

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Hisense USA Corporation

Petitioner

v.

Brightplus Ventures LLC

Patent Owner

Case IPR2023-01168

U.S. Patent No. 9,605,835

Ex. 2001 - Declaration of William Bohannon

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EXHIBIT LIST

Exhibit	Description
2001	Declaration of William K. Bohannon (“Bohannon Decl.”)
2002	Curriculum vitae of William K. Bohannon
2003	Joint Claim Construction Statement
2004	Brightplus Ventures LLC’s Opening Claim Construction Brief
2005	Hisense’ Opening Claim Construction Brief

I, William K. Bohannon, hereby declare under penalty of perjury:

I. INTRODUCTION

1. I am an independent consultant. I am over eighteen years of age, and I would otherwise be competent to testify as to the matters set forth herein if I am called upon to do so.

2. I have prepared this Declaration for consideration by the Patent Trial and Appeal Board in the Inter Partes Reviews of U.S. Patent No. 9,605,835 (“the ’835 Patent”).

3. I provide this Declaration at the request of and have been retained by Ni, Wang & Massand, PLLC, which represents Patent Owner Brightplus Ventures LLC (“Brightplus” or “Patent Owner”) in connection in connection with the above-captioned Inter Partes Review.

4. I have been informed and understand that Petitioner Hisense USA Corporation (“Hisense” or “Petitioner”) contends that claims 1- 5 and 7-14 of the ’835 Patent are invalid based on Grounds 1-3.

5. I am being compensated at an hourly rate of \$350 per hour. My compensation is not dependent on the outcome of or any issue in relation to the above-captioned Inter Partes Review, and I have no interest in either party.

6. In forming my opinions, I relied on my knowledge, education, experience, and training in the field and on documents and information referenced in this Declaration.

A. Expert Qualifications

7. My curriculum vitae (“CV”) is attached hereto as Exhibit 2002 and provides an accurate identification of my background and experience.

8. I have over (30) years of commercial industrial electronics experience including experience in the areas of LCD, Plasma, CRT and Large Screen Display Equipment: LCD manufacturing, substrates, drivers and other related components for rear screen displays including Avionics and cockpit displays.

9. From 1989 to 1994 I worked as a Chief Scientist for Display Products which included tracking liquid crystal display (LCD) and other display technology worldwide with a special emphasis on Japan and working closely with several Japanese companies and laboratories to develop new products and test existing LCD products.

10. Since 1994, I have been an independent consultant for Manx Research working on various display products including managing and conducting detailed technical product evaluations for all kinds of display products – LCD, CRT, Plasma and LED direct view, projection products of all types, CRT products and plasma products. Furthermore, I was also a design and procurement consultant to an

aerospace display company involved in re-designing Avionic LCD display sub-systems to use full color LED light sources instead of short arc lamps.

11. I also have 7 issued U.S. Patents in displays and display technology.

B. Basis of My Opinion and Materials Considered

12. I have reviewed the '835 Patent, including the claims of the patent in view of the specification. In addition, I have reviewed the '835 Patent's prosecution history, Dr. Pattison's declaration (Ex. 1003), the prior art discussed herein, and the remaining exhibits listed herein.

C. Summary of Opinions

13. In my opinion, claims 1-5 and 7-14 of the '835 Patent aren't rendered obvious by the prior art combinations cited in Grounds 1-3. In the remainder of this declaration, I demonstrate these in detail and address the lack of motivation to combine certain references.

II. LEGAL STANDARDS TO BE APPLIED

14. Counsel has advised me of the following legal standards that are relevant to IPR proceedings, which I have applied in forming my opinions.

15. I understand that an inter partes review ("IPR") is a proceeding before the United States Patent & Trademark Office for evaluating the patentability of an issued patent's claims based on prior-art patents and printed publications.

A. Person of Ordinary Skill in the Art

16. I understand that the claims of a patent are reviewed from the point of view of a hypothetical person of ordinary skill in the art (“POSITA”) at the time of the filing of the patent. The “art” is the field of technology to which a patent relates.

B. Claim Construction

17. I understand that, in IPR proceedings, claim terms in a patent are given their ordinary and customary meaning as understood by a POSITA in the context of the entire patent and the prosecution history pertaining to the patent. If the specification provides a special definition for a claim term that differs from the meaning the term would otherwise possess, the specification’s special definition controls. I have applied these standards in preparing the opinions in this declaration.

C. Validity

18. I understand that, in this proceeding, Petitioner has the burden of proving that the challenged claims of the ’835 Patent are unpatentable by a preponderance of the evidence. I understand that “preponderance of the evidence” means that a fact or conclusion is more likely true than not true.

19. I understand that there are two ways in which prior art may render a patent claim unpatentable. First, the prior art can “anticipate” the claim. Second, the prior art can render the claim “obvious” to a POSITA. I understand that for an invention claimed in a patent to be patentable over the prior art, it must not be

anticipated and must not be obvious based on what was known before the invention was made.

20. I understand that a patent claim may be invalid as anticipated under 35 U.S.C. § 102 if a prior art reference discloses each element of the claimed subject matter.¹

21. I understand that a patent claim may be invalid as obvious under 35 U.S.C. § 103 if the differences between the subject matter claimed and the prior art are such that the claimed subject matter as a whole would have been obvious to a POSITA at the time the invention was made. I also understand that several factual inquiries underlie a determination of obviousness. These inquiries include (1) the scope and content of the prior art, (2) the level of ordinary skill in the field of the invention, (3) the differences between the claimed invention and the prior art, and (4) any objective evidence of non-obviousness (i.e., “secondary considerations”).

22. I further understand that when a party alleges obviousness, that party may rely on one reference or a combination of multiple references. I also understand that, when a party alleges obviousness based on a combination of references, that party should identify a reason why a POSITA would have been motivated to combine the asserted references in the manner recited in the claims and to explain

¹ Patent laws discussed herein refer to AIA versions of the relevant laws.

why a POSITA would have had a reasonable expectation of success in making such combinations.

23. I understand that an obviousness analysis permits the application of “common sense” in examining whether a claimed invention would have been obvious to a POSITA. For example, I understand that combining familiar elements according to known methods and in a predictable way may suggest obviousness when such a combination would yield nothing more than predictable results. And I understand a party asserting obviousness should still provide a specific motivation to combine the references as recited in the claims and explain why one would have reasonably expected to succeed in doing so.

24. I understand that one indicator of nonobviousness is when prior art teaches away from combining certain known elements. For example, a prior art reference teaches away from the patent’s particular combination if it leads in a different direction or discourages that combination, recommends steps that would not likely lead to the patent’s result, or otherwise indicates that a seemingly inoperative device would be produced.

III. TECHNOLOGY OVERVIEW

25. The relevant field for that of the ’835 Patent is that of solid-state lighting systems, and more particularly to adjusting the light output of solid-state lighting (e.g. backlighting). Generally, the field relates to employing solid state

lighting devices (e.g., LEDs) to illuminate a liquid crystal display (LCD) panel. This may be accomplished through the employment of several structures and layers incident upon the surface on which the LEDs are mounted as well as between the LEDs and the LCD panel. These structures may include reflective surfaces, polarizers of varying type and function, diffusers, lenses, brightness enhancement layers and others. The purpose and alignment of these structures is intended to maximize the amount of light that is directed through the LCD panel at an angle and intensity that is appropriate for viewing the images displayed on the LCD panel.

IV. THE '835 PATENT'S OVERVIEW

26. The '835 patent describes the use of LEDs to illuminate an LCD panel. The '835 patent accomplishes this by orienting the LEDs on a substrate to face in the direction normal to the plane of the LCD panel. The light emitted by the LEDs passes through a diffuser and into a specific type of brightness enhancement film (BEF). The term brightness enhancement film or BEF, is not a standardized term understood the same way by everyone but is merely a way of referring to a class of films with different characteristics. The BEF of the '835 patent is designed to allow light having a first orientation (i.e., entering at an incident angle below a certain threshold) to pass through the BEF and reflecting light having a second orientation (i.e. entering at an incident angle outside of a certain threshold) back towards the LED substrate. The LED substrate includes a reflector constituting a sheet or

covering thereon. The reflector reflects light back into the diffuser and the BEF in a process referred to as “recycling”. The purpose of recycling light is to ensure that the light reaching the BEF is of the first orientation so that as the light passes through the LCD panel it is of an appropriate angle and intensity for adequately illuminating the panel for a viewer.

V. A PERSON OF ORDINARY SKILL IN THE ART

27. I understand that the factors considered in determining the ordinary level of skill in a field of art at issue include the level of education and experience of persons working in the field; the types of problems encountered in the field; and the sophistication of the technology at the time of the purported invention, which I understand to be as early as April 21, 2006. I understand that a person of ordinary skill in the art (“POSITA”) is not a specific real individual, but rather is a hypothetical individual having the qualities reflected by the factors above. I understand that a POSITA would also have knowledge from the teachings of the prior art, including the art cited below.

28. Based on these factors, on or before April 21, 2006, a POSITA relating to the technology of the '835 Patent would have (a) a Bachelor's of Science degree in a technical field and at least four years of experience in the field of design and/or manufacture of display systems; (b) a Master's of Science degree in a technical field and at least two years of experience in the field of design and/or manufacture of

display systems; or (c) a PhD in a technical field relating to the design and/or manufacture of display systems. Additional graduate education could substitute for professional experience, or significant experience in the field could substitute for formal education. A POSITA is presumed to have knowledge of all relevant prior art, and therefore would have been familiar with each of the references cited in this declaration and the full range of teachings they contain.

29. With respect to the subject matter of the '835 Patent, a Bachelor of Art in Mathematics is equivalent to a Bachelor of Science degree in a technical field.

30. Before April 21, 2006, my level of skill in the art was at least that of a POSITA. I am qualified to provide opinions concerning what a POSITA would have known and understood at that time, and my analysis and conclusions in this declaration are from the perspective of a POSITA prior to April 21, 2006. Furthermore, I have taught, worked with and supervised persons whom I would consider to be persons of ordinary skill in the art according with the description given above.

VI. CLAIM CONSTRUCTION

31. For IPR petitions filed after November 13, 2018, I understand the Patent Trial and Appeal Board ("Board") construes claim terms as having their ordinary and customary meaning to a POSITA at the time of invention (i.e., the same standard used in district court). I have applied this standard in rendering my opinions on claim

construction. In addition, I have been asked to assume that the claims are not indefinite.

32. Claim terms are generally given their plain and ordinary meaning, which is the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention. When the words in the context of the surrounding claim language make the ordinary meaning readily apparent, claim construction involves little more than the application of the widely accepted meaning of commonly understood words.

33. The claims must be read in view of the specification of which they are a part. The specification is the best source for understanding a technical term. The construction that stays true to the claim language and most naturally aligns with the patent's description of the invention will be, in the end, the correct construction.

34. Although terms must be construed in light of the specification, it is improper to import a limitation from the specification into the claims. Courts must capture the scope of the actual invention, rather than strictly limit the scope of claims to disclosed embodiments or allow the claim language to become divorced from what the specification conveys is the invention.

35. The prosecution history can often inform the meaning of the claim language by demonstrating how the inventor understood the invention and whether the inventor limited the invention in the course of prosecution, making the claim

scope narrower than it would otherwise be. The prosecution history consists of the complete record of the proceedings before the PTO and includes the prior art cited during the examination of the patent.

A. “on”

36. The term “on” as used in the ’835 Patent requires contact either directly on, or with intervening elements present. This construction is described in the patent specification in col. 6:47-51. This is consistent with the purpose of the invention in the ’835 Patent which avoids light loss or light leakage. See Ex. 2003 at 4, Ex. 2004 at 9-10, Ex. 2005 at 9-10.

VII. PETITIONER’S PRIOR ART SUMMARY

37. I understand that Petitioner has identified three primary references and three secondary references as prior art to the ’385 Patent in its Grounds 1-3.

A. Mok

38. Petitioner’s primary reference for Ground 1 is U.S. Patent Publication No. 2006/0227545 (“Mok”) filed on April 11, 2005. Mok describes a light emitting panel with a base panel having a plurality of light emitting elements mounted thereon. Specifically, Mok describes using a diffuser to accomplish light recycling. Mok at [0021] “A reflective surface 50 may be provided on the base panel 12 to ‘recycle’ (i.e., reflect) light which may be reflected by the back surface 60 of the diffuser 16 (i.e., light incident on back surface 60 of the diffuser 16 at an angle that

exceeds the critical angle for the particular diffuser 16).” *Id.* The light emitting panel of Mok includes base panel 12, diffuser 16 and brightness enhancer 18 spaced apart by distances 48 and 54 respectively. These elements are arranged in linear stacks.

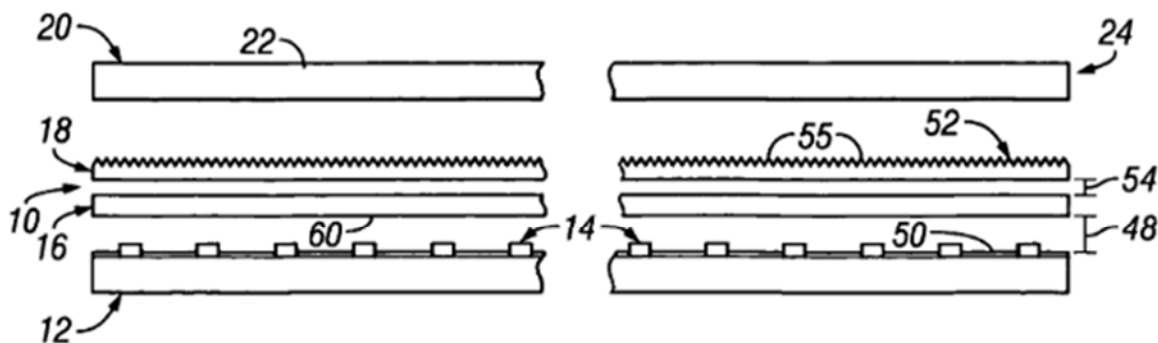


FIG. 1

Mok Fig. 1

B. Epstein

39. Petitioner’s primary reference for Ground 2 is U.S. Patent Publication No. 2005/0265029 (“Epstein”) filed on June 1, 2004. Petitioner further relies on Epstein as one of two secondary references for Ground 3. Epstein describes an array of LEDs on a substrate over which an intermediate layer and a guiding layer are arranged. The LEDs of Epstein function to emit light upwards.

C. Ko

40. Petitioner’s primary reference for Ground 3 is U.S. Patent Publication No. 2006/0082698 (“Ko”) filed on October 15, 2004. Ko describes an LCD directly illuminated from behind employing cold cathode fluorescent lamps (CCFLs) as a

light source mounted above, as opposed to on, the substrate on which a reflector is mounted. The light produced by the CCFLs 16 that propagates downwards is reflected by the reflector towards several layers including a diffuser plate, a reflecting polarizer, a brightness enhancing layer, and two layers of absorbing polarizers. Ko employs its reflecting polarizer to manage light reflection and recycling.

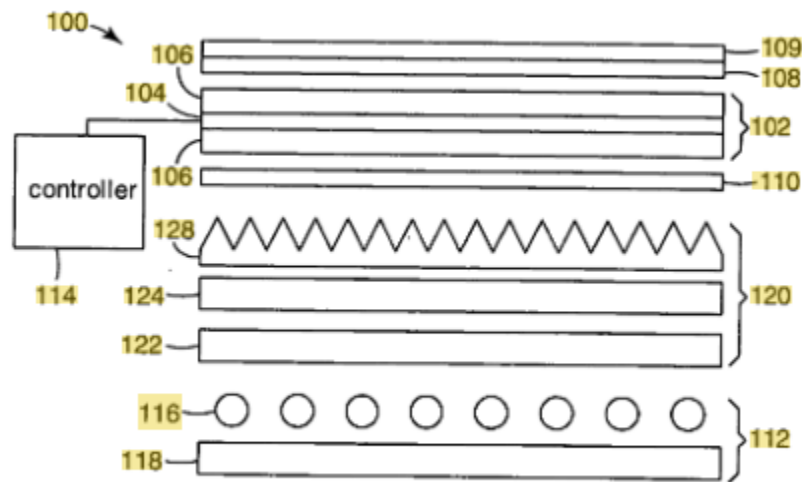


FIG. 1

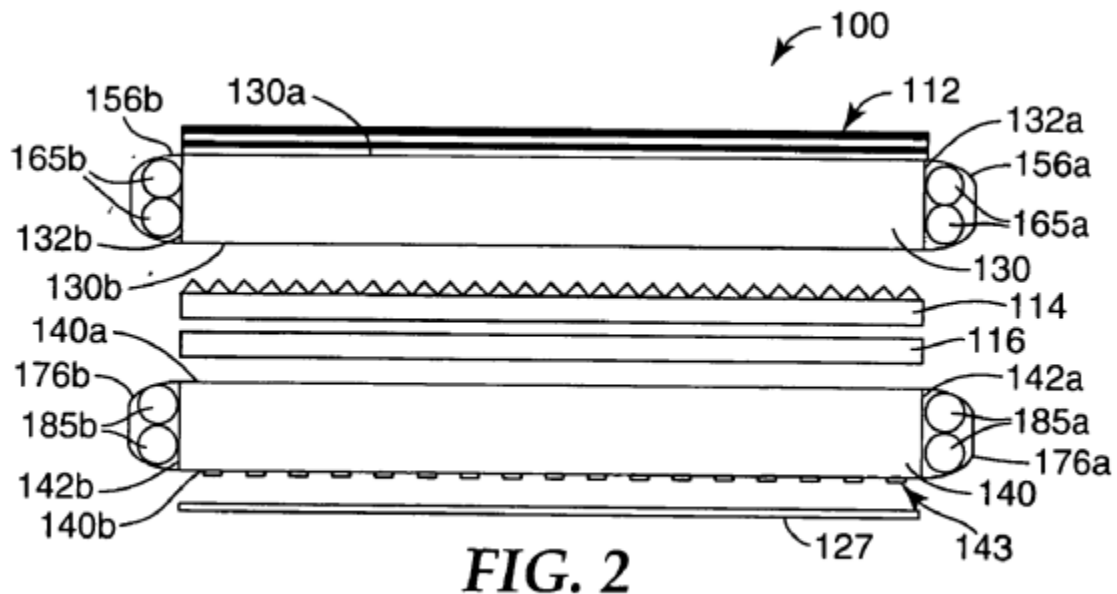
D. Holman

41. Petitioner relies on WO 03/056876 (“Holman”) as one of two secondary references for both Grounds 1 and 2. Holman was filed December 13, 2002, and claims priority to a US filing dated December 14, 2001. Holman describes a multi-layered LED light source array that employs reflectors, elevated prismatic films, and polarization converting films to collimate light for optimal illumination of and LCD panel.

E. Lamb

42. Petitioner relies on U.S. Patent Publication No. 2005/0135115 (“Lamb”) as one of two secondary references for both Grounds 1 and 2. Lamb was filed December 23, 2003.

43. Lamb is directed to a side lighting or edge lighting system using cold cathode fluorescent lamps (CCFLs). Lamb at [0034] Specifically, Lamb teaches a back lighting system 100 which includes a double pair of CCFL light sources 165a and 165b placed at the opposing edges 132a and 132b of the first lightguide 130. Lamb at [0036] Furthermore, a second, double pair of light sources 185a and 185b are placed at the opposing edges 142a and 142b of the second lightguide 140. Lamb at [0037]



As disclosed in Lamb, the cold cathode fluorescent lamp light sources 165a and 165b include “lamp cavity reflectors 156a, 156b” and the cold cathode fluorescent lamp light sources 185a, 185b include “lamp cavity reflectors 176a, 176b.” Lamb at [0036-0037]

F. Kretman

44. Petitioner relies on U.S. Patent Publication No. 2003/0118805 (“Kretman”) as one of two secondary references for Ground 3. Kretman describes a diffuse reflective article employed in a CCFL side lighting, edge lighting or light back scattering arrangement to optimize the incident angle of light on a display for improved illumination.

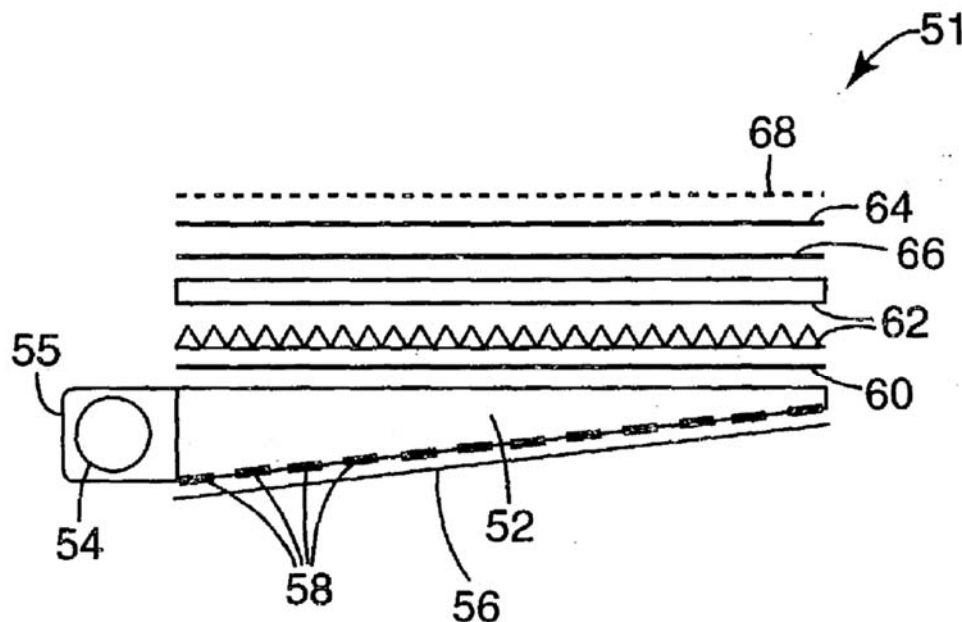


Fig. 9E

VIII. GROUND 1 - PETITIONER'S MOK, HOLMAN AND LAMB COMBINATION FAILS TO RENDER OBVIOUS INDEPENDENT CLAIM 1.

45. Petitioner relies on Mok as its primary reference for Gound 1. But Petitioner fails to demonstrate that a POSITA would be motivated to combine Lamb with Mok and Holman, nor demonstrate that the combination of Mok, Holman and Lamb teach or render obvious claim 1.

A. Mok Does Not Disclose Claim 1D of “a brightness enhancement film on the reflector.”

46. Mok discloses a diffuser spaced at a distance from the reflective surface and specifically teaches an “air gap”. As discussed in the claim construction above, the term “on” requires that the BEF be “directly on” the diffuser or on with intervening elements present. An air gap makes for a larger, thicker structure with the potential for undesirable light leakage and lower efficiency.

47. Petitioner concedes that this “air gap” is not an intervening layer. Petition, at 18. As such, Petitioner then relies on Prism sheets 58 and 60 of Holman to disclose this element. *Id.* However, the prism sheets 58 and 60 are not BEFs. For example, Holman differentiates between prisms sheets and BEFs:

"One unique aspect of elevated prism sheets 58 and 60 as used in all previous illumination examples, is that they do not have to exhibit the extreme standards in cosmetic perfection that have associated with 3M's BEF in direct view brightness enhancement applications [...] Preventative measures include discarding all damaged BEF sheets. No such costly measures are needed with present prism sheets 58 and 60. Cosmetic defects in prism sheets 58 and 60 cannot be directly viewed."

Holman at 121, section 8.2.1

48. Recognizing the fallacy of this argument, Petitioner then claims that “Holman discloses a BEF 131 that rests on a transparent dielectric material 144.” Petition at 19. Petitioner then claims it would’ve been obvious to modify Mok’s layer arrangement using Holman’s teachings because *there is a general pressure in the art to reduce the thickness of panels*. Petition, at 20. (emphasis added) However, Mok specifically teaches away from this reasoning as Mok states “Generally speaking, *larger spaced-distances 48 will improve the uniformity of the light produced by the panel, but at the expense of panel thickness and some loss of efficiency*. By way of example, in one embodiment, the diffuser 16 is separated from the base panel 12 by a distance 48 of about 50 millimeters (mm) or less.” Mok, [0023](emphasis added)

B. The “Brightness Enhancer 18” of Mok Does Not Recycle Light and Thus is Not “a brightness enhancement film” as claimed in the ’835 Patent.

49. Mok explicitly states “the brightness enhancer 18 comprises a brightness enhance film (BEF) available from 3M and sold under the registered trademark Vikuiti®. Mok, [0024]. However, based on my experience in the industry the 3M product is not a brightness enhancement film because it does not recycle light as required of a “brightness enhancement film” as claimed in the ’835 Patent. The “brightness enhancement film” as taught in the ’835 Patent has 2 angles, one that

emits (e.g., passes) light and one that reflects light to be recycled. This is explicitly recited in Claim 1. Mok does not disclose or teach light recycling.

50. A POSITA would know that there is no standard BEF and that a “brightness enhancement film” is just that, any kind of film that enhances brightness. The '835's brightness enhancement film enhances brightness by enabling light recycling while other BEFs do other things.

C. A POSITA Would Not Be Motivated to Combine Lamb with Mok and/or Holman.

51. Mok and Holman talk about solving the problem of a compact and efficient backlight. Lamb instead discloses a system for illuminating a display that would now be commonly known as "edge lighting". Edge lighting uses light sources arranged around the edge of a light guide behind and emitting perpendicular to the surface of a display. The light from the light sources propagates through the light guide after making a 90 degree turn before interacting with the diffuser layer and BEF. Thus, far less light is incident on the BEF at an angle that would allow for emission until it has been turned around again and again and then recycled repeatedly to allow for correction. Lamb figure 2 is provided below:

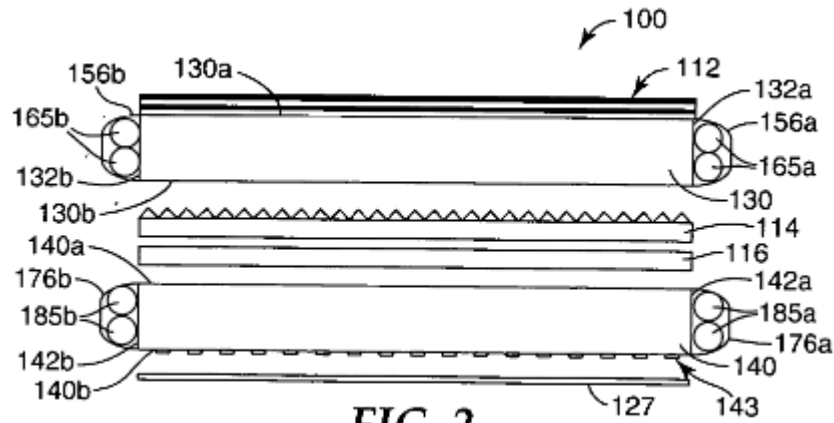
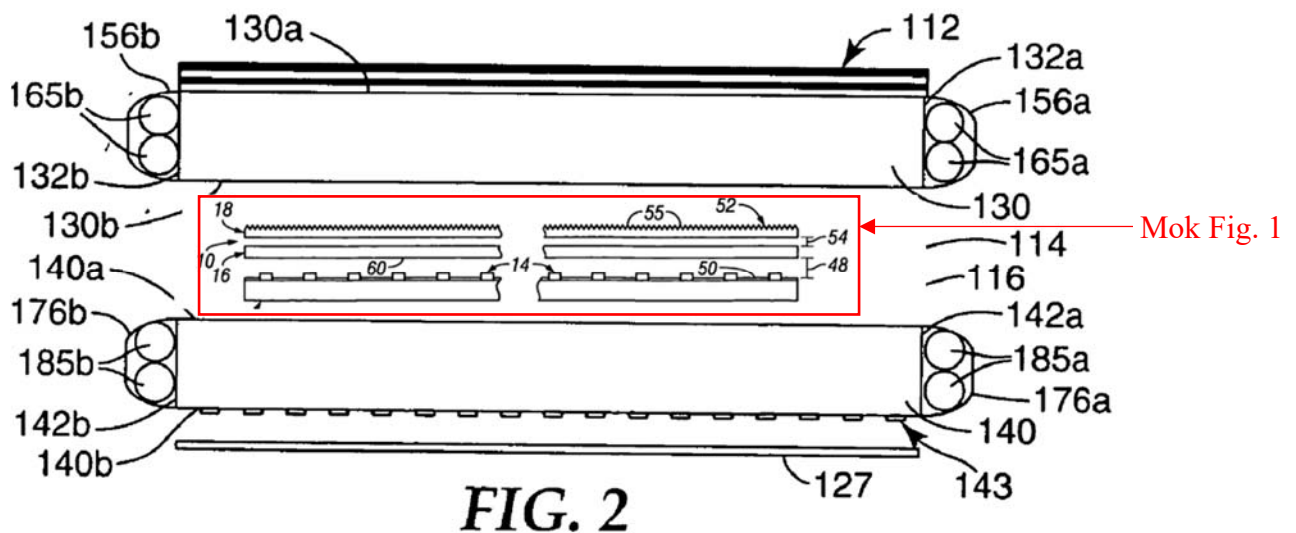


FIG. 2

52. As shown above in Fig. 2², and consistent with all figures of Lamb, Lamb employs, in order, a first set of light sources coupled to a light guide 140, a diffuser sheet 116, a BEF 114, a second set of light sources coupled to a second light guide 130, and a recycling enhancement structure 112 disposed at the surface 130a which comprises a reflective polarizer. Thus, Lamb seeks to accomplish with edge lighting, light guides and two layers of light recycling features what the '835 patent accomplishes with a far simpler arrangement. The system described in the '835 patent employs the BEF "preferentially emit[s] light having a first orientation from the lighting panel and preferentially reflect[s] light having a second orientation...back into the lighting panel." This is distinct from the combination of Mok and Lamb which would use multiple structures to accomplish the preferential emission/reflection (e.g., reflective polarizer, diffuser, BEF).

² Also, in Fig. 2 – the circles used for the edge lighting on the edges are cold cathode fluorescent lamps or CCFL tubes and not a compact LED system.

53. Lamb's multi-stage lighting system is not readily combinable with a back lighting system such as that of Mok as seen below because the light guides in Lamb (130, 140) are designed for edge lighting and force the light through a 90-degree turn - from the lamp lit edge to the emitting surface. The '835's invention requires no such light guide or turn. If Mok's LED substrate is mounted on top of Lamb's light guide 140, it will block all of that section's light as shown below.



MOK FIG. 1 Combined with LAMB FIG. 2

D. The Combination of Mok, Holman, and Lamb Also Does Not Disclose Limiting “direct emissions from the lighting panel...to thereby encourage light recycling/diffusion in the lighting panel” of Claim 11.

54. To summarize the above, Mok does not describe a BEF that preferentially emits light having a certain incident angle. Rather it describes a BEF that “comprises a plurality of optical elements, such as prisms 55 defined by the front surface 52 of the brightness enhancer 18, that collect light from the diffuser 16 and

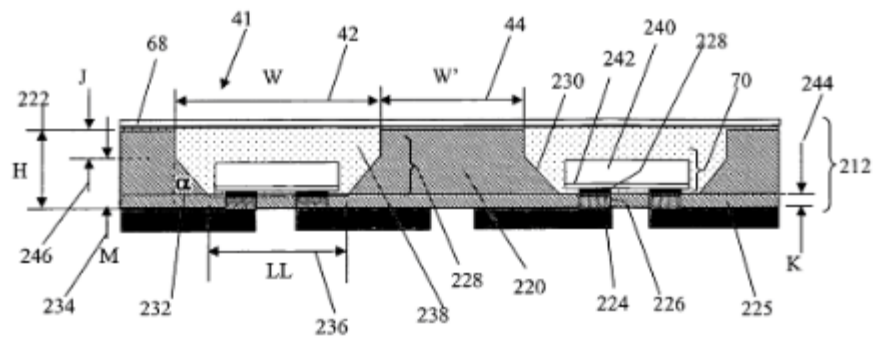
direct it out the front surface 52 of the brightness enhancer 18. The brightness enhancer 18 thereby maximizes the on-axis brightness of the panel 10.” Mok, [00240] This is merely describing re-orientation of the light to be more normal to the surface of the display, not recycling the light.

E. The Combination of Mok, Holman, and Lamb Also Does Not Disclose “a heatsink panel on a second side of the at least one substrate” of Claim 14.

55. Petitioner concedes that Mok does not explicitly disclose a heatsink panel and instead argues that “a printed circuit board is a heat sink.” Petition at 34. However, a printed circuit board is printed on the surface of the substrate. It does not penetrate the substrate. It is not designed, intended or functional to draw heat away from the LEDs without substantially more than being simply a printed circuit board.

56. In the alternative, Petitioner relies on Holman and contends that the “Holman describes a base layer 220 that functions as part of a heat sink.” Petition, at 34. However, the actual text of Holman states that “Not only must the base layer material be thermally stable, it must be counted on to service as part of the collective heat sink.” Holman at [0040]. Holman does not teach or suggest that the base layer is considered by itself a heatsink panel on a second side of the at least one substrate. Instead, as shown in FIG. 13A in Holman below:

FIG. 13A.



57. base layer 220 is the intervening space between the two flip chip mounted LEDs. It is well known in the art that this component of an LED package would be composed of an electrically insulating material. Holman confirms this "The individual LEDs 70 are mounted flip-chip...on composite, electrically-insulating, reflective base layers 220 and 225..." Holman. pg. 37, Sec 4.1.41. Electrically insulating materials are generally not advantageous for heat sinking because they do not conduct heat any better than they conduct electricity. Even granting Petitioner the most favorable interpretation of Holman, that the base layers 220 and 225 would function as heat sinks, the base layer of the LED package is not a heat sink within the meaning ascribed to it in the '835 patent. The heatsink of the '835 patent is configured to draw heat away from the substrate in a direction opposite to a direction of light emission. Petitioner has shown an LED package. An LED package is mounted on the substrate of the lighting panel. All Petitioner has demonstrated is that Holman discloses moving heat from the LEDs to the substrate, not away from the substrate or the sensitive display components which they light.

IX. GROUND 2 - PETITIONER’S EPSTEIN, HOLMAN AND LAMB COMBINATION FAILS TO RENDER OBVIOUS INDEPENDENT CLAIM 1.

58. Petitioner relies on Epstein as its primary reference for Gound 2. But Petitioner fails to demonstrate that a POSITA would be motivated to combine Lamb with Epstein and Holman, nor demonstrate that the combination of Epstein, Holman and Lamb teach or render obvious claim 1.

A. A POSITA Would Not be Motivated to Combine Lamb with Epstein and Holman.

59. As discussed in Ground 1 above Lamb uses a clumsy, double stack of edge lit backlights with CCFLs instead of rear mounted LEDs like those used in Epstein and Holman. In fact Lamb's CCFL arrangement wouldn't even be considered by a POSITA seeking to improve a LED based system.

B. Epstein Fails to Disclose Claim Element 1D, “a brightness enhancement film on the reflector.”

60. Epstein does not disclose a BEF directly on the reflector as described in the '835 Patent. As shown in Epstein Fig. 11, there is an air gap between BEF 662 and guiding layer 610. Therefore, the BEF is not directly on the intermediate layer 610 and the layers presented in Epstein are not stacked in direct contact.

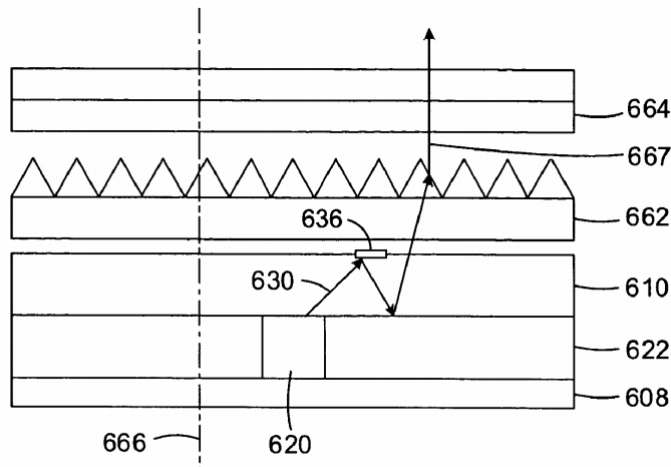


FIG. 11

61. Petitioner concedes that this element is not met as there is an airgap between the layers. Petition, at 40. Again, Petitioner relies on Holman to meet this element. I have addressed why Holman does not meet this element above. *See supra* ¶47-48.

C. Epstein Fails to Disclose Claim Element 1F, “the brightness enhancement film is configured to ...preferentially reflect light having a second orientation, different from the first orientation, back into the lighting panel.”

62. Epstein does not disclose a BEF reflecting light back into the lighting panel. As stated in the Petition, the BEF of Epstein **refracts** light 667 in a second direction that is closer to axis 666. As shown in Fig. 11, Epstein only discloses that the BEF **emits** light. Petition, at 42. There is no teaching of the BEF reflecting light 667 back into the lighting panel. Therefore, Epstein does not disclose a BEF that emits light having a first orientation and preferentially reflecting light having a

second orientation different from the first orientation, back into the lighting panel for recycling.

D. Similarly, Epstein Fails to Disclose Claim Element 1G, “wherein the light having the second orientation is reflected back into the lighting panel is recycled within at least the diffuser sheet.”

63. As I discussed for claim element 1F above, Epstein does not disclose a BEF which reflects light back into the lighting panel, nor recycles such light within the diffuser sheet.

64. Petitioner appears to concede this and relies on Lamb. Petition, at 44. Even assuming arguendo that a POSITA would even try to combine Lamb's edge lit system, Lamb fails to teach or disclose this element. Instead, Lamb states “... One function of the diffuser is the randomization of the polarization and direction of the light reflected by the reflective polarizer back into the backlighting system 100.” Lamb at [0042] and “diffuser sheet primarily serves to increase spatial uniformity of the light exiting the second lightguide 140, as well as to aid in randomizing polarization of the light reflected back into the backlight 100.” Lamb at [0048]

65. The disclosure of Lamb does not teach that light is reflected into the lighting panel and recycled within the diffuser sheet. Therefore, Lamb, nor the combination of Lamb and Epstein disclose all elements within Claim 1G.

E. Epstein Fails to Disclose “the light extraction features are random features” of Claim 10

66. Petitioner concedes that Epstein does not disclose this element of Claim 10. Petition, at 49. Petitioner only argues that “it would’ve been obvious to a POSITA to modify the exemplary embodiments shown to include other light extraction features, including ones that randomize light.” *Id.*

67. However, I disagree with Dr. Pattison that it's obvious to a POSITA to include other light extraction features, including ones "that randomize light" to a combination (however that could be done) of Lamb and Epstein since adding one more light extraction component to that mess would only add further inefficiencies.

F. Epstein Fails to Disclose that the BEF is “configured to limit direct emission...to thereby encourage light recycling/diffusion in the lighting panel” of Claim 11

68. Petitioner concedes that Epstein does not disclose this element of Claim 11. The only function of a BEF in Epstein is to orient light in a direction more parallel to axis 666. This function is simply a re-orientation of the light to be more normal to the surface of the display. There is no mention of the BEF reflecting or limiting direct emissions. Further, the reflector polarizer described by Petitioner is not disclosed as a BEF in Epstein. The reflective polarizer is a layer above the light emitting components, namely either the guiding layer or the intermediate layer, not the BEF. It is not obvious to POSITA to include features of Lamb's brightness enhancement components in a system with Epstein since Lamb's light guides are

edge lit and therefore entirely different in operation than any optical design based around Epstein's back lit LED system.

69. Likewise, as discussed above, a POSITA would not be motivated to combine Lamb with Epstein. Lamb employs several more elements than the '835 Patent to accomplish recycling/diffusion in the lighting panel. The system described in Lamb is, again, an edge lighting system, not a back lighting system. Petitioner chooses to avoid referencing the figures of Lamb as this distinction would be immediately apparent if it had. Lamb's multi-stage lighting system is not readily combinable with a back lighting system such as that of Epstein because a POSITA could not make a functional system from two incompatible systems as shown below.

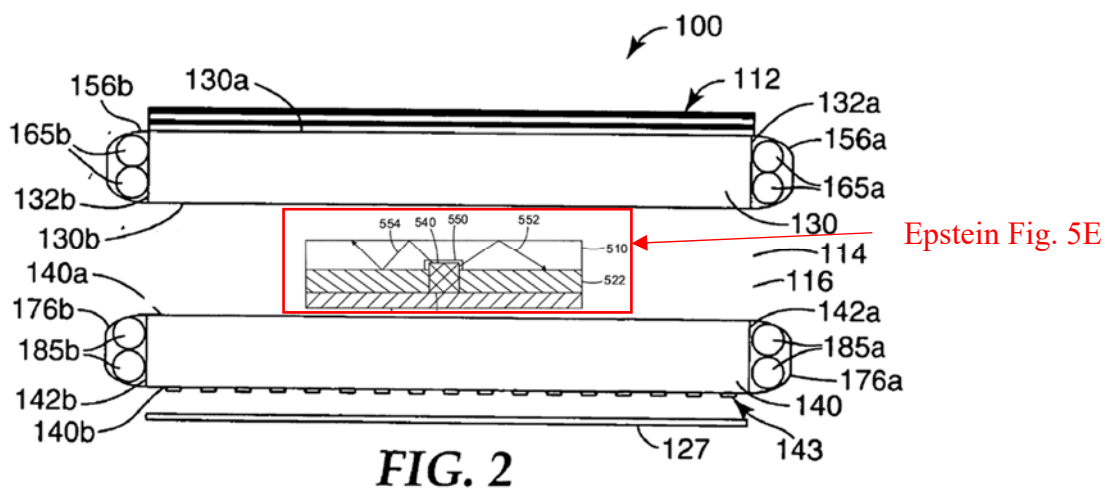


FIG. 2 of Lamb combined with Fig. 5E of Epstein

X. GROUND 3 - PETITIONER’S KO, KRETMAN, AND EPSTEIN COMBINATION FAILS TO RENDER OBVIOUS INDEPENDENT CLAIM 1.

70. Petitioner relies on Ko as its primary reference for Gound 3. But Petitioner fails to demonstrate that a POSITA would be motivated to combine Epstein with Ko and Kretman, nor demonstrate that the combination of Ko, Kretman and Epstein teach or render obvious claim 1.

A. Ko Fails to Disclose Claim Elements 1B & 1C “solid state lighting devices arranged...” and “a reflector on the first side of a substrate”

71. Figure 1 of Ko is the only figure that describes a reflector. Ko describes its reflector as follows:

The backlight 112 may also include a reflector 118 for reflecting light propagating downwards from the light sources 116, in a direction away from the LCD panel 102. The reflector 118 may also be useful for recycling light within the display device 100, as is explained below. The reflector 118 may be a specular reflector or may be a diffuse reflector. One example of a specular reflector that may be used as the reflector 118 is Vikuiti™ Enhanced Specular Reflection (ESR) film available from 3M Company, St. Paul, Minn. Examples of suitable diffuse reflectors include polymers, such as polyethylene terephthalate (PET), polycarbonate (PC), polypropylene, polystyrene and the like, loaded with diffusely reflective particles, such as titanium dioxide, barium sulphate, calcium carbonate and the like. Ko at [0043]

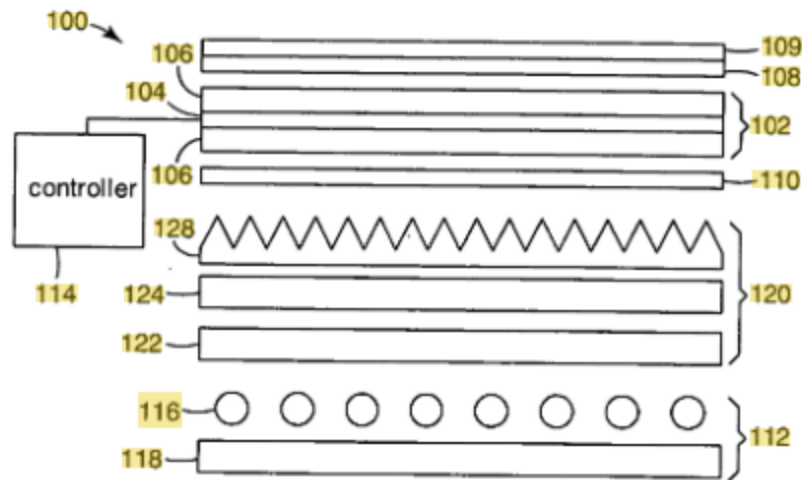


FIG. 1

The reflector as described in Ko is not disposed on a substrate.

72. Ko specifically describes the purpose of the reflector as being for "reflecting light propagating downwards from the light sources" Ko at [0043]. In order for the light to propagate downwards, the light sources must either, in the case of a limited emission angle light source, be directed downwards or, in the case of a 360-degree angle CCFL light source as shown in Ko's Fig 1 above, be suspended above the reflector.

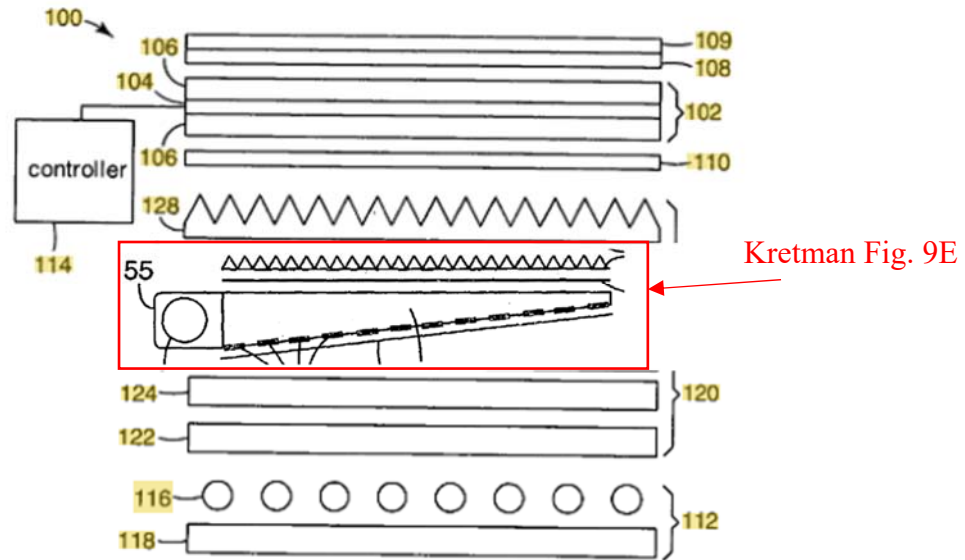
73. In Ko, the arrangement of the light sources with respect to the reflector teaches away from an arrangement wherein the light sources and the reflector are both mounted to a substrate that is "parallel to a principal plane of the lighting panel" as claimed in Claim 1 of the '835 Patent.

74. Petitioner appears to concede that Ko does not includes these elements an relies on Kretman. Petition, at 56-57. Kretman, or Kretman with Ko do not teach

the relevant features of the reflector described in the '835 patent. The figures of Kretman relevant to the reflector arrangement on the substrate are figures 9A-F.

75. In Kretman, Figure 9A and 9E below depicts a side lighting or edge lighting arrangement with CCFLs similar to that described in Ground 1 by Lamb. As with Lamb, a POSITA would not be motivated to combine a non-analogous CCFL based edge lighting arrangement with a direct back lighting arrangement like Ko because it makes no sense, adds inefficiencies and wouldn't work with the two different optical systems and light guides. A POSITA would know that there is no advantage in this kind of combination. A POSITA would know that you can't combine edge lit with direct lit because edge lit needs to make a 90 degree turn in its light guide (52 below) and direct or back lit devices don't need a light guide. Inserting Kretman's light guide anywhere into Ko would just block Ko's light as shown in a combination figure below.

76. Kretman is an edge lit device with fluorescent tubes (CCFL), therefore there is no place that you can mount LEDs in a way that would function. Ko's CCFL are mounted above the reflector where they will block Epstein's LEDs. Additionally, CCFLs are much larger and clumsier than LEDs and CCFLs require a separate, high voltage power supply incompatible with LEDs. For further illustration, inserting Kretman's light guide anywhere into Ko would just block Ko's light as shown in a combination figure below.



Ko Fig. 1 + Kretman Fig. 9E

77. Petitioner cites Fig. 9C of Kretman in its petition. Petition, at 58. This figure further demonstrates teaching away from the claimed invention of the '835 Patent as Fig. 9C illustrates light emitting diodes 24 mounted to emit light downwards towards a reflector that will scatter the light into a brightness enhancing film 10.

B. A POSITA Would Not Be Motivated to Combine Epstein with Ko and/or Kretman to meet Claim Elements 1B & 1C “solid state lighting devices arranged...” and “a reflector on the first side of a substrate”

78. Petitioner apparently concedes that neither Ko nor Kretman sufficiently disclose claim elements 1B & 1C. Petition, at 58. However, Epstein is not combinable with Kretman and/or Ko.

79. Epstein describes an array of LEDs on a substrate over which an intermediate layer and a guiding layer are arranged. The LEDs of Epstein function

to emit light upwards, in such an arrangement the features of Ko and Kretman would be non-operative. The way in which the CCFL light sources of Kretman and Ko would have to receive power would be non-functional if applied to Epstein and the reflective features of Epstein would be nonfunctional if the LEDs were arranged as described in Ko and Kretman who only show CCFLs and not LEDs.

80. Petitioner's argument for this combination does not in any way describe how such a combination would function. The combination would, in fact, require a complete re-engineering of the backlighting panel in a way that is non-obvious to a POSITA who knows that you can't combine edge lit with direct lit because edge lit needs 90 degree turn in its optics and direct lit doesn't.

C. The Combination of Ko, Kretman and Epstein Fail to Disclose Claim 1D “a brightness enhancement film on the reflector.”

81. Additionally, the combination of Ko, Kretman and Epstein fail to disclose an arrangement such as the one described in Figure 5a of the '835 patent wherein a diffuser sheet is in contact with the reflector.

82. Figure 1 of Ko is the only figure that includes a reflector, the reflector 118 is not in contact with the diffuser. The relevant figure of Kretman, figure 9C does not include a diffuser but the arrangement of elements in the referenced figure 9E prevents a diffuser from being mounted in contact with the reflector.

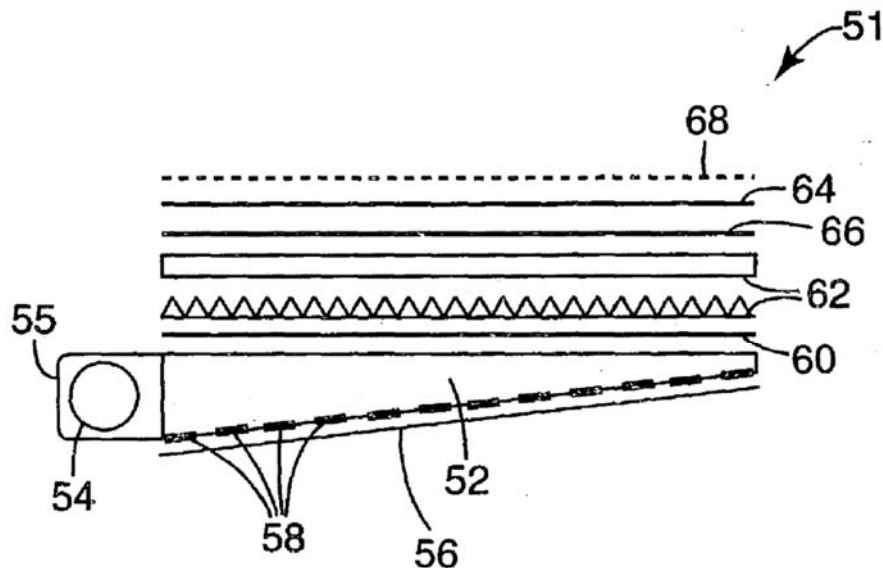


Fig. 9E

Neither Kretman nor Ko could meet this element.

83. The element that could be construed as a reflector in Epstein, the intermediate layer, is separated from the other layers by a guiding layer. All of the figures in Epstein that reference what could be construed as a diffuser (diffusely reflecting material) show that element separated from the reflector by some distance.

D. The Combination of Ko, Kretman and Epstein Fail to Disclose Claim 1F “...preferentially emit light having a first orientation from the lighting panel and preferentially reflect light having a second orientation back into the lighting panel.”

84. Petitioner references Ko's brightness enhancing layer “which has a number of prismatic ridges that redirect the illumination light, through refraction and reflection.” Petition, at 61. Petitioner selectively quotes Ko to omit the previous

sentence which contextualizes this statement. The description in context is as follows:

"A brightness enhancing layer is one that includes a surface structure that redirects off-axis light in a direction closer to the axis of the display. This increases the amount of light propagating on-axis through the LC layer 104, thus increasing the brightness of the image seen by the viewer. One example is a prismatic brightness enhancing layer, which has a number of prismatic ridges that redirect the illumination light, through refraction and reflection." Ko at [0051]

85. This section describes redirecting/collimating the emitted light towards the liquid crystal layer and not reflecting light back towards diffuser, reflector and light sources which becomes apparent on a more fulsome reading of Ko. Ko employs a reflecting polarizer to accomplish the described light reflecting, not a BEF as described in the '835 patent.

*"**The reflecting polarizer** 124, however, may be used to reflect the light that would otherwise be absorbed in the lower absorbing polarizer, and so this light may be recycled by reflection between the reflecting polarizer 124 and the reflector 118. At least some of the light reflected by the reflecting polarizer 124 may be depolarized, and subsequently returned to the reflecting polarizer 124 in a polarization state that is transmitted through the reflecting polarizer 124 and the lower absorbing polarizer 110 to the LC layer 104. In this manner, **the reflecting polarizer** 124 may be used to increase the fraction of light emitted by the light sources 116 that reaches the LC layer 104, and so the image produced by the display device 100 is brighter."*

Ko at [0045] (emphasis added)

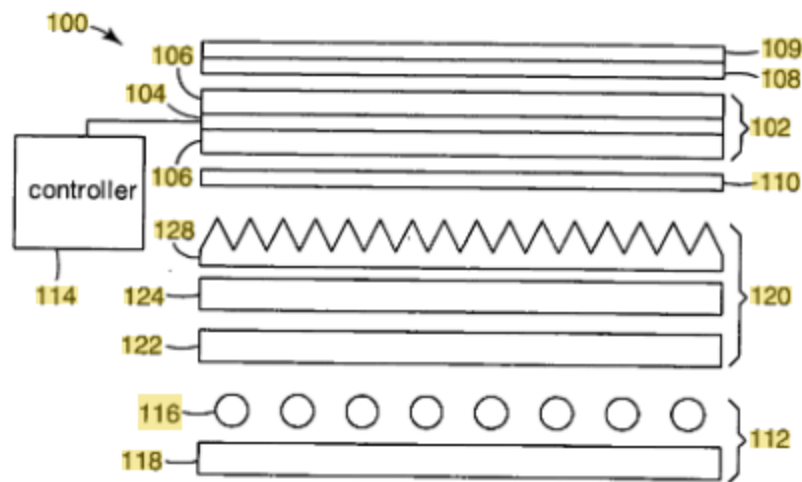
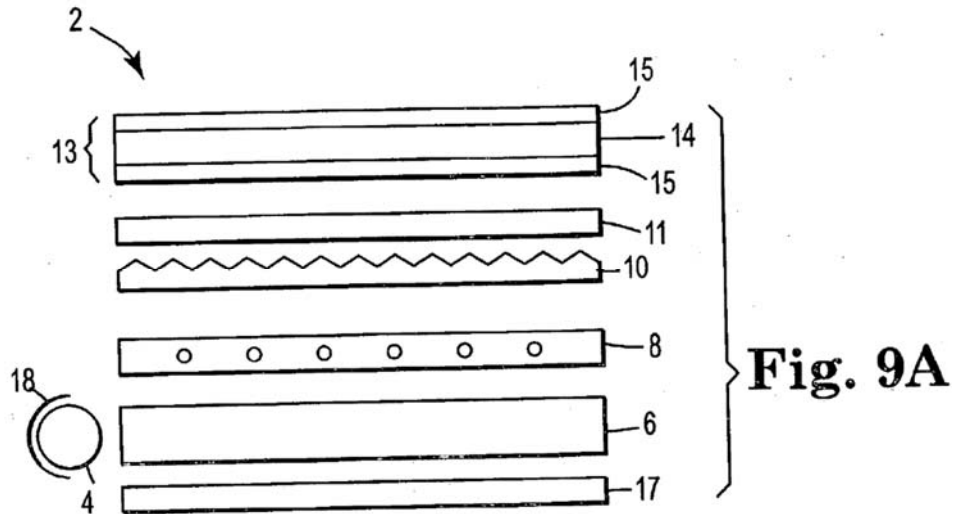


FIG. 1

86. Ko employs several polarizers (e.g. a reflecting polarizer and a lower absorbing polarizer) to accomplish what the '835 Patent describes using solely the BEF. Thus, Ko does not render the recycling function of the BEF of the '835 patent obvious.

87. Petitioner advances Kretman as an alternative to render these features obvious. Petition, at 61. Petitioner relies on Figure 9A of Kretman for this assertion. *Id.* For the reasons outlined above, the edge lighting CCFL arrangement of Kretman figure 9A is not combinable with a back lighting LED or CCFL apparatus. Kretman is non-analogous to the '835 Patent and a POSITA would not use this combination due to at least the basic incompatibility of edge lit versus back lit devices.



E. Ko fails to disclose Claim 1G “a generally planar diffuser sheet between the reflector and the brightness enhancement film, wherein the light having the second orientation that is reflected back into the lighting panel is reflected within at least the diffuser sheet.”

88. However, as described above, Ko accomplishes light recycling through a series of polarizers, not the BEF. The arrangement detailed in Ko employs a reflecting polarizer to either emit or reflect light depending on its state of polarization. This is an entirely different arrangement than that described in the '835 patent which reflects and recycles light at the BEF. Again, Ko uses several polarizers to accomplish what the '835 patent discloses with solely the BEF.

F. Ko and Kretman alone or in combination fail to disclose Claim 11 “The lighting panel of claim 9, wherein the brightness enhancement film is configured to limit direct emission from the lighting panel of light emitted by the plurality of solid-state light emitting devices to thereby encourage light recycling/diffusion in the lighting panel.”

89. Petitioner relies on the combination of Ko and Kretman to allege that a brightness enhancement film configured to limit direct emission from the lighting

panel of light emitted by the plurality of solid state light emitting devices to thereby encourage light recycling/diffusion in the lighting panel would have been obvious at the time of the priority date of the '835 patent.

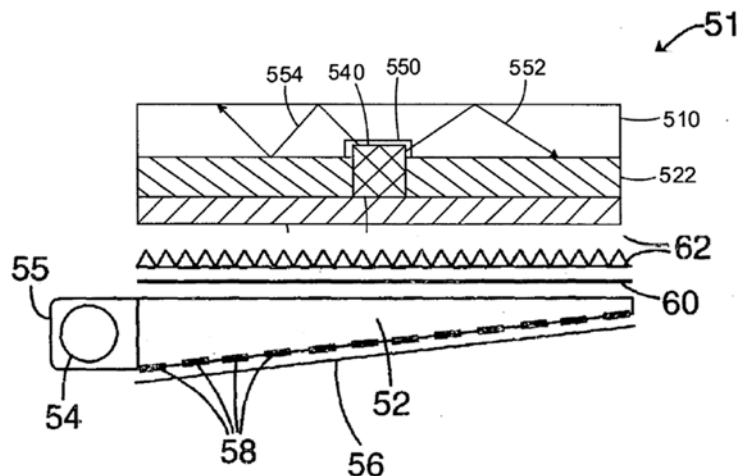
90. As discussed earlier, Ko does not describe a BEF that preferentially emits light having a certain incident angle. Rather, it describes a brightness enhancing layer as "one that includes a surface structure that redirects off-axis light in a direction closer to the axis of the display." Ko, at [0051]. This increases the amount of light propagating on-axis through the LC layer 104, thus increasing the brightness of the image seen by the viewer. One example is a prismatic brightness enhancing layer, which has a number of prismatic ridges that redirect the illumination light, through refraction and reflection."

91. This is merely describing re-orientation or collimating of the light to be more normal to the surface of the display, not recycling the light. Claim 1 does not claim collimating light. Claim 4 adds a separate layer intended to collimate light. Ref FIG. 5B

92. Petitioner also again relies on Ko's implementation of a reflective polarizer, as stated above, this is inappropriate and does not render obvious claim 11 of the '835 patent. Petitioner attempts to ameliorate this shortcoming by citing the claim language of Ko which intimate that the diffuser plate and reflective polarizer elements may be attached to the brightness enhancing layer. This is irrelevant as they

are separate elements. Attaching them together does not create the system of the '835 patent which accomplishes light recycling via its BEF not a combination of disparate elements as in Ko.

93. Petitioner's reliance on Kretman is similarly misplaced. Again, Kretman describes a system that is entirely different than the one disclosed in the '835 patent. Petitioner chooses to avoid referencing the figures of Kretman as this distinction would be immediately apparent if it had. Kretman's edge lighting and back scattering systems are not readily combinable with a back lighting system because Kretman's optical design and its associated light guide would block the back mounted LED's light or if the LED is mounted first the LED's substrate blocks light and neither combination works and is incompatible with LED backlights. The potential combination of Epstein and Kretman below illustrates this problem.



- G. Kretman and Epstein alone or in combination fail to disclose claim 14 “The lighting panel of claim 1, further comprising a heatsink panel on a second side of the at least one substrate**

opposite to the first side and configured to draw heat away from the at least one substrate in a direction opposite to a direction of light emission from the at least one substrate.

94. Petitioner relies on the combination of Kretman and Epstein to allege that a heatsink panel coupled to the second side of the substrate and configured to draw heat away from the at least one substrate in a direction opposite to a direction of light emission would have been obvious by the priority date of the '835 patent.

95. Kretman's CCFLs do not use heat sinks nor does he describe a heat sink apparatus as detailed in the '835 patent:

“[T]he lighting panel 40 may further include a heatsink panel 80 provided on a side of the tiles 10 opposite to the lighting elements 12. Thus, heat may be extracted from the lighting panel 40 in a direction opposite to the direction of light emission...The heatsink features 82 may be positioned opposite the lighting elements 12.” ‘835 Patent, col.12:54-56.

96. Kretman in the relevant section cited by Petitioner, reads as follows:

"One embodiment of the present invention, a sign cabinet, is shown in FIG. 10. The sign cabinet 30 includes an image on film 32 (such as PANAFLEX™ available from 3M) attached as the front panel of a box 33 having the other sides 34 made of an inexpensive and heat resistant material such as aluminum. The box 30 contains a light source 36 able to provide sufficient light to illuminate the imaged film over a prolonged period of time." Kretman, [0094]

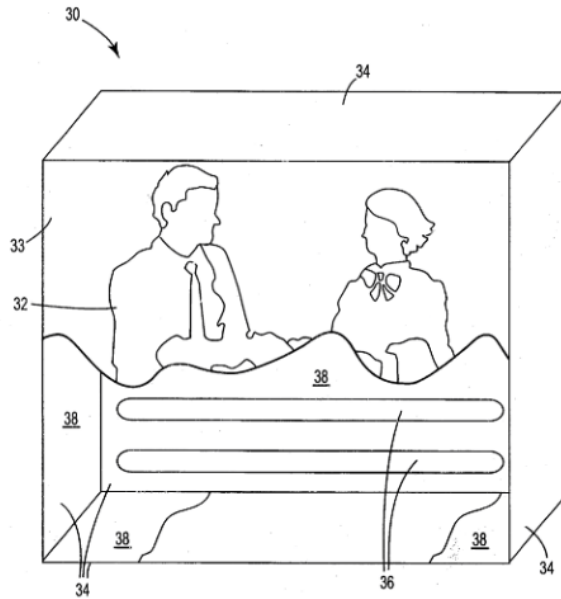


Fig. 10

97. Accordingly, Kretman's Fig. 10 describes a sign, potentially for outdoor usage where the external metal box is merely a housing which protects against the elements not used as a heat sink for internal electronics.

98. Petitioner is implying that building the sides of a box out of metal is equivalent to employing a heatsink. That this is false should be immediately obvious. A heat sink only works to cool an IC or LED chip when there is a low heat resistance path from the LED's die substrate to the so-called heat sink which is then configured to be cooled by air flow or by some other coolant. Merely having a die to be cooled near something metal does not work any better than it would work to cool Kretman's CCFL which do not use heat sinks which would be incompatible with glass CCFL tubes.

99. The panel sides of Kretman are not disposed on the side of the substrate opposite the lighting elements, there is no indication that they are even attached to the substrate. A POSITA would know that having a metallic layer on the opposite side of an LED's insulating substrate 408 as shown in Epstein's 4E could not act as a heat sink because there is no low heat resistance path from the LED's die to that metal layer. All of Kretman's figures like Fig. 9E below show CCFLs (54 below) which cannot be cooled with any kind of heat sink, relying solely on-air flow around the glass tube 54.

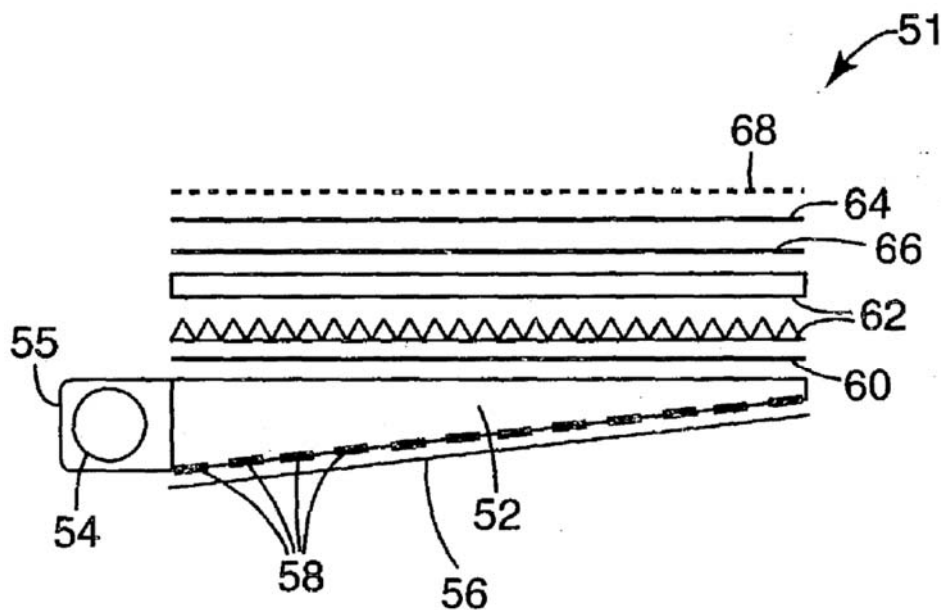
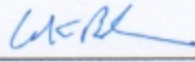


Fig. 9E

100. I declare that all statements made herein of my own knowledge are true, and that all statements made on information and belief are believed to be true; and that these statements were made with the knowledge that willful false statements and

the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

Dated October 25, 2023

By 
William K. Bohannon,