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(54) **MULTI-PANEL MONITOR DISPLAYING SYSTEMS**

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Publication Classification

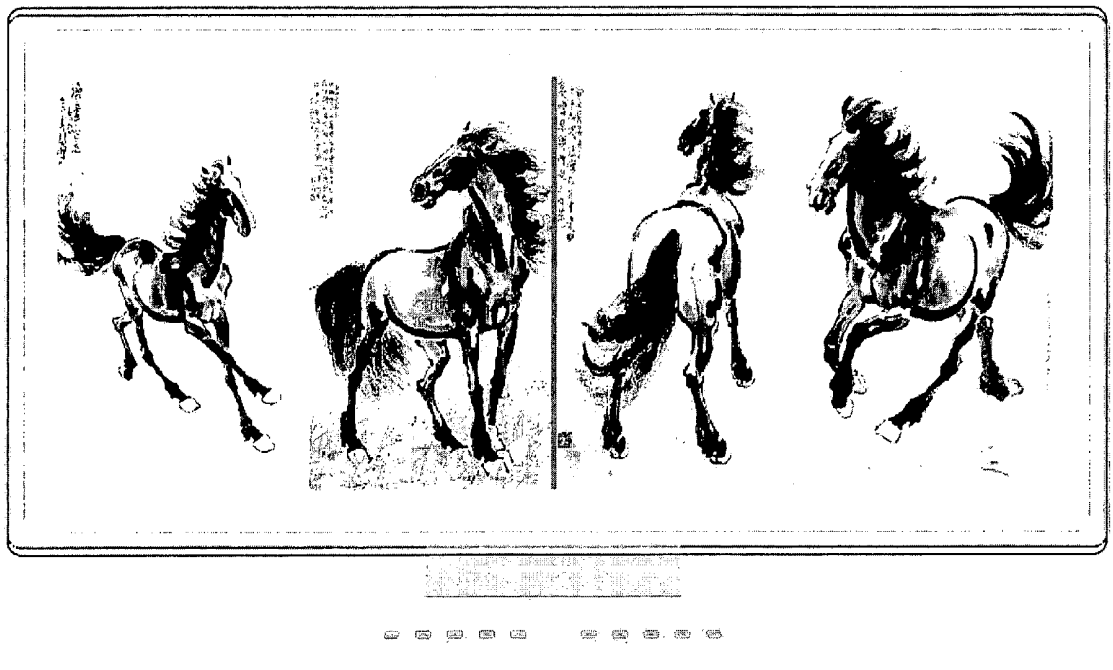
(51) **Int. Cl.**[7] **G09G 5/00**

(52) **U.S. Cl.** **345/1.3**; 345/87

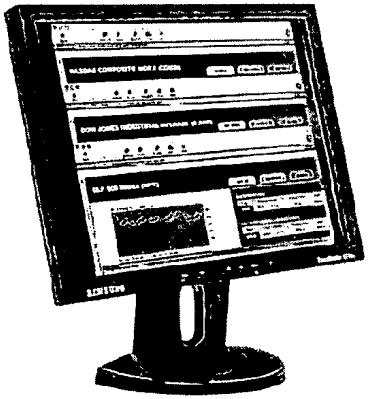
(57) **ABSTRACT**

A multi-panel monitor displaying system has a multi-panel monitor supported by one integrated Liquid Crystal Display Glass Module (LGM). The multi-panel monitor contains visually un-detective gaps between panels and, therefore, can provide viewers with high quality visual effect with low productive cost. A set of LGM technologies is utilized to re-design and integrate a plurality of LGMs. After integration, image rotation is also required by the multi-monitor displaying system to ensure perfect image displays.

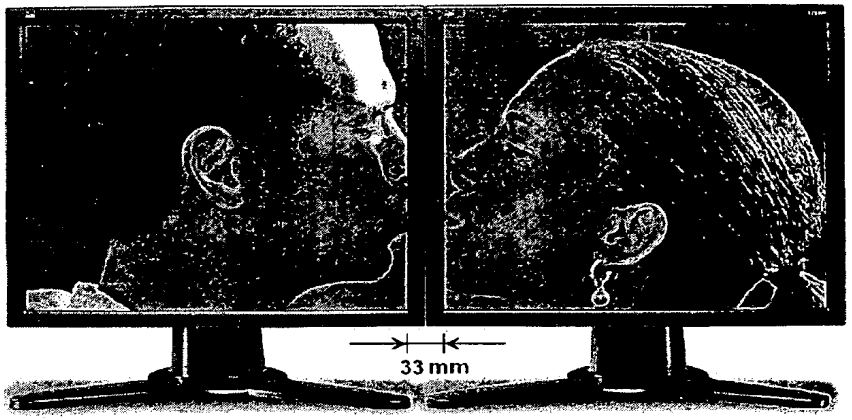
Portal Type Photo of Multi-Panel Monitor Gemini H156B



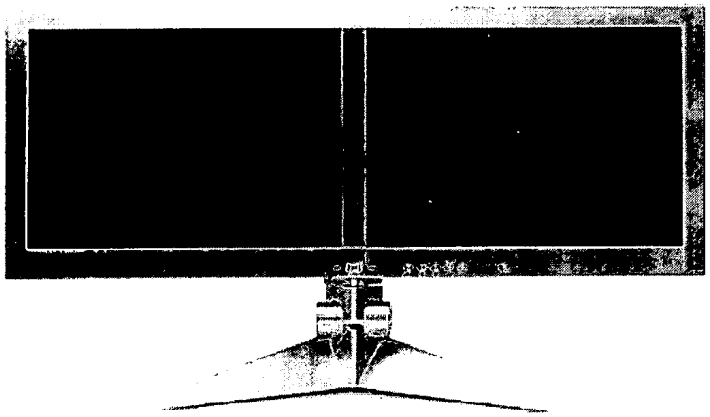
25.6 inch, Dual 15 inch LCD Panel Gap<20 mm, 8:3 Extra Wide Viewing



The Narrowest
in the World:
15 inch =16.2 mm
17 inch =14.0 mm
19 inch =18.6 mm



Multi-Monitor: Dual 17 inch LCD Monitor
Gap (between two screens) = 33 mm



Multi-Module Monitor: Dual 15 inch LCD Module
Gap (between two screens) = 24 mm

FIG. 1 Prior Art

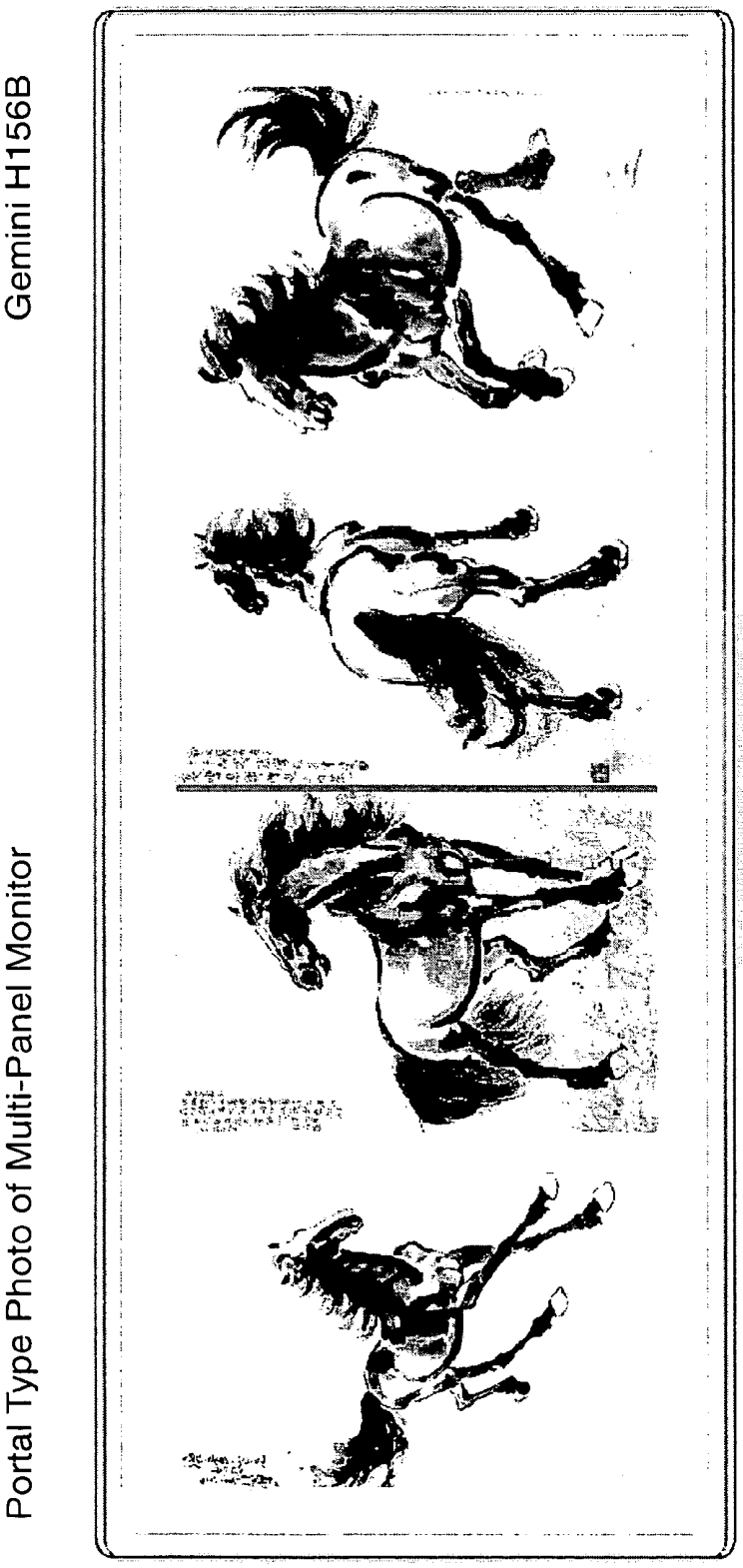
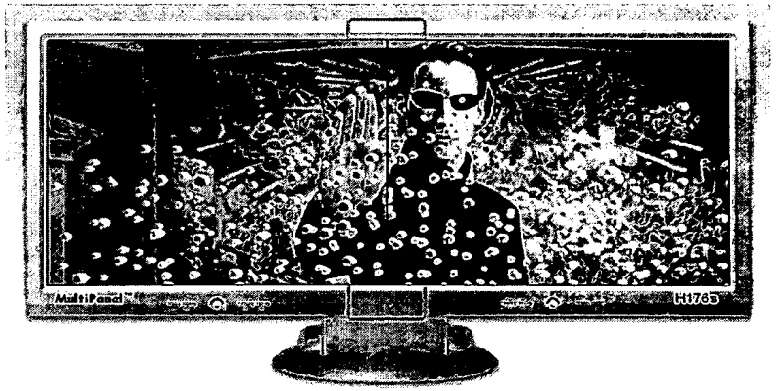

Portal Type Photo of Multi-Panel Monitor
Gemini H156B
25.6 inch, Dual 15 inch LCD Panel Gap<20 mm, 8:3 Extra Wide Viewing

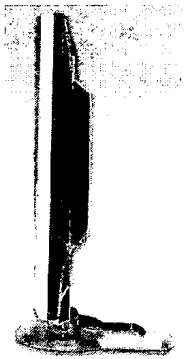
FIG. 2

Portal Type	Gemini (dual panel) Serial	Photo

Gemini H156S



Gemini H176S



8:3 Extra Wide Viewing

H156S, Gap: 6mm, Resolution: 2048X768

H176S, Gap: 6mm, Resolution: 2560X1024

FIG. 3

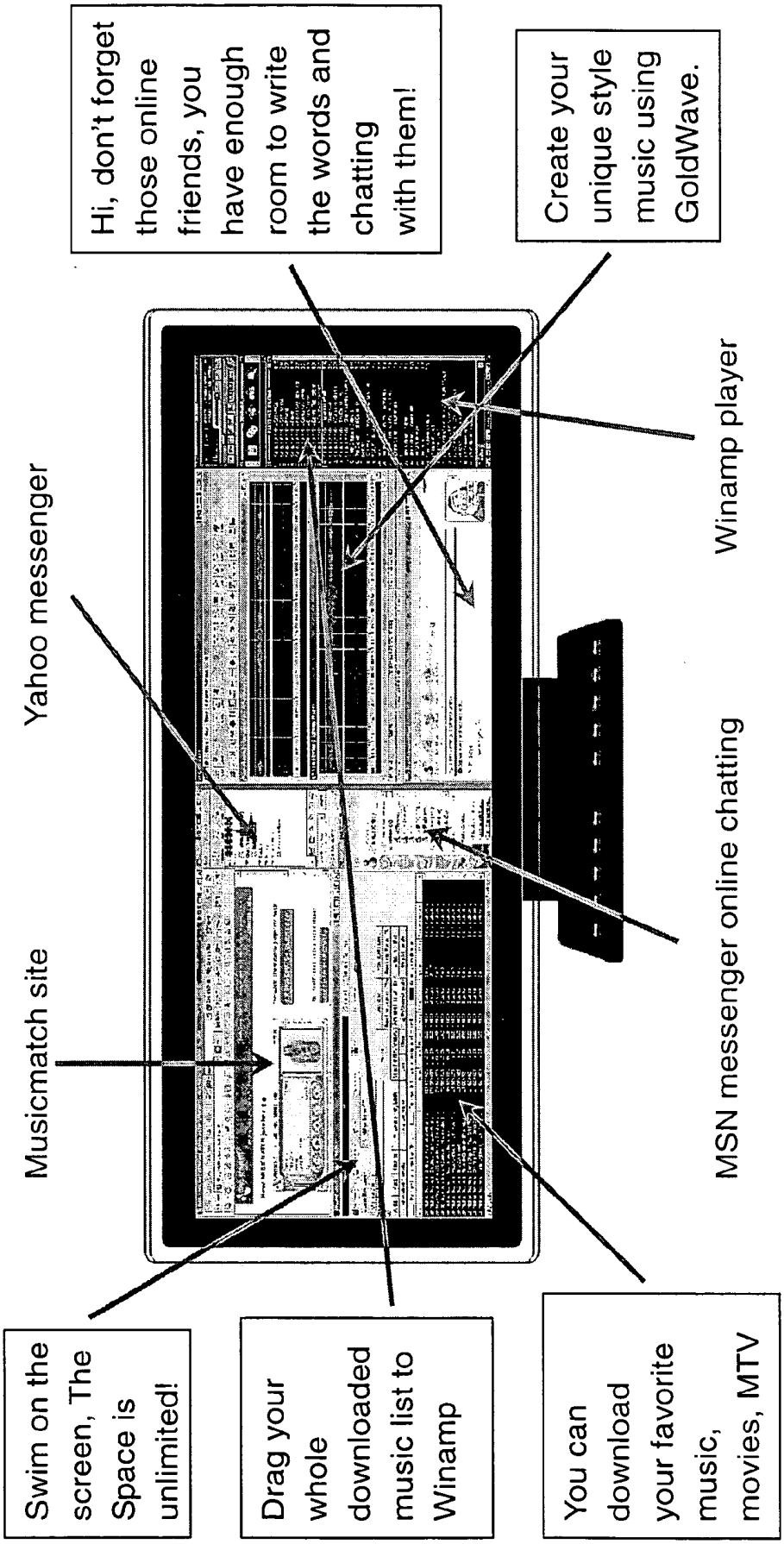
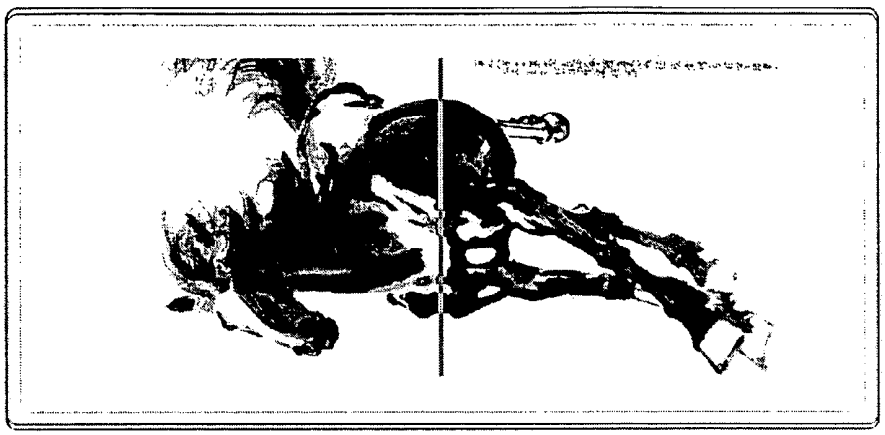

Hi, don't forget those online friends, you have enough room to write the words and chatting with them!
Create your unique style music using GoldWave.
Yahoo messenger
Winamp player
Musicmatch site
MSN messenger online chatting
Swim on the screen, The Space is unlimited!
Drag your whole downloaded music list to Winamp
You can download your favorite music, movies, MTV

FIG. 4



Horizontally and Vertically
Effect of Desktop Displaying
And Multi-Panel Wall Displaying

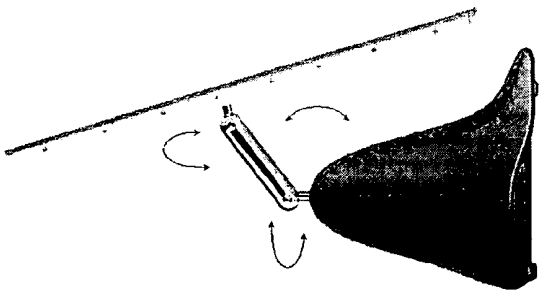


FIG. 5

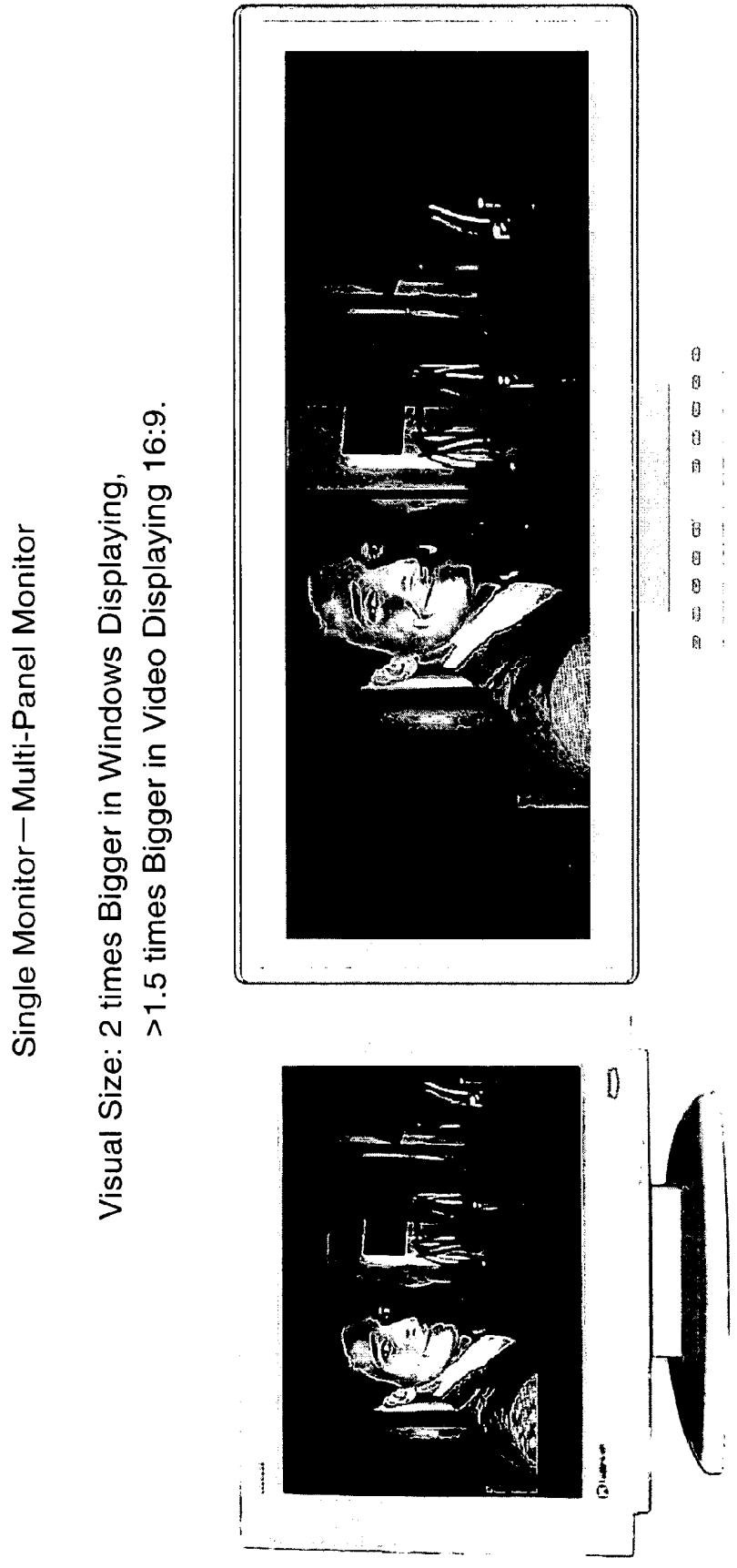

Single Monitor—Multi-Panel Monitor
Visual Size: 2 times Bigger in Windows Displaying,
>1.5 times Bigger in Video Displaying 16:9.
Gemini Serial, 25.6 inch 8:3
Single Monitor, 15 inch 4:3

FIG. 6

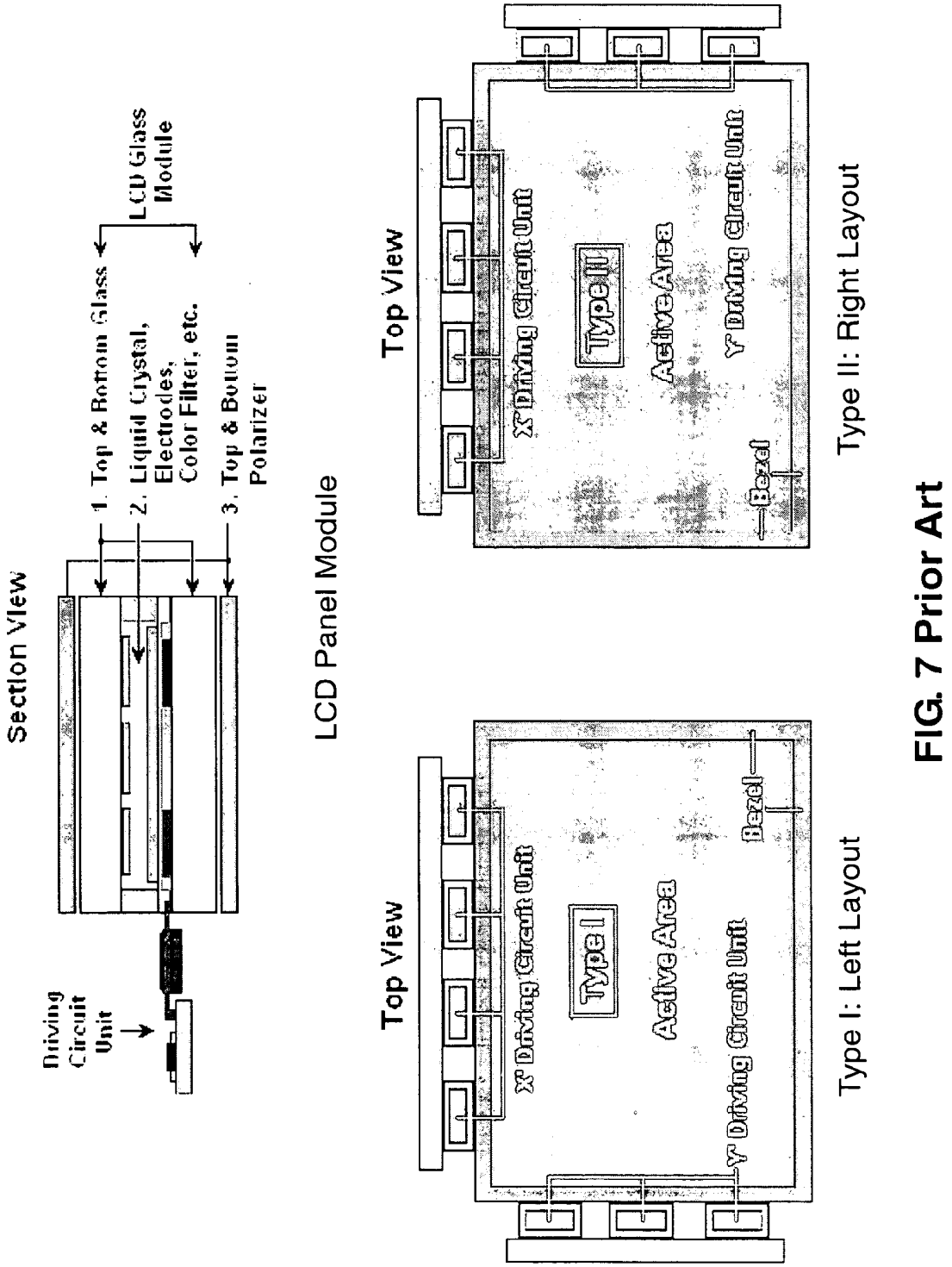
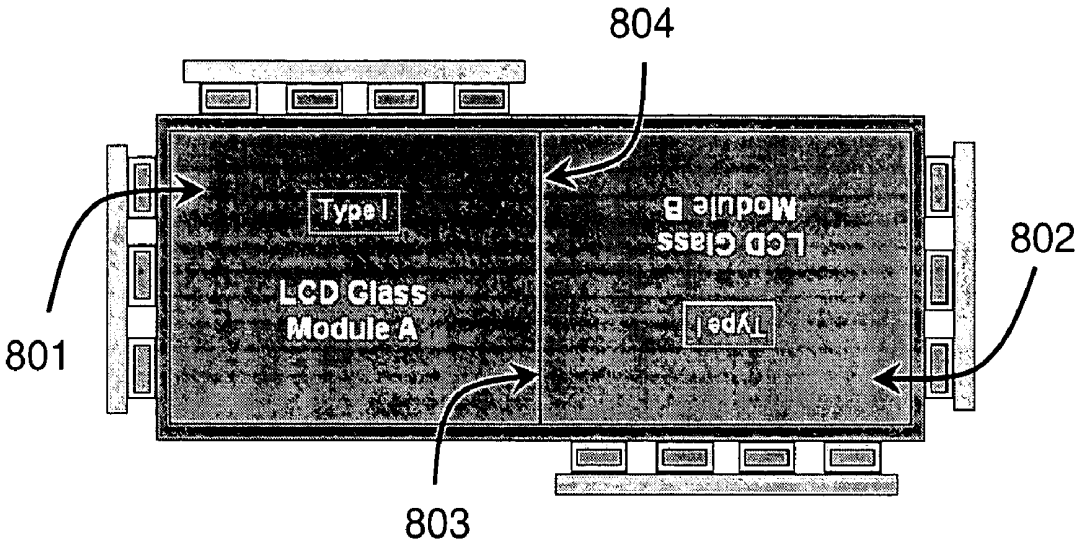


FIG. 7 Prior Art


804
Type I
LCD Glass
Module A
LCD Glass
Module B
Type I
801
802
803

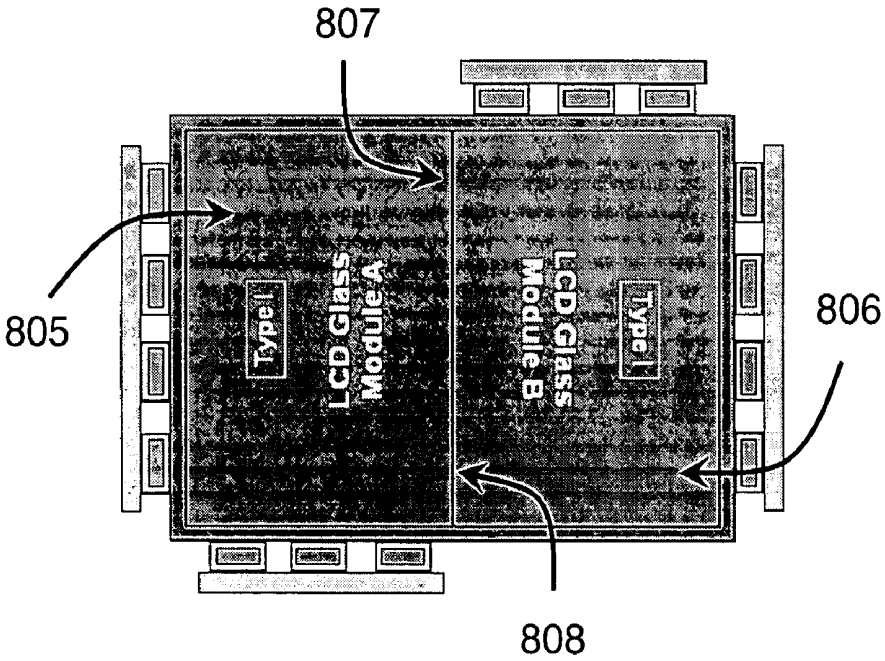
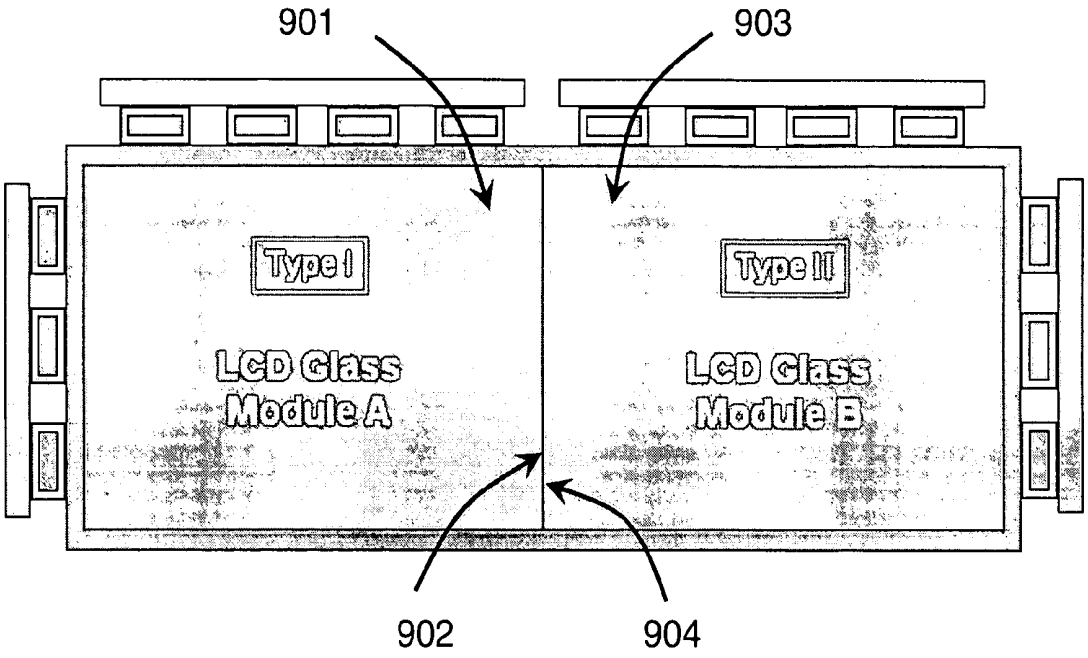

807
Type I
LCD Glass
Module A
LCD Glass
Module B
Type I
805
806
808

FIG. 8


901
903
Type I
Type II
LCD Glass Module A
LCD Glass Module B
902
904

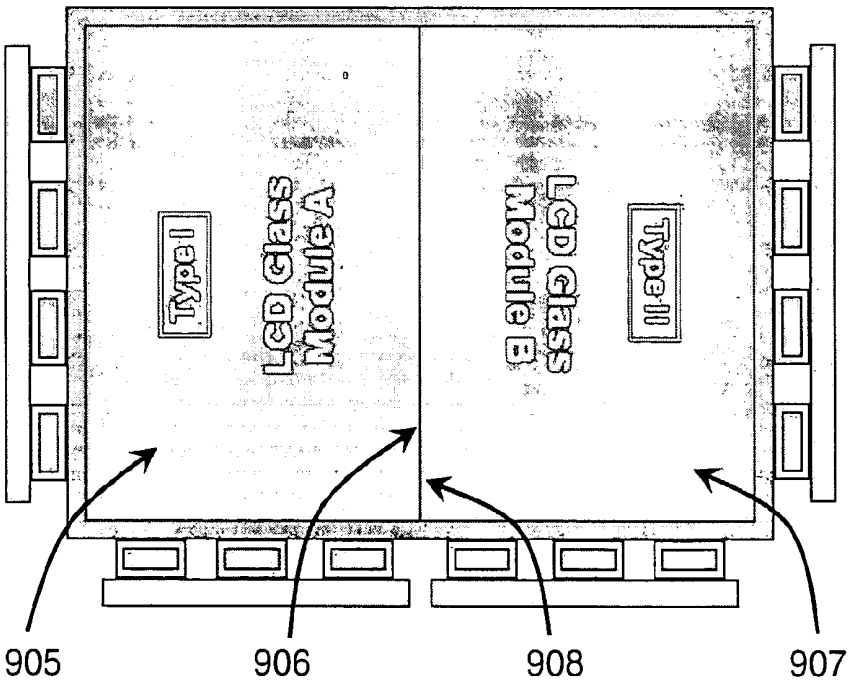

Type I
LCD Glass Module A
LCD Glass Module B
Type II
905
906
908
907

FIG. 9

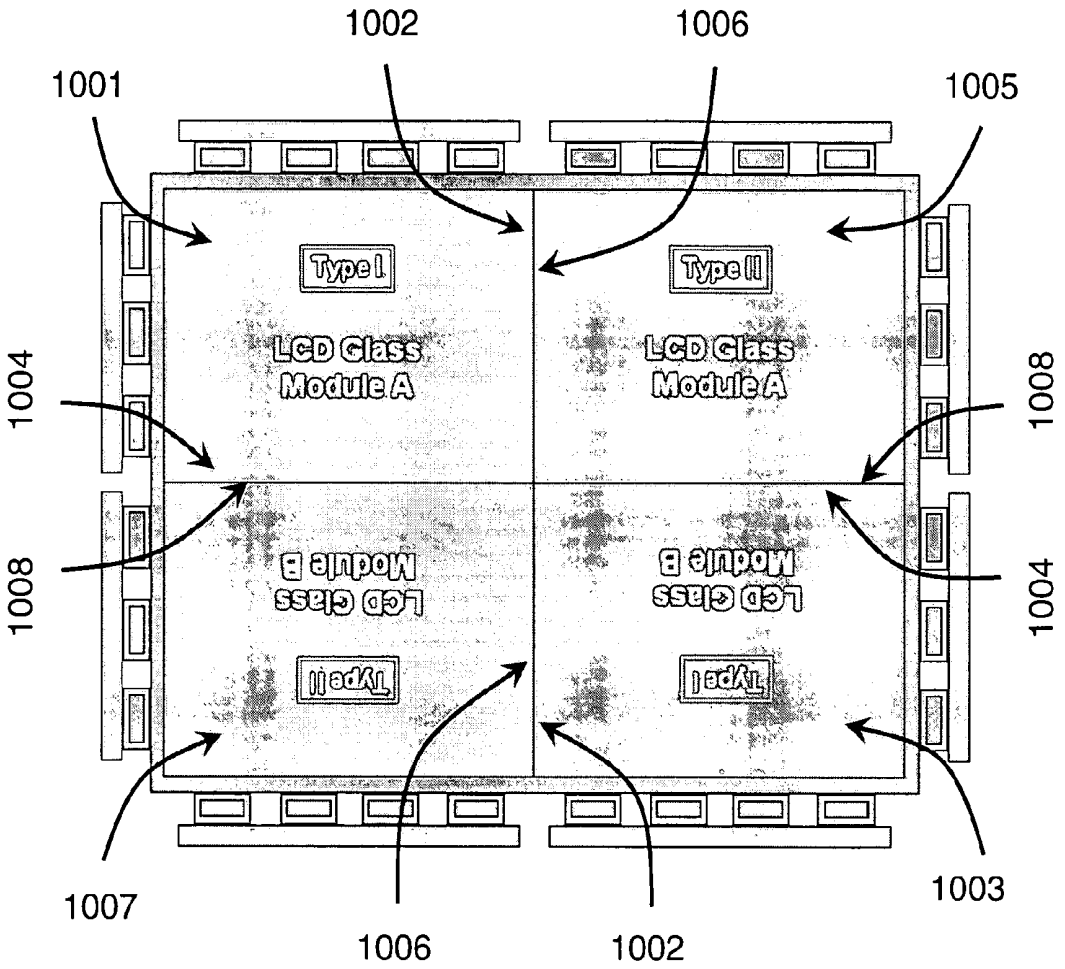
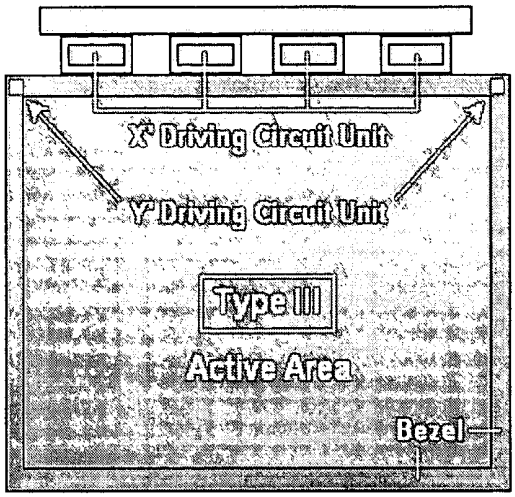
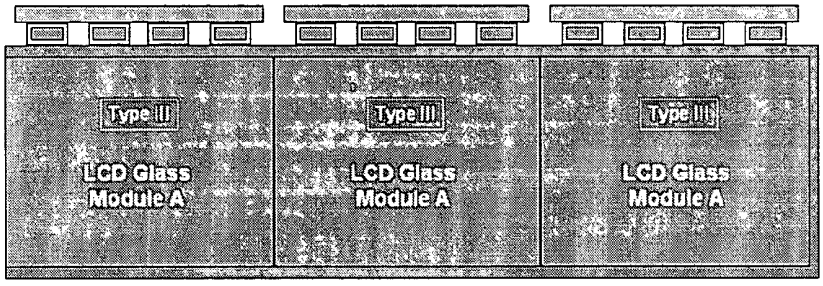

1002
1006
1001
1005
Type I
Type II
LCD Glass
Module A
LCD Glass
Module A
1004
1008
1008
1004
LCD Glass
Module B
LCD Glass
Module B
Type II
Type I
1007
1003
1006
1002

FIG. 10

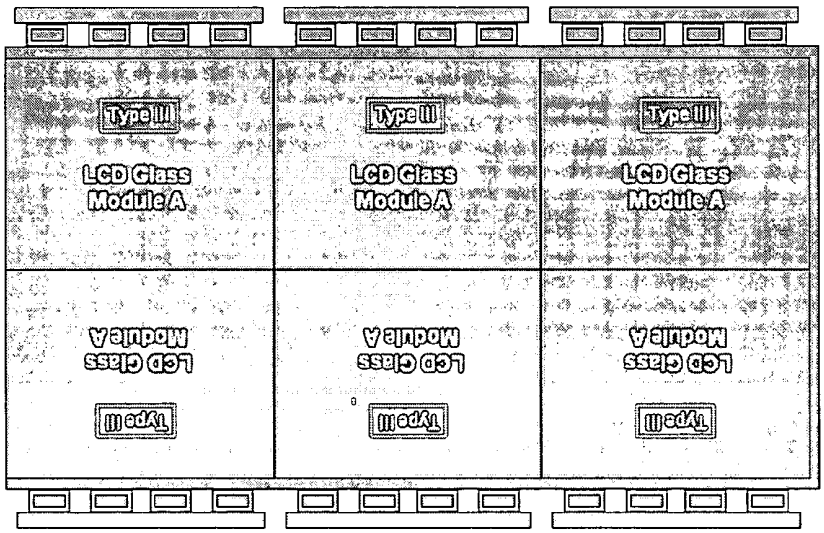


1101
Prior Art



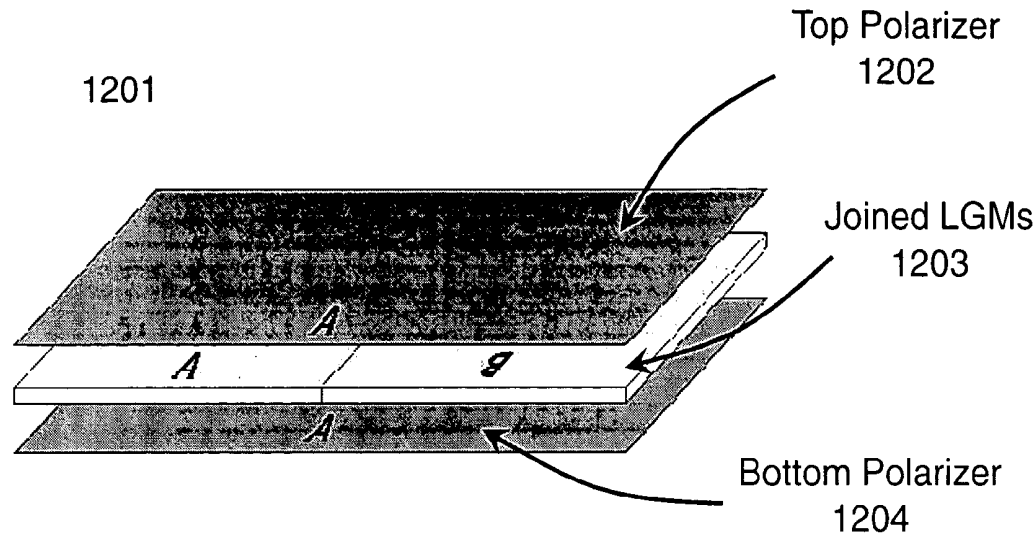
1102

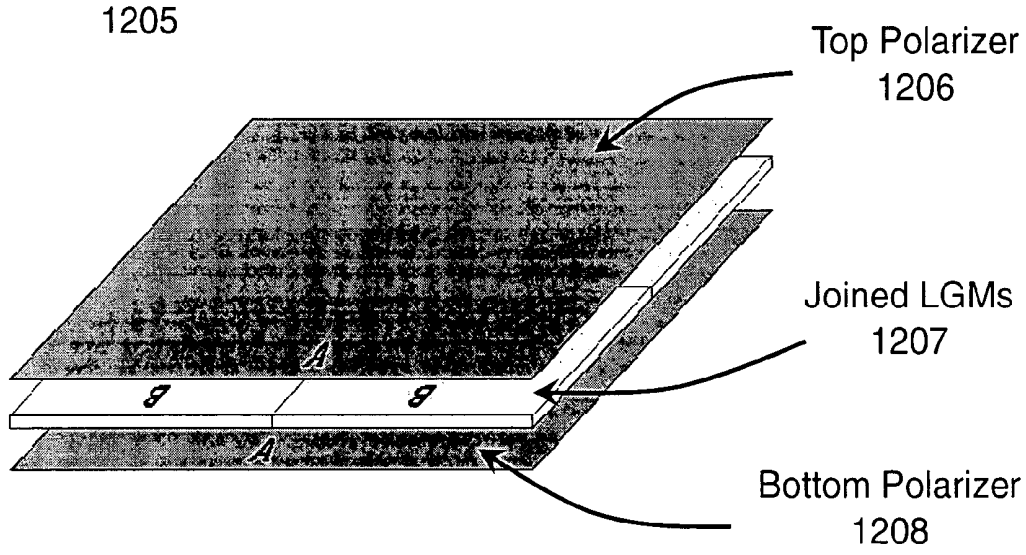
1104



1103

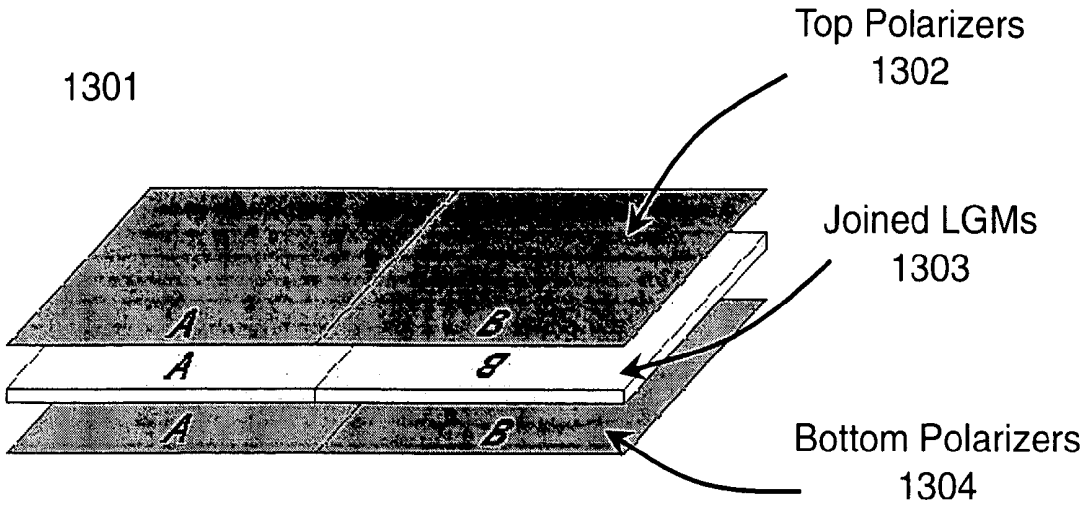
FIG. 11



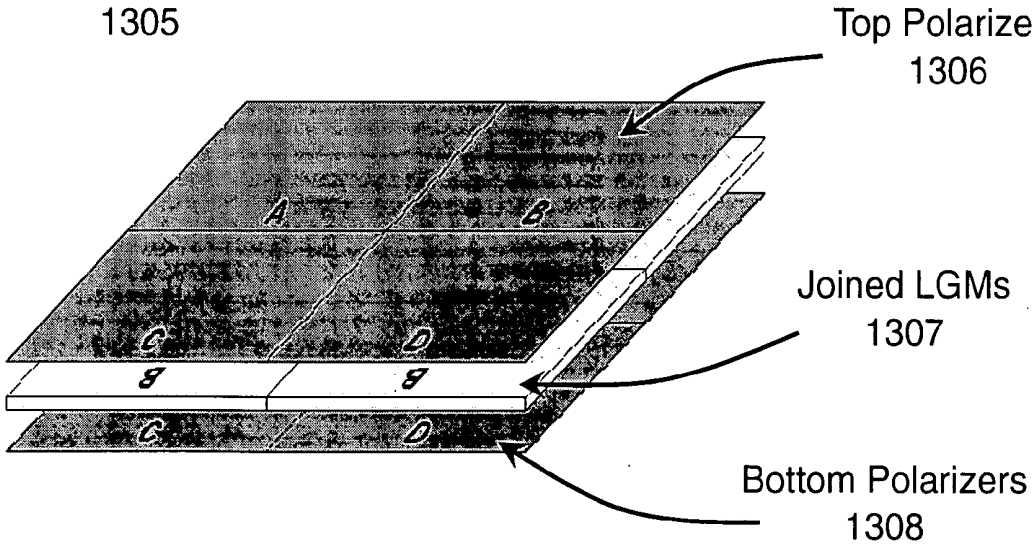


2 Pieces of integrated polarizer

FIG. 12

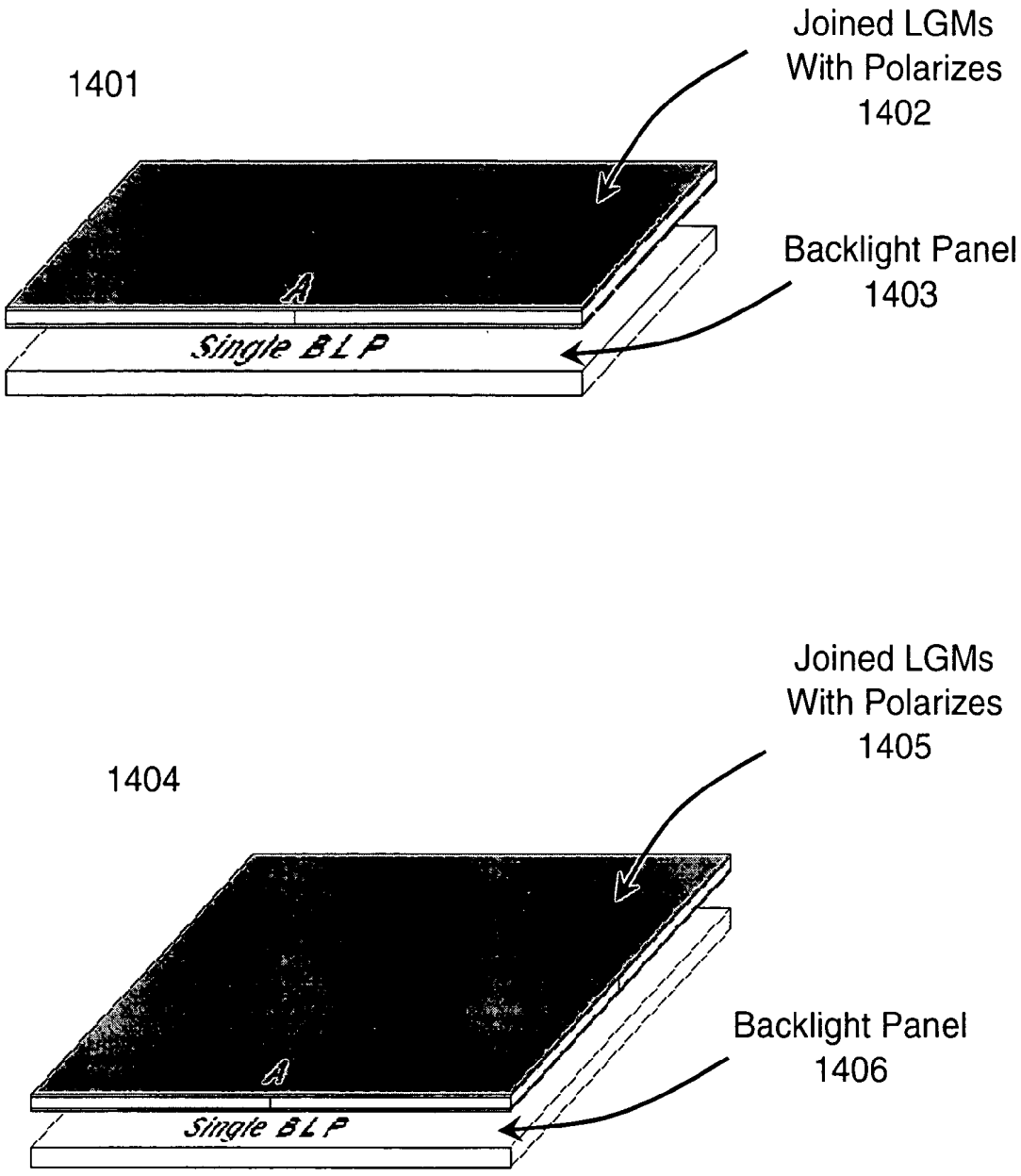


4 Pieces of integrated polarizer



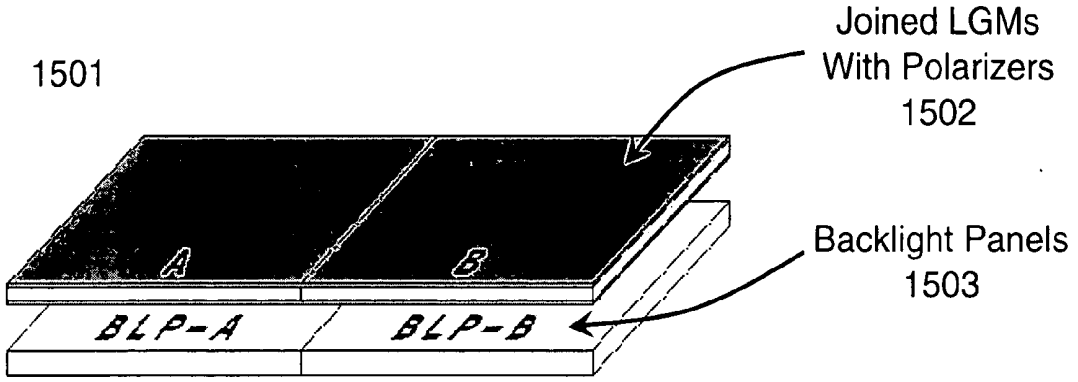
8 Pieces of integrated polarizer

FIG. 13

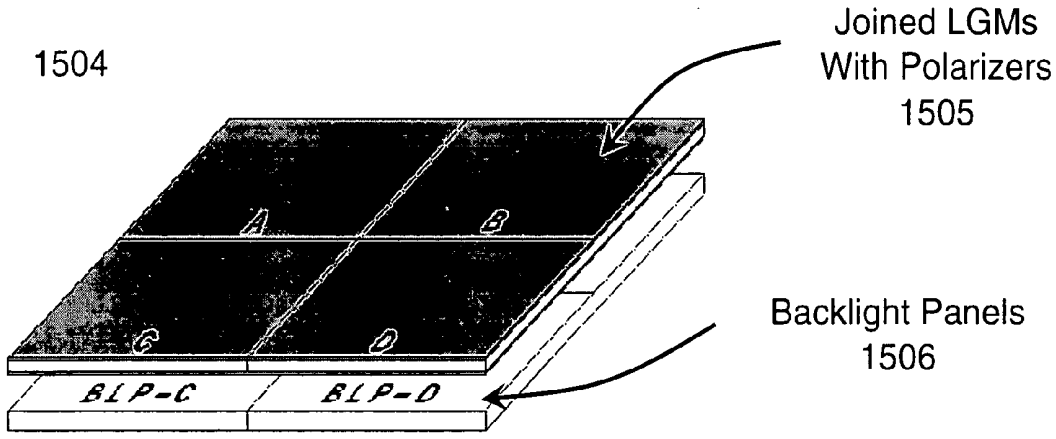


Single Backlight Panel

FIG. 14

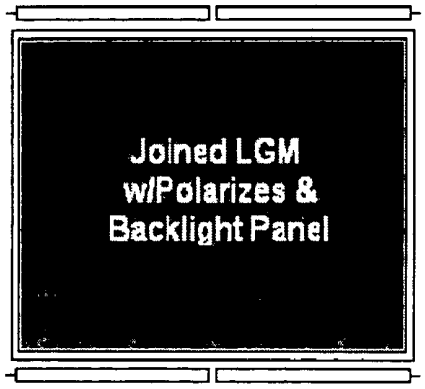


2 pieces of Backlight Panels

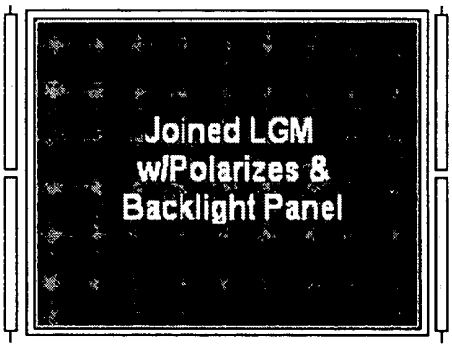


4 pieces of Backlight Panels

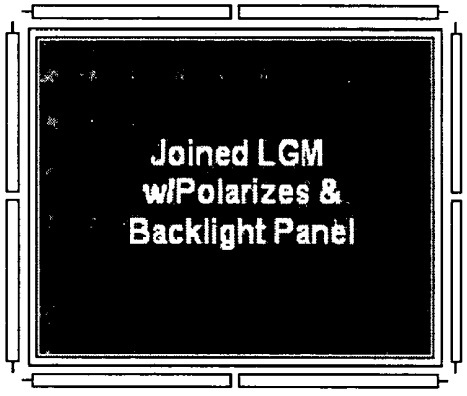
FIG. 15



1601



1602

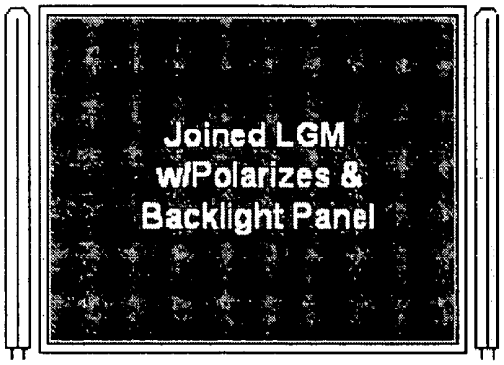


1603

Straight CCFLs

FIG. 16

1701

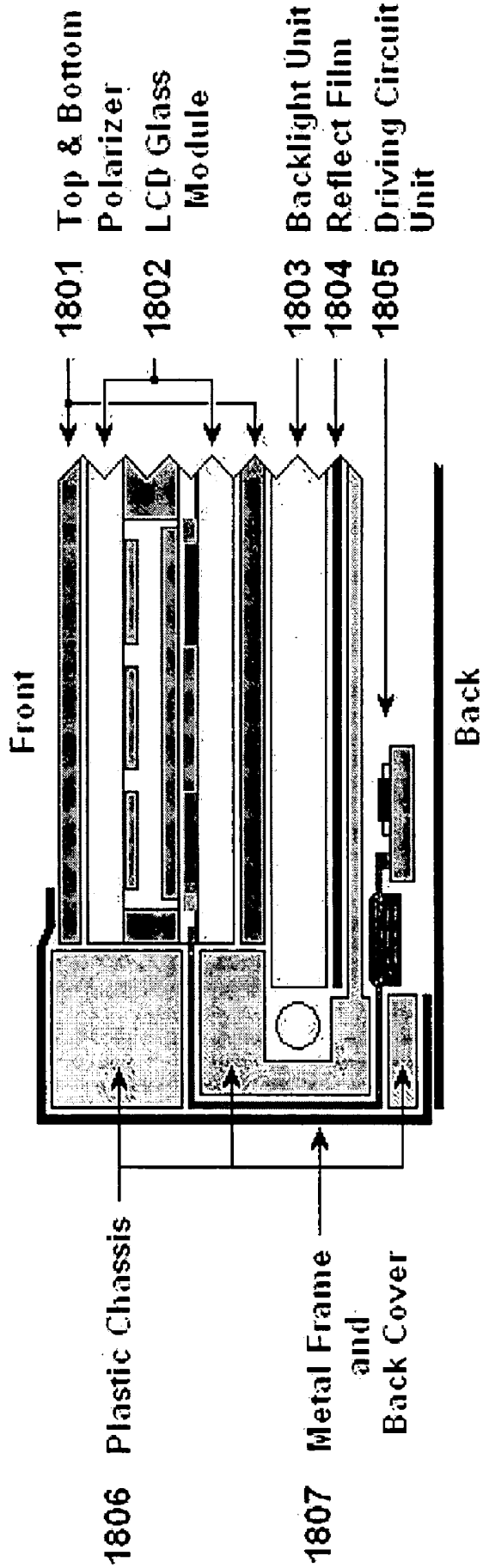


1702

1703

U-Shaped CCFLs

FIG. 17


Front
Back
1801 Top & Bottom Polarizer
1802 LCD Glass Module
1803 Backlight Unit
1804 Reflect Film
1805 Driving Circuit Unit
1806 Plastic Chassis
1807 Metal Frame and Back Cover

1800

FIG. 18

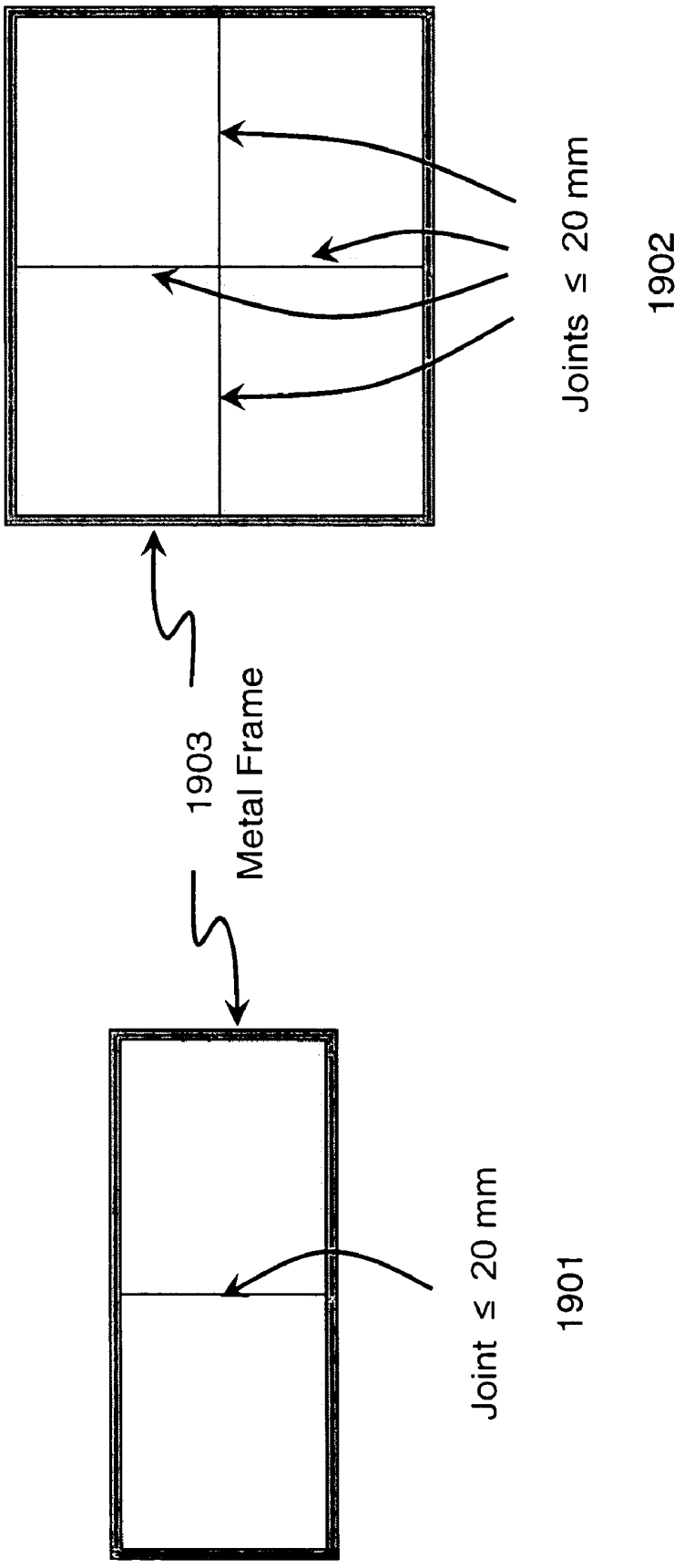


FIG. 19

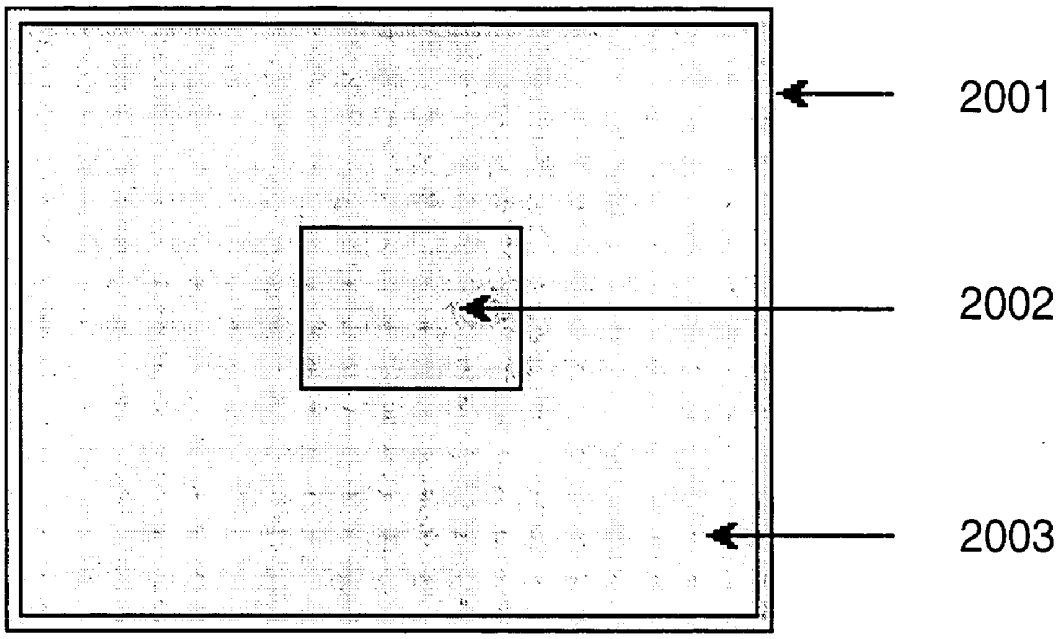


FIG. 20

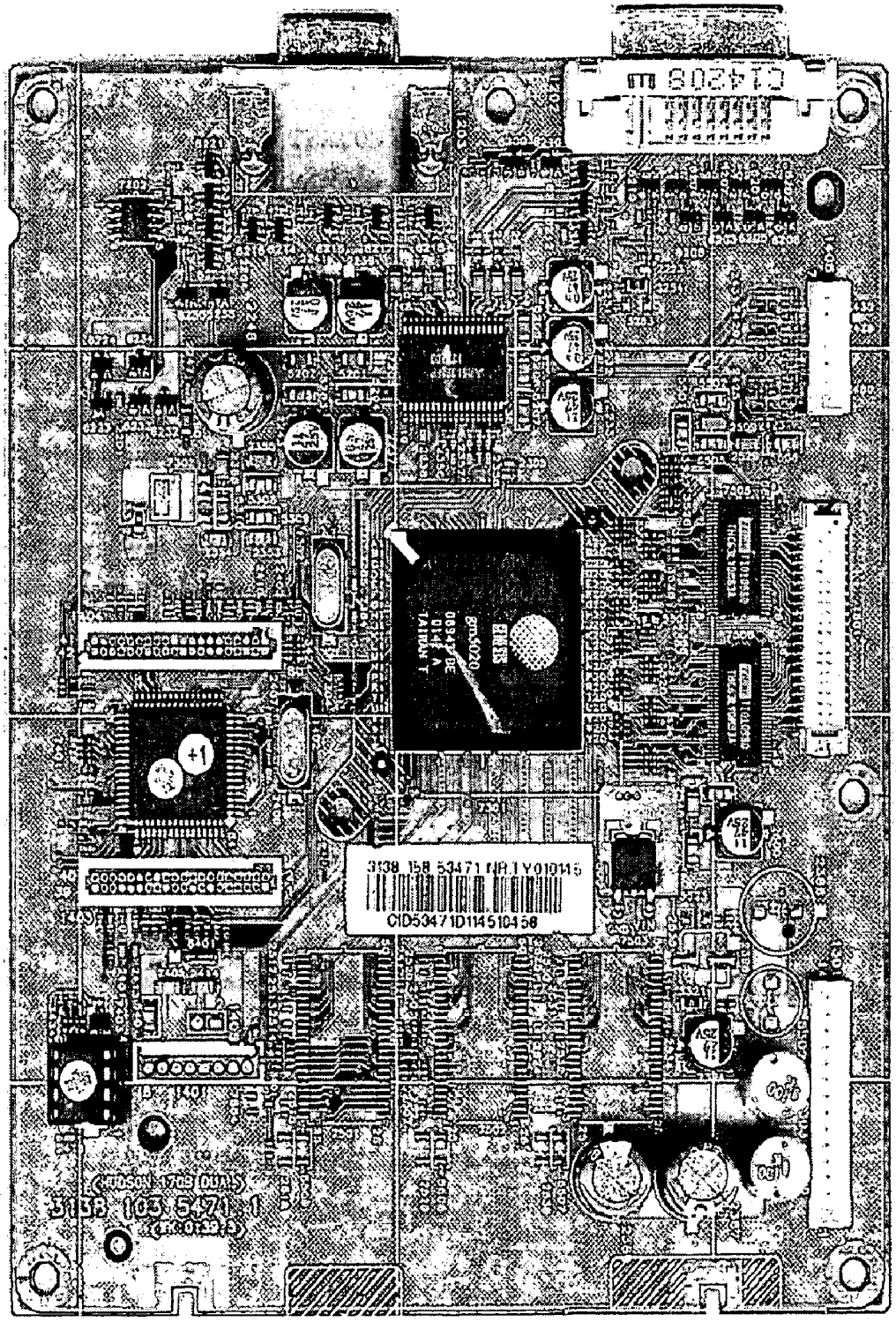


FIG. 21 Prior Art

Gemini Serial Products

Gemini V Serial				
Mode	Panels	Diagonal	Ratio	Resolution
V14xx	2x14"	20.3"	3:2	1536x1024
V15xx	2x15"	21.6"	3:2	1536x1024
V17xx	2x17"	25"	3:2	2048x1280
Gemini VW Serial				
VW17xx	2x17"	23.4"	9:8	2560x1536
VW22xx	2x22"	30.1"	9:8	4800x3840
Gemini H Serial				
H14xx	2x14"	24"	8:3	2048x768
H15xx	2x15"	25.6"	8:3	2048x768
H17xx	2x17"	28.6"	8:3	2560x1024
H18xx	2x18"	30.4"	8:3	2560x1024
Gemini HW Serial				
HW17xx	2x17"	31.3"	32:9	2560x768
HW22xx	2x22"	39.4"	32:9	7680x2400
Multipanel Q Serial				
Q14xx	4x14"	28"	4:3	2048x1536
Q15xx	4x15"	30"	4:3	2048x1536
Q17xx	4x17"	34"	4:3	2560x2048
Q18xx	4x18"	36"	4:3	2560x2048
Multipanel QW Serial				
QW17xx	4x17"	34"	16:9	2560x1536
QW22xx	4x22"	44.4"	16:9	7680x4800

FIG. 22

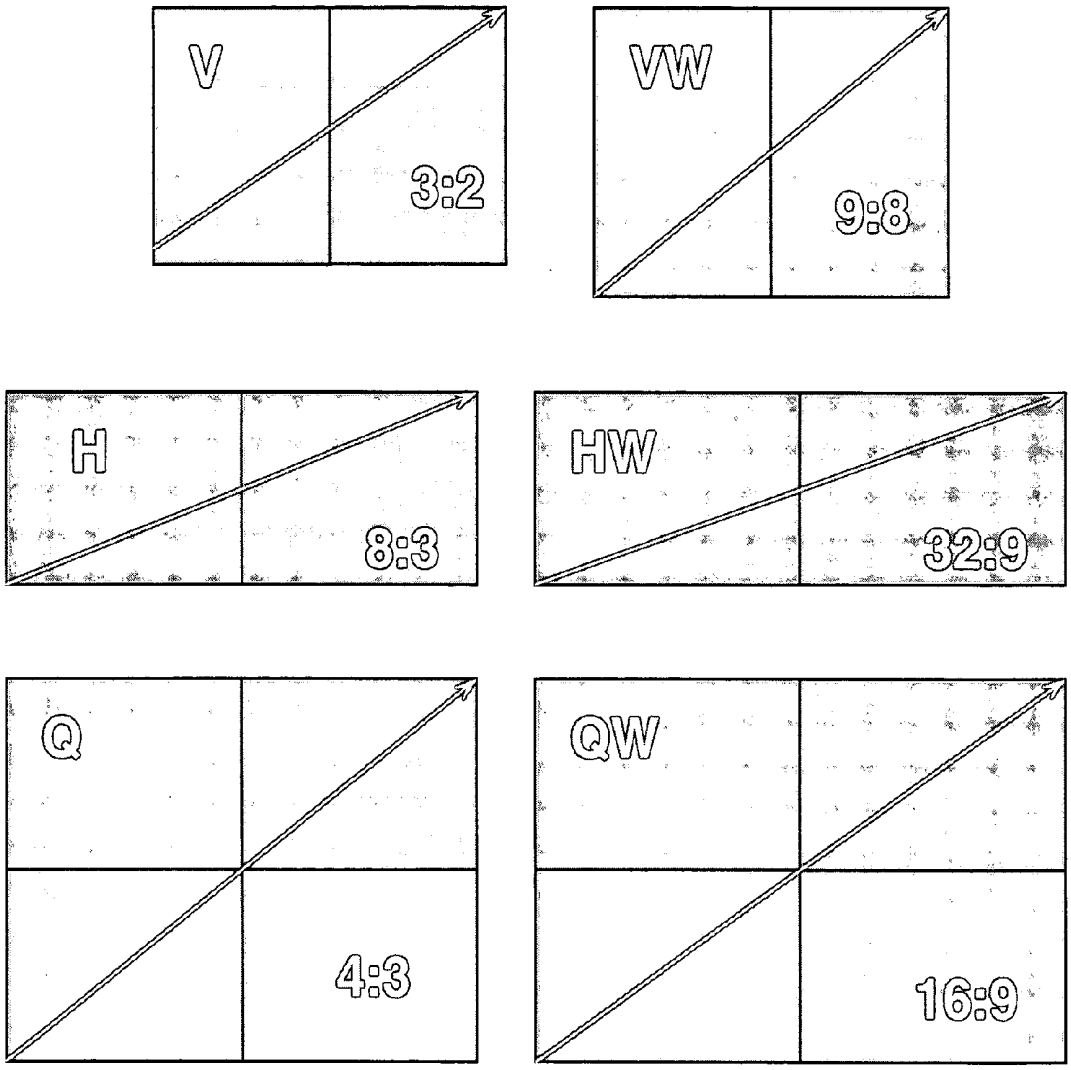


FIG. 23

MULTI-PANEL MONITOR DISPLAYING SYSTEMS

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] The present application claims the benefit of U.S. provisional patent application No. 60/497,904 "Multi-Panel Monitor Displaying Systems," filed Aug. 27, 2003, the contents of which are hereby incorporated by reference.

FIELD OF THE INVENTION

[0002] The present invention is related to multi-panel monitor display systems. Particularly, the present invention is related to liquid crystal multi-panel monitor displaying systems.

BACKGROUND OF THE INVENTION

[0003] Liquid Crystal Display (LCD) system is the display system of the digital age. All major electronic displaying systems have switched from the traditional CRTs to LCDs, particularly, computer monitors and televisions. Once people switched from traditional CRTs to LCDs, it is unlikely for them to switch back to the traditional CRT displaying systems again. Hence, high quality LCD displaying systems are in demand. However, there are still some technical limitations on these LCD displaying systems, such as the number of pages can be reviewed simultaneously and how many features can be carried in the display area.

[0004] Most commercially available LCD products are single monitor displaying systems. **FIG. 1** illustrates one single panel LCD monitor product, and two two-panel monitors. These products have an overall size ranged from 15 inches to 19 inches and a frame width ranged from 14.0 mm to 18.6 mm. Very too often an image is too large to be fully displayed on a single LCD monitor.

[0005] Hence, there are multi-monitor displaying systems available in the market providing multiple projector-based displays or video displays. These systems are assembled with a plurality of monitors having wide encircled frames. Some multi-monitor displaying systems can provide a better visual effect than the conventional single monitor displays by re-arranging these video displays in certain angles within a single housing unit. However, the gaps between monitors are still so big to be ignored and it interferes with viewer's enjoyment.

[0006] In addition, there are multi-panel displaying systems, also called multi-module displaying systems, available in the market. These displaying systems usually have wide gaps, also referred to as mullions, between panels. For example, a two-panel LCD product typically has an inch wide gap between the panels with a frame width of 13 mm. Despite of the wide gap, this type of multi-panel LCD is the best possible LCD displaying system available in the market. The large mullion between panels prevents the image display from having an integrated look and definitely gets in the way to interfere with the view effect.

[0007] Moreover, both the multi-monitor displaying systems and the multi-panel displaying systems are extremely costly. The high productive cost not only burdens the manufacturers but also decrease the enjoyable view effect of these systems. Therefore, reducing the production cost is equally important and challenging as reducing the gap between monitors for the next generation of multi-panel monitor displaying systems.

SUMMARY

[0008] Accordingly, the multi-panel monitor displaying systems of the present invention is developed to provide viewers with high quality of visual effect and substantially low production cost. The multi-panel monitor displaying systems of the present invention includes a multi-panel monitor of a plurality of panels and an integrated Liquid Crystal Display Glass Module (LGM) supporting the plurality of panels.

[0009] The integrated LGM consists of a plurality of Liquid Crystal Display Glass Modules (LGMs) and is achieved by utilizing a set of LGM technologies developed by the present invention. The LGM technology includes a set of technologies to re-design and manipulate LCD glass modules; they are the Multi-Join technology, the Cut Panel technology, the Backlight Panel technology, and the Polarizer technology.

[0010] The multi-panel monitor display systems of the present invention provide viewers the best viewing effect without any disadvantages of the conventional multi-monitor display systems and multi-module displaying systems. The display systems of the present invention have achieved the same enjoyable visual effect of the largest conventional LCD monitor, however, with extremely low production cost. Particularly, the multi-panel monitor displaying systems of the present invention can provide a greater width to length ratio and better visual effect. Most of all, the gaps between panels are visually un-detective. Specifically, the visually un-detective gap is less than or equal to 20 mm.

[0011] Several preferred embodiments of the present invention are illustrated herein for exemplary purposes. Referring to **FIG. 2** and **FIG. 3**, three different preferred embodiments of the multi-panel monitor displaying systems, the Gemini H series, are shown with width and gap width. The Gemini H156 models have only a 6 mm gap and extensive multimedia capabilities, including brilliant colors and immaculate clarity. Gemini H series greatly expands your viewing area. This powerful 25.6-inch 8:3 multi-panel LCD monitor displaying system, as shown in **FIG. 2**, will redefine the way you do high-end photo, graphs, spreadsheets and drawings with a complete desktop multimedia presentation and video display in one exquisitely designed device. Various display effects are shown in **FIG. 4** for a Gemini H156B model.

[0012] Furthermore, **FIG. 5** illustrates other preferred embodiments of the multi-panel monitor displaying systems of the present invention. By utilizing the LGM and A/D board modifying technologies, a plurality of multi-panel monitor displaying models can offer viewer top quality of visual effect and with the lowest possible cost. Various details of the preferred embodiments of the present invention will be fully discussed in the following detailed description section.

DESCRIPTION OF DRAWINGS

[0013] **FIG. 1**: **FIG. 1** illustrates the LCD prior art, including one panel and two-panel displaying models.

[0014] **FIG. 2**: **FIG. 2** illustrates one of the preferred embodiments of the present invention, Gemini H156B.

[0015] **FIG. 3**: **FIG. 3** illustrates two of the preferred embodiments of the present invention, Gemini H series.

[0016] **FIG. 4**: **FIG. 4** illustrates a sample of operation of a preferred embodiment of a multi-panel monitor displaying system.

[0017] **FIG. 5**: **FIG. 5** illustrates two preferred embodiments of the multi-panel monitor displaying systems of the present invention.

[0018] **FIG. 6**: **FIG. 6** illustrates comparison of the visual effect of a single monitor vs. multi-panel monitor of the present invention.

[0019] **FIG. 7**: **FIG. 7** illustrates some commercially available LCD panel modules employed in the present invention.

[0020] **FIG. 8**: **FIG. 8** illustrates the Multi-Join technology applied on two Type-I LGMs.

[0021] **FIG. 9**: **FIG. 9** illustrates the Multi-Join technology applied on one Type-I LGM and one Type-II LGM.

[0022] **FIG. 10**: **FIG. 10** illustrates the Multi-Join technology applied on two Type-I LGMs and two Type-II LGMs employed by the present invention.

[0023] **FIG. 11**: **FIG. 11** illustrates the application of Multi-Join technology applied on the Chip On Glass (COG), Type-III LGMs.

[0024] **FIG. 12**: **FIG. 12** illustrates the Polarizer technology developed by the present invention.

[0025] **FIG. 13**: **FIG. 13** illustrates the Polarizer technology developed by the present invention.

[0026] **FIG. 14**: **FIG. 14** illustrates the Backlight Panel developed by the present invention.

[0027] **FIG. 15**: **FIG. 15** illustrates the Backlight Panel technology applied on a preferred two-piece Backlight Panel model and a preferred four-piece Backlight Panel model.

[0028] **FIG. 16**: **FIG. 16** illustrates a Multi-Join method for Cold Cathode Fluorescent Lamps developed by the present invention.

[0029] **FIG. 17**: **FIG. 17** illustrates a Multi-Join method for Cold Cathode Fluorescent Lamps developed by the present invention.

[0030] **FIG. 18**: **FIG. 18** illustrates the side view of an integrated Multi-Panel Module of the present invention.

[0031] **FIG. 19**: **FIG. 19** illustrates the front view of an integrated Multi-Panel Module of the present invention.

[0032] **FIG. 20**: **FIG. 20** illustrates the back view of an integrated Multi-Panel Module of the present invention.

[0033] **FIG. 21**: **FIG. 21** illustrates a commercially available A/D board used in the present invention.

[0034] **FIG. 22**: **FIG. 22** illustrates a table showing the data of one of the preferred embodiments of the present invention, the Gemini Serial Products.

[0035] **FIG. 23**: **FIG. 23** illustrates the ratios of the Gemini Serial Products.

DETAILED DESCRIPTION OF THE INVENTION

[0036] Liquid crystal display (LCD) system is the display system of the digital age. The present invention has made a break-through in LCD manufacturing technology by integrating a plurality of LGMs into one bigger and clearer displaying module, the multi-panel monitor displaying systems. The display systems can dissolve all the setbacks in the conventional LCD systems. A plurality of preferred embodiments of the present invention discussed herein. Some preferred embodiments of the present invention are shown in **FIGS. 2, 3** and **5**.

[0037] One preferred embodiment of the present invention is the Gemini H series. The picture-by-picture capability of Gemini H series with Extra-Wide panel enables you to view two input sources simultaneously at 2048×768 resolution. The Gemini H series also meet multimedia needs with direct interface capabilities for VCR, DVD, digital satellite receiver, camcorder and more. Connecting Gemini H with HDTV decoder or HDTV set-top box, you can enjoy HDTV too. With features like auto adjustment, color control, and image enhancement, there's no limit to what you can accomplish.

[0038] In addition, whether you are executing finely detailed CAD/CAM and ACAD drawings or creating extensively layered graphics, the Gemini H series can deliver the most powerful performance that you deserve. Afterwards, you would not want to return to single panel monitor environment after experiencing the productivity and work-enabling advantage of the multi-panel monitor display systems of the present invention. **FIG. 6** illustrates the visual effect of a single monitor display system versus a multi-panel monitor displaying system.

[0039] In order to achieve a top quality visual effect and a gap between LCD panels less than or equal to 20 mm, the present invention employs a Multi-Join technology, a Cut Panel technology, a Backlight Panel technology, and a Polarizer technology. Specifically, by utilizing these technologies on a set of commercially available LGM modules, as shown in **FIG. 7**, the present invention is able to integrate a plurality of LGM modules into one single LGM module. As a result, the present invention is able to offer top quality visual effect and lowest possible productive cost; most of all, achieving a gap that is less than or equal to 20 mm between LCD panels.

[0040] Multi-Join Technology

[0041] A Multi-Join Technology is used in the LGM integration process of the present invention. The LGM integration process is first arrange a plurality of LCD Glass Modules (LGMs) into a desired pattern, e.g., a joint of one Type-I LGM with a Type-II LGM, then, rotate one of some of the LGMs vertically or horizontally as needed. The Multi-Join technology, as illustrated in **FIG. 8**, is also utilized to encircle Cold Cathode Fluorescent Lamps (CCFLs) and Backlight Panels.

[0042] Afterwards, cut the correspondent bezels based on the desired pattern. For example, the commercially available Type-I and Type-II LGMs, the Type-I LGM can only be cut and joined at the right or bottom bezel because the right or bottom bezel does not have the driving circuit unit, and Type-II LGM can be cut on the left and bottom sides only.

Referring to **FIG. 7**, the side view of a LCD Glass Module, the left side of the LGM is connected to a driving circuit. After the bezel cutting process, these LGMs are ready for joining. Now, join these LGMs either on the right side or on the bottom side of the LGMs. These LGMs then mature into an integrated LGM.

[**0043**] When joining two Type-I LGMs horizontally, referring to **FIG. 8**, first cut the right side bezels **803**, **804** of LGM A **801** and LGM B **802** (i.e., Modules A and B) respectively, and rotate Module B 180° clockwise. Lastly, join the right side **803** of Module A **801** with the right side **804** of Module B **802** together. When joining two Type-II LGMs vertically, referring to **FIG. 8**, first cut the bottom side bezels **807**, **808** of LGM A **805** and LGM B **806** respectively, then rotate Module A 90° counterclockwise and Module B 90° clockwise. At this point, both Module A **805** and Module B **806** are placed vertically. Finally, join Module A and Module B from their bottom sides **807**, **808**.

[**0044**] Subsequently, image rotation is required after the LGM integration process is completed. There are two ways to accomplish image rotation. The most convenient and economic way to rotate image for the multi-panel displaying systems of the present invention is utilizing a PC graphic card that supports multi-displaying image rotation. Viewers can invoke image rotation easily through a user-friendly graphical user interface; for example, activating the CONTROL PANEL then clicking on the DISPLAY and SETTING. Typically, the degree of image rotation and the designation of a particular panel can be specified.

[**0045**] Another way to achieve image rotation is to employ a newly designed A/D board, which can be called "A/D Board **180**". When coupled with an "A/D Board **180**", the multi-panel monitor displaying systems of the present invention can do image rotation without PC graphic cards. A conventional A/D board is shown in **FIG. 21**. When the multi-panel monitor displaying systems of the present invention is coupled with a conventional A/D board, a PC graphic card is needed to achieve great image display. However, when a newly designed A/D Board **180** is coupled with the multi-panel monitor displaying systems of the present invention, great image displays come with the systems, no PC graphic card is necessary.

[**0046**] Furthermore, two Type-II LGMs can also be joined horizontally or vertically with a similar fashion as illustrated in **FIG. 8**. However, the joint is slightly different when it comes to join one Type-I LGM with one type-II LGM. Referring to **FIG. 9** for the joint of one Type-I LGM (i.e., Module A) and one Type-II LGM (i.e., Module B) horizontally, first, cut the right side bezel **902** of Module A **901** and the left side bezel **904** of Module B **903**. Then, join the right side **902** of Module A **901** with the left side **904** of Module B **903**. Further, **FIG. 9** illustrates the joint of one Type-I LGM (i.e., Module A) and one type-II LGM (i.e., Module B) vertically. First, cut the bottom side bezels **906**, **908** of Module A **905** and Module B **907** respectively. Then, rotate Module A 90° counter clockwise and Module B 90° clockwise. Both Modules are now placed vertically. Finally, join Module A **905** and Module B **907** from their bottom sides **906**, **908**.

[**0047**] Now refer to **FIG. 10** for the joint of two Type-I LGMs and two Type-II LGMs. For joining four mixed type LGMs, first, cut the right **1002** and bottom **1004** side bezels of Type-I LGMs (i.e., Module A **1001** and Module B **1003**), and rotate Module B 180° counterclockwise. Then, cut the left **1006** and bottom **1008** side bezels of Type-II LGMs (i.e., Module A **1005** and Module B **1007**), and rotate Module B 180° clockwise. Now, join the right side **1002** of Module A **1001** and the left side **1006** of Module A **1005** together horizontally; join Module A **1001** and Module B **1007** from their bottom sides **1004**, **1008**; join the right side **1002** of Module B **1003** with the left side **1006** of Module B **1007**, and the bottom side **1004** of Module **1003** with the bottom side **1008** of Module A **1005**.

[**0048**] Furthermore, **FIG. 11** illustrates another preferred embodiment of commercially available Type-III LGM, the single layout Chip On Glass (COG) **1101**. This Type-III LGM has the control and driving circuit connected to one side bezel only. Therefore, all the technologies developed by the present invention, which are the Multi-Join technology, the Cut Panel technology, the Backlight Panel technology, and the Polarizer technology, can be applied to the right, left, and bottom bezels of this type LGM. Two exemplary patterns are shown in **FIG. 11**, the first pattern **1102** has three Type-III LGMs joined together horizontally, and in this particular pattern, no image rotation is required. The second pattern **1103** has six Type-III LGMs joined together horizontally and vertically. More importantly, this Type-III LGMs allows the patterns **1104** to be further joined by additional panels.

[**0049**] Based on the preferred embodiments given above, it should be obvious to those skilled in the art to apply the newly developed LGM technologies of the present invention to a plurality of LCD modules. Various layouts and models can be arranged according to individual manufacturing needs and market demands.

[**0050**] Cut Panel Technology

[**0051**] Coupled with Multi-Join technology is the cut panel technology. The cut panel technology is applied to the LCD Glass Module and not the polarizers. Therefore, the polarizers need to be taken off the LGMs first then put back to the LGMs after the LGMs have been cut. Frequently, the cut bezels of the LGMs require some polish work and the liquid crystal needs to be refilled and resealed to ensure a perfect visual effect.

[**0052**] Furthermore, the polarizers can be put back to the LGMs either after the LGMs have been cut or after the LGMs have been cut and rotated. Although there is an option for some models on whether to rotate polarizers along with the cut module, the displaying effect, however, is different. If the polarizers do not rotate with the cut module, the panel image display quality is somewhat lower than the display quality of a panel having polarizers rotated along with the module.

[**0053**] Polarizer Technology

[**0054**] After joining and cutting the LGMs into a desired pattern, the Polarizer technology is utilized to integrate the joined LGMs into one LGM unit for the displaying systems of the present invention. There are two preferred embodiments of the present invention shown in **FIG. 12**. In **FIG. 12**, two preferred models of 2 pieces of integrated polarizes are illustrated. In both the rectangular **1201** and square **1205** shape models, the single polarizers face up. Two top polarizers **1202**, **1206** attach to the top of the joined LGMs **1203**,

1207 respectively and the bottom polarizes **1204**, **1208** attach to the bottom of the jointed LGMs **1203**, **1207** respectively.

[**0055**] In addition, **FIG. 13** shows a model of 4 pieces of polarizers **1301** and a model of 8 pieces of polarizers **1305**. In **FIG. 13**, the two pieces of polarizers joined together horizontally becomes one set **1302**, **1304**; the four pieces of polarizers joined together horizontally and vertically become one set **1306**, **1308**. These sets of polarizers all face up. The top polarizer sets **1302**, **1306** attach to the top of the joined LGMs **1303**, **1307**, and the bottom polarizer sets **1304**, **1308** attach to the bottom of the joined LGMs **1303**, **1307**.

[**0056**] Backlight Panel Technology

[**0057**] Another important technology required for a top quality visual effect is the Backlight Panel technology. The backlight panel is used as the planar light source of the present invention. After joining a plurality of LGMs into one single LGM unit, the Backlight Panel technology is used to add a backlight panel that fits the integrated LGM unit to generate a further integrated LGM unit.

[**0058**] **FIG. 14** is an illustration that shows some preferred Multi-Join methods for Backlight Panel technology. In **FIG. 14**, two Backlight Panel models **1401**, **1404** are illustrated to demonstrate the Backlight Panel Technology. In these particular models, both the backlight panels **1403**, **1406** face up and attach to the unit of the integrated LGMs and polarizers **1402**, **1405**.

[**0059**] Now referring to **FIG. 15** for a 2-piece backlight panel model **1501** and a 4-piece backlight panel model **1504**. In the 2-piece backlight panel model, two pieces of backlight panels are joined together horizontally into one set of Backlight Panel (BLP) **1503**. The BLP **1503** faces up and attaches to the joined LGMs with Polarizers **1502**. In the 4-piece backlight panel model, four pieces of backlight panels are joined together horizontally and vertically into one set of BLP **1506**. The BLP **1506** faces up and attaches to the unit of assembled LGMs and Polarizes **1506**.

[**0060**] Multi-Join Methods for Cold Cathode Fluorescent Lamps (CCFLs)

[**0061**] Finally, the Multi-Join method for Cold Cathode Fluorescent Lamps is used to hold the joined LGMs with polarizers and backlight panel together. **FIGS. 16 and 17** show two preferred Multi-Join methods for CCFLs illustrating the basic application of Multi-Join methods for CCFL. Both the straight CCFL model and the U-Shaped CCFL model are utilized for the present invention.

[**0062**] **FIG. 16** shows three straight CCFL layouts. In **FIG. 16**, the first layout **1601** shows four straight CCFLs are attached to a unit of integrated LGMs with polarizers and backlight panels horizontally. The second layout **1602** shows four straight CCFLs are attached to a unit of integrated LGMs with polarizers and backlight panels vertically. Lastly, the third layout **1603** shows a unit of integrated LGMs with polarizers and backlight panel is encircled by eight straight CCFLs.

[**0063**] Straight CCFLs have connectors at two ends and the middle section of a CCFL tends to be a bit darker than the rest of the CCFL. When connecting two straight CCFLs together, the connected area containing two CCFL connectors creates a dark section. As a result, a gap panels greater than 6 mm becomes inevitable.

[**0064**] Hence, in order to achieve a narrower gap between panels, the U-Shaped CCFL is used because the U-Shaped CCFLs do not have end connectors; thus, do not create a dark section at the connected area. Generally, the U-Shaped CCFLs application can provide displays with greater luminance and extremely slim gap.

[**0065**] **FIG. 17** shows three U-Shaped CCFL layouts. In the first layout **1701**, two U-Shaped CCFLs are attached to a unit of integrated LGMs with polarizers and backlight panels horizontally. In the second layout **1702**, two U-Shaped CCFLs are attached to a unit of integrated LGMs with polarizers and backlight panels vertically. Lastly, in the third layout **1703**, four U-Shaped CCFLs are attached to and encircles a unit of integrated LGMs with polarizers and backlight panels.

[**0066**] Structure Overview of a Multi-Panel LCD Monitor

[**0067**] In **FIG. 18**, a detailed side view of a preferred embodiment of an assembled multi-panel module **1800** of the present invention is illustrated. This preferred assembled multi-panel module **1800** includes an integrated LGM unit that has a top and bottom polarizers **1801**, and a LCD glass module **1802**. This preferred module **1700** further includes a backlight unit **1803**, three plastic chassis **1806**, and a driving circuit unit **1805**. The backlight unit **1803** has a reflect film **1804** attached to its back. The integrated LGM unit is placed on top of the backlight unit **1803** and together mounted on two plastic chassis **1806**. The driving circuit unit **1805** and the third chassis **1806** under the backlight unit **1803** are held together with the integrated LGM unit and the backlight unit **1803** by a metal frame and back cover **1807** to secure the assembly.

[**0068**] The front view of a preferred multi-panel module is shown in **FIG. 19**. In **FIG. 19**, both the rectangular module **1901** and the square module **1902** have a negligible gap less than or equal to 20 mm. The front view of the multi-panel modules also shows a metal frame **1903** in **FIG. 19**. In **FIG. 20**, the back view of a preferred multi-panel module **2000** is illustrated. The module **2000** includes a metal frame **2001**, an A/D board and CCFL connectors **2002**, and a back cover **2003**.

[**0069**] Additionally, there are certain preferred accessories for the multi-panel monitor displaying systems of the present invention. They are power adapters, video cables, and some inner cables. There are also some other required and preferred accessories besides the assembled multi-panel modules **1700** and an A/D board, as shown in **FIG. 21**. They are an inverted board, a plastic shell, a metal chassis, a bracket, cables, connectors, an on screen display (OSD) keypad, and a stand.

[**0070**] An A/D board is illustrated in **FIG. 21**. This commercially available A/D board is utilized in the present invention. However, when a newly designed A/D board is utilized for image rotation, a PC graphic card that supports image rotation will be no longer required. Consequently, the multi-panel monitor displaying systems of the present invention can be used as a gigantic TV monitor or a video wall for special displays.

[0071] The Gemini Series

[0072] One of the preferred embodiments of the present invention is the Gemini Series. A table showing all the data of the Gemini Serial Products is given in **FIG. 22**, and **FIG. 23** shows the ratios of the Gemini Serial Products. The Gemini H156B, as shown in **FIG. 3**, flat panel display (TFT) is 25.6 inches. This model weighs only 9.8 pounds with dimensions (W×D×H) of 26 inches×5.5 inches×13 inches and a diagonal size of 25.6 inches. Another preferred embodiment is also shown in **FIG. 2**, the Gemini H series. The Gemini H model has a 24 inches overall size monitor and an 8:3 length to width ratio.

[0073] The gap between panels of Gemini H156B is only 6mm, and a view of 8:3 extra-wide. The Dot Pitch is 0.29 mm, and the maximum resolution can be at 2048×768. The color support of Gemini H156B is 24 bits, that is, 16.7 Mega colors. With all these high standard specifications, the operational power consumption is only 35 watt. Compliant standards include but not limited to Plug and Play, CE, CSA, TUV, VCCI, C-Tick, GOST, CCIB, DDC-1, DDC-28, IEC950, MEEI, NEMKO, SEMKO, SIQ, TCO '95, UL 1950, VDE.

[0074] The Gemini H series also includes other models that have unit dimensions from 2×14 inches to 2×18 inches. For example, the Gemini H156S Monitor can be used as one panel display system or a multi-panel display system. The product size ranges from 24 inches to 30.4 inches, a length to width ratio of 8:3, and resolutions from 2048×768 to 2560×1024.

[0075] There are also Gemini V series and Gemini Q series products. The Gemini V series have unit size from 2×15 inches to 2×17 inches and product size from 20.3 inches to 25 inches. With a length to width ratio of 6:4, the Gemini DP series have resolutions from 1536×1024 to 2048×1280. The Gemini Q series have unit size from 4×14 inches to 4×18 inches and product size from 28 inches to 36 inches. With a length to width ratio of 4:3, the Gemini Q series have resolutions from 2048×1536 to 2560×2048.

[0076] Accordingly, the present invention provides multi-panel monitor displaying systems for displaying images on multi-panel LCD screens. Although the present invention has been described in certain preferred embodiments, many modifications and variations would be apparent to those skilled in the art. It is therefore understood that the present invention may be practiced otherwise than as specifically described herein. Hence, those preferred embodiments described in the present invention should be considered in all respects as illustrative and not restrictive.

We claim:

1. A process of making a multi-panel monitor for image display comprising:

cutting a first correspondent bezel of a Liquid Crystal Display Glass Module (LGM) of a plurality of Liquid Crystal Display Glass Modules (LGMs) in a desired pattern;

attaching polarizers to the cut LGM;

multi-joining the plurality of LGMs together into a large integrated LGM; and

joining the large integrated LGM with a backlight mechanism.

2. The process of claim 1 wherein the desired pattern is arranging a plurality of Liquid Crystal Display Glass Modules (LGMs) into a layout for the multi-joining.

3. The process of claim 2 further comprising cutting a second correspondent bezel of a Liquid Crystal Display Glass Module (LGM).

4. The process of claim 3 further comprising cutting a third correspondent bezel of a Liquid Crystal Display Glass Module (LGM).

5. The process of claim 1 wherein the large integrated LGM further comprising a gap between the plurality of LGMs less than or equal to 20 mm.

6. The process of claim 1 wherein the backlight mechanism further comprising a plurality of straight Cold Cathode Fluorescent Lamps (CCFLs).

7. The process of claim 1 wherein the backlight mechanism further comprising a plurality of U-Shaped Cold Cathode Fluorescent Lamps (CCFLs).

8. The process of claim 1 wherein the backlight mechanism further comprising a plurality of backlight panel.

9. The process of claim 1 wherein the large integrated LGM further comprising coupling with a PC graphic card for image rotation.

10. A method of making a multi-panel monitor for image display comprising:

cutting a first correspondent bezel of a Liquid Crystal Display Glass Module (LGM) of a plurality of Liquid Crystal Display Glass Modules (LGMs) in a desired pattern;

attaching polarizers to the cut LGM;

multi-joining the plurality of LGMs together into a large integrated LGM; and

joining the large integrated LGM with a backlight mechanism.

11. The method of claim 10 wherein the desired pattern is arranging a plurality of Liquid Crystal Display Glass Modules (LGMs) into a layout for the multi-joining.

12. The method of claim 11 further comprising cutting a second correspondent bezel of a Liquid Crystal Display Glass Module (LGM).

13. The method of claim 12 further comprising cutting a third correspondent bezel of a Liquid Crystal Display Glass Module (LGM).

14. The method of claim 10 wherein the large integrated LGM further comprising a gap between the plurality of LGMs less than or equal to 20 mm.

15. The method of claim 10 wherein the backlight mechanism further comprising a plurality of straight Cold Cathode Fluorescent Lamps (CCFLs).

16. The method of claim 10 wherein the backlight mechanism further comprising a plurality of U-Shaped Cold Cathode Fluorescent Lamps (CCFLs).

17. The method of claim 10 wherein the backlight mechanism further comprising a plurality of backlight panel.

18. The method of claim 10 wherein the large integrated LGM further comprising coupling with a PC graphic card for image rotation.

19. A multi-panel monitor displaying system comprising:

a display device of a plurality of panels; and

an integrated Liquid Crystal Display Glass Module (LGM) supporting the display device.

20. The multi-panel monitor displaying system of claim 19 wherein the integrated LGM further comprising a plurality of cut Liquid Crystal Display Glass Modules (LGMs), the plurality of cut LGMs are attached with polarizers and then multi-joined with a backlight mechanism.

21. The multi-panel monitor displaying system of claim 20 wherein the plurality of multi-joined LGMs further comprising rotating one or more of the LGMs.

22. The multi-panel monitor displaying system of claim 20 wherein the backlight mechanism further comprising multi-joining the plurality of LGMs with a plurality of straight Cold Cathode Fluorescent Lamps (CCFLs).

23. The multi-panel monitor displaying system of claim 20 wherein the backlight mechanism further comprising multi-joining the plurality of LGMs with a plurality of U-Shaped Cold Cathode Fluorescent Lamps (CCFLs).

24. The multi-panel monitor displaying system of claim 20 wherein the backlight mechanism further comprising a plurality of backlight panel.

25. The multi-panel monitor displaying system of claim 19 further comprising a gap less than or equal to 20 mm between the plurality of panels.

* * * * *

专利名称(译)	多面板监视器显示系统		
公开(公告)号	US20050057435A1	公开(公告)日	2005-03-17
申请号	US10/927043	申请日	2004-08-27
[标]申请(专利权)人(译)	苏明		
申请(专利权)人(译)	苏明		
当前申请(专利权)人(译)	苏明		
[标]发明人	SU MING		
发明人	SU, MING		
IPC分类号	G02F1/1333 G09G3/36 G09G5/00		
CPC分类号	G02F1/13336 G09G2340/0492 G09G3/36		
优先权	60/497904 2003-08-27 US		
其他公开文献	US7667815		
外部链接	Espacenet USPTO		

摘要(译)

多面板监视器显示系统具有由一个集成的液晶显示器玻璃模块（LGM）支持的多面板监视器。多面板监视器在面板之间包含视觉上无法检测的间隙，因此可以为观看者提供高质量的视觉效果和低生产成本。利用一组LGM技术来重新设计和集成多个LGM。在集成之后，多监视器显示系统还需要图像旋转以确保完美的图像显示。