IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

HISENSE INTERNATIONAL CO. LTD., HISENSE INTERNATIONAL (HONG KONG) AMERICA INVESTMENTS CO. LTD.,

Petitioners,

v.

VISTA PEAK VENTURES, LLC,
Patent Owner.

DECLARATION OF RICHARD A. FLASCK

February 28, 2023

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I, Richard A. Flasck, declare as follows.

I. INTRODUCTION

1. I have been retained by Hisense International Co. Ltd and Hisense International (Hong Kong) America Investments Co. Ltd. ("Hisense" or "Petitioners") through its counsel Winston & Strawn LLP as a technical expert witness in connection with the Hisense petition for *inter partes* review of U.S. Patent No. 6,513,943, entitled "BACKLIGHT UNIT AND DISPLAY DEVICE USING THE SAME BACKLIGHT UNIT" ("the '943 Patent") (Ex. 1001), which is assigned to NEC Corporation ("Patent Owner"). I have been asked by Petitioners to offer my analyses and opinions regarding whether the issued claims of the '943 Patent are patentable and valid over prior art. This Declaration sets forth my analyses of the '943 Patent and certain prior-art references and the opinions I have reached based on my analyses. I have concluded that claims 1–2, 4-6, 8, and 10-11 are either anticipated or obvious and not patentable over the prior-art references cited and analyzed below.

2. In preparing this Declaration, I have reviewed the '943 Patent, the prosecution history, and each of the documents I reference here. In reaching my opinions, I have relied upon my experience in the field of liquid-crystal display (LCD) and LCD backlight unit (BLU) design and have considered the viewpoint of a person of ordinary skill in the art at the time of the '943 Patent's priority date. As explained below, I am familiar with the level of skill of a person of ordinary skill in the art regarding the technology at issue as of that time frame. My opinions expressed in this Declaration are based on documents and materials identified in this Declaration, including the '943 Patent, the prior-art references and background materials discussed in this Declaration, and any other references specifically identified in this Declaration. I have considered these materials in their entirety, even if only portions are discussed here.

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3. My opinions expressed in this Declaration are based on documents and materials identified in this Declaration, including the '943 Patent, the prior-art references and background materials discussed in this Declaration, and any other references specifically identified in this Declaration. I have considered these materials in their entirety, even if only portions are discussed here.

4. I have considered a number of prior-art references, including the ones listed in the references listed in the exhibit list of the Hisense IPR Petition.

5. I have also relied on my own experience and expertise in display technologies, including specifically LCD displays and their backlighting units (BLUs).

6. All exhibit numbers used in this Declaration refer to exhibits to Petitioners' IPR Petition.

7. I am being compensated at a rate of $395/hour by Petitioners for my work in connection with this Declaration. The compensation is not contingent upon my performance, the outcome of the IPR or any other proceeding, or any issues involved in or related to the IPR.

II. BACKGROUND AND QUALIFICATIONS

8. My qualifications for forming the opinions set forth in this Declaration are summarized here and explained in more detail in my curriculum vitae, which is submitted as an exhibit to Petitioners' IPR Petition.

9. I received a Bachelor of Science degree in physics from the University of Michigan, Ann Arbor, in 1970. I thereafter received a Master of Science degree in physics from Oakland University in Rochester, Michigan, in 1976. I am the founder and CEO of RAF Electronics Corp., where I developed and patented liquid crystal on silicon (LCOS) microdisplay projection technology and LED-based lighting products.

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10. After receiving my bachelor's degree, I was employed as a scientist and a manager by Energy Conversion Devices, Inc. from 1970 through 1982. My work at Energy Conversion Devices concerned the development of thin-film photovoltaics, ablative imaging films, nonvolatile memory, multi-chip modules, superconducting materials, electroluminescent materials, and thin-film transistors (TFTs).

11. After leaving Energy Conversion Devices, I founded and served as CEO of Alphasil, Inc., where I developed amorphous silicon thin-film transistor (TFT) active-matrix liquid-crystal displays (AMLCDs). My work at Alphasil included TFT process and circuit design, data driver and gate driver design, scalers, video circuits, gamma correction circuits, backlighting unit (BLU), and inverter design. I worked at Alphasil from 1982 through 1989.

12. After leaving Alphasil, I founded RAF Electronics Corp., described above. I have served as CEO of RAF Electronics since that time. In 1997, I took the position of president and COO at Alien Technology Corporation, where I was responsible for completing a Defense Advanced Research Projects Agency (DARPA) contract, and for implementing MEM fluidic self-assembly (FSA) technology for use in flat panel displays and RFID tags. I left the position in 1999.

13. In 2002, I cofounded and served as COO of Diablo Optics, Inc., where I developed, produced, and commercialized key optical components for HDTV projectors, such as polarization optics, condenser lenses, projection lenses, and ultrahigh-performance optical interference filters using thin-film stacks in conjunction with LED devices and microdisplays. I left Diablo in 2007.

14. Regarding backlight units (BLUs) for liquid-crystal displays (LCDs), specifically, my experience is as follows: In the mid-1980s, I designed and developed LCD BLUs using cold cathode fluorescent lamps (CCFLs). This activity included the configuration, design, and

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incorporation of the lamps, BLU housing, reflector, diffusers, and lens sheets (also known as brightness enhancement films (BEFs), lenticular lens sheets, or prism sheets). The activity also included the design and implementation of the power supplies and control electronics for the CCFL BLU lamps. This work resulted in U.S. Patent No. 4,824,378. Beginning around 2000, I developed several LED-based products, including LED-based BLUs for LCDs.

15. I am listed as an inventor on twenty-six patents issued in the United States and foreign countries, including one United States design patent. My inventions concern technologies including LCD, LED devices, semiconductor materials, glass materials, nonvolatile memory cells, thin-film transistors, flat-panel backplanes and displays, and wafer-based active matrices.

16. I have authored or coauthored twenty-five articles or conference presentations, including numerous papers and presentations concerning lighting and display technologies. My curriculum vitae lists these articles and conference presentations.

III. BRIEF HISTORY OF DISPLAY TECHNOLOGY

17. The cathode ray tube (CRT) was the dominant display device from the 1940s through the end of the last century. The CRT relies on raster-scanning a focused electron beam inside a large vacuum tube, allowing the beam to impinge on a phosphor coating on the inner surface of the tube. The phosphor emits light in proportion to the electron beam intensity. Pictures are thus drawn on the inner surface of the CRT with an electron beam of modulated intensity.

18. During the 1970s, interest began to arise in finding a "flat panel" technology to supplant the large, heavy CRT displays. Many technologies were pursued, including electroluminescent, electrochromic, electrophoretic, vacuum fluorescent, plasma, liquid crystal, and others. By 1990, liquid-crystal displays (LCD) began emerging as the winning technology to supplant the CRT in most commercial and consumer applications. The first LCDs were low-segment-count, direct-driven displays, such as wristwatch and calculator displays. Each segment

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had a common upper electrode and a patterned lower electrode. These electrodes were continuously actively driven. Each segment required a separate dedicated conductor running to the segment. While this was feasible for low-information-content displays, passive and active matrix LCDs were required for higher-pixel-count display devices. Active matrix generally has brightness, contrast, response time, and viewing-angle advantages over passive matrix.

19. Although there are exceptions, most commercial LCD displays comprise two outer polarizer sheets, with a glass plate adjacent to each polarizer. The inner surfaces of the glass plates have transparent indium-tin-oxide (ITO) conductive electrodes. The small gap (usually 1 to 5 micrometers) between the ITO electrodes is filled with liquid-crystal material. An epoxy rim seal keeps the liquid-crystal material in place.

20. There are several types of liquid-crystal material, and generally several modes in which each type of liquid-crystal material can be used. The types of liquid-crystal materials include twisted nematic (TN), Electrically Controllable Birefringent (ECB), cholesteric, smectic, and ferroelectric, among others. Various modes include 90º twist, super (270º) twist, Polymer Dispersed (PDLC), vertically aligned (VA), In Plane Switching (IPS), Hybrid Aligned (HAN), bi-stable, normally white and normally black.

21. The industry has migrated from direct-driven segmented watch and calculator displays to active-matrix thin-film transistor (TFT) LCDs. Consumer demand has continually grown.

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IV. ACTIVE-MATRIX LIQUID CRYSTAL DISPLAYS (AMLCDS)

22. Most LCD-based monitors and televisions today use active-matrix liquid-crystal display (AMLCD) technology with Thin Film Transistors (TFTs)[1]. AMLCDs use TN with a 90° twist, or a vertically aligned (VA) ECB with negative dielectric constant anisotropy operating in the normally black mode, or In Plane Switching (IPS). Common to each of these modes is the fact that the light transmission at each pixel (picture element) is controlled by the voltage across the pixel electrodes. In the early 2000s, most liquid-crystal displays used the TN mode.

23. "Color TFT LCDs are turning up everywhere these days. The color TFT display, a light, slender display, with a beautiful image that does not tire the eyes even when viewed for hours at a time, is finding its way into many products, even in demanding environments, like the dashboard of a car. Because the color TFT display is an LCD (liquid crystal display) panel incorporating thin film transistors, it can reproduce a wider range of colors than can competing technologies. The color TFT shows extremely uniform brightness, with no color degradation or distortion, even in the corners of the screen." Pg. 1, *Color TFT Liquid Crystal Displays*, by Teruhiko Yamazaki, Hideaki Kawakami and Hiroo Hori (Semiconductor Equipment and Materials International), 1996, ASIN B0728FCK38 ("1996 Yamazaki").

24. "The momentum the LCD industry has gained is difficult to supplant by alternative flat panel technologies. Even if, on paper, they may have advantages over LCDs." Pg. 7, *Active Matrix Liquid Crystal Displays: Fundamentals and Applications*, Willem den Boer, (Newnes-Elsevier, 2005) ISBN-13:978-0-7506-7813-1 ("2005 den Boer").

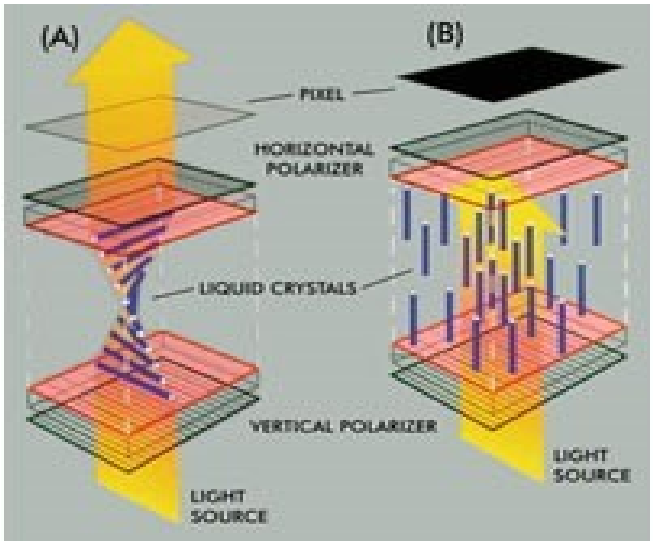
[1] In addition to LCD displays, various commercial displays for smartphones, computers, television sets, and other devices use organic light-emitting diodes (OLEDs) that directly emit colored light for displaying images.

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25. The quotes above testify to the fact that by the early 2000s POSITAS were well aware of the basic structure and operating principles of the ubiquitous active-matrix liquid-crystal display (AMLCD). Hereinbelow is a summary of that technology.

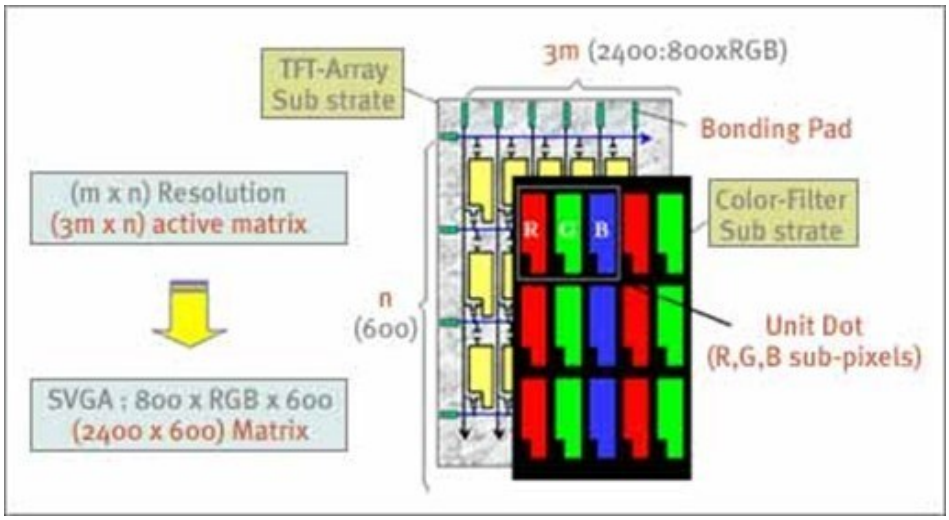
26. Liquid-crystal materials (LCMs) are unusual liquids that exhibit stable states with long range order, wherein the stable state can be determined by the strength of the imposed electric field. These stable states can exhibit differing optical properties. These differing optical properties are exploited to vary the transmission of small segments (pixels or picture elements) of the display by application of an electric field.

27. A typical AMLCD comprises an array of color pixels. Each color pixel can comprise color subpixels, usually red, green, and blue. At each subpixel is a sample and hold circuit, addressed by a thin-film transistor, wherein the voltage across the LCM is held by a storage capacitor. Each subpixel acts like a variable shutter, allowing a level of light transmission based on the voltage across the LCM, as shown below. In the figure below, on the left there is no voltage and all light is allowed to pass. On the right, full voltage is applied and no light is allowed to pass. At intermediate voltages, an intermediate level of light is allowed to pass.



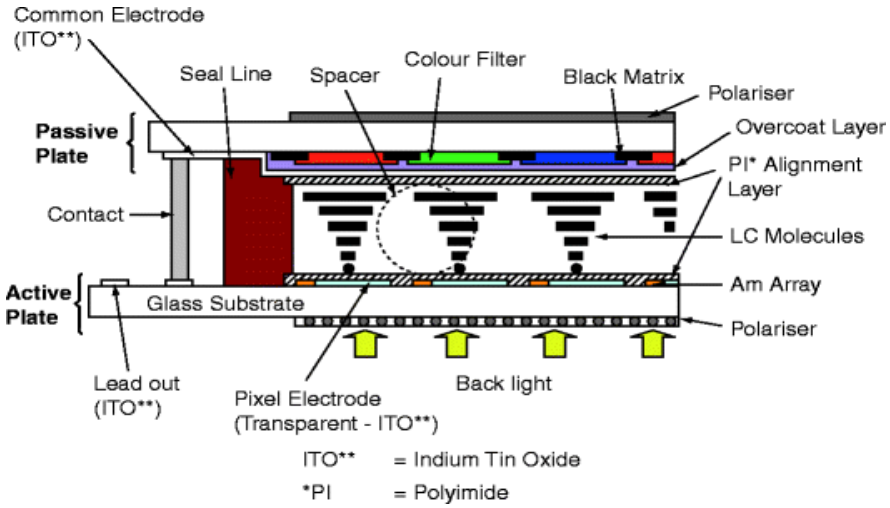
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28. Each color pixel is usually organized as three or more subpixels: for example, one red, one green, and one blue in various color pixel designs. The color produced by each pixel is determined by the color filter patch over each subpixel, as shown below:

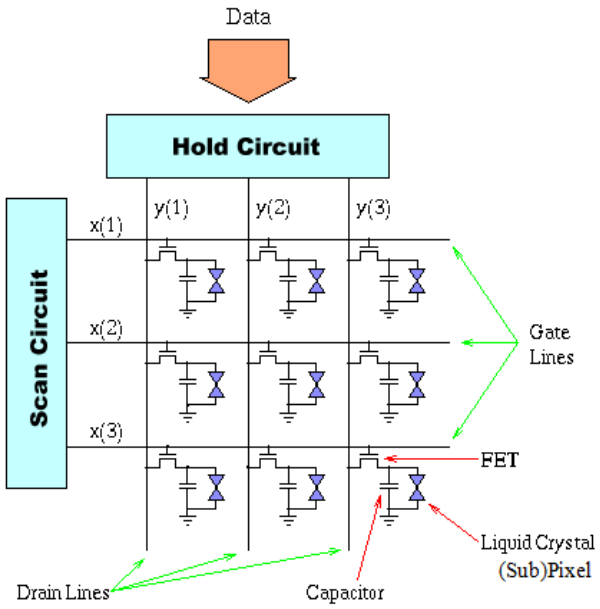


29. The specific color perceived by the human eye (including white) is determined by the proportions of red, green, and blue light transmitted by each pixel.

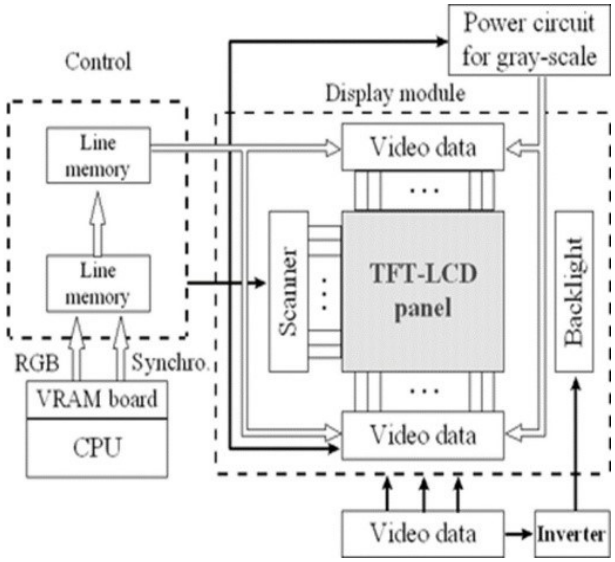
30. As previously mentioned, each subpixel circuit comprises a thin-film transistor (TFT), a capacitor, and the LCM between the upper and lower pixel electrode. Below is a typical cross-section of a pixel comprising three color subpixels:



31. I include a figure below to illustrate a typical electrical diagram of the TFT active matrix:



32. I further include below a block diagram of an AMLCD device:

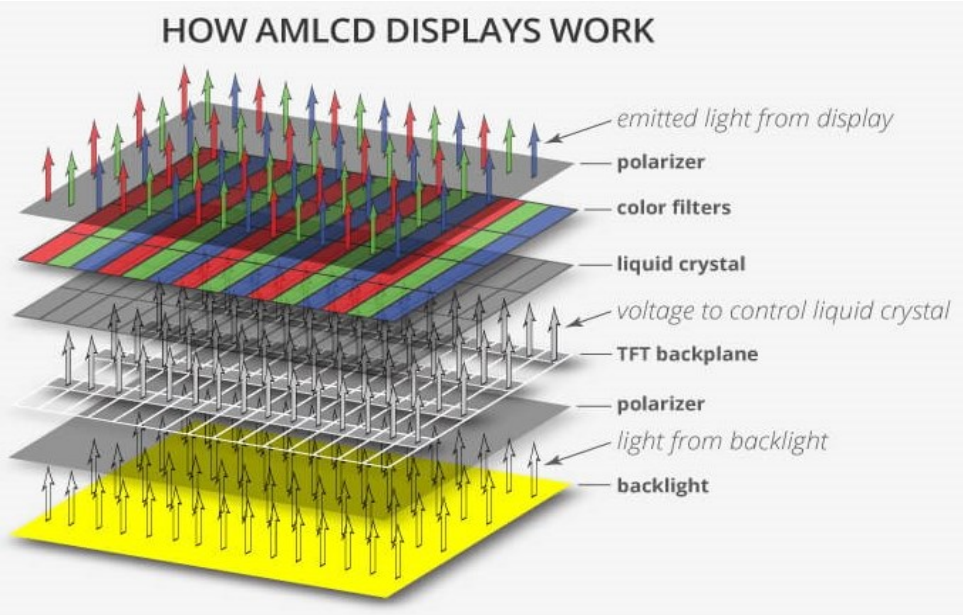


33. Brightness information is loaded into the matrix one line (row) at a time. After the scan drive selects a line, the data driver sends the brightness voltage down all the data lines

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simultaneously to program each pixel capacitor on the line with the correct pixel brightness voltage. Then the selected line is deselected and the next line is selected for writing.

The physical structure of the typical AMLDC is shown below:



34. The AMLCD is a non-emissive technology where the pixels control the light passing through, rather than generating light. Therefore, virtually all AMLCDs comprise a backlight unit (BLU) as indicated in several of the images above.

V. BACKLIGHT UNIT (BLU)

35. Each AMLCD module has a BLU located below the AMLCD panel. The BLU provides the light that is modulated by each pixel. There are two generic types of BLUs: direct (or full array) BLUs and edge-lit BLUs. The two types of BLUs are shown below from 1996 Yamazaki pp. 272–73. The configuration Yamazaki refers to as "Top-down" is known as direct or full array in today's terminology.

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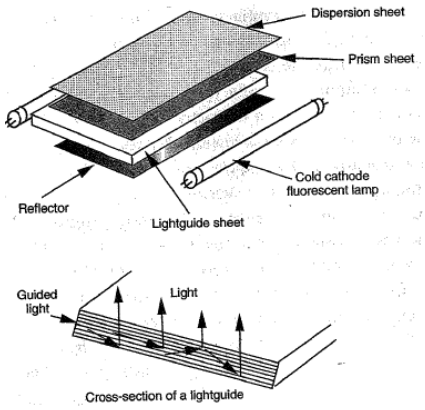


Figure 3.81 Edge illumination unit

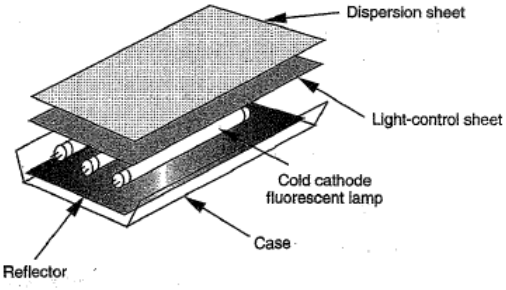


Figure 3.80 Top-down backlight unit

36. Full array BLUs have the light source(s) directly underneath the LCD panel with a dispersion (diffuser) sheet between the light sources and the LCD panel. The edge-lit BLUs have the light sources on one or more sides of a light guide or cavity, with the light being directed into the light guide and then exiting toward the LCD panel above the BLU.

37. In both BLU configurations, there is a diffuser plate between the light sources and the LCD panel. "Most AMLCDs operate in the transmissive mode. **They can be considered electronically controlled transparencies on a light box – the backlight.**" Pg. 105, 2005 den Boer. [Emphasis added.]

38. Also, in both BLU configurations, there is a frame holding the BLU components, and a reflector on the bottom of the frame to reflect light back to the AMLCD pixels.

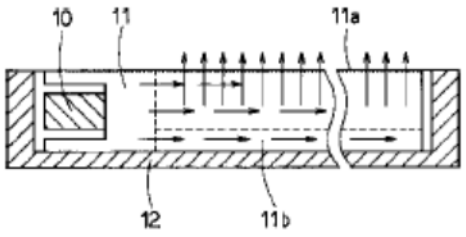
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39. Further, the 1996 Yamazaki states, "Because they have a direct bearing on the performance of the display unit, backlight units are subject to stringent performance requirements as indicated below: … 2) Uniform brightness A minimum uniformity (minimum brightness divided by maximum brightness) of 0.8 is required." 1996 Yamazaki at pp. 274 and 275. Thus, uniform brightness was a well-known desirable feature.

40. Additionally, the desirability of a thin-profile BLU was a well-known, important parameter of BLUs, and substantial work throughout the years went into addressing this issue. For example, BLU thickness was a known issue identified in Kurihara.

41. Starting as early as 1993, JPH06-230378, entitled "BACK LIGHT DEVICE FOR LIQUID CRYSTAL DISPLAY ELEMENT," by Kisoo disclosed edge-lit BLUs having a light guide, diffuser plate, reflector bottom, and casing and using LEDs as light sources. Figure 5 in Kisoo is reproduced below:

【図5】



42. Figure 4 from US Patent 5,485,354 ("Cuipke ") from 1996 below illustrates the basic principles of operation of backlit BLUs.

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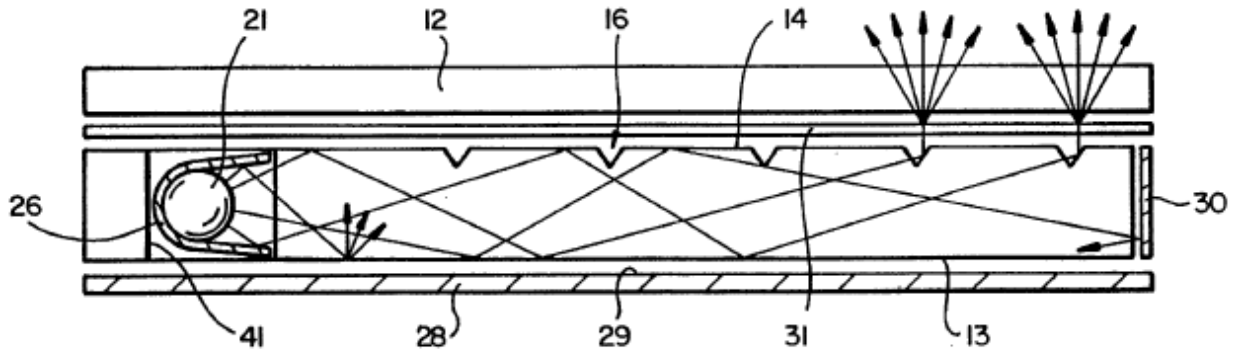


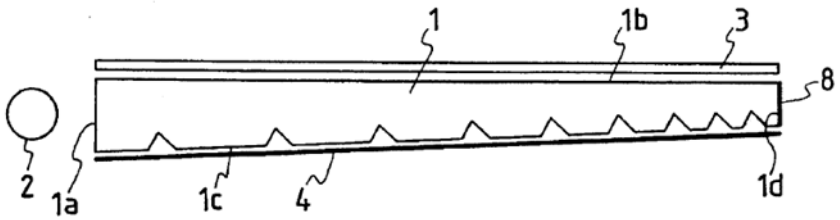
FIG_4

Cuipke US 5,485,354 from 1996

43. Light source 21 injects light into a transparent light guide. Total Internal Reflection (TIR) allows light to propagate down the light guide until a groove, protrusion, or other feature negates the critical angle TIR condition and the light escapes the light guide. Any light exiting the light guide through the bottom is reflected back upwards by the reflective surface 29. The spacing of the grooves can spatially vary to ensure uniform brightness. After exiting the top surface of the light guide, a diffusion film and/or a prismatic lens film 31 tailors the uniformity and viewing angle before the light from the BLU enters the back of the LCD 12.

44. Figure 4 from Ishikawa below is another example of a CCFL-based BLU using a wedged light guide 8, a linear (cold cathode fluorescent lamp (CCFL)) light source 2, a diffuser sheet 3, and a reflector sheet 4.

FIG. 4



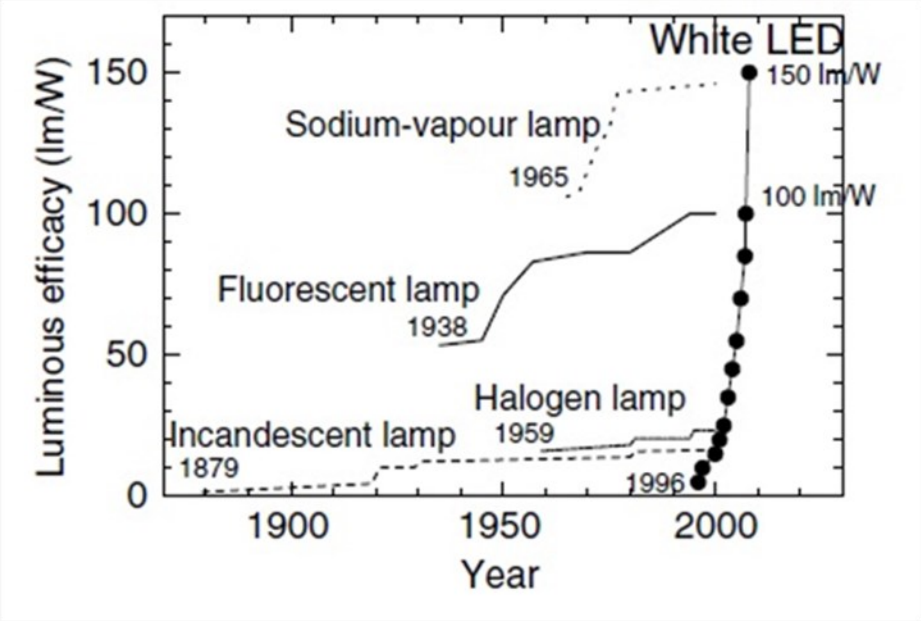
Ishikawa US 5,575,549 from 1996

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45. During the 1990's, the edge-lit CCFL backlight was almost universally used. The CCFLs provided more light using less energy than LEDs (at least in the early 1990's), and provided a thinner profile than direct, full array BLUs.

46. However, in the mid-1990s, LED efficacy and brightness started an exponential rise as phosphor-coated GaN blue LED began reaching the market. See the chart below:

https://phys.org/news/2010-08-white-super-high-luminous-efficacy.html



47. Throughout the 1990s and 2000s, the edge-lit backlight was common. LEDs eventually replaced CCFLs as the light sources because of their higher efficacy, longer life, and lower operating voltage. Starting in the mid-2000s, consumer demand for High Dynamic Range (HDR) ultra-high-contrast displays saw full-array, direct-lit LED BLUs replace the CCFL edge-lit BLUs in TV products.

VI. SCOPE OF DECLARATION AND LEGAL STANDARDS

48. I am not an attorney and will not offer opinions on the law, but I have been instructed in and applied the law as described in this section.

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A. Legal Standard for Prior Art

49. I understand that a patent or other publication must first qualify as prior art before it can be used to invalidate a patent claim.

50. I am informed by counsel that the applicable law in this case for prior art is 35 U.S.C. § 102 as written before the America Invents Act.

51. I understand that the "priority date" of a patent is the date on which it is filed, or the date on which an earlier-filed patent application is filed if the patentee claims it is entitled to the benefit of priority to that earlier-filed patent application. To be entitled to that benefit, I further understand that the earlier-filed application must support the claimed subject matter in the manner required by U.S.C. § 112. I understand that this section requires the patent's specification to contain a sufficient written description of the claimed invention to demonstrate that the applicant actually possessed the invention as of the filing date as broadly as it is claimed. In considering whether this written description requirement is met, I understand that I should consider the written description from the viewpoint of a person of ordinary skill in the art. I also understand that I should consider whether this person of ordinary skill would have recognized that the written description describes the full scope of the claimed invention and that the inventor actually possessed that full scope as of the claimed effective filing date. I understand that a person of ordinary skill would be able to immediately discern the limitations of the claims from the priority specification. I understand that a priority specification may provide inherent support if explicit support is missing. I understand that person of ordinary skill would have understood an element to be inherent if the priority specification requires that element, but inherency cannot be established by probabilities or possibilities. I also understand that the law for priority is not the same as the obviousness analysis under 35 U.S.C. § 103.

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52. I further understand that the priority date is significant because patents, systems, or documents that are public prior to the priority date may invalidate the claims.

53. I understand that a U.S. patent may qualify as prior art to an asserted patent if the date of publication or issuance is prior to the invention in the asserted patent. I further understand that a printed publication, such as a book or an article published in a magazine or trade publication, may qualify as prior art to an asserted patent if the date of publication is prior to the invention of the asserted patent. A paper or presentation may also qualify as prior art if presented at a publicly available seminar, conference, or trade show prior to the invention in the asserted patent.

54. I understand that a U.S. patent or published patent application may qualify as prior art to the asserted patent if the application for that U.S. patent or published patent application was filed in the United States before the invention of the asserted patent.

55. I understand that to qualify as prior art, a reference must contain an enabling disclosure that allows one of ordinary skill to practice the claims without undue experimentation.

56. I understand that documents and materials that qualify as prior art can be used to invalidate a patent claim as anticipated or as obvious.

B. Anticipation

57. I understand that once the claims of a patent have been properly construed, determining anticipation of a patent claim requires a comparison of the properly construed claim language to the prior art on a limitation-by-limitation basis.

58. I understand that a prior art reference "anticipates" an asserted claim, and thus renders the claim invalid, if all elements of the claim are disclosed in that prior art reference, either explicitly or inherently (i.e., necessarily present or implied).

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59. I understand that a patent is anticipated if, before such person's invention thereof, the invention was made in this country by another inventor who had not abandoned, suppressed, or concealed it.

60. I have written this report with the understanding that in an *inter partes* review, anticipation must be shown by a preponderance of the evidence.

C. Obviousness

61. I have been instructed by counsel on the law regarding obviousness, and understand that even if a patent is not anticipated, it is still invalid under 35 U.S.C. § 103, as written before the America Invents Act, if the differences between the claimed subject matter and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person of ordinary skill in the pertinent art.

62. I understand that a person of ordinary skill in the art (POSITA) provides a reference point from which the prior art and claimed invention should be viewed. This reference point prevents a person of ordinary skill from using one's insight or hindsight in deciding whether a claim is obvious.

63. I also understand that an obviousness determination includes the consideration of various factors such as (1) the scope and content of the prior art, (2) the differences between the prior art and the challenged claims, (3) the level of ordinary skill in the pertinent art, and (4) the existence of secondary considerations such as commercial success, long-felt but unresolved needs, failure of others, etc.

64. I am informed that secondary considerations of non-obviousness may include (1) a long-felt but unmet need in the prior art that was satisfied by the invention of the patent, (2) commercial success or lack of commercial success of processes covered by the patent, (3) unexpected results achieved by the invention, (4) praise of the invention by others skilled in the

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art, (5) taking of licenses under the patent by others, and (6) deliberate copying of the invention. I also understand that there must be a relationship or "nexus" between any such secondary indicia and the invention. I further understand that contemporaneous and independent invention by others is a secondary consideration supporting an obviousness determination.

65. I understand that an obviousness evaluation can be based on a combination of multiple prior-art references. I understand that the prior-art references themselves may provide a suggestion, motivation, or reason to combine, but that at other times the link between two or more prior-art references is simple common sense. I further understand that obviousness analysis recognizes that market demand, rather than scientific literature, can drive innovation, and that a motivation to combine references may be supplied by the direction of the marketplace.

66. I understand that if a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill.

67. I also understand that practical and commonsense considerations should guide a proper obviousness analysis, because familiar items may have obvious uses beyond their primary purposes. I further understand that a person of ordinary skill in the art looking to overcome a problem will often be able to fit the teachings of multiple publications together like pieces of a puzzle, although the prior art need not be like two puzzle pieces that must fit perfectly together. I understand that obviousness analysis therefore considers the inferences and creative steps that a person of ordinary skill in the art would employ under the circumstances.

68. I understand that a particular combination may be proved obvious by showing that it was obvious to try the combination. For example, when there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of

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ordinary skill has good reason to pursue the known options within his or her technical grasp because the result is likely the product not of innovation but of ordinary skill and common sense.

69. I understand that the combination of familiar elements according to known methods may be proven obvious when it does no more than yield predictable results. When a work is available in one field of endeavor, design incentives and other market forces can prompt variations of it, either in the same field or in a different one. If a person of ordinary skill can implement a predictable variation, obviousness likely bars its patentability.

70. It is further my understanding that a proper obviousness analysis focuses on what was known or obvious to a person of ordinary skill in the art, not just the patentee. Accordingly, I understand that any need or problem known in the field of endeavor at the time of invention and addressed by the patent can provide a reason for combining the elements in the manner claimed. Additionally, a reference outside the field of endeavor may still be prior art if the reference is reasonably pertinent to the particular problem being solved by the patentee.

71. I understand that a claim can be obvious in light of a single reference, without the need to combine references, if the elements of the claim that are not found explicitly or inherently in the reference can be supplied by the common sense and knowledge of one of skill in the art.

72. I understand that a person of ordinary skill could have combined two pieces of prior art or substituted one prior-art element for another if the substitution can be made with predictable results, even if the swapped-in element is different from the swapped-out element. In other words, the prior art need not be like two puzzle pieces that must fit together perfectly. The relevant question is whether prior-art techniques are interoperable with respect to one another, such that a person of skill would view them as a design choice, or whether a person of skill could apply prior-

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art techniques into a new combined system. The person of ordinary skill would use ordinary creativity and is not limited like an automaton.

73. In sum, my understanding is that prior-art teachings are properly combined where a POSITA, having the understanding and knowledge reflected in the prior art and motivated by the general problem facing the inventor, would have been led to make the combination of elements recited in the claims. Under this analysis, the prior-art references themselves, or any need or problem known in the field of endeavor at the time of the invention, can provide a reason for combining the elements of multiple prior-art references in the claimed manner.

74. I have been informed and understand that the obviousness analysis requires a comparison of the properly construed claim language to the prior art on a limitation-by-limitation basis.

75. I have written this report with the understanding that in an *inter partes* review, obviousness must be shown by a preponderance of the evidence.

VII. PRIORITY DATE OF THE '943 PATENT

76. I understand that the priority date of the '943 Patent is assumed for the purposes of this Petition as March 24, 2000.

77. I understand that a POSITA is presumed to know and be familiar with all the relevant art in the field at the time of the relevant invention before March 24, 2000, the priority date of the '943 Patent.

78. The technology at issue in the challenged claims of the '943 Patent relates to backlight units (BLUs) of liquid-crystal displays (LCDs).

79. I was also asked to provide an opinion regarding the skill level of a POSITA at the time of the alleged invention of the '943 Patent. I considered several factors, including the types of problems encountered in the art, the solutions to those problems, the pace of innovation in the

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field, the sophistication of the technology, and the education level of active workers in the field. In my opinion, the POSITA would have (i) a bachelor's degree in mechanical engineering, optical engineering, or physics, or undergraduate training in an equivalent field, and (ii) at least two years of experience in the design and/or implementation of backlight units (BLUs) for liquid-crystal displays (LCDs). Additional graduate education could substitute for professional experience, and significant work experience could substitute for formal education.

80. I am qualified as a person of at least ordinary skill in the art, and my qualifications enable me to provide opinions regarding the '943 Patent from the perspective of a POSITA.

81. I understand that the prior art to the '943 Patent includes patents and printed publications in the relevant art that predate the '943 Patent's priority date of March 24, 2000.

VIII. OVERVIEW OF THE '943 PATENT

A. Prosecution

82. The '943 Patent has a priority date of March 24, 2000, a filing date of March 19, 2001, and an issue date of February 4, 2003.

83. The USPTO initially rejected claims 1–3 and 5–9 as being anticipated by Toshima. Claim 4 was rejected as being obvious over Toshima in view of Funamoto. Claim 12 was objected to as being dependent on a rejected claim. The applicant amended the claims to include the additional limitation of "a light source" and "wherein said light source is arranged immediately below the reinforcing plate and between said reflecting member and said reinforcing plate." New claims were added. On February 12, 2002, a Notice of Allowance was granted, allowing claims 1–3, 5–10, and 12–20. The patent was granted on February 4, 2003.

B. Technology

84. The '943 Patent's purported invention is an improved structure for backlight units (BLUs) to liquid-crystal displays. *See* '943 2:33–35. The '943 claims that thermal-deformation

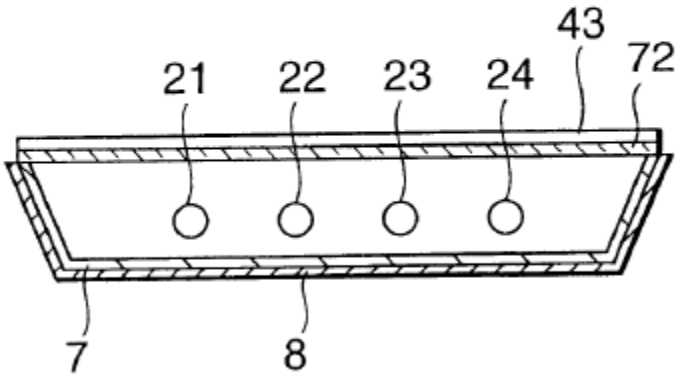
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problems resulting in brightness nonuniformity are mitigated by the ’943 purported invention. “When the backlight unit including such thin optical sheets is assembled together with a non-light emitting display device and operated in high temperature and high humidity environment or in low temperature environment, the light collecting and light diffusing optical sheets of the backlight unit are not only thermally expanded but also thermally deformed, resulting in wrinkles or flexion of the optical sheets. Therefore, the uniformity of luminance is degraded.” [’943 2:1–8.]

85. The ’943 purported invention was a BLU that arranged the (at the time) well-known common elements of a conventional BLU (the optical sheets, optical plates, reflector plates, and lamps) in a relationship to one another that the ’943 considered novel.

86. Various dependent claims (a) add common elements like support structures and adhesives to the independent claims or (b) specify certain common optical transmission properties, thermal properties, or mechanical properties to some structures in the independent claims. Figure 5 below from the ’943 Patent shows most of the elements involved.

FIG.5



87. The components in Figure 5 are identified as follows:

(1) 8 is a “support plate” that acts as a housing, case, or shell

(2) 7 is the “reflecting plate”

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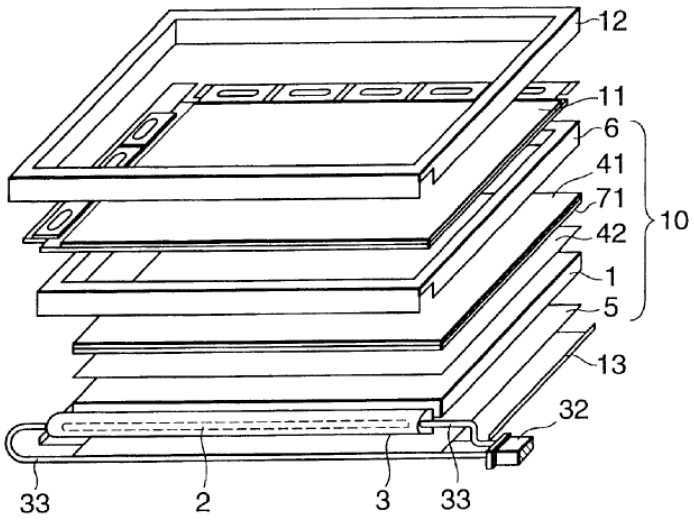
(3) 22-24 are the "light sources" (typically linear cold cathode fluorescent lamps, CCFLs)

(4) 72 is a "reinforcing plate"

(5) 43 is an optical sheet (typically a prism or diffuser) supported and held flat by reinforcing plate 72.

88. In some embodiments, optical sheet 43 is replaced by optical sheet 41 (typically a prism sheet) and reinforcing plate 72 is replaced by reinforcing plate 71 as shown below in Figure 3:

FIG.3



89. The purported core invention is the use of a reinforcing plate below an optical sheet to support and stabilize the optical sheet to prevent the optical sheet from thermally warping or wrinkling, which would degrade the brightness uniformity across the surface of the BLU.

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IX. OVERVIEW OF PRIOR ART

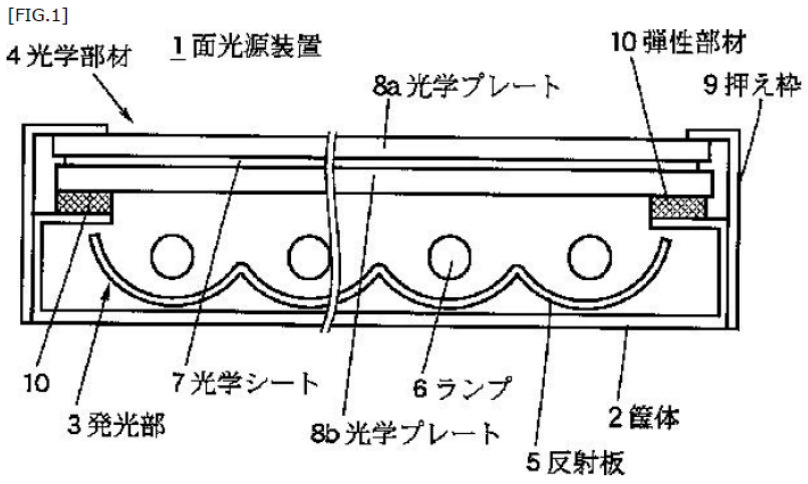
A. Overview of Yamamoto

90. Yamamoto JPH10105074A Is a Japanese patent application filed on 9/30/1996, published on 4/24/1998. Yamamoto is prior art to the '943.

91. The title of Yamamoto is "SURFACE LIGHT SOURCE DEVICE." In the Abstract, it states, "A surface illuminant device which is usable as a backlight for liquid crystal display units … ." Like the '943, Yamamoto pertains to BLUs for LCDs. Paragraph [0002], "The present invention relates to a surface light source device used for a backlight or the like disposed on a rear surface of a transmissive liquid crystal panel."

92. Like the '943, one of the problems Yamamoto addresses is the deformation of an optical sheet in the BLU that degrades brightness uniformity. *See* Yamamoto [Overview]: "PROBLEM TO BE SOLVED: To reduce deflection and thermal deformation of an optical sheet built in a surface light source device." And Yamamoto [0004]: "However, the optical sheet 7 has elasticity due to heat, and when it is heated from the lamp 6 side, it causes thermal expansion and wrinkles. This wrinkle also adversely affects the surface luminance distribution of the illumination light."

93. Below, Figure 1 of Yamamoto shows the structure:



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94. The list below shows the Yamamoto nomenclature first and then the '943 equivalent in parentheses, where:

(1) 1 is the backlight unit (backlight unit)

(2) 2 is the housing (support plate)

(3) 4 is the emitting surface

(4) 5 is the reflecting plate (reflecting plate)

(5) 6 is the lamp (light source)

(6) 7 is the optical sheet (optical sheet)

(7) 8a and 8b are thick rigid optical plates (reinforcing plates)

(8) 9 is a presser-foot frame, and

(9) 10 is an elastic member.

95. In the Yamamoto BLU, as in the '943 BLU, the lamps generate light. The light is reflected by the reflecting plate. The light then goes through the optical plate (reinforcing plate 8b). The light then passes through the optical sheet. While passing through the optical sheet, the optical sheet modifies the illumination distribution before the light exits the BLU.

X. CLAIM ANALYSIS

96. I have been asked to analyze claims 1-2, 4-6, 8 and 10-11 of the '943 Patent.

97. Claims 1 and 4 are independent claims. Claims 2, 5, 8 and 10 are dependent claims of independent claim 1. Claim 6 is a dependent claim of claim 5. Claim 11 is a dependent claim of independent claim 4.

98. The claim limitations are:

Claim 1

[1-preamble] *A backlight unit comprising:*

[1a] *a light source*

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[1b] *an optical sheet for transmitting light from said light source and giving an optical change to the light;*

[1c] *a transparent reinforcing plate in intimate contact with a major surface of said optical sheet; and*

[1d] *a light reflective sheet fastened to the second surface of the frame in a manner to cover at least a portion of the second surface of the frame and to cover the second surface of the light conductive plate,*

[1e] *wherein said lights source is arranged immediately below said reinforcing plate and between said reflecting member and said reinforcing plate.*

Claim 2

[2a] *A backlight unit as claimed in claim 1,*

[2b] *wherein said transparent reinforcing plate is formed of a material having light transmittance and glass transition temperature higher than those of said optical sheet.*

Claim 4

[4-preamble] *A backlight unit comprising:*

[4a] *a reflecting member constructed with a support plate;*

[4b] *a reflecting plate supported by said support plate;*

[4c] *a light source comprising a plurality of juxtaposed line shaped light sources,*

[4d] *an optical sheet for transmitting light from the light source and giving an optical change to the light;*

[4e] *a transparent reinforcing plate in intimate contact with a major surface of said optical sheet; and*

[4f] *the reflection member for reflecting the light emitted from said light source to said transparent reinforcing plates such that the light from said light source passed through said transparent reinforcing plate passes through said optical sheet,*

[4g] *wherein said light source is arranged immediately below said reinforcing plate and between said reflecting member and said reinforcing plate.*

Claim 5

[5a] *A backlight unit as claimed in claim 1,*

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[5b] *wherein said reinforcing plate is stuck on said optical sheet by a transparent tackiness agent.*

Claim 6

[6a] *A backlight unit as claimed in claim 5,*

[6b] *wherein said transparent tackiness agent is acrylic tackiness agent.*

Claim 8

[8a] *A backlight unit as claimed in claim 1,*

[8b] *wherein light transmittance of said reinforcing plate for light from said light source is 90% or more.*

Claim 10

[10-preamble] *A liquid crystal display device comprising,*

[10a] *a liquid crystal display panel and*

[10b] *a backlight unit claimed in claim1,*

[10c] *wherein said backlight unit is arranged on a rear surface of said liquid crystal display panel integrally.*

Claim 11

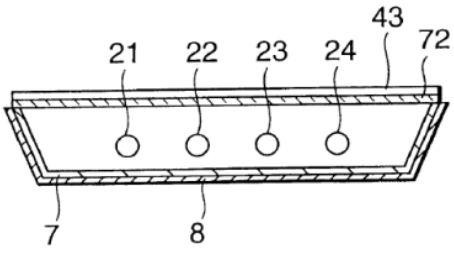
[11a] *The unit of claim 4,*

[11b] *wherein said reflecting plate is a white reflecting plate.*

B. Claim 1 Analysis (Yamamoto anticipation)

99. I will be using '943 Figure 5 below in most of my analysis since it best represents the scope of claim 1.

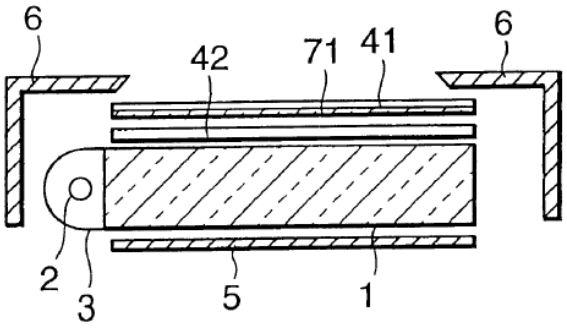
FIG.5



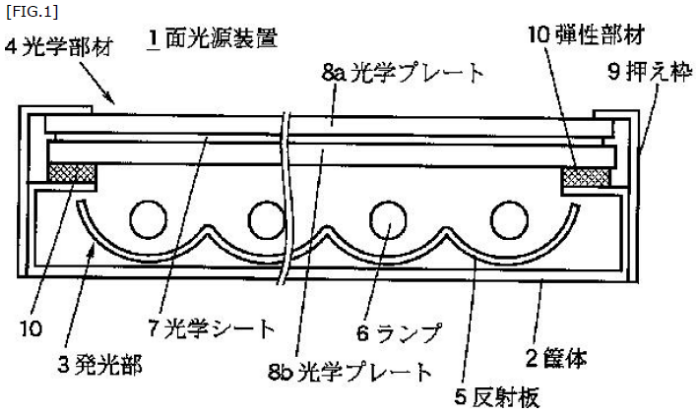
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100. The ’943 shows another embodiment as ’943 Figure 4 below:

FIG.4



101. I will be using Yamamoto as the primary prior art. Yamamoto Figure 1 is shown below.



1. [1-preamble] A backlight unit comprising

102. Yamamoto teaches a backlight unit (BLU).

103. “[Technical field of invention] The present invention relates to a surface light source device used for a backlight or the like disposed on a rear surface of a transmissive liquid crystal panel.” Yamamoto ¶ [0001].

104. To the extent that the preamble is limiting, Yamamoto teaches it.

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2. [1a] a light source

105. In Yamamoto Figure 1, element 6 is a lamp. *See* Yamamoto ¶ [0008]: "The lamp 6 consists of fluorescent tubes etc. and serves as a light source … ."

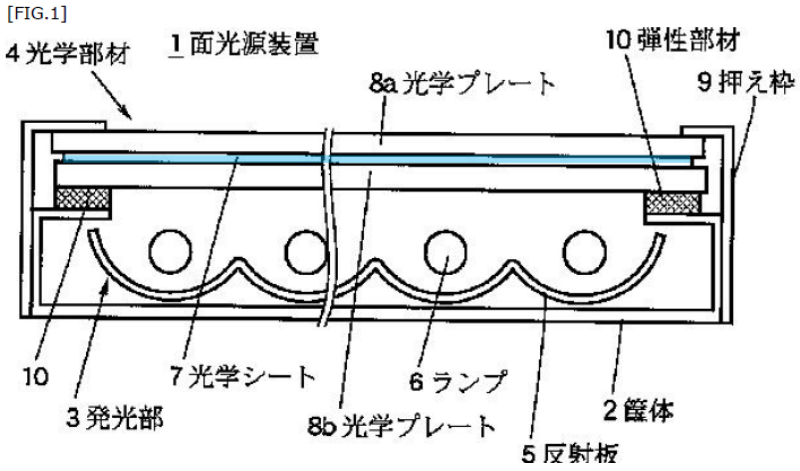
106. Yamamoto's lamp 6 is the '943 light source 21–24 in '943 Figure 5 or light source 2 in '943 Figure 4.

107. Yamamoto teaches this limitation.

3. [1b] an optical sheet for transmitting light from said light source and giving an optical change to the light;

108. The '943 teaches the optical sheets (41, 42, or 43) in '943 Figures 4 and 5 can be prism sheets or diffuser sheets ("light diffusing optical sheet or a light collecting optical sheet arranged on"). '943 Patent, Abstract. Further, the '943 Patent explains that a light-collecting optical sheet can be a prism sheet at '943 1:28–30 ("A light collecting optical sheet 41 such as a prism sheet … .").

109. Annotated Yamamoto Figure 5 shows element 7 (an optical sheet in blue) below:



110. Yamamoto [Overview] ("The optical material 4 has a compound structure consisting of an optical sheet 7 … .") and further teaches that the optical sheet can be a prism sheet at Yamamoto [0003] ("the optical sheet 7 is a prism sheet").

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111. Additionally, Yamamoto teaches that the optical sheet 7 is giving an optical change to the light and is transmitting the light at Yamamoto [0007]: "the optical sheet 7 is a prism sheet in which microprisms are arranged at a predetermined pitch, and converts the light of the light source into an illumination light having a desired front luminance distribution by refracting and transmitting the light."

112. Finally, the light changed by optical sheet 7 is light from the Yamamoto light source 6. At Yamamoto [0007]: "the optical sheet 7 is a prism sheet in which microprisms are arranged at a predetermined pitch, and converts the light of the light source."

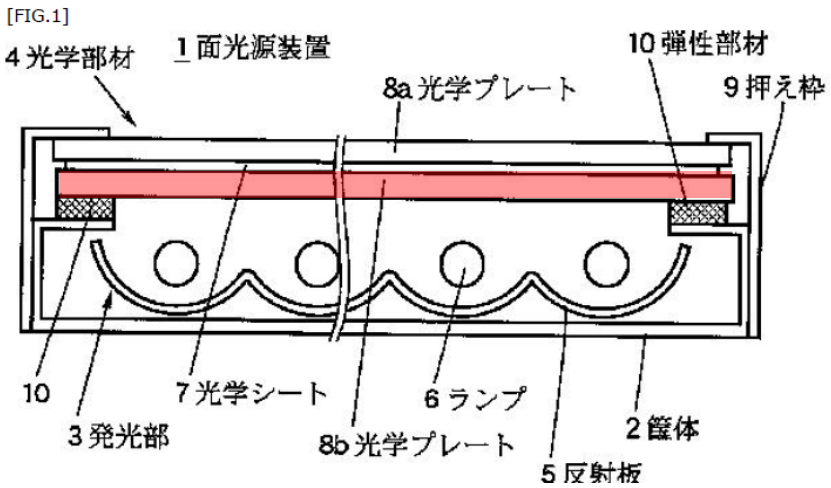
113. The Yamamoto optical sheet 7 corresponds to the '943 optical sheet (41, 42, or 43).

114. A POSITA would understand that increasing the front brightness provides an optical change for the light being transmitted from the light source.

115. Yamamoto discloses this limitation.

4. [1c] a transparent reinforcing plate in intimate contact with a major surface of said optical sheet; and

116. Yamamoto optical plate 8b (red in annotated Yamamoto Figure 1 below) corresponds to the '943's transparent reinforcing plate.



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117. Yamamoto teaches that element 8b in Figure 5 can be a transparent plate. Yamamoto [0007]: "In some cases, at least one side of the pair of optical plates 8a, 8b may be a transparent plate."

118. Reinforcing plate 8b is rigid and is in contact with flexible and thermally deformable optical film 7 Yamamoto [0007]: "consisting of an optical sheet 7 having relatively thin flexibility and flexibility, and a pair of optical plates 8a and 8b having relatively thick rigidity and holding the optical sheet 7 from the front and rear." Yamamoto Figure 5 also shows optical sheet 7 in contact with reinforcing plate 8b.

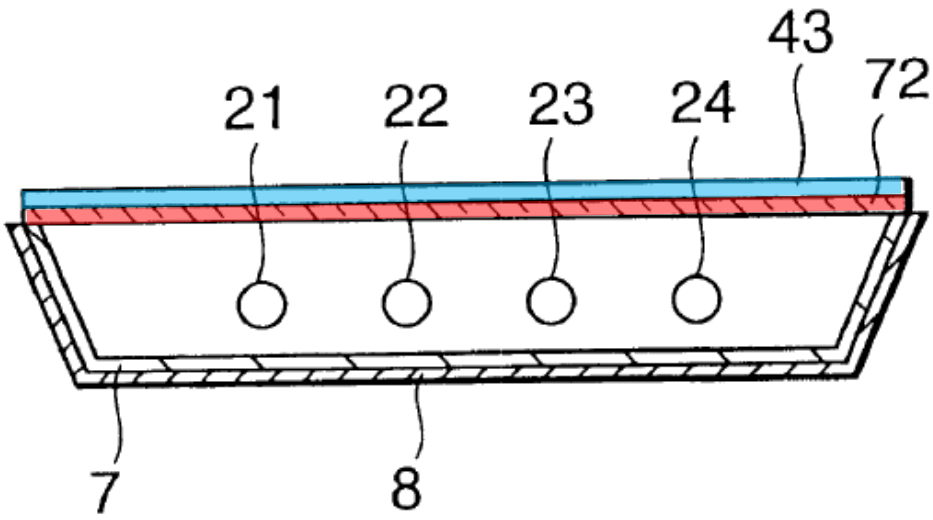
119. And an unsupported optical film 7 is subject to wrinkling and deformation. Yamamoto [0004]: "the relatively thin and flexible optical sheet 7 cannot be free-standing against gravity, resulting in bending deformation." and Yamamoto [0004]: "However, the optical sheet 7 has elasticity due to heat, and when it is heated from the lamp 6 side, it causes thermal expansion and wrinkles. This wrinkle also adversely affects the surface luminance distribution of the illumination light … ."

120. The Yamamoto optical plate 8b is a transparent reinforcing plate that reinforces and stabilizes optical sheet 7. Yamamoto's 8b corresponds to the '943 reinforcing plate (71 or 72).

121. In Fig 5 of the '943 shown below, 72 is the reinforcing plate (red) and 43 is the optical sheet (blue):

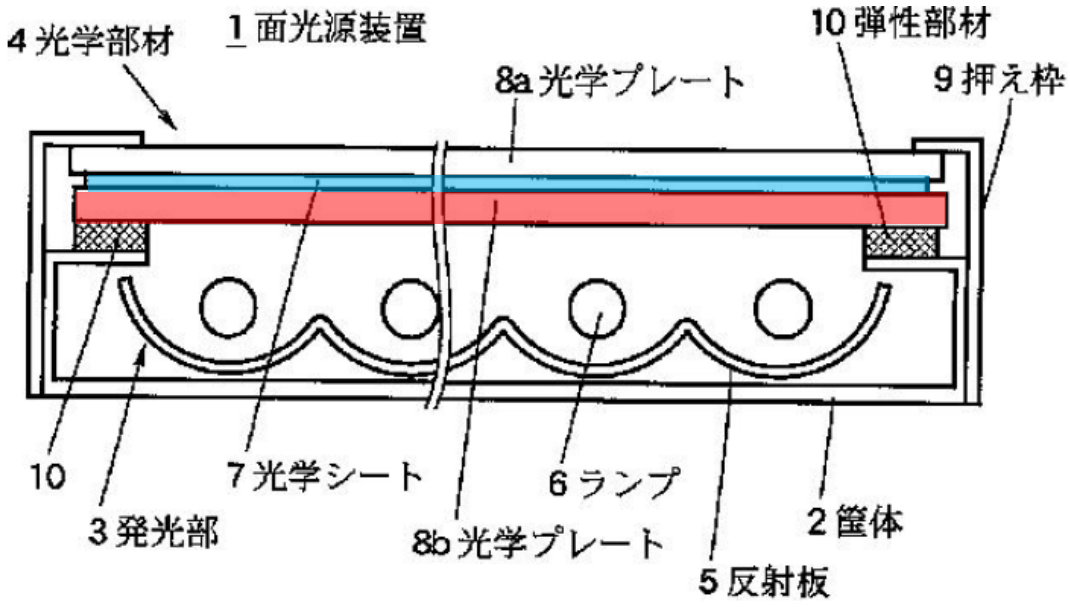
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FIG.5



122. ‘943 6:28-30 says “Furthermore, a transparent reinforcing plate 72 is stuck on a rear surface of the light diffusing optical sheet 43”

123. In Fig 1 of Yamamoto shown below, 8b is a reinforcing sheet (red) and 7 is an optical sheet (blue):



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124. The ‘943 teaches at ‘943 6:39-46 “light diffusing optical sheet 43 arranged in the vicinity of the line-shaped light sources 21 to 24 and having no reinforcing plate located immediately above the line-shaped light sources are expanded by heat generated by the light sources, causing local wrinkles to be occur. However, by using the reinforcing plate 72 stuck on the light diffusing optical sheet as in this embodiment, it is possible to restrict generation of wrinkles in the optical sheet.” So the ‘943 teaches that the reinforcing plate prevents heat induced wrinkling in the optical sheet 43.

125. 8b in Yamamoto serves the same purpose. Reinforcing plate 8b is rigid and is in contact with flexible and thermally deformable optical film 7 Yamamoto [0007]: “…consisting of an optical sheet 7 having relatively thin flexibility and flexibility, and a pair of optical plates 8 a and 8 b having relatively thick rigidity and holding the optical sheet 7 from the front and rear.” Yamamoto Fig 5 also shows optical sheet 7 in contact with reinforcing plate 8b. And an unsupported optical film 7 is subject to wrinkling and deformation. Yamamoto [0004]: “….the relatively thin and flexible optical sheet 7 cannot be free-standing against gravity, resulting in bending deformation…” and Yamamoto [0004]: “…However, the optical sheet 7 has elasticity due to heat, and when it is heated from the lamp 6 side, it causes thermal expansion and wrinkles. This wrinkle also adversely affects the surface luminance distribution of the illumination light…”

126. So in the ‘943, reinforcing plate 72 prevents heat induced wrinkling of optical sheet 43.

127. Likewise, in Yamamoto, optical plate 8b in Yamamoto prevents heat induced wrinkling of optical sheet 7.

128. Further, the ‘943 teaches that reinforcing plate 72 is transparent at ‘943 6:28-30: “… a transparent reinforcing plate 72 is stuck on a rear surface of the light diffusing optical sheet

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43. Yamamoto teaches that optical plate 8b is transparent at Yamamoto [0007]: "… 8b may be a transparent plate."

129. Having the same relative positions, same transparency, and same purposes, the Yamamoto optical plate 8b corresponds to the '943 reinforcing plate 72, and the Yamamoto optical sheet 7 corresponds to the '943 optical sheet 43.

130. Yamamoto teaches this limitation.

5. [1d] a reflection member for reflecting the light emitted from said light source to said transparent reinforcing plate such that the light from said light source passed through said transparent reinforcing plate passes through said optical sheet,

131. Yamamoto teaches such a reflection member as reflector 5 in Figure 1 at Yamamoto [0008] "The reflector 5 reflects the light source light generated by the lamp 6 toward the front. The lower optical plate 8 b is a light diffusing plate, and is a plate material in which diffusive fine particles are dispersed in an acrylic resin. Direct light source light from the lamp 6 and indirect light source light from the reflecting plate 5 are diffused, and an action for eliminating luminance unevenness in which the space between the lamps 6 and immediately above each lamp 6 and appears dark is eliminated. The optical sheet 7 is a prism sheet, and serves to converge the light source light diffused by the lower optical plate 8 b to the outside of the viewing angle to increase the front luminance …"

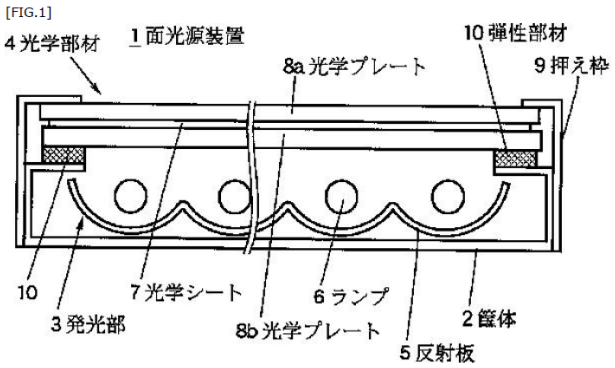
132. Thus, Yamamoto reflector 5 corresponds to the '943 reflecting member performing the required function.

133. Yamamoto teaches this limitation.

6. [1e] wherein said light source is arranged immediately below said reinforcing plate and between said reflecting member and said reinforcing plate.

134. As can be seen in Yamamoto Figure 1 below:

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135. Lamp 6 (the light source) is immediately below (i.e., with no intervening elements) plate 8b (the reinforcing plate), and lamp 6 (light source) is between reflector 5 (reflecting member) and plate 8b (reinforcing plate).

136. This lamp location is further confirmed at Yamamoto [0007]: "and a lamp 6 including a plurality of fluorescent tubes arranged immediately below the opening surface and directly above the reflecting plate 5."

137. Yamamoto teaches this limitation.

138. Conclusion:

139. Yamamoto teaches each and every limitation of claim 1. Claim 1 is anticipated by Yamamoto. Claim 1 is invalid.

C. Claim 2 Analysis (Yamamoto obviousness)

1. [2a] A backlight unit as claimed in claim 1,

140. *See* analysis of claim 1.

2. [2b] wherein said transparent reinforcing plate is formed of a material having light transmittance and glass transition temperature higher than those of said optical sheet.

141. Yamamoto teaches at Yamamoto [0007]: "In some cases, at least one side of the pair of optical plates 8a, 8b may be a transparent plate. In this case, the transparent plate transmits

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the light source light as it is." Thus, optical plate (reinforcing plate) may be a plain flat plate having no light-altering properties.

142. By their inherent operation, prism sheets have lower light transmittance than flat plates because, by their very nature, they send some incident light back toward the light source, rather than simply transmitting it through the plate.

143. Thus, the flat transparent plate 8b will have a higher light transmittance than prism optical sheet 7.

144. Yamamoto at [0008] teaches "the optical plates 8a and 8b are made of acrylic resin and the optical sheet 7 is made of polyester resin."

145. The most common acrylic resin is PMMA or Plexiglass, which are often used in liquid crystal display device manufacturing.[2] PMMA has a glass transition temperature of 90°C.[3] A POSITA would also know that the most common polyester resin is PET which is often used in liquid crystal display device manufacturing and has a glass transition temperature (depending on purity) between 69°C and 85°C.[4]

146. Thus, the Yamamoto acrylic resin reinforcing plate 8b has a higher glass transition temperature than the Yamamoto polyester resin optical sheet 7.

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[2] Ex. 1007, Sophie Bushwick, SCIENTIFIC AMERICAN, 26 Aug. 2022. See also "How Are Acrylic Sheets Made?", ACME PLASTIC.COM, available at: (https://www.pmma-online.eu/pmma-science/).

[3] "Ex. 1008, Glass Transition Temperature", OMNEXUS: THE MATERIAL SELECTION PLATFORM, available at: (https://omnexus.specialchem.com/polymer-properties/properties/glass-transition-temperature).

[4] Ex. 1009, Fred W. Billmeyer, Jr. (1962). *Textbook of Polymer Science*; see also Comprehensive Guide on Polyethylene Terephthalate (PET), OMNEXUS: THE MATERIAL SELECTION PLATFORM, available at: (https://omnexus.specialchem.com/selection-guide/polyethylene-terephthalate-pet-plastic?src=prop-cnx) ("Polyethylene terephthalate or PET belongs to the family of polyesters. It is widely used in everyday items and easily recyclable . . . The glass transition temperature of PET varies depending on the degree of crystallinity. It has a Tg of 65-80°C.").

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147. Thus, Yamamoto teaches a reinforcing plate with a higher transmittance and a higher glass transition temperature than the optical sheet.

148. Thus, A POSITA would understand that the Yamamoto acrylic resin reinforcing plate 8b has a higher glass transition temperature than the polyester resin optical sheet 7, or at least have found this limitation obvious. More specifically, a POSITA would find it obvious to use a transparent reinforcing plate formed from a PMMA acrylic resin and an optical sheet formed of a PET polyester resin, which would result in a reinforcing plate having a glass transition temperature higher than the optical sheet. A POSITA would find it obvious to try using these commonly used materials according to their known methods of use in manufacturing liquid crystal display manufacturing as claimed and could do so easily with predictable results.

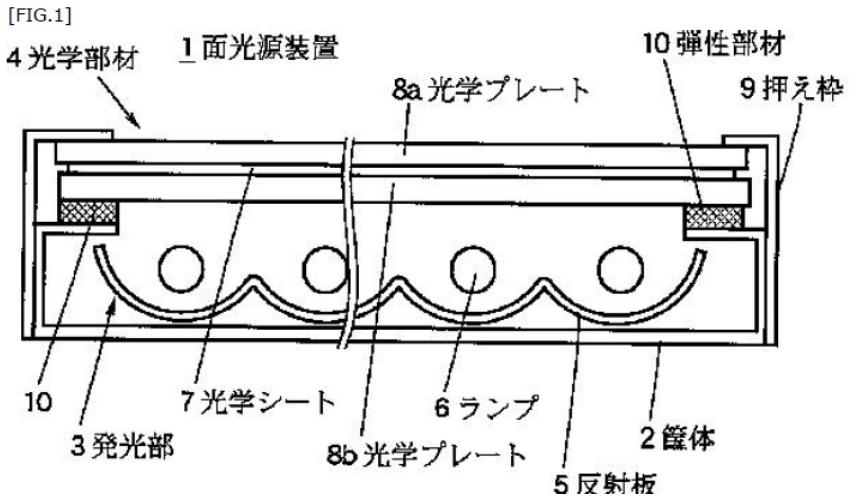
149. Yamamoto teaches this limitation.

150. Conclusion:

151. Yamamoto teaches each and every limitation of claim 2. Claim 2 is rendered obvious by Yamamoto. Claim 2 is invalid.

D. <u>Claim 4 Analysis (Yamamoto anticipation)</u>

152. Yamamoto Figure 1 is shown below:



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2. [4-preamble] A backlight unit comprising:

153. To the extent that it is limiting, see the claim 1 analysis. Yamamoto teaches this limitation.

3. [4a] a reflecting member constructed with a support plate;

154. '943 3:31–34 teaches "reflecting member is preferably constructed with a support plate and a white reflecting plate."

155. The Yamamoto surface light source 1 has a support plate (housing 2) and a reflecting plate (reflecting plate 5). Yamamoto surface light source 1 is the [4a] reflecting member.

156. Yamamoto [0003]: "surface light source device 1 includes a housing 2."

157. A POSITA would understand that the placement of enclosure 2 under the light reflective plate 5 provides support therefore due to the nature and arrangement of the materials.

158. Yamamoto teaches this limitation.

4. [4b] a reflecting plate supported by said support plate;

159. Yamamoto [0003]: "surface light source device 1 includes a housing 2 having an open surface in front of a flat space, a light emitting unit 3 arranged in a flat space."

160. Thus, the Yamamoto light source 1 comprises a light-emitting unit 3.

161. Yamamoto [0003]: "the light emitting unit 3 includes a reflecting plate 5." Thus, the Yamamoto light emitting unit 3 comprises Yamamoto reflector plate 5.

162. Therefore, the surface light source comprises the light-emitting unit and the light-emitting unit comprises the reflector plate. Therefore, the light source 1 comprises reflecting plate 5 and the housing 2. As can be seen from Yamamoto Figure 1, the housing 2 surrounds and supports the reflecting plate 5.

163. Yamamoto teaches this limitation.

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5. [4c] a light source comprising a plurality of juxtaposed line shaped light sources,

164. Referring to Figure 1, Yamamoto [0007] says "the light emitting section 3 includes a reflecting plate 5 disposed opposite to an open surface of the housing 2, and a lamp 6 including a plurality of fluorescent tubes arranged immediately below the opening surface and directly above the reflecting plate 5." Yamamoto Figure 5 shows the cross section of the common linear cold cathode florescent tubes used in BLUs at the relevant time.

165. Yamamoto teaches this limitation.

6. [4d] an optical sheet for transmitting light from the light source and giving an optical change to the light;

166. *See* analysis of claim 1 [1b].

167. Yamamoto teaches this limitation.

7. [4e] a transparent reinforcing plate in intimate contact with a major surface of said optical sheet; and

168. *See* analysis of claim 1 [1c].

169. Yamamoto teaches this limitation.

8. [4f] the reflection member for reflecting the light emitted from said light source to said transparent reinforcing plates such that the light from said light source passed through said transparent reinforcing plate passes through said optical sheet,

170. *See* analysis of claim 1 [1d].

171. Yamamoto teaches this limitation.

9. [4g] wherein said light source is arranged immediately below said reinforcing plate and between said reflecting member and said reinforcing plate.

172. *See* analysis of claim 1 [1e].

173. Yamamoto teaches this limitation.

174. Conclusion:

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175. Yamamoto teaches each and every limitation of claim 4. Claim 4 is anticipated by Yamamoto. Claim 4 is invalid.

E. Claim 5 Analysis (Yamamoto obviousness)

1. [5a] A backlight unit as claimed in claim 1,

176. Yamamoto [0006] says: "In some cases, 2 optical plates sandwiching an optical sheet may be bonded to each other using a heat-resistant adhesive tape, an adhesive, or the like."

177. At the relevant time, a POSITA would be well aware of many structures, sheets, and plates within an LCD module that were glued together with "transparent tackiness agents." One common example is the LCD TFT backplane substrate adhesively attached to the bottom polarizer in virtually every single TFT active-matrix flat panel display.[5] For example, Superglue was commonly used (see Claim 6) and a POSITA would find it obvious to try using Superglue as a commonly used adhesive adhering the reinforcing plate and optical sheet as claimed and could do so easily with predictable results.

178. Conclusion:

179. The teachings of Yamamoto and a POSITA's common knowledge make claim 5 obvious. Claim 5 is invalid.

F. Claim 6 Analysis (Yamamoto obviousness)

1. [6a] A backlight unit as claimed in claim 5,

180. *See* analysis of claim 5.

[5] Ex. 1011, Pfeiffer, U.S. Patent No. 4,193,287 (issued Mar. 18, 1980). Pfeiffer 4:27-35: "Continuing with FIG. 1, two polarizers 17 and 18 are shown near the partially-finished LCD it). Each polarizer 17 or 18 has a transparent adhesive coating on the side of the polarizer nearest the partially-finished LCD 10. For simplicity in illustrating the drawing, a transparent adhesive coating 19 is only shown on the second polarizer 18. The polarizers 17 and 18 are pressed onto the outside faces of the glass plates 12 and 13 to complete assembly of the LCD in the prior art." So Pffeiffer discloses polarizer (18) attached to LCD plate (13) using an adhesive coating (19).

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181. This limitation was known and obvious.

2. [6b] wherein said transparent tackiness agent is acrylic tackiness agent.

182. The Superglue (Cyanoacrylate) acrylic glue patent was filed in 1947 (U.S. Patent No. 2,467,927). It is a clear adhesive. Any POSITA at the relevant time was well aware of the use of "acrylic tackiness agents" for use in gluing optical parts together.

183. This limitation is known and obvious using the common knowledge of a POSITA.

184. Conclusion:

185. The teachings of Yamamoto and a POSITA's common knowledge make claim 6 obvious. Claim 6 is invalid.

G. Claim 8 Analysis (Yamamoto obviousness)

1. [8a] A backlight unit as claimed in claim 1,

186. *See* analysis of claim 1.

187. Yamamoto teaches this limitation.

2. [8b] wherein light transmittance of said reinforcing plate for light from said light source is 90% or more.

188. Yamamoto [0008] teaches "the plate thicknesses of the optical plates 8 a and 8 b are about 2 to 3."

189. Further, Yamamoto [0009] teaches "the optical plates 8a and 8b are made of acrylic resin."

190. Thus, Yamamoto teaches that the reinforcing sheet 8b can be a PMMA flat plate about 3 mm (1/8 in.) thick. PMMA (Plexiglass) has a Fresnel reflection of 4% at each air plate surface. In 1/8-inch thickness, the absorption of PMMA is virtually zero. In the worst case, when the reinforcing plate is not glued to the optical sheet, the reinforcing plate reflection losses would

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be 2 × 4% = 8%, and the absorption losses would be <<1%. Thus, the light transmittance would be 100 − (2 × 4) − 0 = 92%.

191. So, Yamamoto teaches that the reinforcing plate can have a transmittance of 92%.

192. Yamamoto teaches this limitation.

193. Conclusion:

194. The teachings of Yamamoto and a POSITA's common knowledge make claim 8 obvious. Claim 8 is invalid.

H. Claim 10 Analysis (Yamamoto anticipation)

1. [10-preamble] A liquid crystal display device comprising

195. To the extent it is limiting, then Yamamoto [0002] says: "Liquid crystal panels and the like have attracted attention as large flat displays instead of CRTs, and have been actively developed today. A liquid crystal panel is not a self-emissive type but is used to modulate an external light to display an image, and roughly divided in to a transmissive type and a reflective type. In a transmission type, it is necessary to attach a backlight to the back face of a liquid crystal panel. Conventionally, a planar light source device having a flat shape is used as the backlight … ."

196. Yamamoto discloses this limitation.

2. [10a] a liquid crystal display panel and

197. Yamamoto [0002] says: "Liquid crystal panels and the like have attracted attention as a large flat displays to replace CRTs, and are currently being actively developed. Liquid crystal panels are not self-luminous, but display images by modulating external light, and are broadly classified as being a transmissive type or a reflective type. With the transmissive type, a backlight must be attached to the back surface of the liquid crystal panel. A surface light source device having a flat shape has been conventionally used as the backlight."

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198. Yamamoto discloses this limitation.

3. [10b] a backlight unit claimed in Claim 1,

199. *See* analysis of claim 1. Further, Yamamoto [0002] says, "Liquid crystal panels and the like have attracted attention as a large flat displays to replace CRTs, and are currently being actively developed. Liquid crystal panels are not self-luminous, but display images by modulating external light, and are broadly classified as being a transmissive type or a reflective type. With the transmissive type, a backlight must be attached to the back surface of the liquid crystal panel. A surface light source device having a flat shape has been conventionally used as the backlight."

200. Yamamoto discloses this limitation.

4. [10c] wherein said backlight unit is arranged on a rear surface of said liquid crystal display panel integrally.

201. Yamamoto [0002] states that "it is necessary to attach a backlight to the back face of a liquid crystal panel."

202. Conclusion:

203. Claim 10 is invalid because Yamamoto teaches each and every limitation and thus anticipates claim 10.

I. Claim 11 Analysis (Yamamoto obviousness)

1. [11a] The unit of claim 4,

204. *See* analysis of claim 4.

205. Yamamoto teaches this limitation.

2. [11b] wherein said reflecting plate is a white reflecting plate.

206. Yamamoto [0008] teaches: "The reflector 5 reflects the light source light generated by the lamp 6 toward the front … ."

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207. By the filing date in 2001, most liquid-crystal displays were color active-matrix TFT liquid-crystal displays. A POSITA would understand that the BLU must produce white light, so that the red, green, and blue subpixels receive the required light.

208. A POSITA would know that there are only two possible reflector alternatives to produce the white light:[6]

(1) a reflector with a specular (mirrorlike) reflective surface or

(2) a reflector with a diffuse white reflective surface.

209. A POSITA would know that either could be made to work in a BLU with little or no experimentation, with predictable results. In fact, both specular and white reflectors were routinely used in BLUs at the relevant time period.

210. Yamamoto combined with the general knowledge of a POSITA makes this limitation obvious.

211. Conclusion:

212. The teachings of Yamamoto combined with the general knowledge of a POSITA make claim 11 obvious. Claim 11 is invalid.

XI. RESERVATION OF RIGHTS

213. My opinions are based upon the information that I have considered to date. I am unaware of any evidence of secondary considerations with respect to the '943 Patent that would

[6] Ex. 1010, Hansen, U.S. Patent No. 5,499,120 (issued Mar. 12, 1996).

See Hansen 3:59-63: "Referring to FIG. 1, there is shown a printed circuit board (PCB) 10 having mounted thereon an array of LEDs 11, 12, 13. The PCB 10 has a top solder mask 14 which has a white surface."

See also, Hansen 3:35-40 "The surface of the PCB may be lightly coloured or silvered, but is most preferably white (e.g. paper white) so as to reflect as much as possible of the light from the LEDs within the space between the PCB and the LCD backplane. Preferably still, all the surfaces behind and around the LEDs are substantially white."

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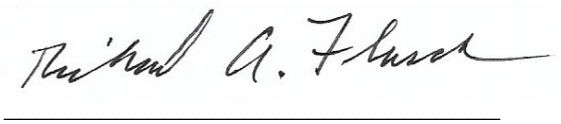
render any of the asserted claims nonobvious. I reserve the right, however, to supplement my opinions in the future to respond to any arguments raised by the owner of the '943 Patent and to consider new information that becomes available to me.

XII. CONCLUSION

214. For the reasons discussed above, it is my opinion that claims 1, 4 and 10 of the '943 Patent are anticipated, and claims 2, 5-6, 8 and 11 are obvious to a POSITA for at least the reasons stated herein.

215. I hereby 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 further that these statements were made with the knowledge that willful false statements and the like are punishable by fine or imprisonment, or both, under § 1001 of Title 18 of the United States Code.

Date: February 28, 2023



Richard A. Flasck

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