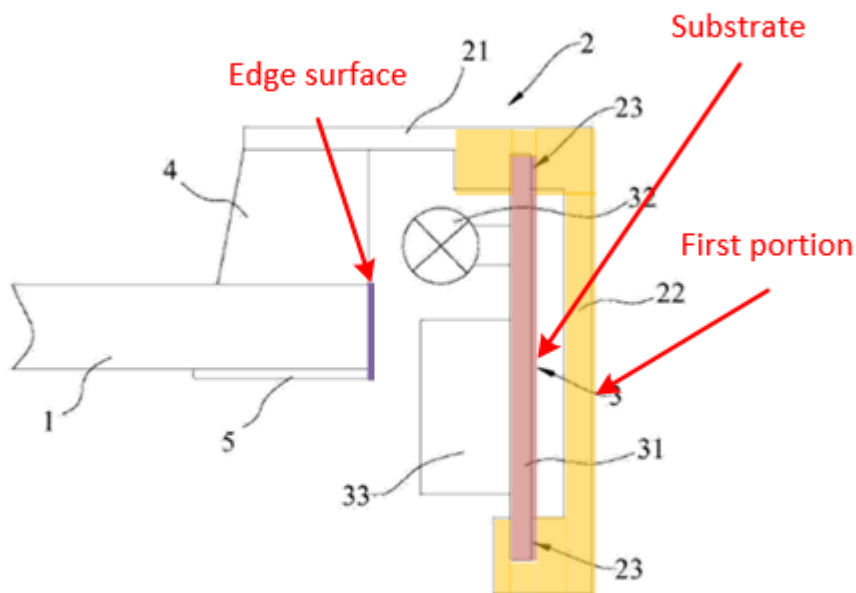


FIG 1.

Ex. 1009 at Fig. 1 (annotations added).

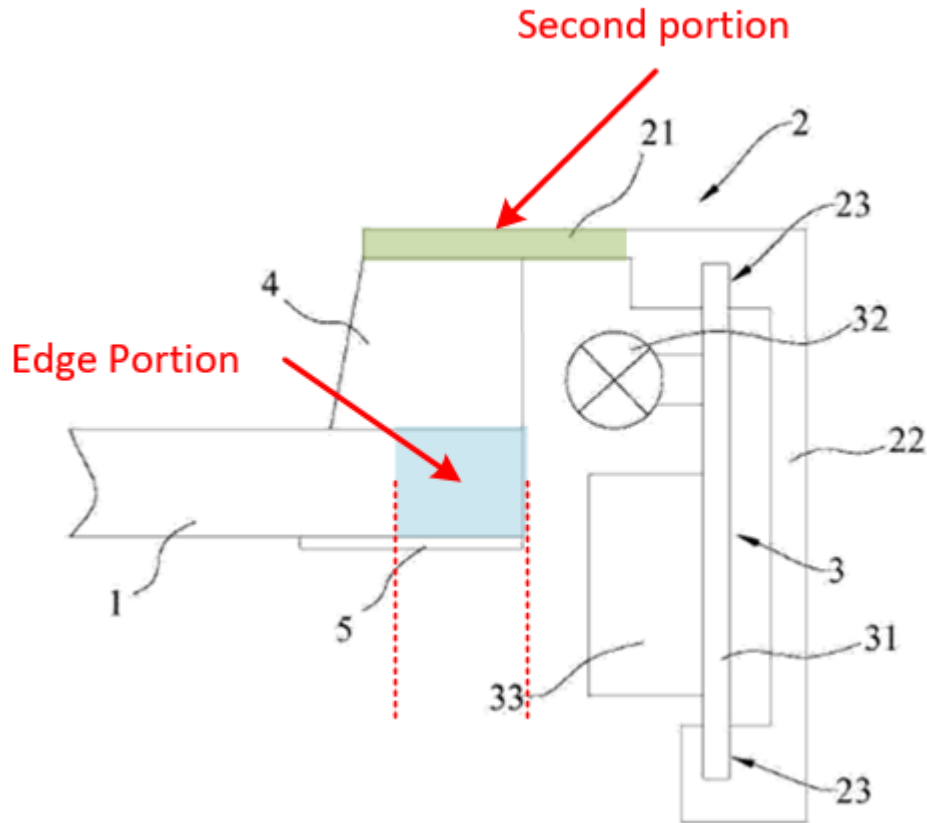
As shown above, the first portion of the rectangular frame 2 supports the PCB board 31 (*i.e.*, the “substrate,” as claimed). *See also id.* at [0023] (the rectangular frame 2 includes “a clamping slot 23 ... for mounting the PCB board 31,” thus enabling

PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 11,281,338

the PCB board 31 to be supported by the first portion in the manner depicted); Ex. 1003 at ¶152.

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

Chen '812 discloses this claim element. Ex. 1003 at ¶153. 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”:

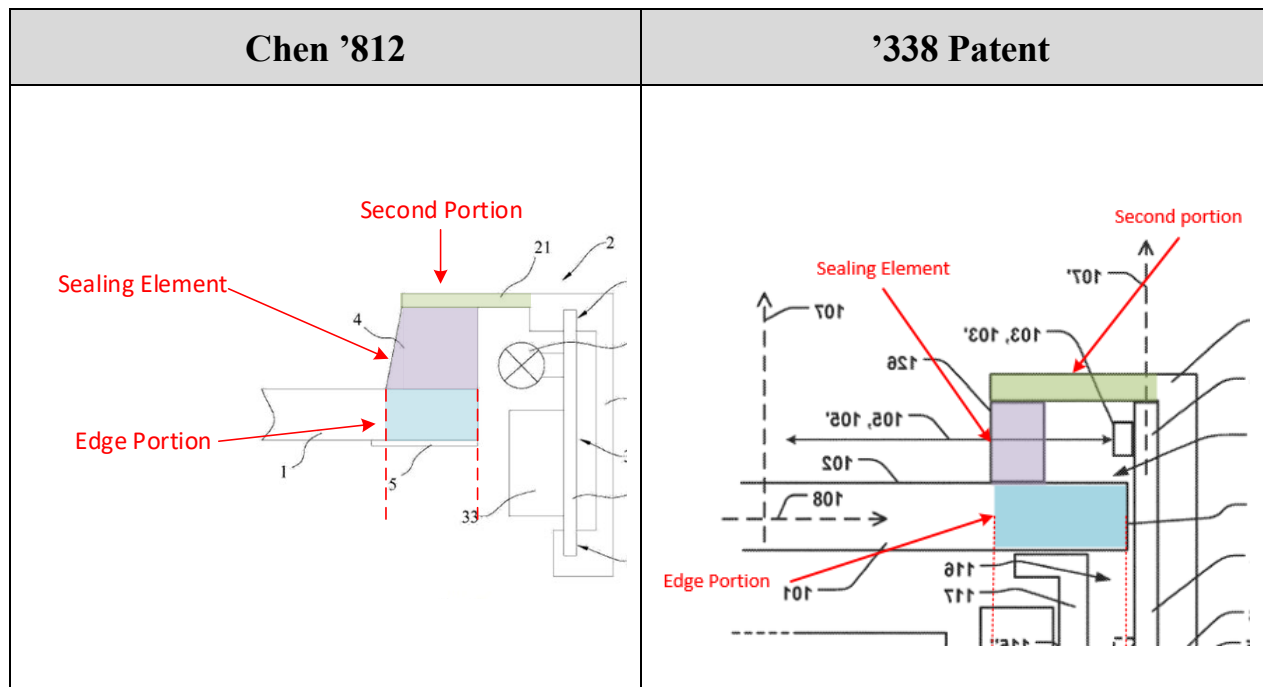


PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 11,281,338

Ex. 1009 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.”

Chen '812 discloses this claim element. Ex. 1003 at ¶¶154-157. 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:



Ex. 1009 at Fig. 4 (annotations added); Ex. 1001 at Fig. 1 (annotations added); *see also* Ex. 1009 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

PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 11,281,338

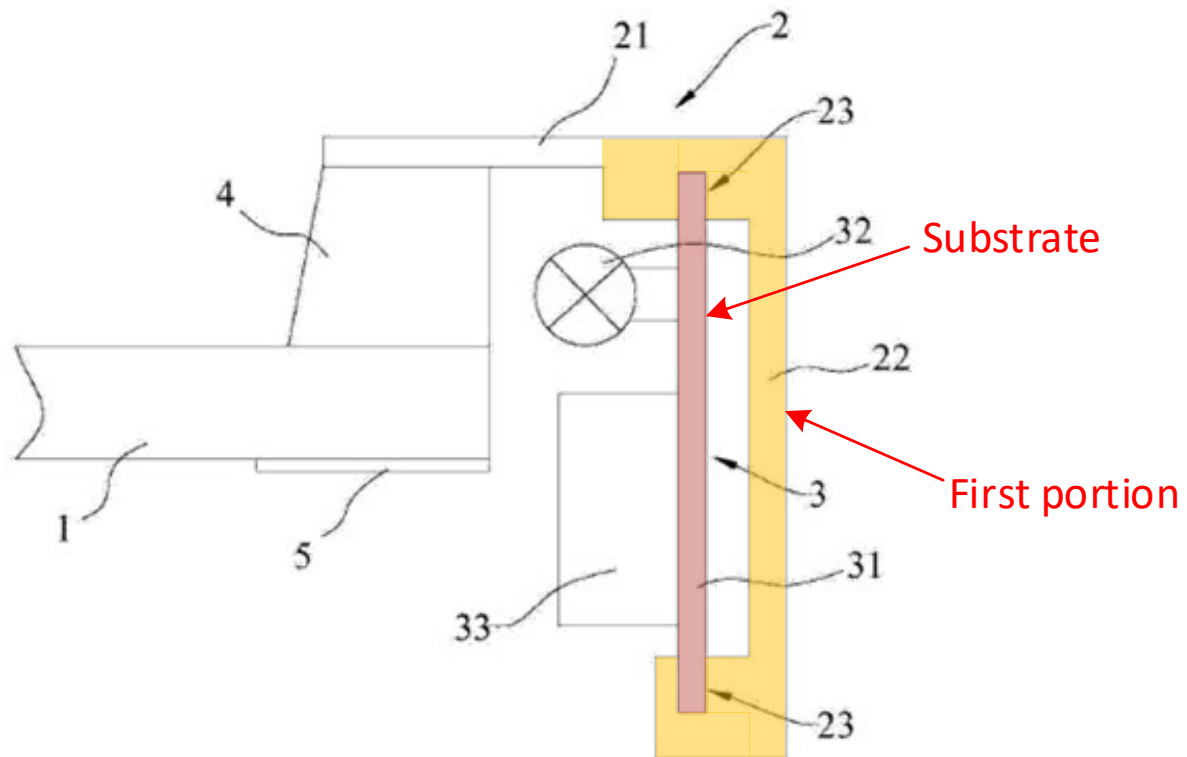
4 is “adhesively connected to the front wall 21 of the rectangular frame 2 and the front surface of the screen body 1”).

Further, the filter strip 4 is a “sealing element,” as claimed. Ex. 1003 at ¶156. As explained above, a POSA would have understood “a sealing element” to mean “an element that provides protection 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” (Ex. 1009 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). Ex. 1003 at ¶156. As seen above, the filter strip 4 is positioned such that it acts as a barrier between the external environment and the infrared emitting tubes, thus providing the light emitters with protection from at least some dirt, water, and other contaminants. Chen ’812 therefore discloses the claimed “sealing element.”

Claim 1 therefore would have been obvious over Chen ’812. Ex. 1003 at ¶157.

2. Claim 2

Claim 2 depends from claim 1 and recites “wherein the substrate is affixed to the first portion of the support structure.” Chen ’812 discloses the limitations added in claim 2. Ex. 1003 at ¶¶158-161. Specifically, the reference discloses the limitations of claim 2 as shown below:



Ex. 1009 at Fig. 1 (annotations added); *see also id.* at [0023]. Further, patentee FlatFrog has interpreted claim 1 as encompassing an air gap between parts of the substrate and the first portion. *See, e.g.,* Ex. 1012 at 3.

Claim 2 therefore would have been obvious over Chen '812. Ex. 1003 at ¶161.

3. Claim 5

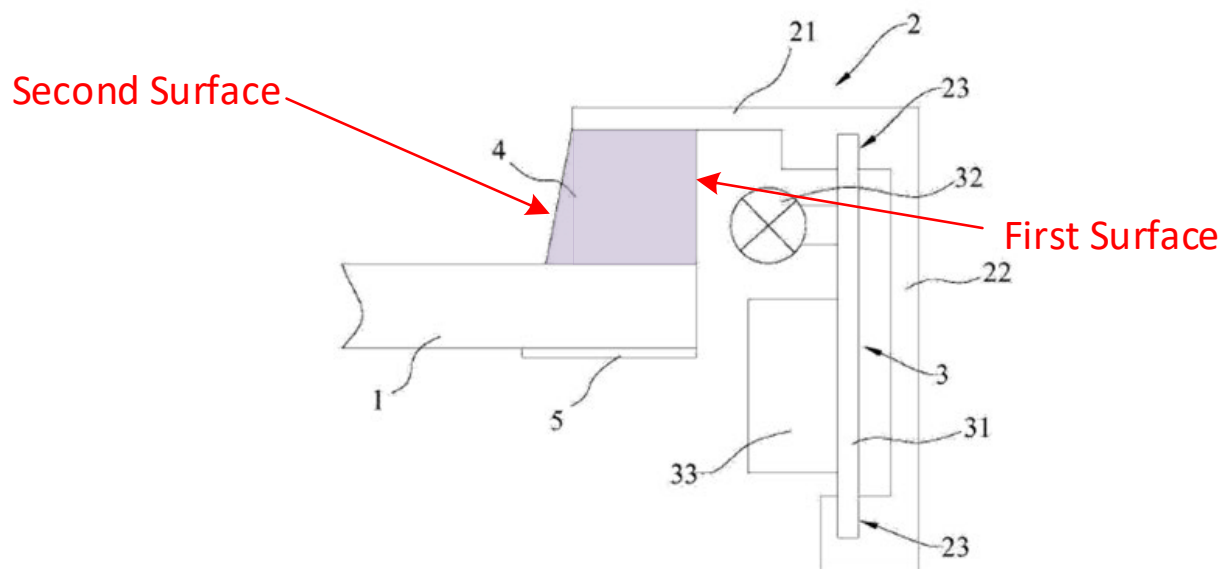
As explained above with reference to ground 1, claim 5 is a product-by-process claim, and the specification of the '338 patent does not demonstrate that the processes recited in this claim (*i.e.*, “an extrusion process, a drawing process, a rolling process, or a molding process”) impart a structural or functional difference in the claimed product. Ex. 1003 at ¶162. Therefore, the process limitations of claim 5 are not limiting.

PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 11,281,338

Because Chen '812 discloses the claimed “support structure” of claim 1, Chen '812 would have rendered obvious claim 5. *Id.*

4. Claim 6

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.” Chen '812 discloses the limitations added in claim 6. Ex. 1003 at ¶¶163-165. Specifically, the reference’s filter strip 4 discloses the limitations of claim 6 as shown below:

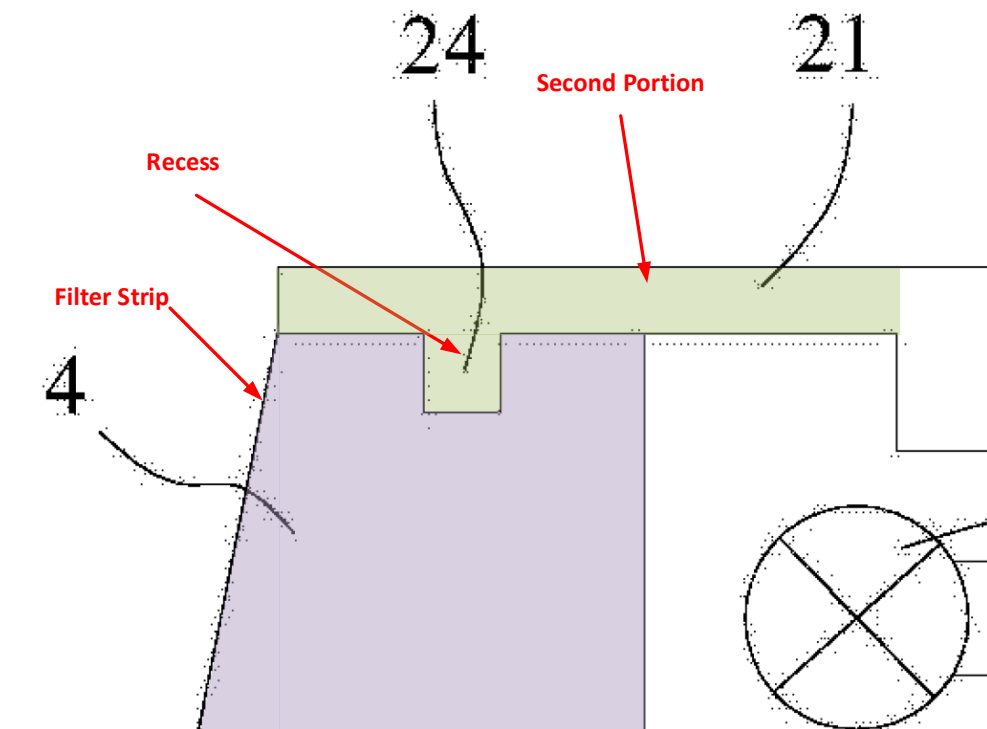


Ex. 1009 at Fig. 1 (annotations added); *see also id.* at [0019].

Claim 6 therefore would have been obvious over Chen '812. Ex. 1003 at ¶165.

5. Claim 8

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.” Chen ’812 discloses the limitations added in claim 8. Ex. 1003 at ¶¶166-168. 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):

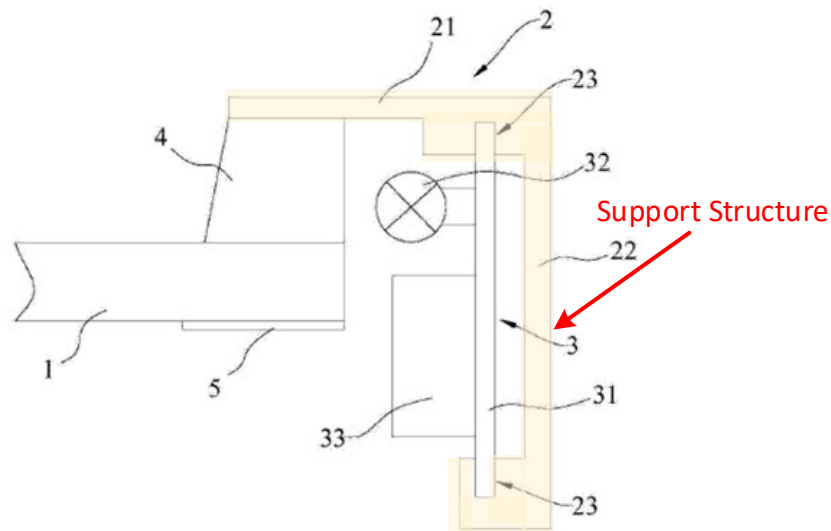


Ex. 1009 at Fig. 3 (annotations added); *id.* at [0025].

Claim 8 therefore would have been obvious over Chen ’812. Ex. 1003 at ¶168.

6. Claim 9

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. Ex. 1003 at ¶¶169-170. 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]. As explained by Dr. Cairns, from this, 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. Ex. 1003 at ¶169.

Claim 9 therefore would have been obvious over Chen ’812. Ex. 1003 at ¶170.

PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 11,281,338

7. Claim 11

Claim 11 depends from claim 1 and recites “wherein the sealing element comprises an optically active element or an optically passive element.” Chen ’812 discloses the limitations added in claim 11. Ex. 1003 at ¶¶171-174. The reference’s filter strip 4 includes a condensing filter that focuses light to enable receipt of a stronger signal. Ex. 1009 at [0022]; Ex. 1003 at ¶172. Because the filter strip 4 is used to focus light, the filter strip 4 “comprises an optically active element,” as claimed. *Id.*; *see also* Ex. 1001 (’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”).

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. Ex. 1003 at ¶173; *see also* Ex. 1001 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”).

Claim 11 therefore would have been obvious over Chen ’812. Ex. 1003 at ¶174.

8. Claim 12

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.” Chen ’812 discloses the limitations added in claim 12 for the reasons provided above with respect to claim 1. Ex. 1003 at ¶¶175-176.

PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 11,281,338

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

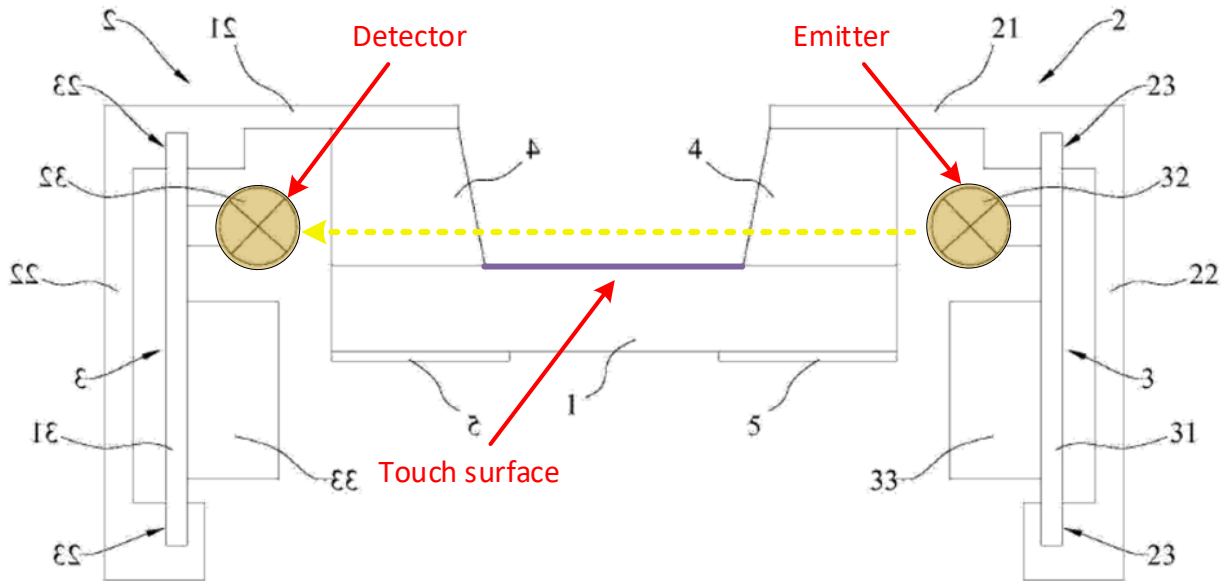
9. Claim 13

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.” Chen '812 discloses the limitations added in claim 13 for the reasons provided above with respect to claim 11. Ex. 1003 at ¶¶178-179.

Claim 13 therefore would have been obvious over Chen '812. Ex. 1003 at ¶180.

10. Claim 14

Claim 14 depends from claim 1 and recites “further comprising a plurality of light detectors arranged along the periphery of the panel.” Chen '812 discloses the limitations added in claim 14. Ex. 1003 at ¶181-183. The reference uses infrared emitting tubes and infrared receiving tubes (*i.e.*, “a plurality of light detectors,” as claimed) such that “infrared emitting tubes [are] located on a left frame ... and infrared receiving tubes [are] located on a right frame” of rectangular frame 2. Ex. 1009 at [0019]. This arrangement is depicted below:

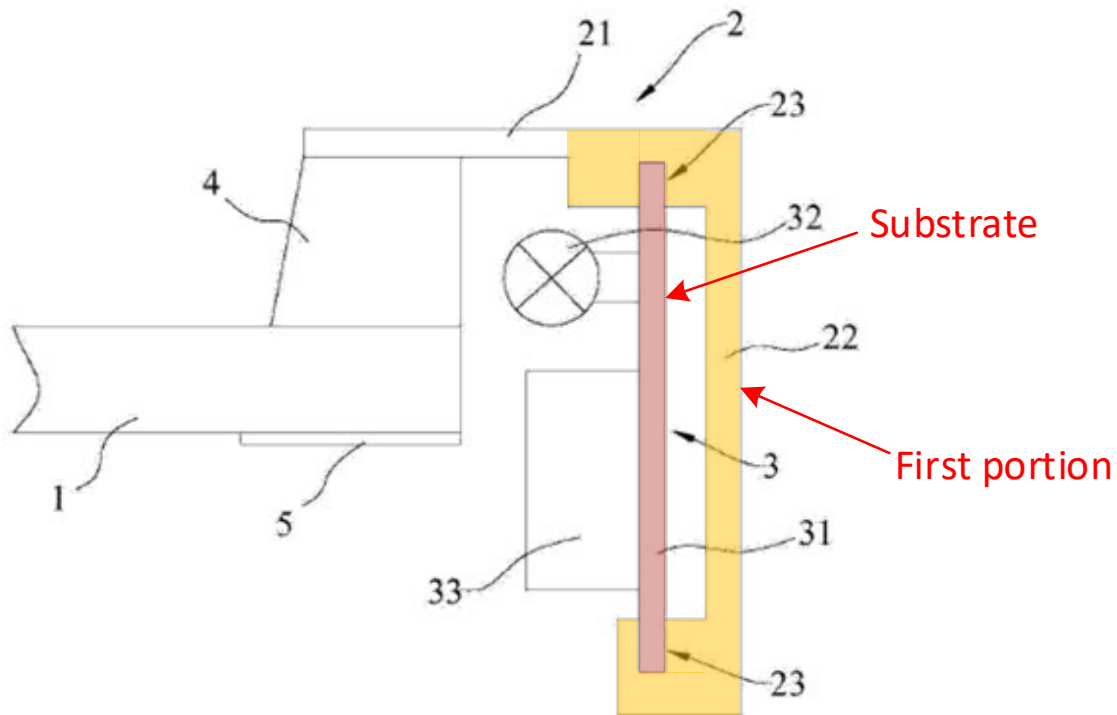


Id. at Fig. 4 (modified and annotations added). Further, Chen '812's light detectors are "arranged along a periphery of the panel," as seen above. *See also id.* at [0019] (describing the infrared receiving tubes as being part of "an infrared touch assembly 3, which is located in the rectangular frame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

Claim 14 therefore would have been obvious over Chen '812. Ex. 1003 at ¶183.

11. Claim 15

Claim 15 depends from claim 1 and recites "wherein the substrate is directly joined to the first portion of the support structure." Chen '812 discloses the limitations added in claim 15. Ex. 1003 at ¶¶184-186. Specifically, the reference discloses the substrate disposed on the first portion of the support structure without any intervening structures as shown below:



Ex. 1009 at Fig. 1 (annotations added); *see also id.* at [0023]. Further, patentee FlatFrog has interpreted claim 1 as encompassing an air gap between parts of the substrate and the first portion. *See, e.g.,* Ex. 1012 at 3.

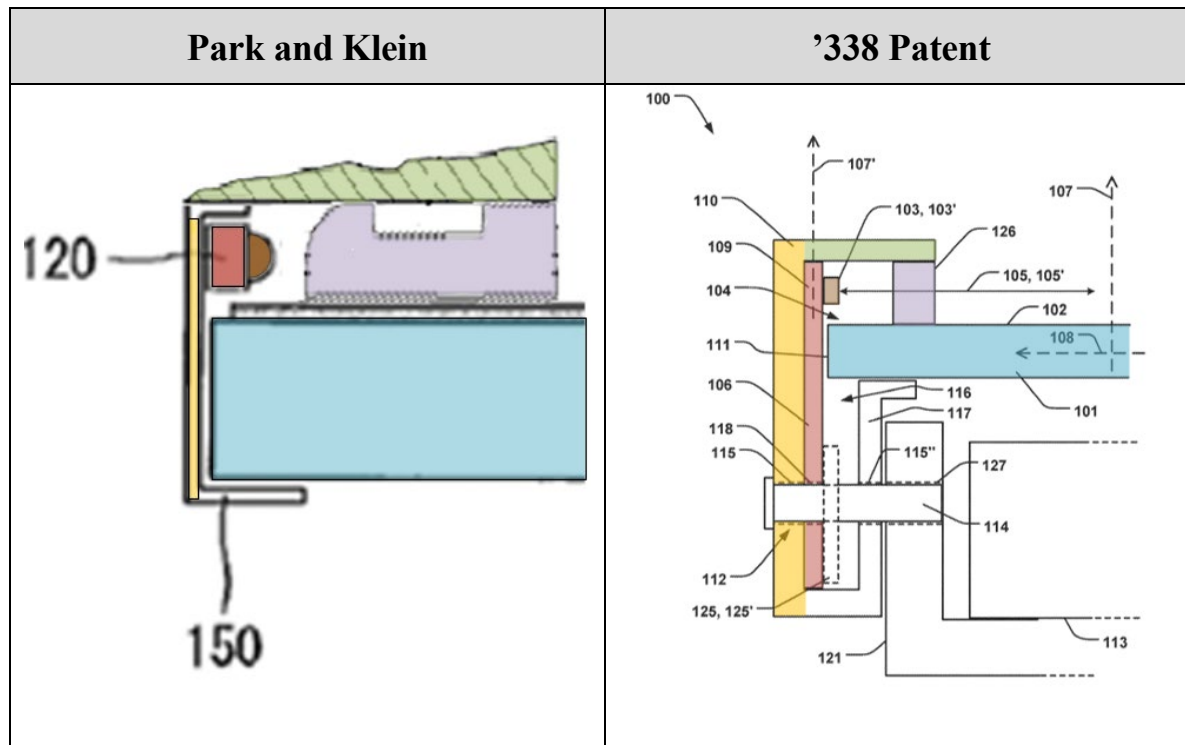
Claim 15 therefore would have been obvious over Chen '812. Ex. 1003 at ¶186.

E. Ground 3: Claims 1, 2, 5-7, and 10-15 Would Have Been Obvious In View Of Park In Combination With Klein

Park and Klein—two U.S. patent documents that were not cited during prosecution of the '338 patent, *see* Ex. 1002—would have rendered obvious claims 1, 2, 5-7, and 10-15 of the '338 patent. Ex. 1003 at ¶187. Starting with claim 1, Park discloses all of the limitations except for the “sealing element,” and the POSA would have been motivated to use Klein’s optical overlay in the device of Park to provide

PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 11,281,338

“sealing or weatherproofing” (Ex. 1006 at 5:53-54), advantageously enabling a more robust device:



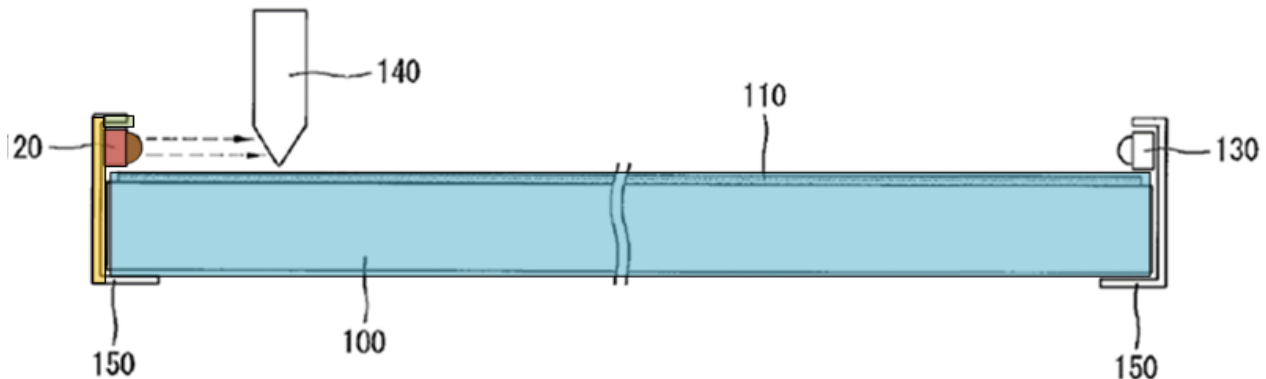
Ex. 1010 at Fig. 2 (modified, color added); Ex. 1001 at Fig. 2 (color added); Ex. 1003 at ¶187.

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. Ex. 1003 at ¶188. 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. *Id.*

1. Claim 1

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

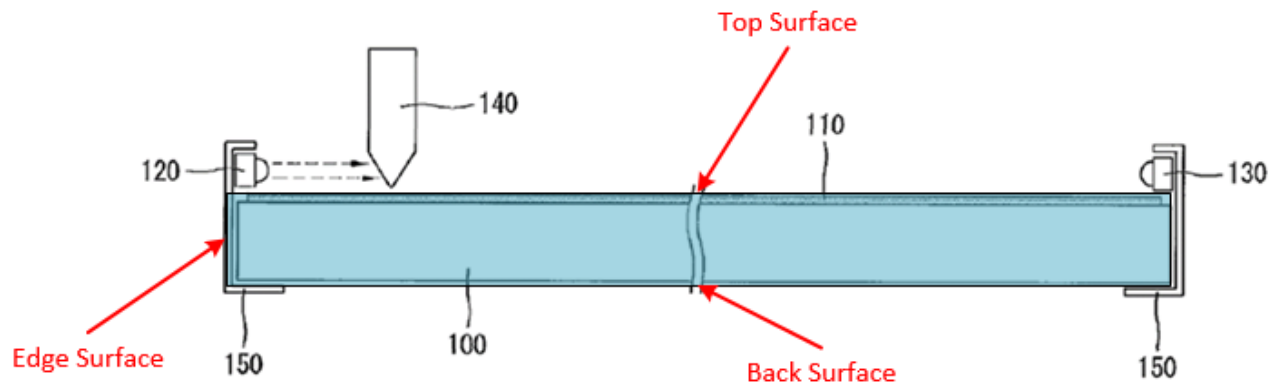
To the extent limiting, Park discloses the preamble of claim 1. Ex. 1003 at ¶189. The reference discloses a “touch panel and a display apparatus,” where “the user touches ... a screen of the display panel with his or her finger or a pen, [and] a predetermined command corresponding the user’s touch is executed.” Ex. 1010 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. Ex. 1003 at ¶190.

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

Park discloses this element. Ex. 1003 at ¶¶191-193. 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 (Ex. 1009 at [0046]-[0047]):

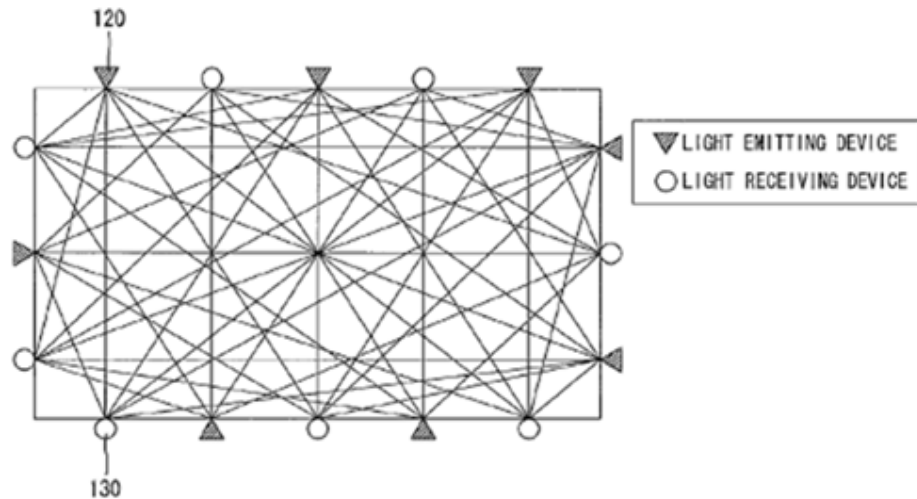


Id. at Fig. 2 (annotations added).

The top surface of Park’s substrate 100 includes a “touch surface,” as claimed. Ex. 1003 at ¶193. 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). Ex. 1009 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”).

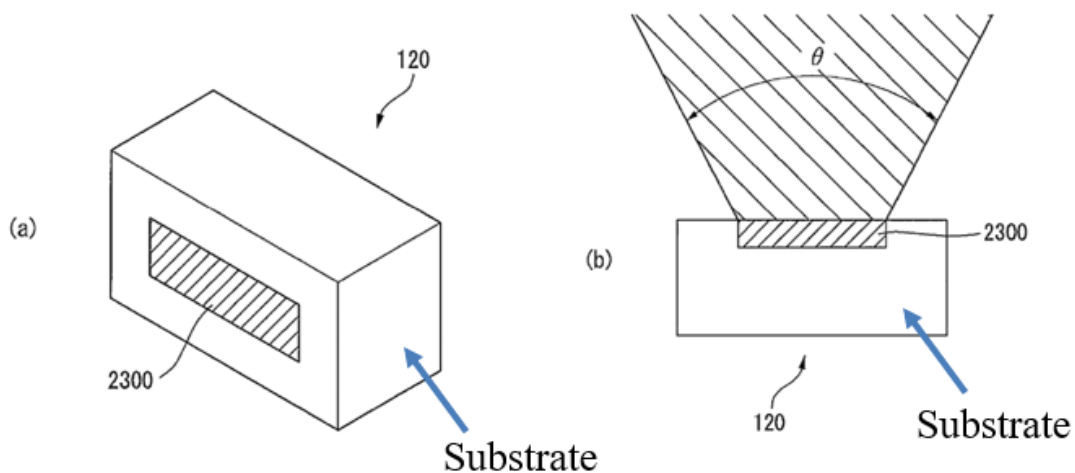
(c) **“a plurality of light emitters arranged along a periphery of the panel;”**

Park discloses this element. Ex. 1003 at ¶¶194-196. The reference describes a plurality of light emitting devices 120, such as those depicted in the example arrangement of Figure 11:



Ex. 1010 at Fig. 11, [0051]. Park’s light emitting devices 120 are “arranged along a periphery of the panel,” as seen in Figure 11 above.

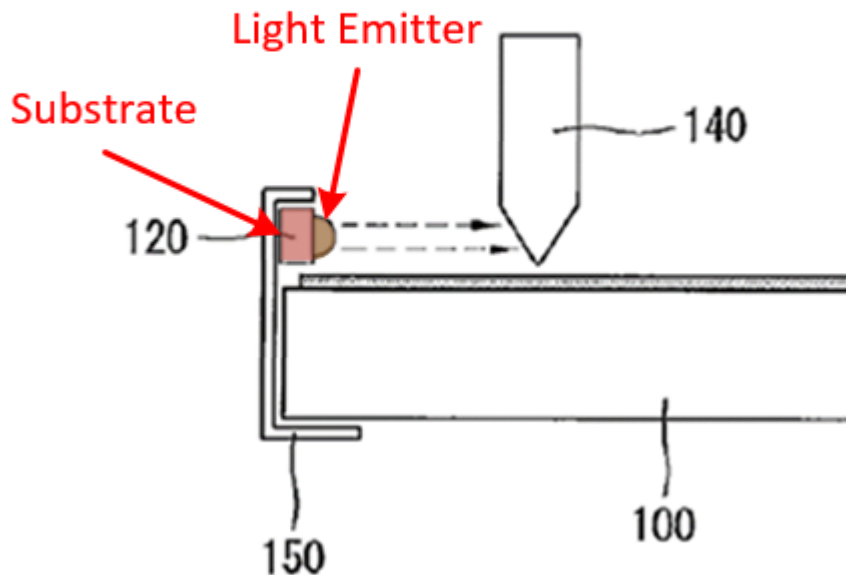
Figures 23(a) and (b) of Park provide further details on the light emitters 120, showing that each of them includes “a light emitting surface 2300” supported by a substrate:



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;”

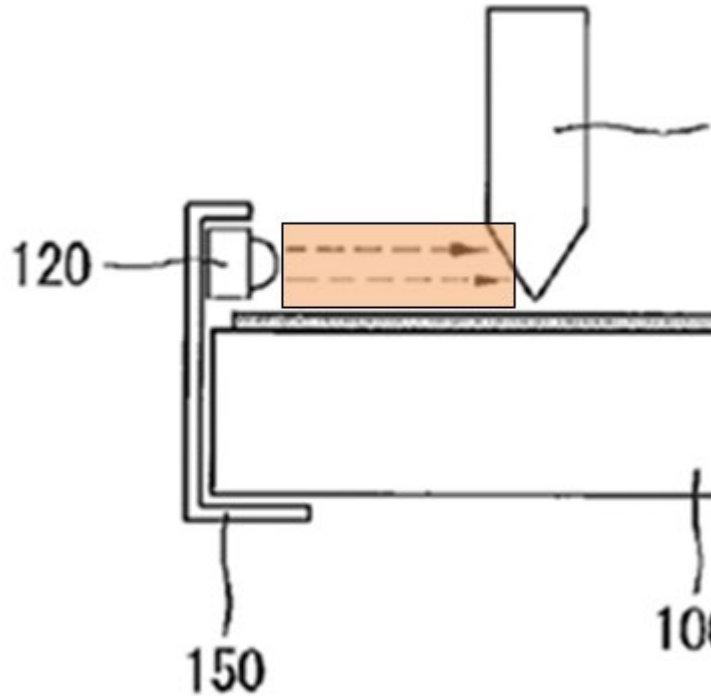
Park discloses this element. Ex. 1003 at ¶¶197-199. As explained above for the preceding claim element, each of Park’s light emitting devices 120 includes a substrate configured to support the light emitting surface 2300. The substrate used to support each of the plurality of light emitters is depicted in Figure 2:



Ex. 1010 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.”

PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 11,281,338

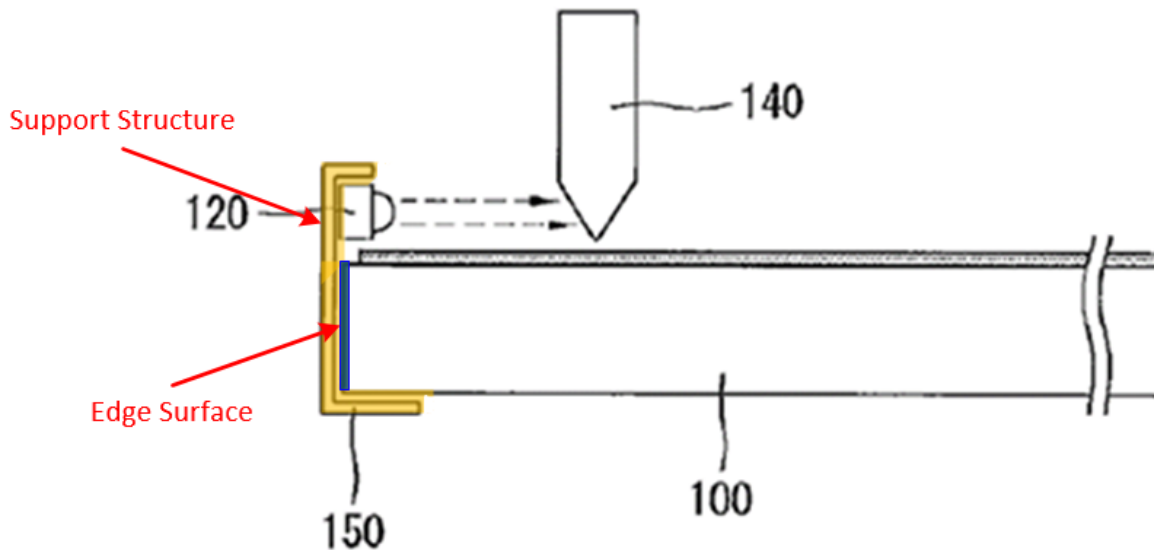
With the light emitters supported by the substrate as shown above, “at least one of the plurality of light emitters transmits a portion of light in a plane extending over the touch surface.” Ex. 1003 at ¶199.



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

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

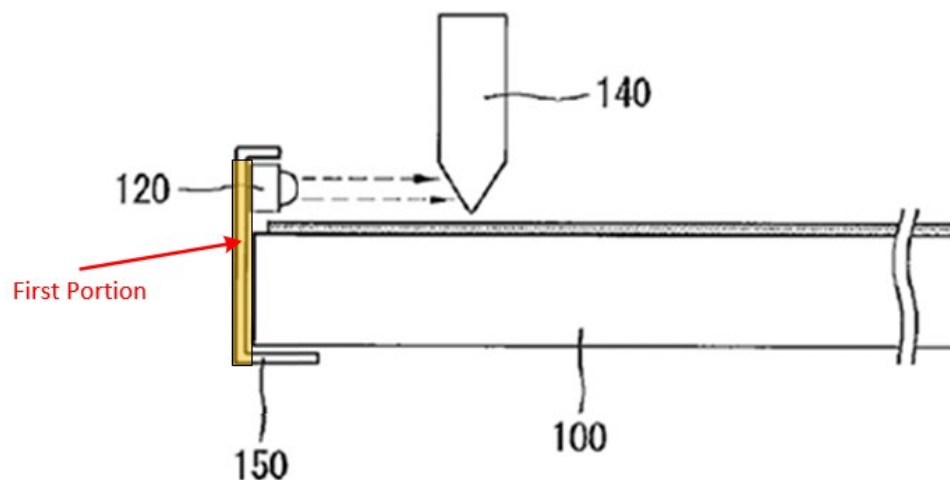
Park discloses this claim element. Ex. 1003 at ¶¶200-201. The reference discloses a protection cover 150 (*i.e.*, “a support structure,” as claimed) that “cover[s] the outside of the limit emitting devices” (Ex. 1010 at [0058]):



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;”

Park discloses this claim element. Ex. 1003 at ¶¶202-203. 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”:

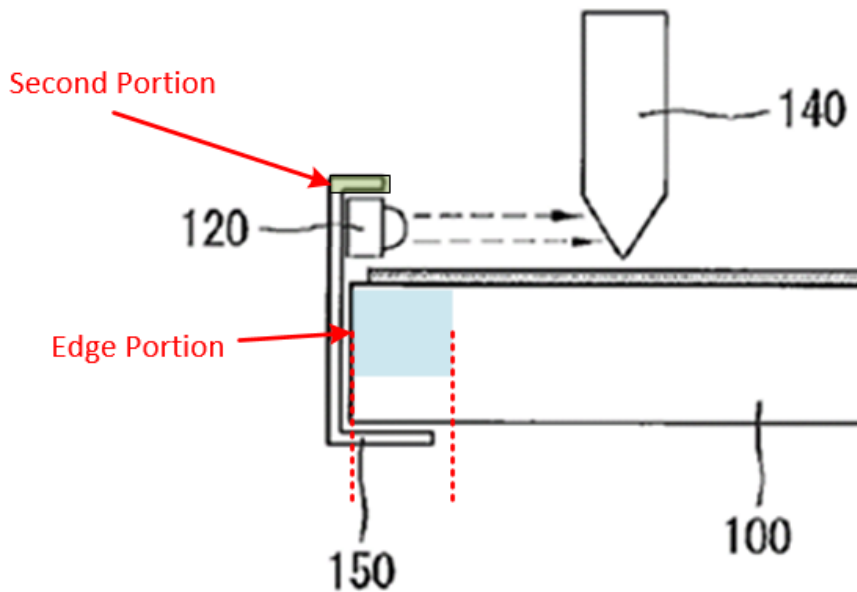


PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 11,281,338

Ex. 1010 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. Ex. 1003 at ¶203.

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

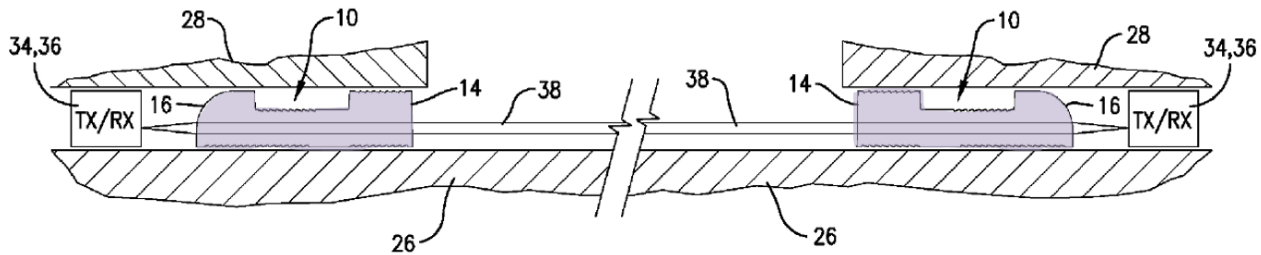
Park discloses this claim element. Ex. 1003 at ¶¶204-205. As shown below, the protection cover 150 (*i.e.*, the “support structure,” as claimed) includes a horizontal portion (*i.e.*, the “second portion,” as claimed) that extends over an edge portion of the top surface of the panel:



Ex. 1010 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.”

The combination of Park and Klein would have rendered obvious this element. Ex. 1003 at 206-213. 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”:

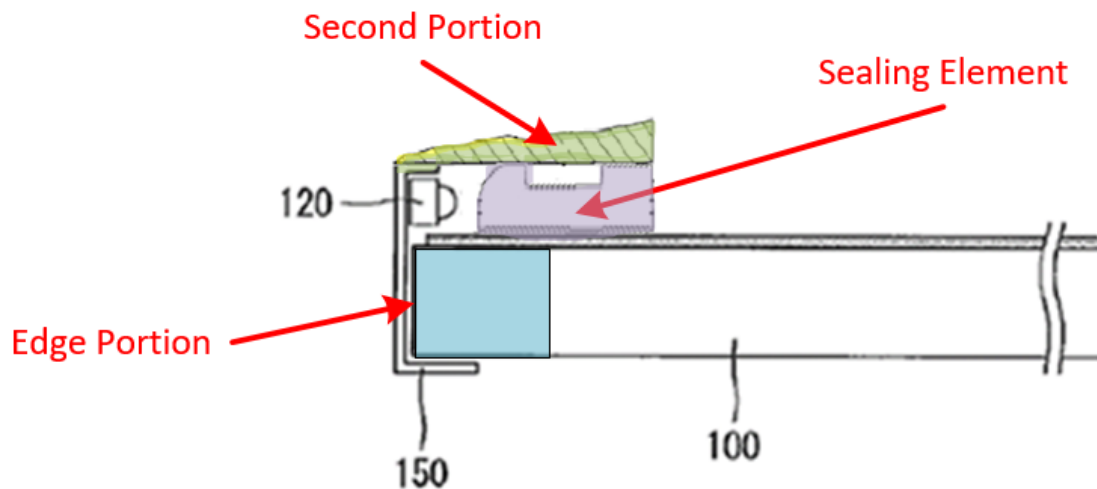


Ex. 1006 at Fig. 8 (color added to highlight the optical overlay 10).

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. Ex. 1003 at ¶208. The optical overlay 10 therefore discloses the claimed “sealing element.” *Id.*

PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 11,281,338

The POSA would have been motivated to use Klein’s optical overlay 10 in the device of Park. *Id.* at ¶209. 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). *Id.* 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:



Ex. 1010 at Fig. 2 (modified and annotations added).

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

PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 11,281,338

possible system contaminants.” Ex. 1006 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.” Ex. 1003 at ¶210. 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). *Id.*

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. Ex. 1003 at ¶211. As explained by Dr. Cairns, 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.” *Id.*

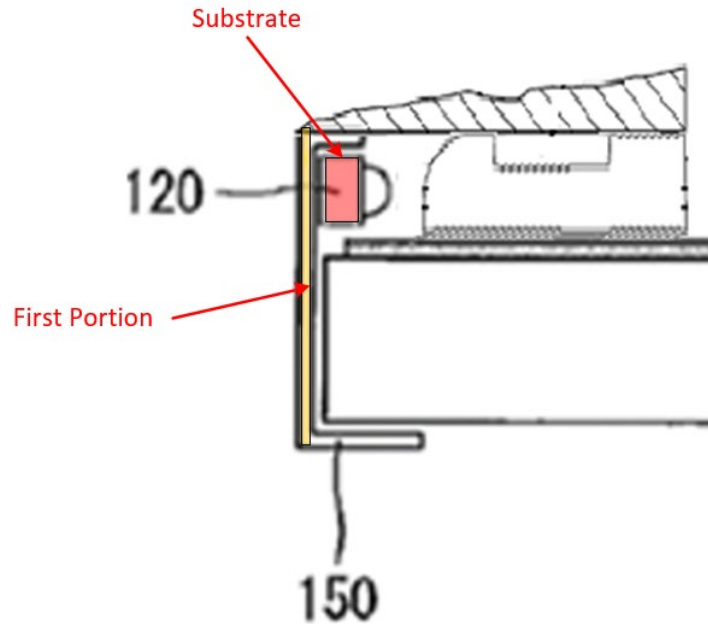
PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 11,281,338

A POSA would have had a reasonable expectation of success in implementing the combination of Park and Klein detailed above. *Id.* at 212. 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.” *Id.* As explained by Dr. Cairns, these are trivial mechanical modifications well within the POSA’s skill. *Id.*

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

2. Claim 2

Claim 2 depends from claim 1 and recites “wherein the substrate is affixed to the first portion of the support structure.” Park discloses the limitations added in claim 2. Ex. 1003 at ¶¶214-217. Specifically, the reference discloses the limitations of claim 2 as shown below:



Ex. 1009 at Fig. 1 (annotations added); *see also id.* at [0181]. As explained by Dr. Cairns, the substrate is affixed to the protection cover. Ex. 1003 at ¶216.

Claim 2 therefore would have been obvious over Park and Klein Ex. 1003 at ¶217.

3. Claim 5

As explained above with reference to ground 1, claim 5 is a product-by-process claim, and the specification of 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. Ex. 1003 at ¶218. Therefore, the process limitations of claim 5 are not limiting. Because Park discloses the claimed “support structure” of claim 1, the combination of Park and Klein would have rendered obvious claim 5. *Id.*

PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 11,281,338

4. Claim 6

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.” Klein discloses the limitations added in claim 6 as explained above with respect to Ground 1. Ex. 1003 at ¶¶219-220.

Claim 6 therefore would have been obvious over Park and Klein. *Id.* at ¶221.

5. Claim 7

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.” Klein discloses the limitations added in claim 7 as explained above with respect to Ground 1. Ex. 1003 at ¶¶222-223.

Claim 7 therefore would have been obvious over Park and Klein. *Id.* at ¶224.

6. Claim 10

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. *Id.* at ¶225.

Claim 10 therefore would have been obvious over Park and Klein. *Id.* at ¶226.

PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 11,281,338

7. Claim 11

Claim 11 depends from claim 1 and recites “wherein the sealing element comprises an optically active element or an optically passive element.” Klein discloses the limitations added in claim 11 as explained above with respect to Ground 1. *Id.* at ¶227-228.

Claim 11 therefore would have been obvious over Park and Klein. *Id.* at ¶229.

8. Claim 12

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.” 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). *Id.* at ¶230-231.

Claim 12 therefore would have been obvious over Park and Klein. *Id.* at ¶232.

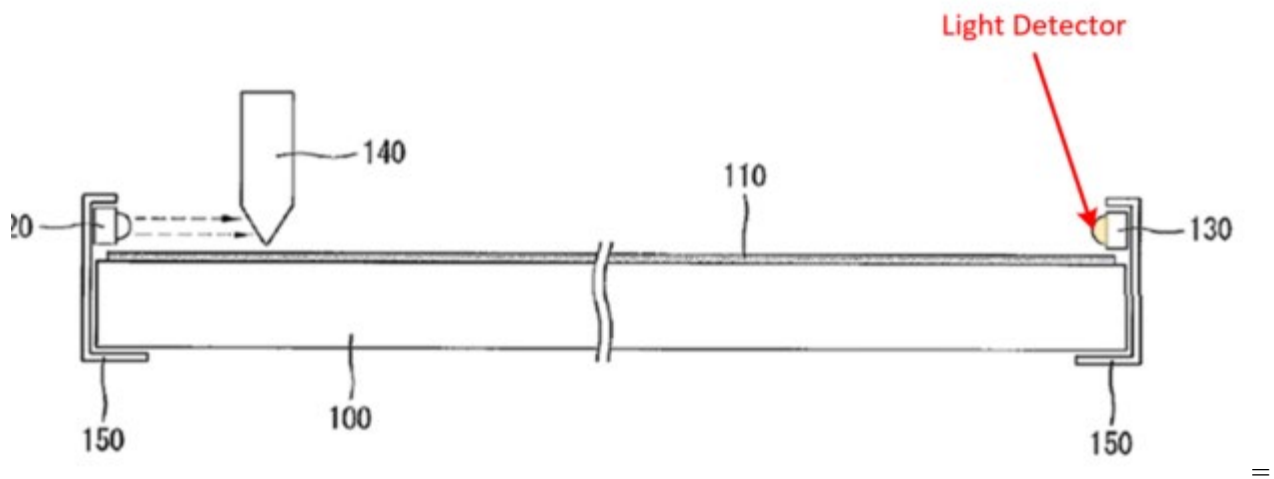
9. Claim 13

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.” Klein discloses the limitations added in claim 13 as explained above with respect to Ground 1. *Id.* at ¶¶233-234.

Claim 13 therefore would have been obvious over Park and Klein. *Id.* at ¶235.

10. Claim 14

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. Ex. 1003 at ¶236-237. Park describes light receiving devices 130 that “receive light emitted by the light emitting devices 120.” Ex. 1009 at [0053].



Id. at Fig. 2 (annotations added). Further, Park discloses a plurality of such light receiving devices. *Id.* at [0065]. Park also 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 emitting devices. *Id.* at [0051].

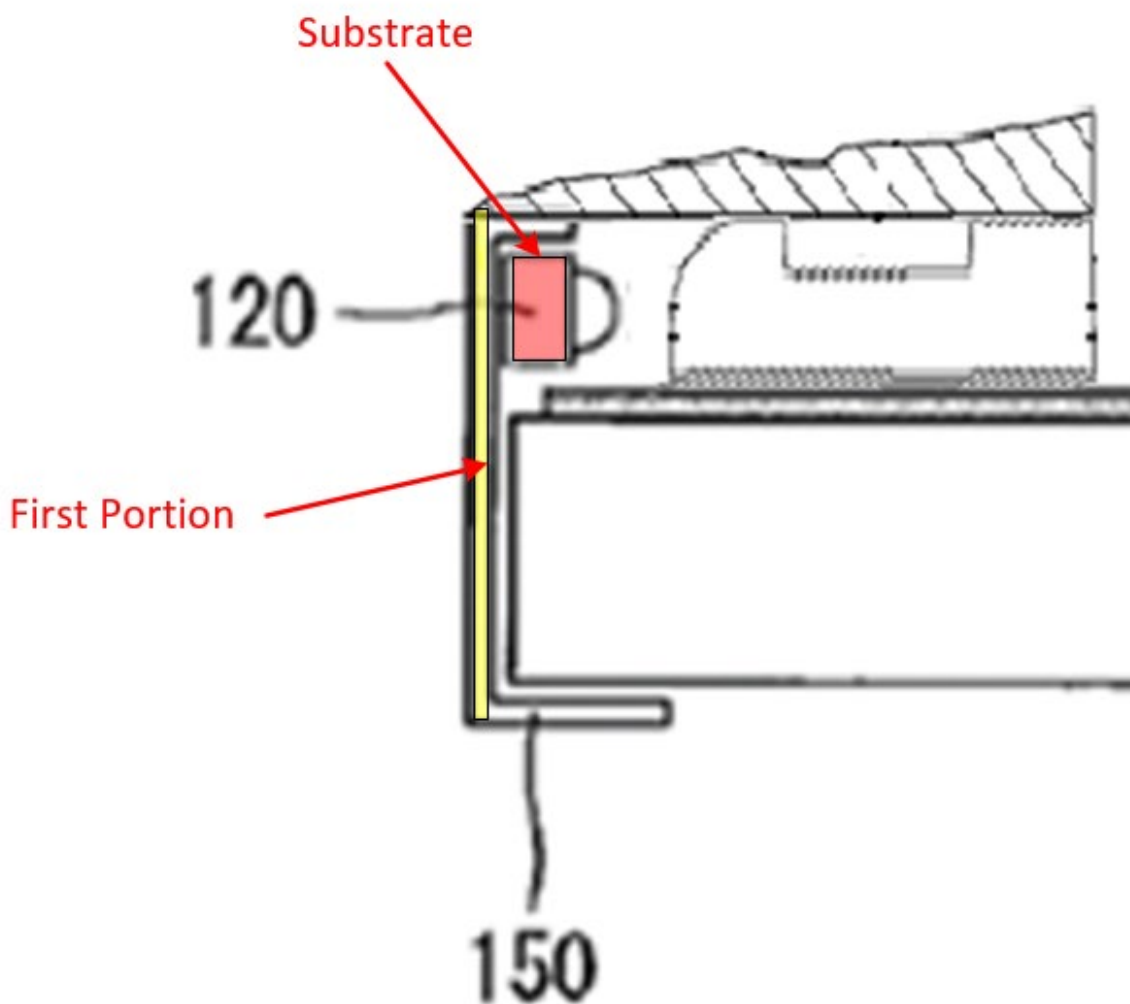
Claim 14 therefore would have been obvious over Park and Klein. Ex. 1003 at ¶237.

11. Claim 15

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

PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 11,281,338

in claim 15. Ex. 1003 at ¶¶238-240. Specifically, the reference discloses the substrate disposed on the support structure without intervening structures:



Ex. 1010 at Fig. 1 (annotations added); *see also id.* at [00181].

Claim 15 therefore would have been obvious over Park and Klein. Ex. 1003 at ¶240.

VI. MANDATORY NOTICES PURSUANT TO 37 C.F.R. § 42.8(A)(1)

Pursuant to 37 C.F.R. § 42.8(a)(1), the mandatory notices identified in 37 C.F.R. § 42.8(b) are provided below as part of this petition.

PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 11,281,338

A. 37 C.F.R. § 42.8(b)(1): Real Parties-in-Interest

The real parties-in-interest are Chemtronics USA, Inc. and Chemtronics Co., LTD.

B. 37 C.F.R. § 42.8(b)(2): Related Matters

The '338 patent is currently the subject of litigation in *Flatfrog Laboratories AB v. Chemtronics Co., LTD.*, Case No. 2:23-cv-00306 (E.D. TX), filed on June 26, 2023. The '338 patent was the subject of litigation in *Flatfrog Laboratories AB v. Chemtronics Co., LTD.*, Case No. 3:20-cv-00121 (S.D. CA), filed on January 23, 2023, which was voluntarily dismissed.

C. 37 C.F.R. § 42.8(b)(3), (4): Lead and Back-Up Counsel and Service Information

Chemtronics provides the following designation of counsel:

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PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 11,281,338

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Pursuant to 37 C.F.R. § 42.10(b), a Power of Attorney accompanies this petition. Please address all correspondence to lead and back-up counsel at the addresses above. Chemtronics also consents to electronic service by email at the email addresses listed above.

Dated: October 6, 2023

Respectfully submitted,

By: /s/ Matthew W. Johnson

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PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 11,281,338

CERTIFICATE OF SERVICE

The undersigned hereby certifies that a copy of the foregoing petition for *Inter Partes* Review of U.S. Patent No. 11,281,338, including all Exhibits, was served on October 6, 2023 via Express Mail delivery directed to the attorney of record for the patent at the following address:

Finnegan, Henderson, Farabow, Garrett & Dunner LLP
901 New York Avenue, NW
Washington, DC 20001-4413

Additionally, a courtesy copy of the foregoing petition for *Inter Partes* Review of U.S. Patent No. 11,281,338, and the accompanying Declaration of Dr. Cairns, was sent on October 6, 2023 to patentee's litigation counsel via email to:

wjohnson@mayerbrown.com
mmolano@mayerbrown.com
cmaier@mayerbrown.com

Date: October 6, 2023

By: /s/ Matthew W. Johnson
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PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 11,281,338

CERTIFICATE OF WORD COUNT UNDER 37 C.F.R. § 42.24(a)

I, the undersigned, do hereby certify that the attached petition 13,923 words, as measured by the Word Count function of Microsoft Word 2016. This is less than the limit of 14,000 words as specified by 37 C.F.R. § 42.24(a)(i).

Date: October 6, 2023

By: /s/ Matthew W. Johnson

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APPENDIX OF EXHIBITS

EXHIBIT NO.	TITLE
1001	U.S. Patent No. 11,281,338
1002	Prosecution History of the '338 patent
1003	Expert Declaration of Darran Cairns, Ph.D
1004	Chinese Patent No. 202,661,975
1005	Certified Translation of Chinese Patent No. 202,661,975
1006	U.S. Patent No. 8,330,736
1007	U.S. Patent Application Publication No. 2014/0111706 A1
1008	Chinese Patent No. 203,720,812
1009	Certified Translation of Chinese Patent No. 203,720,812
1010	U.S. Patent Application Publication No. 2012/0146950 A1
1011	Redacted Joint Claim Construction Brief in <i>FlatFrog Laboratories v. Promethean LTD. et al.</i> , Case No. 1:19-cv-02246-MN
1012	Claim Chart for U.S. Patent No. 11,281,338 (Case No. 2:23-cv-00306) (E.D. TX)
1013	Complaint for Patent Infringement (<i>FlatFrog Laboratories AB v. Chemtronics Co., LTD.</i> , Case No. 2:23-cv-00306 (E.D. TX), filed on June 26, 2023)

1014	<i>Curriculum vitae</i> of Darran Cairns, Ph.D.
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