US 20200111391A1

(19) United States

(12) Patent Application Publication

Chao et al.

(10) Pub. No.: US 2020/0111391 A1

(43) Pub. Date: Apr. 9, 2020

(54) **SPLICED DISPLAY**

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(21) Appl. No.: **16/231,404**

(22) Filed: **Dec. 22, 2018**

(30) **Foreign Application Priority Data**

Oct. 9, 2018 (TW) 107135661

Publication Classification

(51) **Int. Cl.**

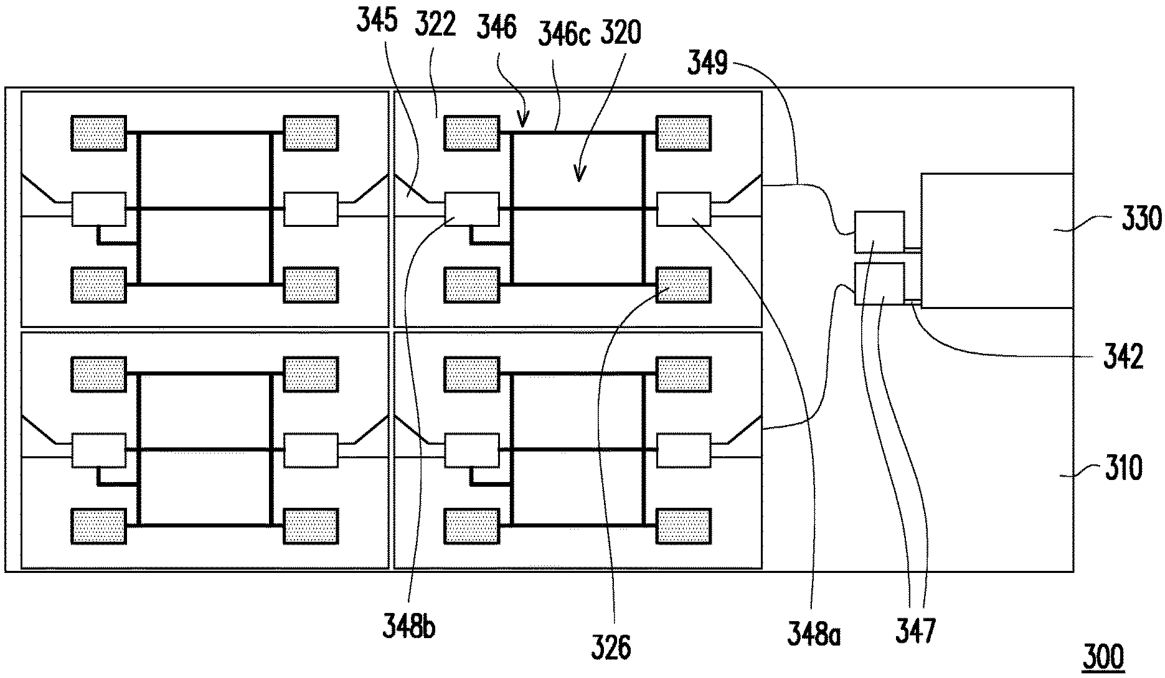
G09F 9/302	(2006.01)
G09G 3/32	(2006.01)
G02B 6/42	(2006.01)
G06F 3/14	(2006.01)

(52) **U.S. Cl.**

CPC ***G09F 9/3026*** (2013.01); ***G09G 3/32*** (2013.01); *H01L 31/125* (2013.01); ***G06F 3/1446*** (2013.01); *G09G 2300/0426* (2013.01); ***G02B 6/4298*** (2013.01)

(57) **ABSTRACT**

A spliced display including a transparent substrate, a plurality of (light-emitting diode) LED modules, at least one control element, and a signal transmission structure is provided. The transparent substrate has a display surface and a back surface opposite to each other. The LED modules are disposed on the back surface of the transparent substrate to be spliced with each other. Each of the LED modules includes a driving backplane and a plurality of micro LEDs, and the micro LEDs are disposed in an array between the driving backplane and the transparent substrate. The control element is disposed on the transparent substrate. The control element is connected to the LED modules via the signal transmission structure, and the LED modules are connected to each other via the signal transmission structure.



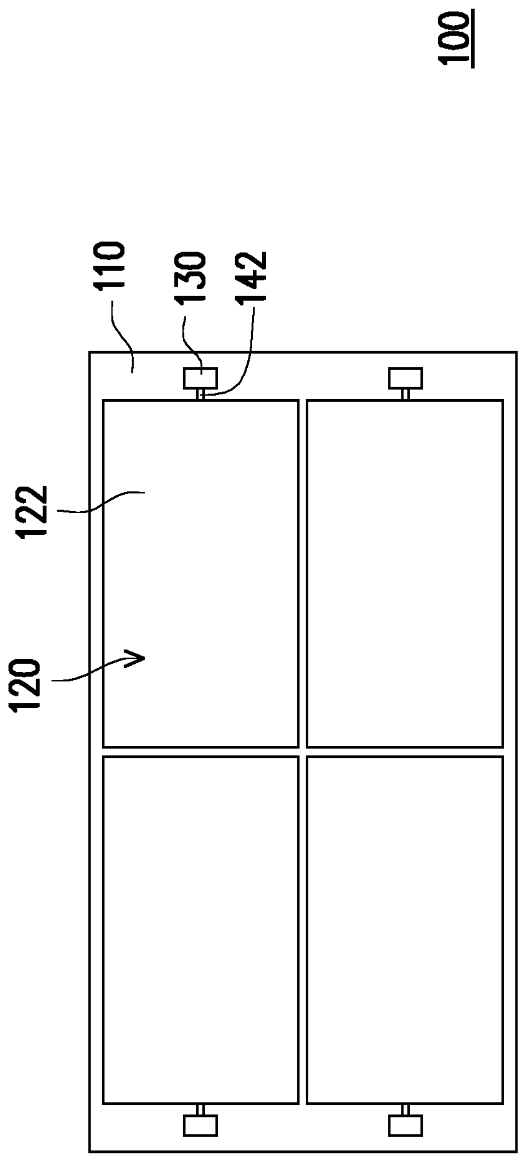

100
110
130
142
122
120

FIG. 1

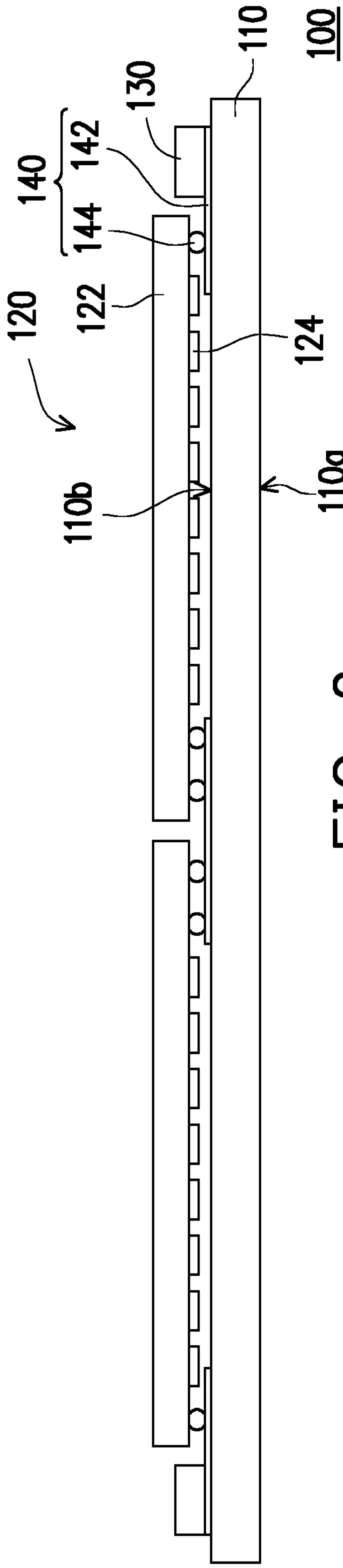

100
110
130
140
142
144
120
122
124
110b
110a

FIG. 2

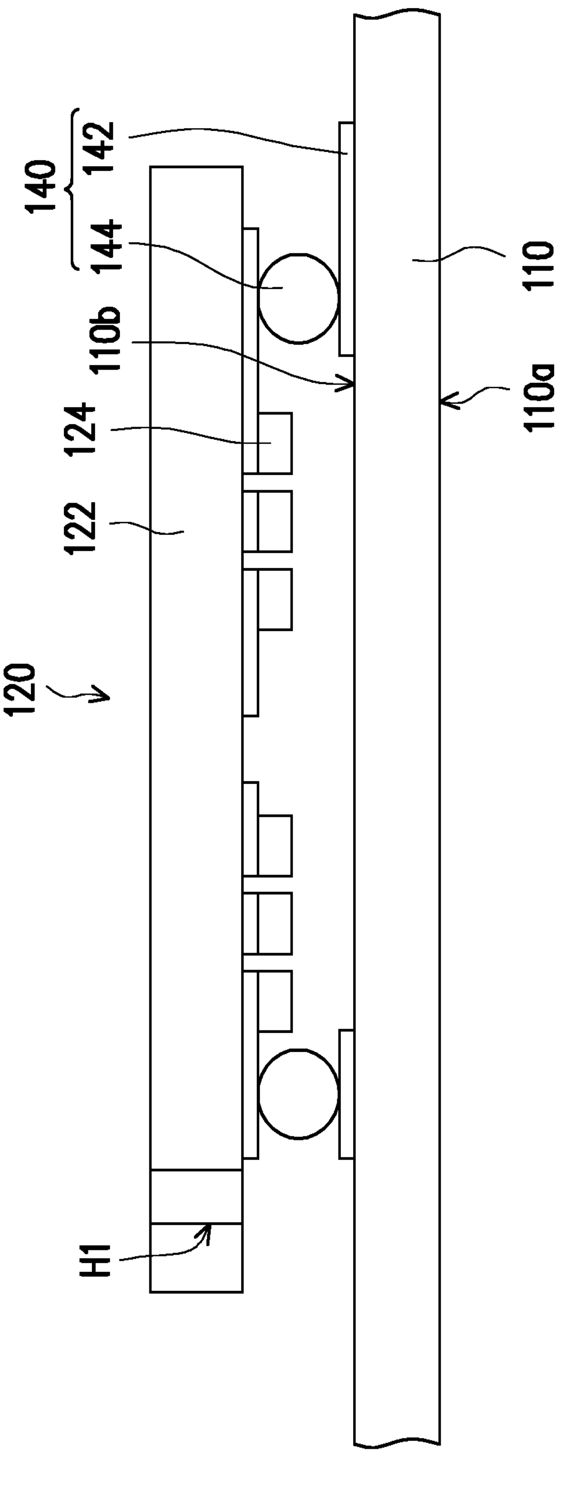


FIG. 3

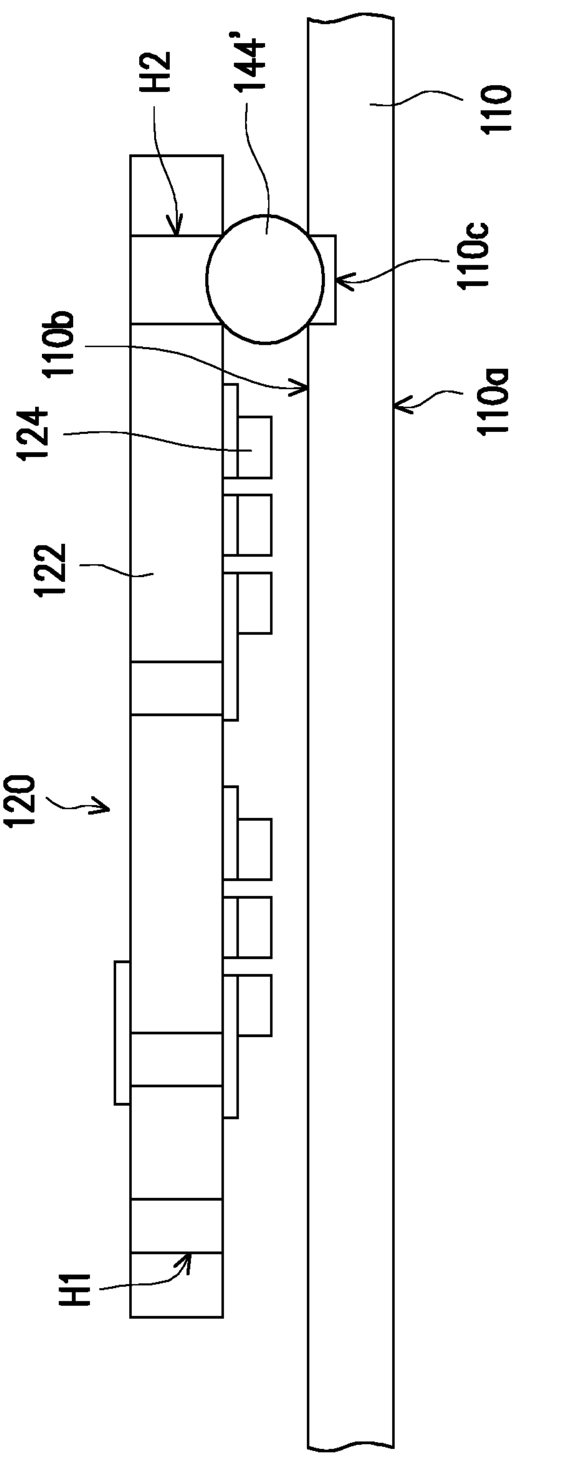


FIG. 4

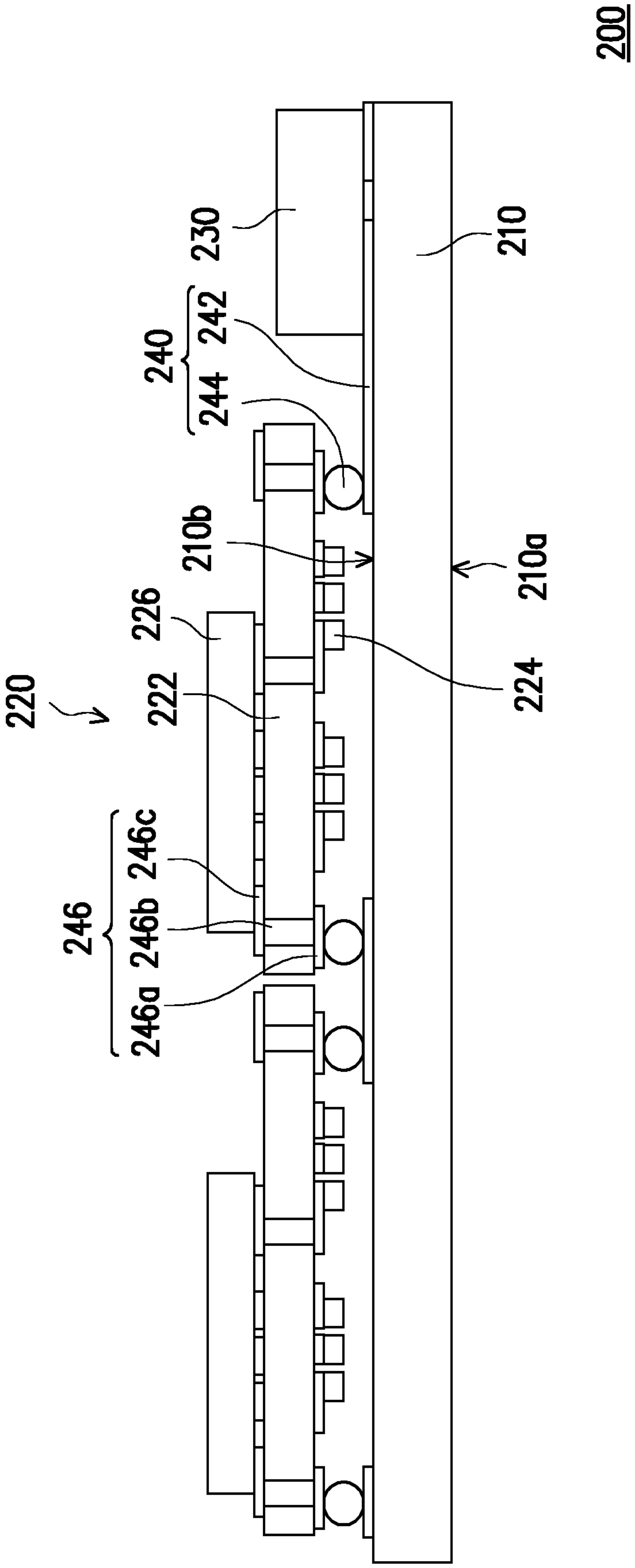

200
210
230
240
242
244
210b
210a
226
224
220
222
246
246c
246b
246a

FIG. 5

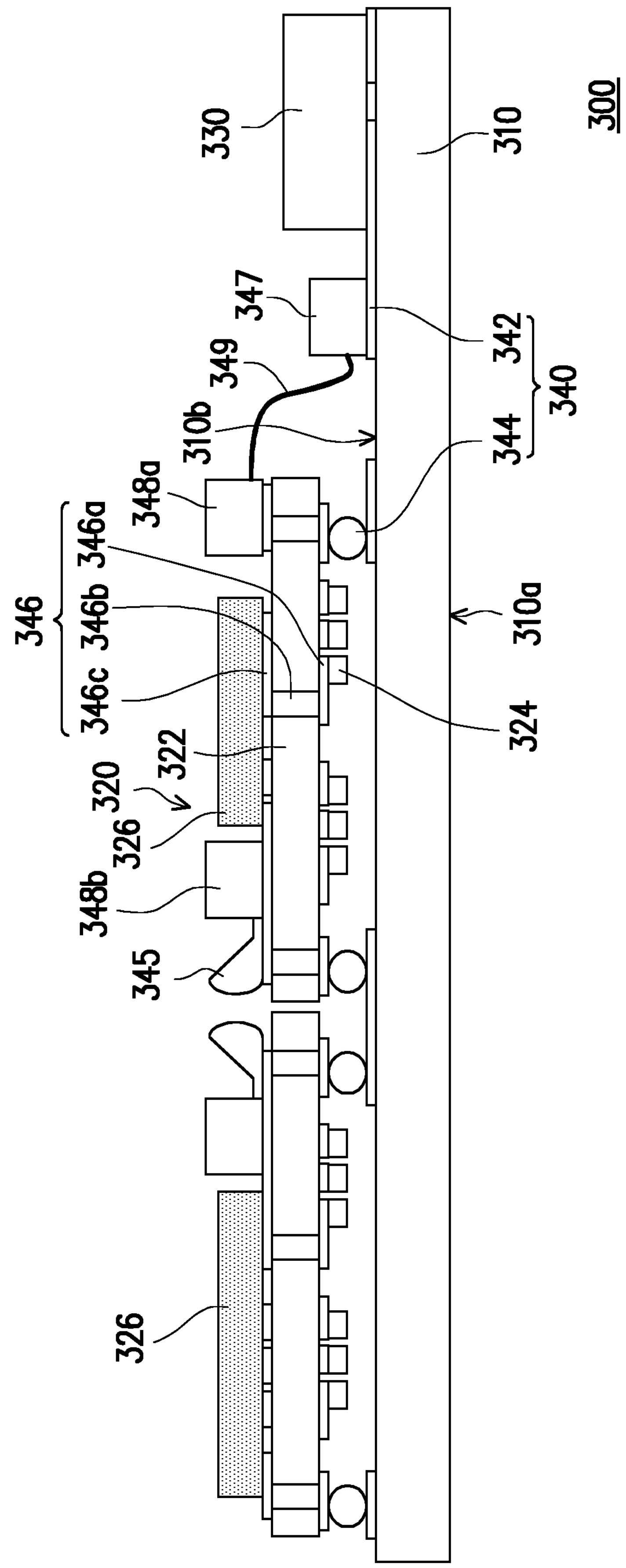

300
310
330
347
342
340
349
310b
344
348a
346a
346
346b
346c
310a
324
322
320
326
348b
345
326

FIG. 6

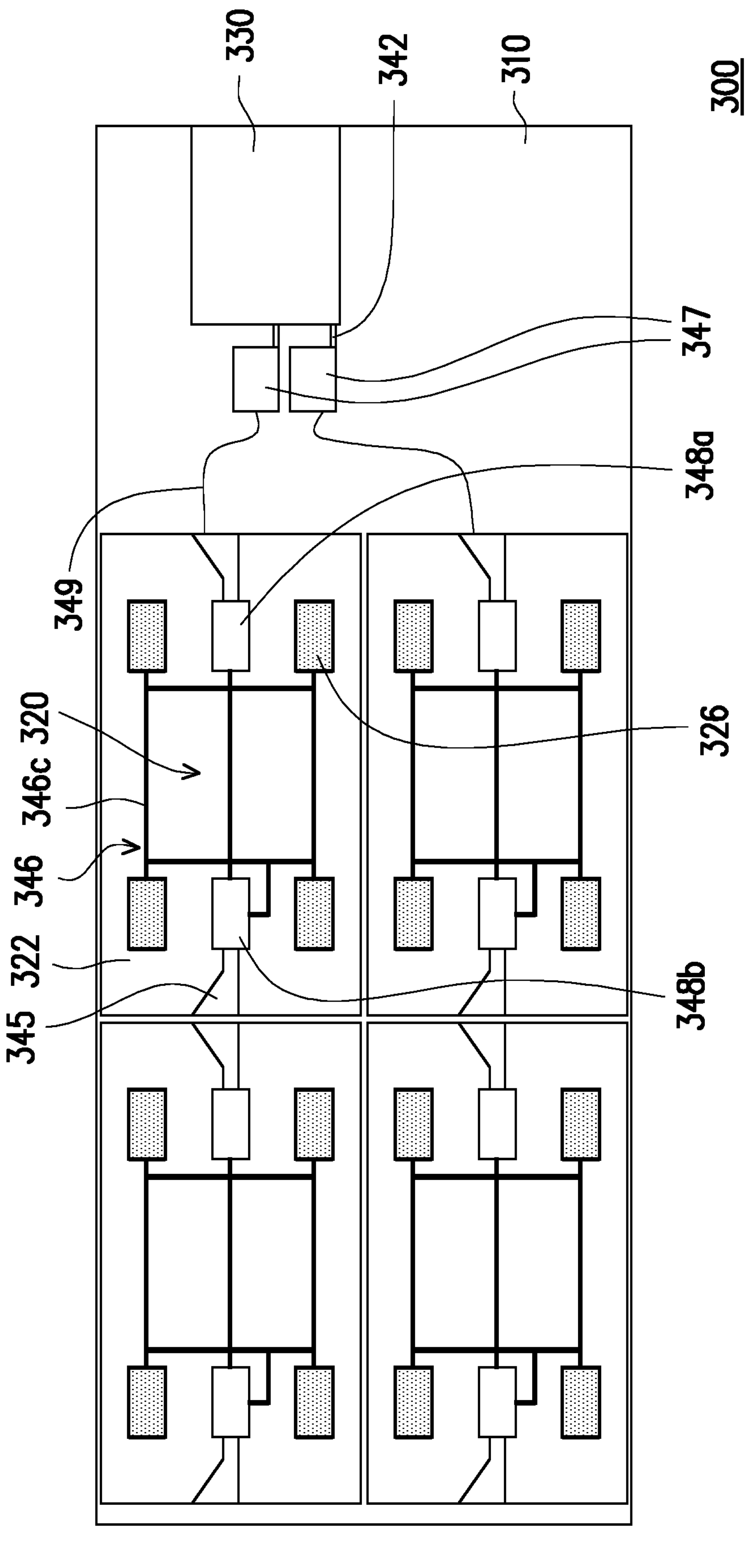


FIG. 7

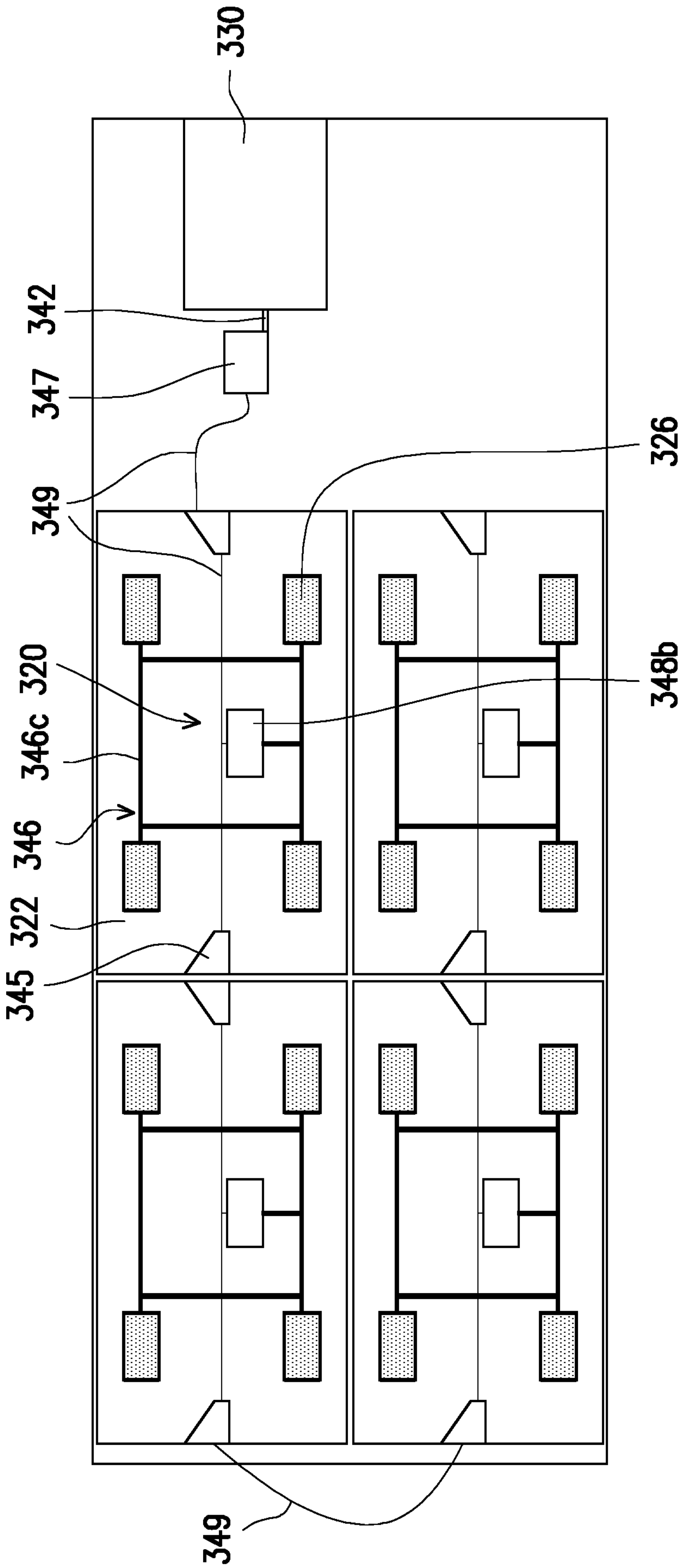


FIG. 8

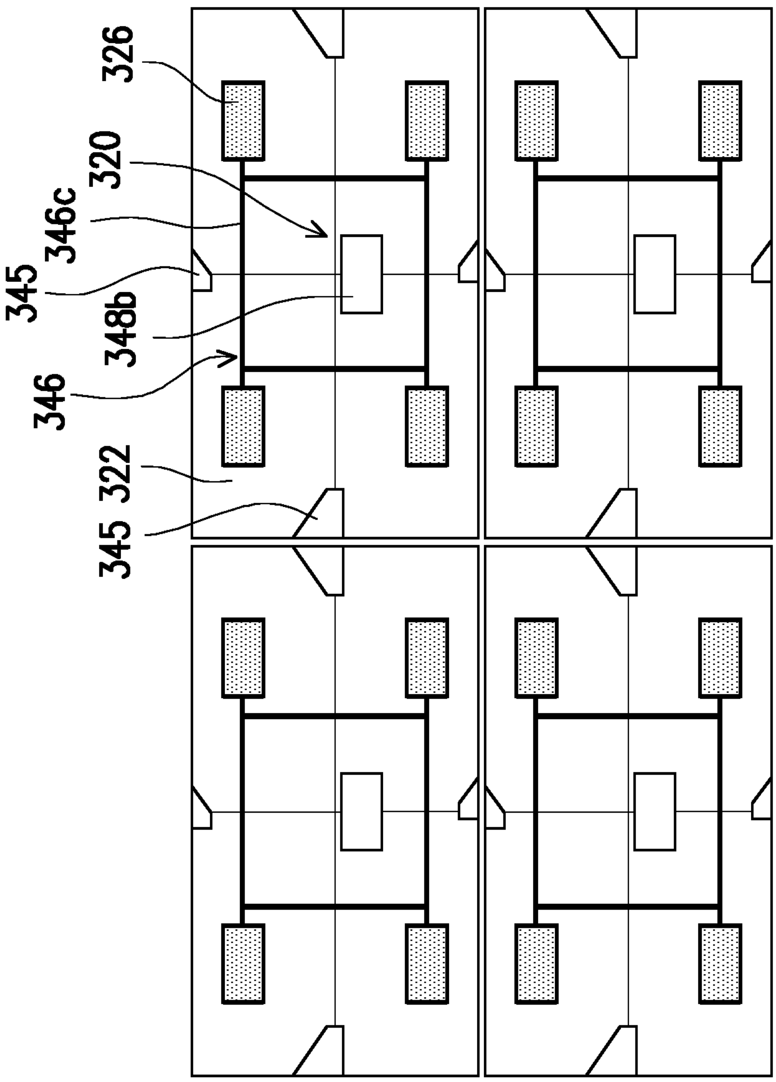


FIG. 9

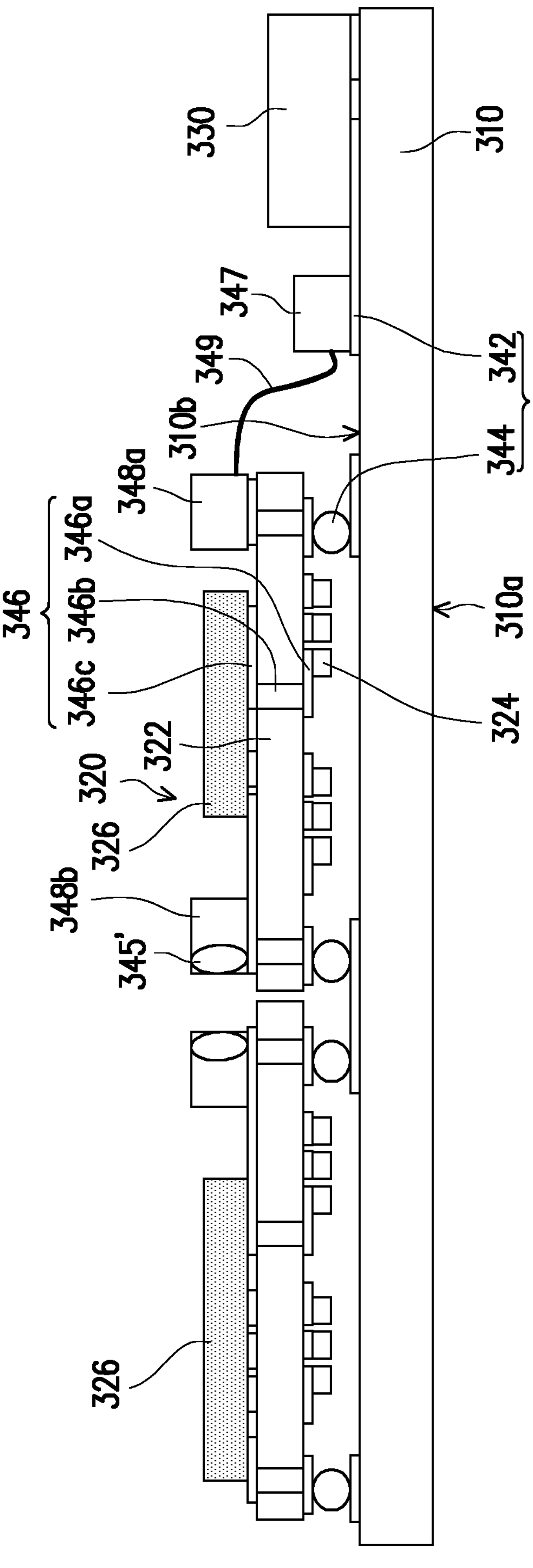

330
310
347
342
340
349
310b
344
348a
346a
346
346b
346c
310a
324
322
320
326
348b
345'
326

FIG. 10

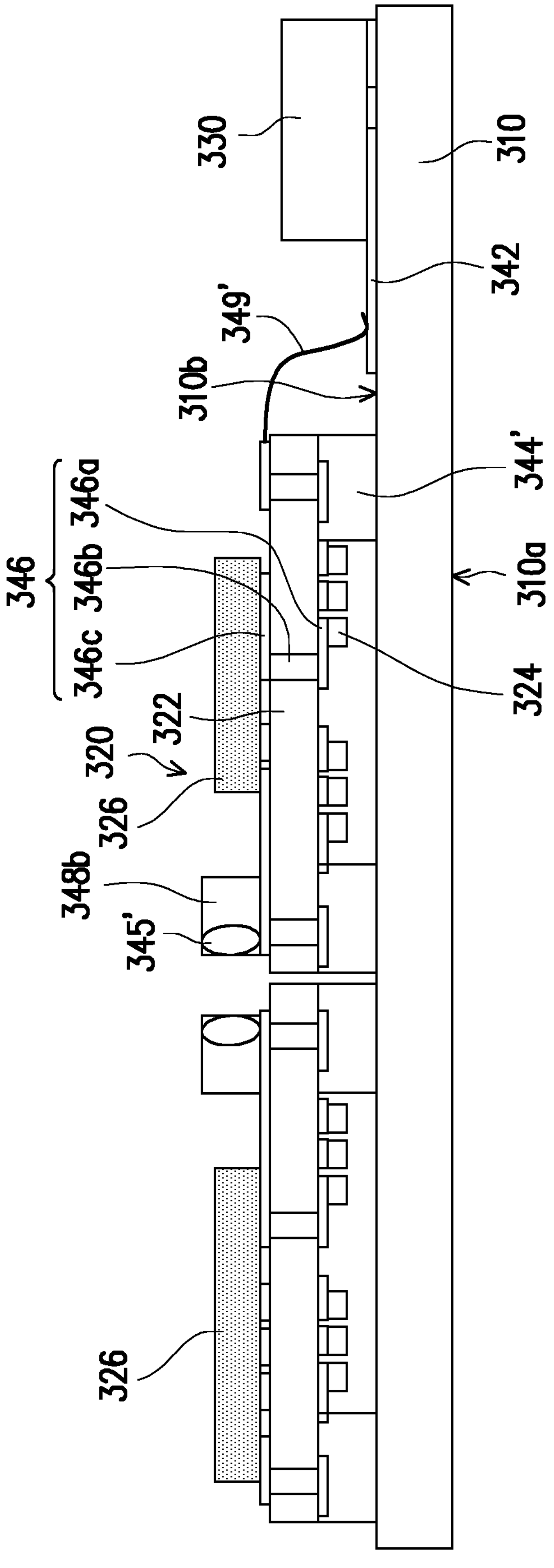

330
310
342
349'
310b
344'
346
346a
346b
346c
310a
324
322
320
326
348b
345'
326

FIG. 11

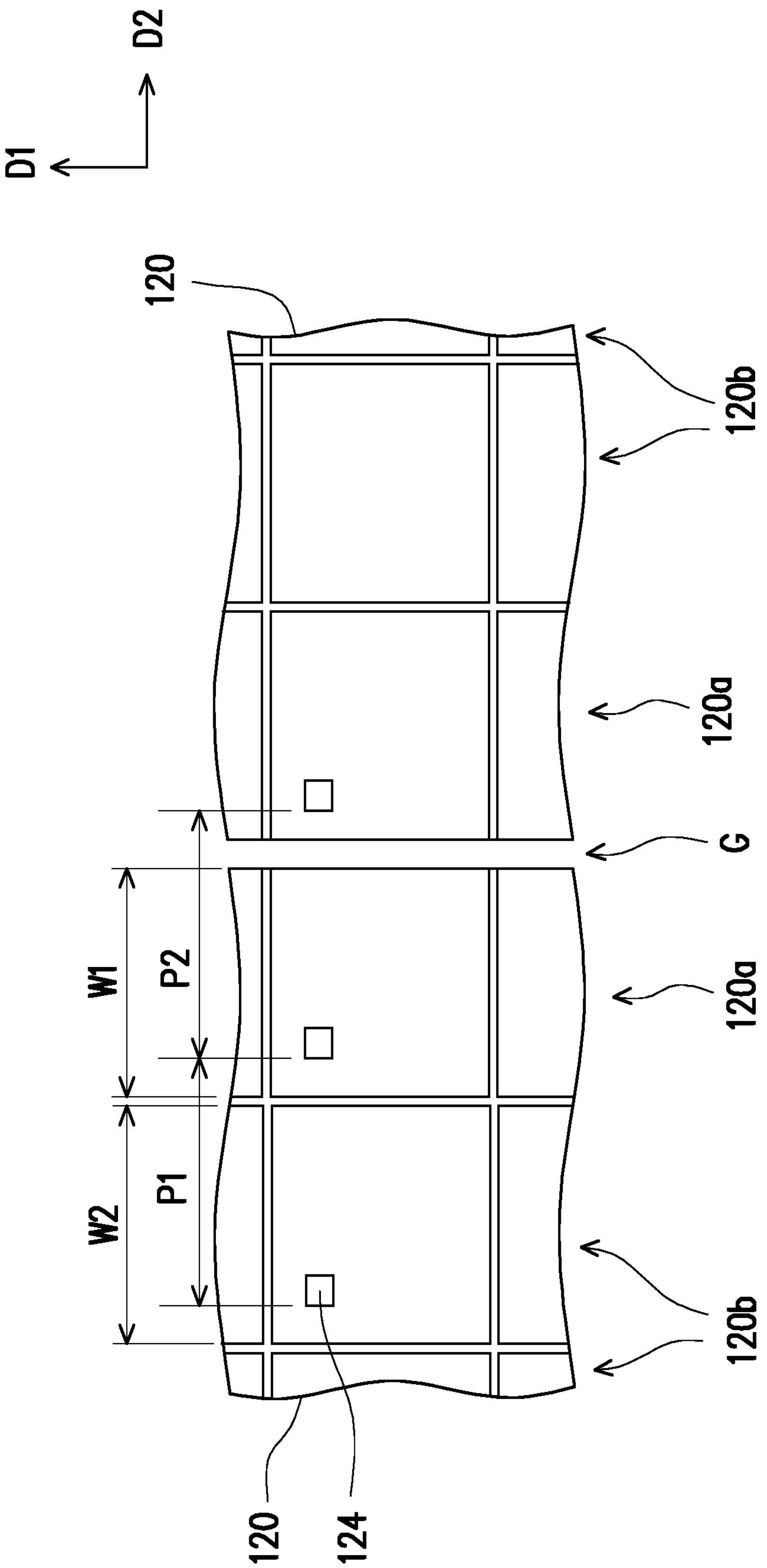


FIG. 12

SPLICED DISPLAY

CROSS REFERENCE TO RELATED APPLICATION

[0001] This application claims the priority benefit of Taiwan application serial no. 107135661, filed on Oct. 9, 2018. The entirety of the above-mentioned patent application is hereby incorporated by reference herein and made a part of specification.

TECHNICAL FIELD

[0002] The disclosure relates to a display, and more particularly, to a spliced display.

BACKGROUND

[0003] In order to provide a large-sized display surface, a known technique uses a splicing method to integrate a plurality of display units to display a screen together. For example, an existing video wall splicing technique involves stacking a plurality of small displays on each other to form a large video wall. However, the assembled structure between the frames of the displays and the adjacent displays causes gaps between the displays, so that the image screen displayed on the video wall is covered with a plurality of visible black lines, thereby affecting display quality. Moreover, the individual displays are spliced using the tiling frame, and the assembly process thereof is complicated and time-consuming. Moreover, with the developing trend of shrinking display pixel pitch, spliced displays are gradually being applied to small and medium-sized displays, such as personal computer display screens. Therefore, the issues of traditional assembly splicing methods need to be solved to provide consumers with high quality and low-cost display products.

SUMMARY

[0004] The disclosure provides a spliced display with good display quality and simple assembly procedure.

[0005] A spliced display of the disclosure includes a transparent substrate, a plurality of (light-emitting diode) LED modules, at least one control element, and a signal transmission structure. The transparent substrate has a display surface and a back surface opposite to each other. The LED modules are disposed on the back surface of the transparent substrate to be spliced with each other. Each of the LED modules includes a driving backplane and a plurality of micro LEDs, and the micro LEDs are disposed in an array between the driving backplane and the transparent substrate. The control element is disposed on the transparent substrate. The control element is connected to the LED modules via the signal transmission structure, and the LED modules are connected to each other via the signal transmission structure.

[0006] Based on the above, in the spliced display of the disclosure, a plurality of LED modules are disposed on a single transparent substrate, so that the LED modules may be spliced with each other without being assembled with each other using a tiling frame. Accordingly, there is no visible gap between adjacent LED modules from a tiling frame, and therefore the presence of visible black lines in the image displayed by the spliced display may be avoided to improve display quality. Moreover, since it is only necessary to bond the LED modules to the transparent substrate to complete splicing and the LED modules do not need to be assembled with each other using a tiling frame as in the prior art, the assembly process may be simplified.

[0007] Several exemplary embodiments accompanied with figures are described in detail below to further describe the disclosure in details.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] The accompanying drawings are included to provide further understanding, and are incorporated in and constitute a part of this specification. The drawings illustrate exemplary embodiments and, together with the description, serve to explain the principles of the disclosure.

[0009] FIG. **1** is a rear view of a spliced display of an embodiment of the disclosure.

[0010] FIG. **2** is a cross section view of the spliced display of FIG. **1**.

[0011] FIG. **3** is a partial cross section view of a spliced display of another embodiment of the disclosure.

[0012] FIG. **4** is a partial cross section view of a spliced display of another embodiment of the disclosure.

[0013] FIG. **5** is a cross section view of a spliced display of another embodiment of the disclosure.

[0014] FIG. **6** is a cross section view of a spliced display of another embodiment of the disclosure.

[0015] FIG. **7** is a rear view of the spliced display of FIG. **6**.

[0016] FIG. **8** is a rear view of a spliced display of another embodiment of the disclosure.

[0017] FIG. **9** is a rear view of some of the components of a spliced display of another embodiment of the disclosure.

[0018] FIG. **10** is a cross section view of a spliced display of another embodiment of the disclosure.

[0019] FIG. **11** is a cross section view of a spliced display of another embodiment of the disclosure.

[0020] FIG. **12** is a partial enlarged view of the junctions of the LED modules of FIG. **1**.

DETAILED DESCRIPTION OF DISCLOSED EMBODIMENTS

[0021] FIG. **1** is a rear view of a spliced display of an embodiment of the disclosure. FIG. **2** is a cross section of the spliced display of FIG. **1**. Referring to FIG. **1** and FIG. **2**, a spliced display **100** of the embodiment includes a transparent substrate **110**, a plurality of light-emitting diode (LED) modules **120**, at least one control element **130**, and a signal transmission structure **140**. The transparent substrate **110** is, for example, a transparent glass substrate or a transparent plastic substrate, and has a display surface **110***a* and a back surface **110***b* opposite to each other. The LED modules **120** are disposed on the back surface **110***b* of the transparent substrate **110** to be spliced with each other. In FIG. **1**, the number of the LED modules **120** is four, but the disclosure is not limited thereto, and the number of the LED modules **120** may actually be more or less.

[0022] Each of the LED modules **120** includes a driving backplane **122** and a plurality of micro LEDs **124**, and the micro LEDs **124** are arranged in an array on the driving backplane **122** and face the back surface **110***b* of the transparent substrate **110**. That is, the micro LEDs **124** are located between the driving backplane **122** and the transparent substrate **110**, and the light emitted by the micro LEDs **124** is incident on the back surface **110***b* of the transparent substrate **110** and then exits the display surface **110***a* of the transparent substrate **110** to provide a display screen. The control element **130** includes, for example, a control circuit. In an embodiment of the disclosure, the control element **130** is disposed on an edge of the back surface **110***b* of the transparent substrate **110** and is connected to the LED modules **120** via the signal transmission structure **140**, and the LED modules **120** are connected to each other via the signal transmission structure **140**. The control element **130** is adapted to actively drive the micro LEDs **124** to illuminate to display an image screen on the display surface **110***a* of the transparent substrate **110**.

[0023] A plurality of LED modules **120** are disposed on a single transparent substrate **110** as described above, so that the LED modules **120** may be spliced with each other without being assembled with each other using a tiling frame. Accordingly, there is no visible gap between adjacent LED modules **120** from a tiling frame, and therefore the presence of visible lines (i.e. seams) in the image displayed by the spliced display **100** may be avoided to improve display quality. Moreover, since it is only necessary to bond the LED modules **120** to the transparent substrate **110** to complete splicing and the LED modules do not need to be assembled with each other using a tiling frame as in the prior art, the assembly process may be simplified.

[0024] In the embodiment, each of the LED modules **120** is bonded to the transparent substrate **110** by, for example, being absorbed by an automated absorption device and moved to a predetermined position of the back surface **110***b* of the transparent substrate **110**, and the back surface **110***b* of the transparent substrate **110** may have an alignment pattern, a positioning groove (such as a positioning groove **110***c* to be described later), or other forms of alignment features for the alignment of each of the LED modules **120** to accurately bond each of the LED modules **120** to a predetermined position on the transparent substrate **110**. In other embodiments, each of the LED modules **120** may be bonded to the transparent substrate **110** by other suitable means, and the disclosure is not limited in this regard.

[0025] In FIG. **1**, the number of the control element **130** is four to respectively correspond to the LED modules **120**. However, the disclosure is not limited thereto, and the number of the control element **130** may actually be different from the number of the LED modules **120**. For example, the number of the control element **130** may be less than the number of the LED modules **120**, and one control element **130** is used to drive the plurality of LED modules **120**.

[0026] The signal transmission structure **140** of the embodiment is specifically described below. Referring to FIG. **2**, the signal transmission structure **140** of the embodiment includes a circuit layer **142** and a plurality of conductive bumps **144**. The conductive bumps **144** are respectively disposed on the driving backplane **122** and located between the driving backplane **122** and the back surface **110***b* of the transparent substrate **110**. The circuit layer **142** is disposed on the back surface **110***b* of the transparent substrate **110** and electrically connected to the control element **130** and the conductive bumps **144**. Therefore, the control element **130** may transmit a power signal and a driving signal to each of the LED modules **120** via the circuit layer **142** and the conductive bumps **144**.

[0027] In the embodiment, the spliced display **100** may further include an adhesive layer for covering the micro LEDs **124** and filled in the gaps between the LED modules **120**. The adhesive layer is, for example, coated on the driving backplane **122** of each of the LED modules **120**, and then extruded as each of the LED modules **120** and the transparent substrate **110** are bonded so as to be evenly distributed between the LED modules **120** and the transparent substrate **110** and be partially moved toward the gaps between the LED modules **120**. The adhesive layer is, for example, an anisotropic conductive paste (ACP) or other types of conductive paste, such that the conductive bumps **144** are electrically connected to the circuit layer **142** via the adhesive layer. In particular, the anisotropic conductive paste may have conductive particles of a suitable particle size for conducting the conductive bumps **144** and the circuit layer **142** and preventing the micro LEDs **124** and the transparent substrate **110** from being unintentionally turned on and causing a short circuit. Moreover, the LEDs **124** may have an insulating layer on the surface thereof to prevent the occurrence of a short circuit. However, the disclosure is not limited thereto, and the conductive bumps **144** may also be directly in contact with the circuit layer **142**. Moreover, the adhesive layer is, for example, a semi-transparent black-dyed adhesive material, so that the display screen has good contrast.

[0028] FIG. **3** is a partial cross section of a spliced display of another embodiment of the disclosure. The difference between the embodiment shown in FIG. **3** and the embodiment shown in FIG. **2** is that the driving backplane **122** of FIG. **3** has at least one through-hole H1 for overflowed adhesive. During the extrusion of the adhesive layer as the LED modules **120** and the transparent substrate **110** are bonded, the excess portion of the adhesive layer may be discharged via the through-hole H1 for overflowed adhesive.

[0029] FIG. **4** is a partial cross section of a spliced display of another embodiment of the disclosure. The difference between the embodiment shown in FIG. **4** and the embodiment shown in FIG. **3** is that the LED modules **120** of FIG. **4** include at least one positioning bump **144'**, the driving backplane **122** further has at least one positioning through-hole H2, and the positioning bumps **144'** are positioned at one end of the positioning through-hole H2. Moreover, the back surface **110***b* of the transparent substrate **110** may have a positioning groove **110***c* as shown in FIG. **4**, and the positioning bumps **144'** are also positioned at the positioning groove **110***c*. Therefore, the LED modules **120** may be accurately bonded to the transparent substrate **110**.

[0030] FIG. **5** is a cross section of a spliced display of another embodiment of the disclosure. In a spliced display **200** of FIG. **5**, the configurations and operations of a transparent substrate **210**, a display surface **210***a*, a back surface **210***b*, LED modules **220**, driving backplane **222**, micro LEDs **224**, a control element **230**, a signal transmission structure **240**, a circuit layer **242**, and conductive bumps **244** are similar to the configurations and operations of the transparent substrate **110**, the display surface **110***a*, the back surface **110***b*, the LED modules **120**, the driving backplanes **122**, the micro LEDs **124**, the control element **130**, the signal transmission structure **140**, the circuit layer **142**, and the conductive bumps **144** of FIG. **2** and are not repeated herein.

[0031] The difference between the spliced display **200** and the spliced display **100** is that each of the LED modules **220** further includes at least one driving element **226**, and the driving element **226** includes, for example, a driving circuit and is disposed on the driving backplane **222**, and the control element **230** is adapted to control the driving element

226 to drive the micro LEDs **224**. Therefore, the signal transmission structure **240** of the embodiment further includes a plurality of circuit structures **246** respectively corresponding to the LED modules **220**. The circuit structures **246** are respectively disposed on the driving backplanes **222**, and each of the circuit structures **246** is connected to the corresponding driving element **226** and the corresponding micro LEDs **224**. Thus, the driving element **226** may transmit a drive signal to the micro LEDs **224** via the circuit structures **246**.

[0032] Specifically, the circuit structures **246** include, for example, a first circuit layer **246***a*, a conductive through-hole **246***b*, and a second circuit layer **246***c*. The first circuit layer **246***a* and the second circuit layer **246***c* are respectively disposed on two opposite surfaces of the driving backplane **222** and are respectively connected to the conductive bumps **244** and the driving element **226**, and the conductive through-hole **246***b* passes through the driving backplane **222** and is connected between the first circuit layer **246***a* and the second circuit layer **246***c*. In other embodiments, the circuit structures **246** may have other suitable configurations, and the disclosure is not limited in this regard.

[0033] FIG. **6** is a cross section of a spliced display of another embodiment of the disclosure. FIG. **7** is a rear view of the spliced display of FIG. **6**. In a spliced display **300** of FIG. **6** and FIG. **7**, the configurations and operations of a transparent substrate **310**, a display surface **310***a*, a back surface **310***b*, LED modules **320**, driving backplanes **322**, micro LEDs **324**, a driving element **326**, a control element **330**, a signal transmission structure **340**, a circuit layer **342**, conductive bumps **344**, circuit structures **346**, a first circuit layer **346***a*, a conductive through-hole **346***b*, and a second circuit layer **346***c* are similar to the configurations and operations of the transparent substrate **210**, the display surface **210***a*, the back surface **210***b*, the LED modules **220**, the driving backplanes **222**, the micro LEDs **224**, the driving element **226**, the control element **230**, the signal transmission structure **240**, the circuit layer **242**, the conductive bumps **244**, the circuit structures **246**, the first circuit layer **246***a*, the conductive through-hole **246***b*, and the second circuit layer **246***c* in the spliced display **200** of FIG. **5** and are not repeated herein.

[0034] The difference between the spliced display **300** and the spliced display **200** is that the signal transmission structure **340** further includes at least one first photoelectric conversion element **347** (shown as two), a plurality of second photoelectric conversion elements **348***a* and **348***b*, and a plurality of optical waveguides **349**. The first photoelectric conversion elements **347** are disposed on the back surface **310***b* of the transparent substrate **310** and is connected to the control element **330**. The second photoelectric conversion elements **348***a* and **348***b* are respectively disposed on the driving backplane **322**, the second photoelectric conversion elements **348***a* and **348***b* on the same driving backplane **322** are connected to each other, and the second photoelectric conversion element **348***a* on the driving backplanes **322** adjacent to the first photoelectric conversion elements **347** is connected to the first photoelectric conversion elements **347** via the optical waveguides **349**. The first photoelectric conversion elements **347** convert a control signal from the control element **330** from an electrical signal into an optical signal and transmits the control signal to the second photoelectric conversion element **348***a* on the adjacent driving backplane **322** via the optical waveguides **349**. The second photoelectric conversion element **348***a* is used, for example, to convert an optical signal into an electrical signal, the second photoelectric conversion element **348***b* is used, for example, to convert an electrical signal into an optical signal, and the second circuit layer **346***c* is used for the electrical signal connection between the driving element **326** and the second photoelectric conversion elements **348***a* and **348***b*, so that the driving element **326** drives the corresponding micro LED **324**. Since in the embodiment, the control signal from the control element **330** is transmitted to the LED modules **320** using the first photoelectric conversion elements **347**, the electrical transmission path formed by the circuit layer **342** and the conductive bumps **344** may be used only to provide power to the LED modules **320**.

[0035] More specifically, the signal transmission structure **340** further includes a plurality of optical coupling elements **345**, and the optical coupling elements **345** are, for example, optical couplers or other suitable forms of light-transmitting elements respectively disposed on the driving backplanes **322** and respectively directly connected to the corresponding second photoelectric conversion element **348***b*. At least one of the optical coupling elements **345** on each of the driving backplanes **322** is aligned with at least one of the optical coupling elements **345** on an adjacent driving backplane **322** to enable the optical signal to be transmitted between two optical coupling elements **345** aligned with each other on two adjacent driving backplanes **322**. Therefore, the optical signal from the first photoelectric conversion elements **347** may be transmitted to the LED modules **320** away from the first photoelectric conversion elements **347** via the optical coupling elements **345** (i.e., the two LED modules on the left in FIG. **7**).

[0036] It should be noted that the number and position of the driving element **326** of each of the LED modules **320** shown in FIG. **6** are only illustrative, and the actual number and position thereof may be four as shown in FIG. **7** and the driving elements **326** are not located in the center of the driving backplanes **322**. Moreover, the connection between the first photoelectric conversion elements **347** and the second photoelectric conversion element **348***a* shown in FIG. **6** is only illustrative, and the second photoelectric conversion element **348***a* is actually disposed with the optical coupling elements **345** as shown in FIG. **7** to make all of the elements on the driving backplanes **322** more symmetrical in order to facilitate mass production. However, the disclosure is not limited thereto. In other embodiments, the second photoelectric conversion element **348***a* may also be disposed without the optical coupling elements **345**.

[0037] FIG. **8** is a rear view of a spliced display of another embodiment of the disclosure. The difference between the embodiment shown in FIG. **8** and the embodiment shown in FIG. **7** is that only one second photoelectric conversion element **348***b* is disposed on each of the driving backplanes **322** of FIG. **8**, and each of the optical coupling elements **345** is connected to the corresponding second photoelectric conversion element **348***b* via the corresponding optical waveguide **349**. Moreover, the number of the first photoelectric conversion element **347** of FIG. **8** is one, and two of the optical coupling elements **345** of two of the LED modules **320** (i.e., the two LED modules **320** on the left in FIG. **8**) away from the first photoelectric conversion element **347** are connected to each other via the optical waveguides **349**, so that the optical signal from the first photoelectric conversion element **347** may be sequentially transmitted to each of the LED modules **320**.

[0038] FIG. **9** is a rear view of some of the components of a spliced display of another embodiment of the disclosure. The difference between the embodiment shown in FIG. **9** and the embodiment shown in FIG. **8** is that in addition to disposing the optical coupling elements **345** at the left and right ends of each of the driving backplanes **322** of FIG. **9**, the optical coupling elements **345** are further disposed at the upper and lower ends thereof. As a result, each of the LED modules **320** may perform optical signal transmission directly with all of the LED modules **320** adjacent thereto.

[0039] FIG. **10** is a cross section of a spliced display of another embodiment of the disclosure. The difference between the embodiment shown in FIG. **10** and the embodiment shown in FIG. **6** is that optical coupling elements **345'** of FIG. **10** are coupling lenses, and the coupling lenses are integrated in the second photoelectric conversion element **348***b*. In other embodiments, the optical coupling elements may be in other suitable forms, and the disclosure is not limited in this regard.

[0040] FIG. **11** is a cross section of a spliced display of another embodiment of the disclosure. The difference between the embodiment shown in FIG. **11** and the embodiment shown in FIG. **10** is that the LED modules **320** of FIG. **11** do not have the conductive bumps **344** shown in FIG. **10**, and instead spacers **344'** connected between the driving backplanes **322** and the back surface **310***a* of the transparent substrate **310** are provided. The spacers **344'** provide structural support between the driving backplanes **322** and the transparent substrate **310** without the function of transmitting power signals and control signals. Power signals and control signals are transmitted between the control element **330** and the adjacent LED modules **320** thereof via, for example, a flexible printed circuit (FPC) **349'** or other suitable forms of electrical transmission element.

[0041] In each of the above embodiments, the adjacent LED modules have gaps at junctions thereof, and in order to prevent the gaps from causing the display screen to be visually discontinuous at the junctions of the LED modules, the pixels located at the junctions of the LED modules may be designed to have a small width, so that the pixel pitch of all pixels is the same. This is specifically described below with reference to the embodiments shown in FIG. **1** and FIG. **2**.

[0042] FIG. **12** is a partial enlarged view of the junctions of the LED modules of FIG. **1**. Referring to FIG. **12**, each of the LED modules **120** has a plurality of pixels arranged in an array, the pixels include a plurality of first pixels **120***a* and a plurality of second pixels **120***b*, and each of the pixels includes a portion of the micro LEDs **124**. To make the drawing clearer, FIG. **12** shows only a few micro LEDs **124**. The first pixels **120***a* of each of the LED modules **120** are arranged along a first direction D**1** and adjacent to another LED module **120**, and the first pixels **120***a* of each of the LED modules **120** are located between the second pixels **120***b* and the other LED module **120**. That is, the first pixels **120***a* are pixels located at the outermost periphery of the LED modules **120**, and the second pixels **120***b* are the other pixels not located at the outermost periphery of the LED modules **120**. Therefore, a width W**1** of each of the first pixels **120***a* along a second direction D**2** perpendicular to the first direction D**1** may be designed to be smaller than a width W**2** of each of the second pixels **120***b* along the second direction D**2**. Therefore, even if there is a gap G between two adjacent LED modules **120**, a pixel pitch P**2** of two adjacent pixels respectively located at the edge of the two LED modules **120** may be maintained as a pixel pitch P**1** of two adjacent pixels of the same LED module **120** to avoid visual discontinuity of the display screen at the junctions of the LED modules. For example, if the width W**2** of the second pixels **120***b* is 200 micrometers, then the width W**1** of the first pixels **120***a* may be reduced to 196 micrometers, and the disclosure is not limited in this regard.

[0043] It will be apparent to those skilled in the art that various modifications and variations may be made to the structure of the disclosed embodiments without departing from the scope or spirit of the disclosure. In view of the foregoing, it is intended that the disclosure cover modifications and variations of this disclosure provided they fall within the scope of the following claims and their equivalents.

What is claimed is:

1. A spliced display, comprising:

a transparent substrate having a display surface and a back surface opposite to each other;

a plurality of (light-emitting diode) LED modules disposed on the back surface of the transparent substrate and spliced with each other, wherein each of the LED modules comprises a driving backplane and a plurality of micro LEDs, and the plurality of micro LEDs are disposed in an array between the driving backplane and the transparent substrate;

at least one control element disposed on the transparent substrate; and

a signal transmission structure, wherein the at least one control element is connected to the plurality of LED modules via the signal transmission structure, and the plurality of LED modules are connected to each other via the signal transmission structure.

2. The spliced display of claim **1**, wherein the at least one control element is disposed on an edge of the back surface of the transparent substrate.

3. The spliced display of claim **1**, wherein the signal transmission structure comprises a circuit layer and a plurality of conductive bumps, the plurality of conductive bumps are respectively disposed between the driving backplanes and the transparent substrate, and the circuit layer is disposed on the back surface of the transparent substrate and electrically connected to the at least one control element and the plurality of conductive bumps.

4. The spliced display of claim **3**, wherein each of the plurality of LED modules comprises at least one positioning bump, each of the driving backplanes has at least one positioning through-hole, and the at least one positioning bump is located at an end of the at least one positioning through-hole.

5. The spliced display of claim **1**, comprising an adhesive layer, wherein the adhesive layer covers the plurality of micro LEDs and is filled in a gap between the plurality of LED modules.

6. The spliced display of claim **5**, wherein each of the driving backplanes has at least one through-hole, and a portion of the adhesive layer is adapted to be discharged via the at least one through-hole.

7. The spliced display of claim **1**, wherein the at least one control element is adapted to actively drive the plurality of micro LEDs.

8. The spliced display of claim **1**, wherein each of the plurality of LED modules comprises at least one driving element, the at least one driving element is disposed on the driving backplane, and the at least one control element is adapted to control the at least one driving element to drive the plurality of micro LEDs.

9. The spliced display of claim **8**, wherein the signal transmission structure comprises a plurality of circuit structures, the plurality of circuit structures are respectively disposed on the driving backplanes, and each of the plurality of circuit structures is connected to at least one corresponding driving element and the plurality of corresponding micro LEDs.

10. The spliced display of claim **9**, wherein the signal transmission structure comprises at least one first photoelectric conversion element, a plurality of second photoelectric conversion elements, and a plurality of optical waveguides, the at least one first photoelectric conversion element is disposed on the transparent substrate and connected to the at least one control element, the plurality of second photoelectric conversion elements are respectively disposed on the driving backplanes, the plurality of second photoelectric conversion elements on the driving backplanes are connected to each other by at least one of the optical waveguides, the second photoelectric conversion element on the driving backplane adjacent to the first photoelectric conversion element is connected to the first photoelectric conversion element by at least one of the optical waveguides, and each of the plurality of second photoelectric conversion elements is connected to at least one corresponding driving element by a corresponding circuit structure.

11. The spliced display of claim **10**, wherein the signal transmission structure comprises a plurality of optical coupling elements, the plurality of optical coupling elements are respectively disposed on the driving backplanes and respectively connected to the plurality of corresponding second photoelectric conversion elements, and at least one of the optical coupling elements on each of the driving backplanes is aligned with at least one of the optical coupling elements on an adjacent driving backplane.

12. The spliced display of claim **11**, wherein each of the plurality of optical coupling elements is directly connected to the corresponding second photoelectric conversion element.

13. The spliced display of claim **11**, wherein each of the optical coupling elements is connected to the corresponding second photoelectric conversion element by a corresponding optical waveguide.

14. The spliced display of claim **1**, wherein each of the plurality of LED modules comprises at least one spacer, and the at least one spacer is connected between the driving backplane and the back surface of the transparent substrate.

15. The splice display of claim **1**, wherein each of the plurality of LED modules has a plurality of pixels arranged in an array, each of the plurality of pixels comprises a portion of the plurality of micro LEDs, the plurality of pixels comprise a plurality of first pixels and a plurality of second pixels, the plurality of first pixels are adjacent to another of the plurality of LED modules and located between the plurality of second pixels and the other LED module, and a width of each of the plurality of first pixels is smaller than a width of each of the plurality of second pixels.

16. The splice display of claim **15**, wherein the plurality of first pixels are arranged along a first direction, the plurality of second pixels are arranged along the first direction, and the width of each of the plurality of first pixels in a second direction perpendicular to the first direction is smaller than the width of each of the plurality of second pixels along the second direction.

* * * * *

patsnap

专利名称(译)	拼接显示器		
公开(公告)号	[US20200111391A1](US20200111391A1)	公开(公告)日	2020-04-09
申请号	US16/231404	申请日	2018-12-22
[标]申请(专利权)人(译)	财团法人工业技术研究院		
申请(专利权)人(译)	工业技术研究院		
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IPC分类号	G09F9/302 G09G3/32 G02B6/42 G06F3/14		
CPC分类号	G02B6/4298 G09G3/32 G06F3/1446 G09G2300/0426 H01L31/125 G09F9/3026 G02B6/43 G09G2300/026 G09G2370/18 H01L25/0753		
优先权	107135661 2018-10-09 TW		
外部链接	Espacenet USPTO		

摘要(译)

提供了一种拼接显示器，包括透明基板，多个（发光二极管）LED模块，至少一个控制元件和信号传输结构。 透明基板具有彼此相对的显示面和背面。 LED模块布置在透明基板的背面上以彼此接合。 每个LED模块包括驱动底板和多个微型LED，并且微型LED以阵列形式布置在驱动底板和透明基板之间。 控制元件设置在透明基板上。 控制元件经由信号传输结构连接至LED模块，并且LED模块经由信号传输结构彼此连接。