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Han

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(54) **DISPLAY PANEL, DISPLAY MOTHERBOARD, AND DISPLAY DEVICE**

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H10K 59/122 (2023.01)

(52) **U.S. Cl.**
CPC ***G02B 5/201*** (2013.01); ***H10K 59/122*** (2023.02)

(58) **Field of Classification Search**
CPC G02B 5/201; H10K 59/122
See application file for complete search history.

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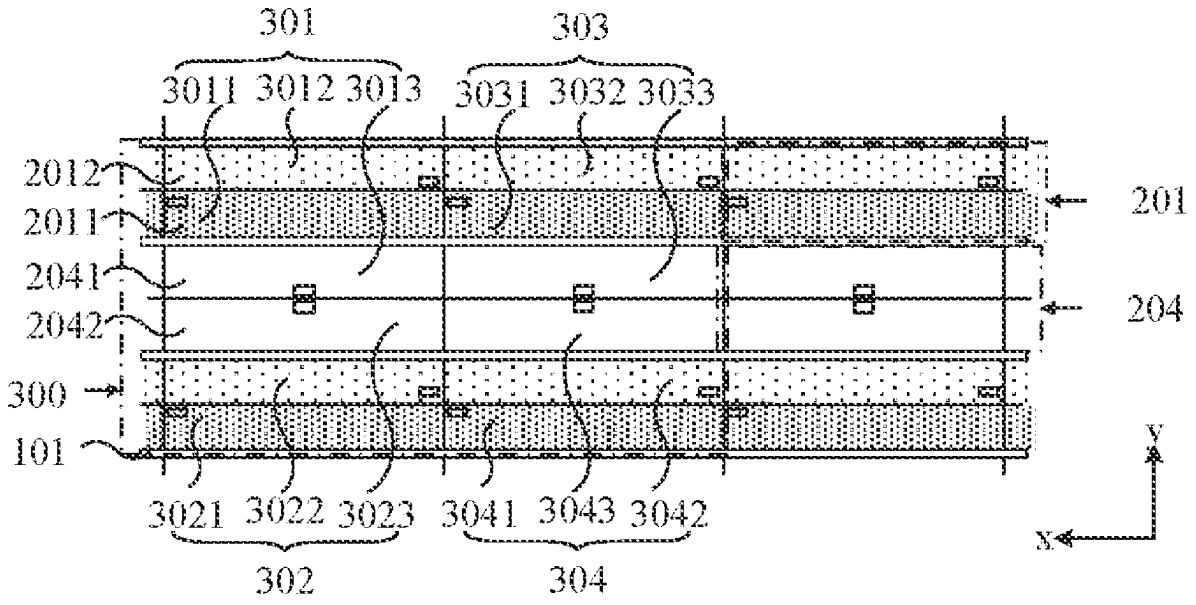
Primary Examiner — Dzung Tran

(57) **ABSTRACT**

A display panel, a display motherboard and a display device are provided. The display panel has a plurality of banks and a first sub-pixel group located between two adjacent banks. The first sub-pixel group has a first sub-pixel and a second sub-pixel adjacent to each other, so as to reduce number of banks in the display panel by having no banks between the first sub-pixel and the second sub-pixel, thereby improving a pixel area ratio. This display panel can take into account both requirements of an aperture ratio and a printing process, which is beneficial to mass production.

10 Claims, 7 Drawing Sheets



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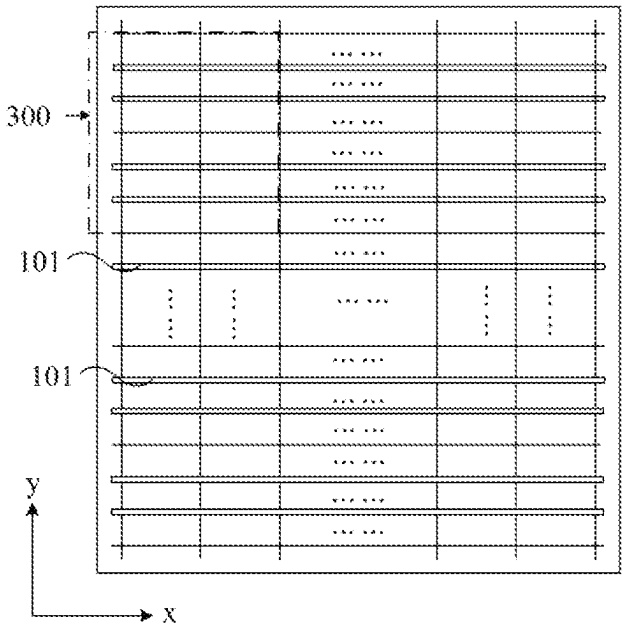
300
101
101
y
x

FIG. 1A

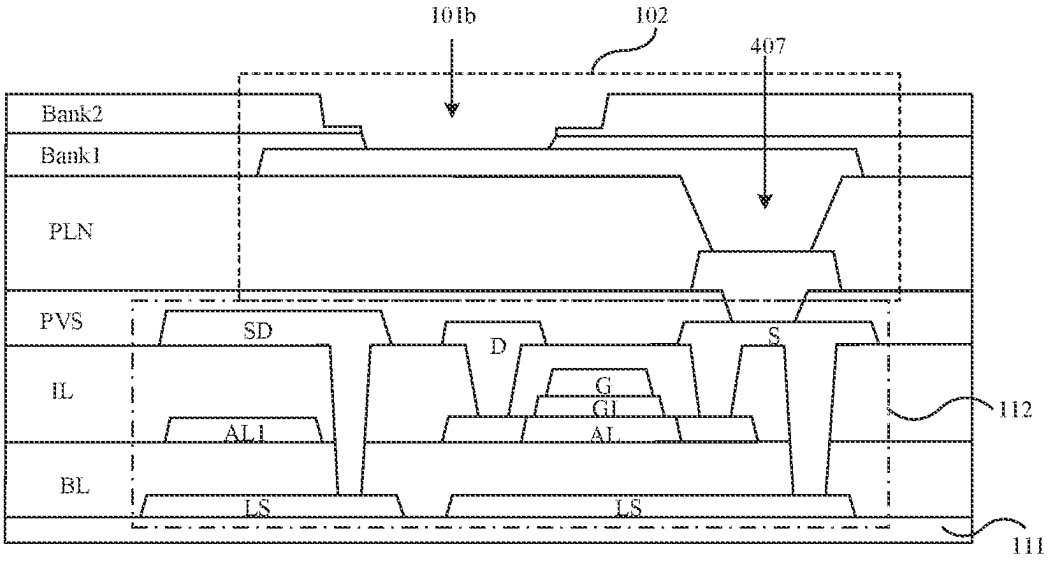
101b
102
407
Bank2
Bank1
PLN
PVS
SD
D
S
IL
G
GI
AL1
AL
112
BL
LS
LS
111

FIG. 1B

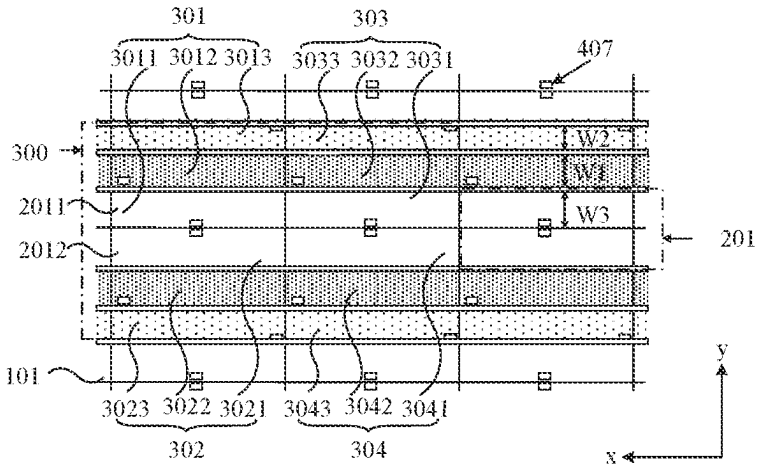

FIG. 2A

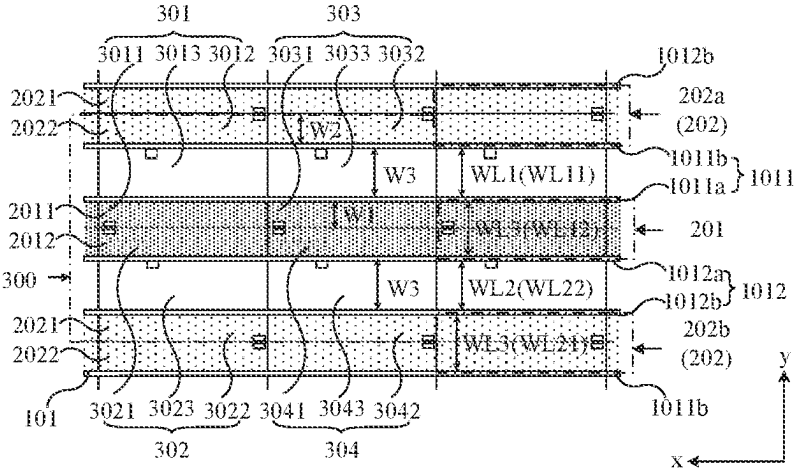

FIG. 2B

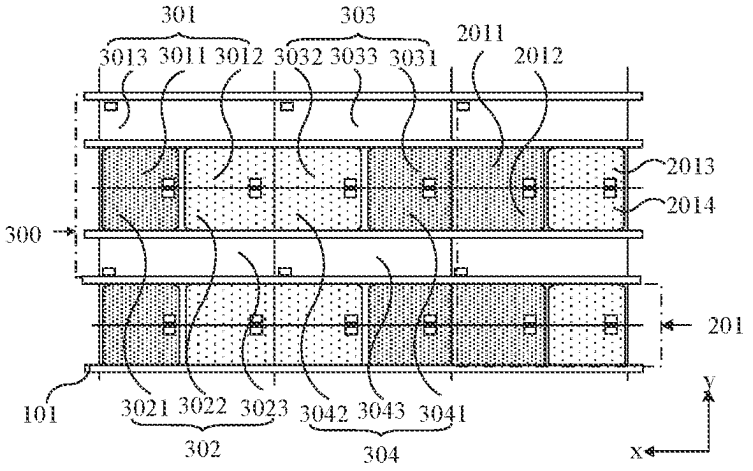

FIG. 2C

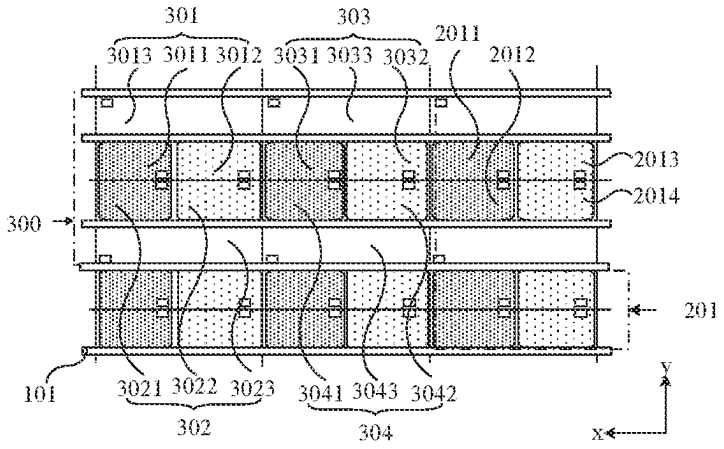

FIG. 2D

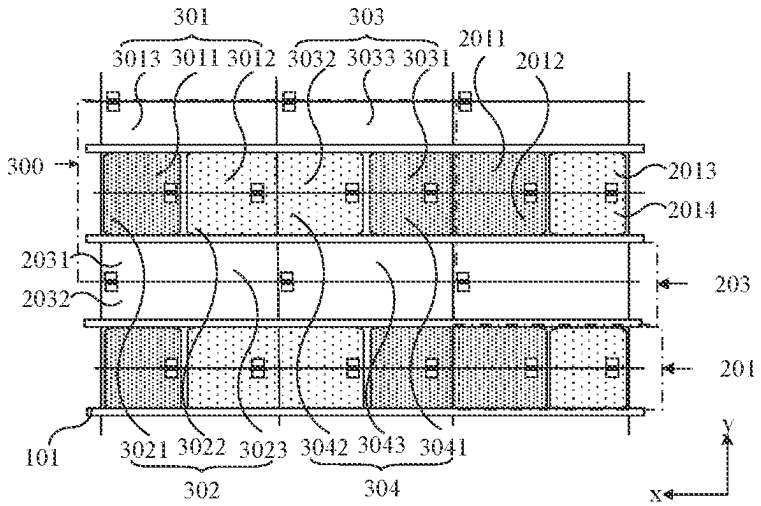

FIG. 2E

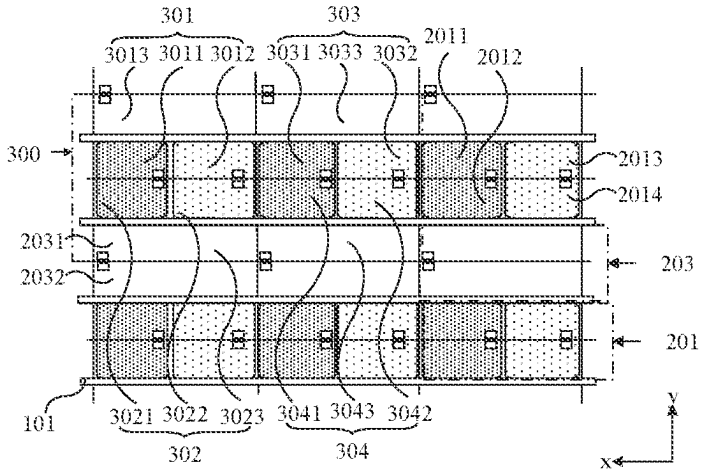

FIG. 2F

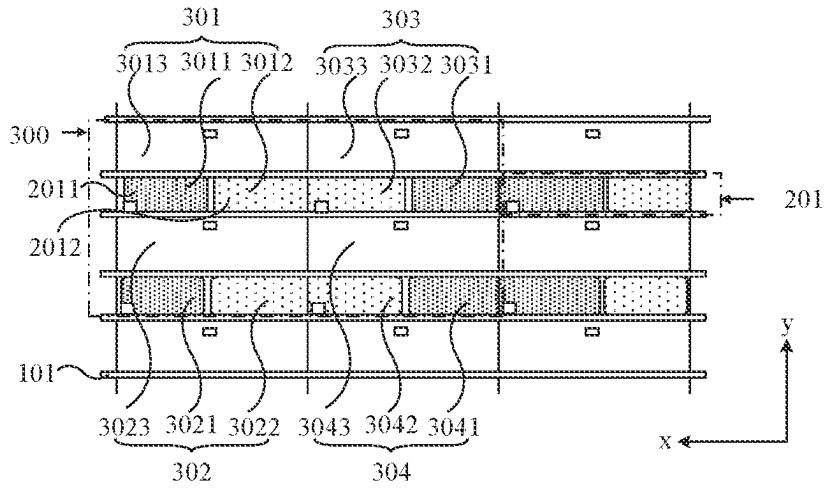

FIG. 2G

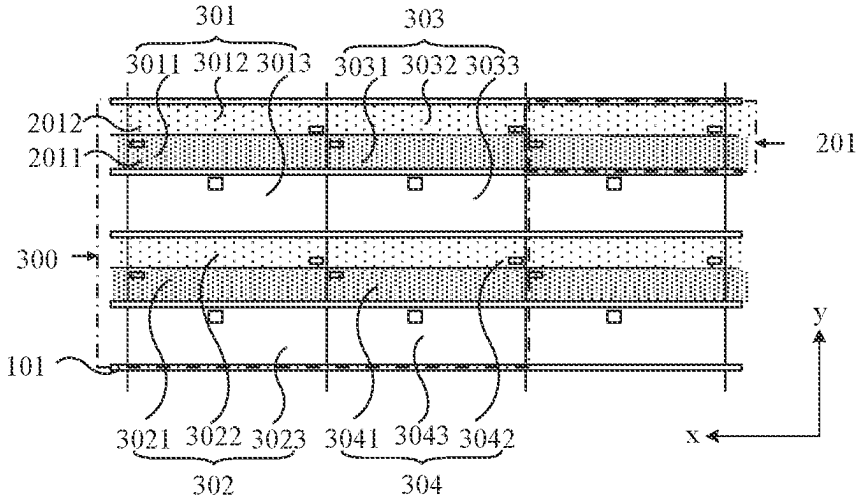

FIG. 2H

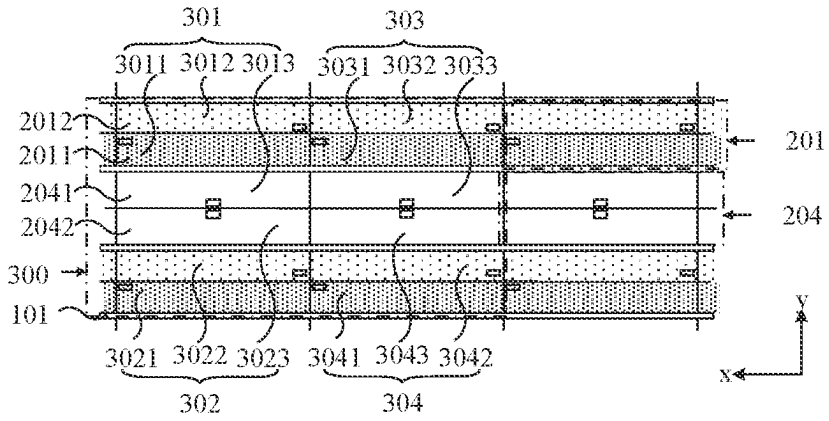

FIG. 2I

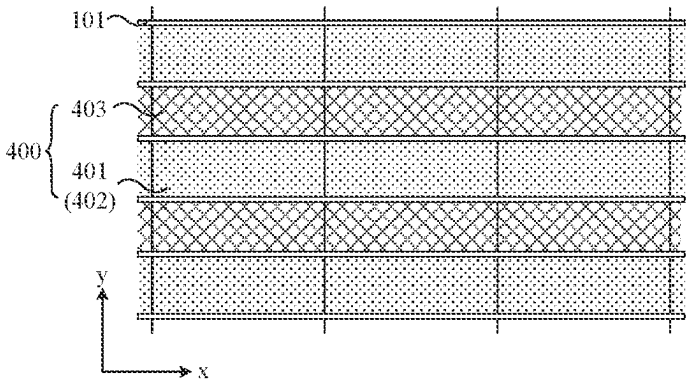

FIG. 3A

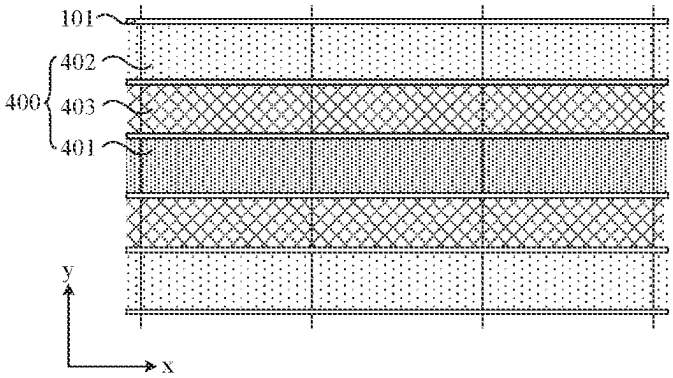

FIG. 3B

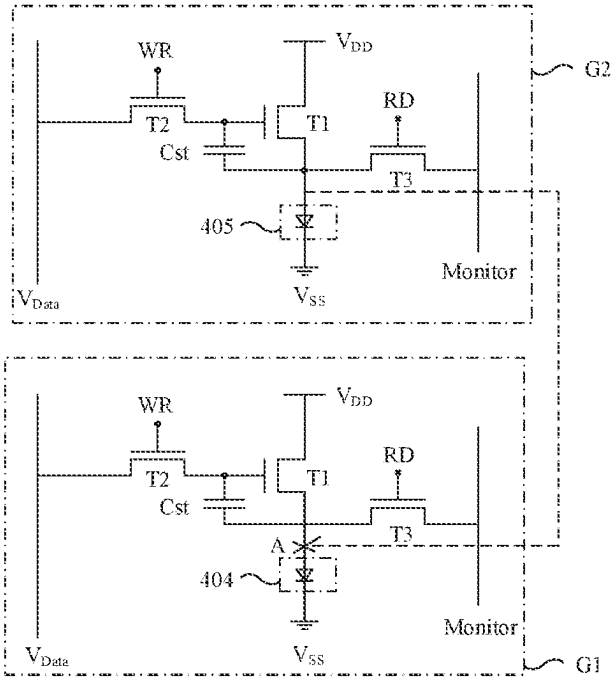

FIG. 4A

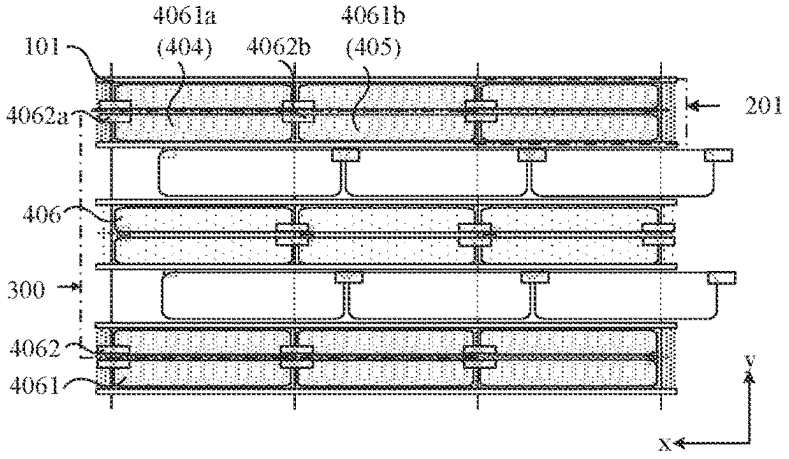

FIG. 4B

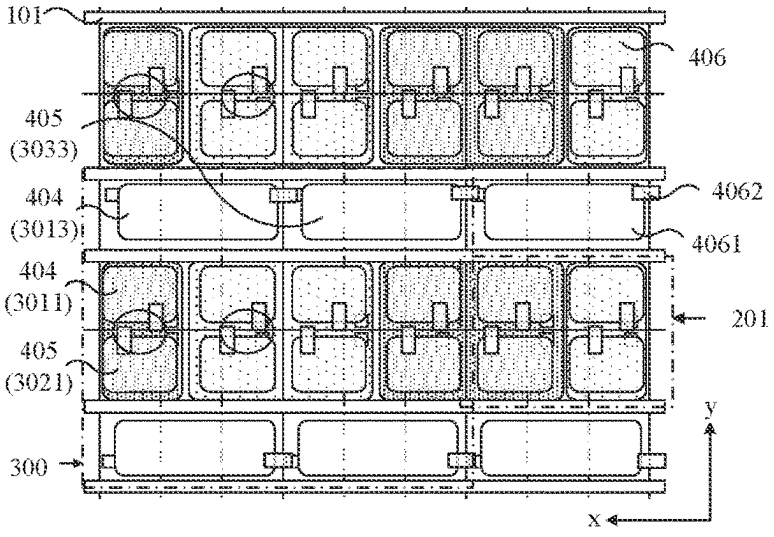

FIG. 4C

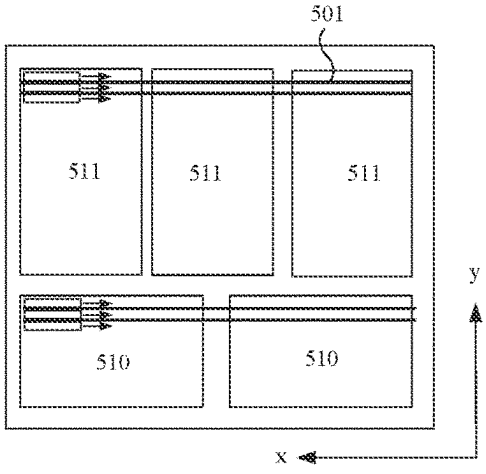

FIG. 5A

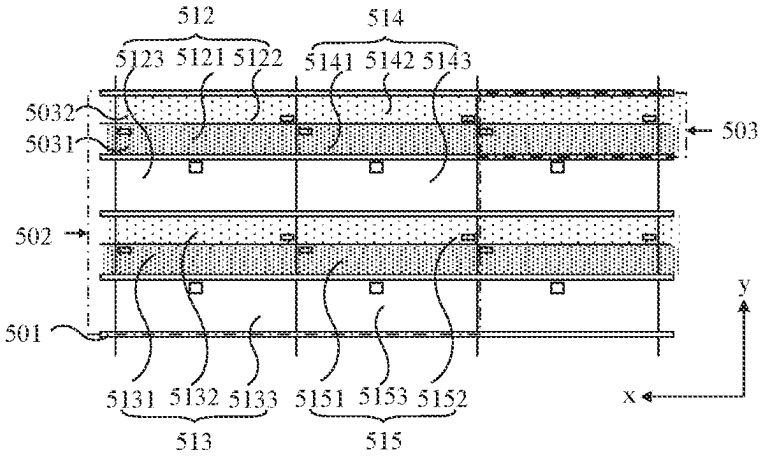

FIG. 5B

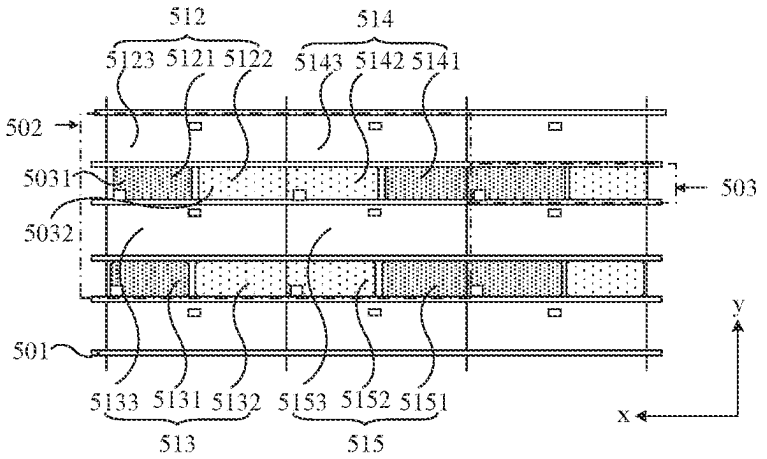

FIG. 5C

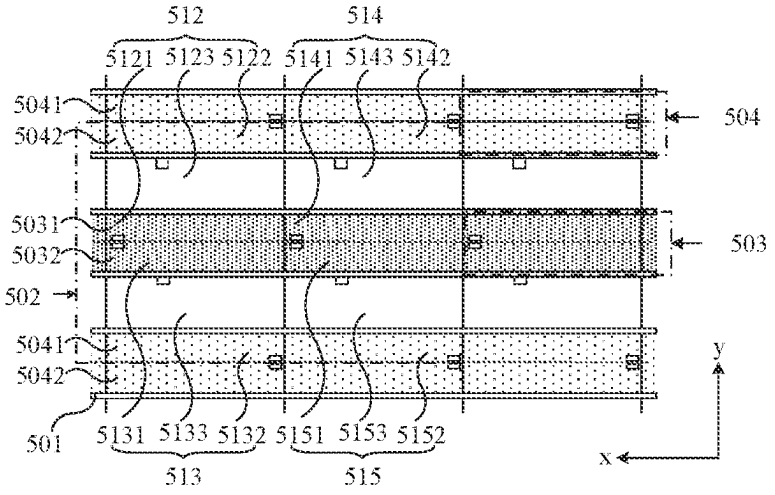

FIG. 5D

DISPLAY PANEL, DISPLAY MOTHERBOARD, AND DISPLAY DEVICE

RELATED APPLICATIONS

This application is a National Phase of PCT Patent Application No. PCT/CN2020/142246 having International filing date of Dec. 31, 2020, which claims the benefit of priority of Chinese Patent Application No. 202011603253.X filed on Dec. 30, 2020. The contents of the above applications are all incorporated by reference as if fully set forth herein in their entirety.

FIELD AND BACKGROUND OF THE INVENTION

The present disclosure relates to displays, and more particularly to a display panel, a display motherboard, and a display device.

Each pixel in an existing display panel includes three banks on average, and a large number of banks reduces an area ratio of pixels. In order to improve an aperture ratio of blue sub-pixels, an area ratio of red and green sub-pixels will be further compressed, so that a size of the red and green sub-pixels will seriously fail to meet a minimum width requirement of a line-bank printing, which is not beneficial to mass production.

SUMMARY OF THE INVENTION

An embodiment of the present application provides a display panel, a display mother board, and a display device, which can meet requirements of a pixel aperture ratio and a printing process.

An embodiment of the present application provides a display panel including: a plurality of banks, wherein each of the plurality of banks extends in a first direction, and the plurality of banks are arranged in a second direction; and a first sub-pixel group located between two adjacent banks, wherein the first sub-pixel group comprises a first sub-pixel and a second sub-pixel adjacent to each other.

An embodiment of the present application further provides a display motherboard including: a plurality of banks, wherein each of the plurality of banks extends in a first direction, and the plurality of banks are arranged in a second direction; and a plurality of display panels comprising a first display panel and a second display panel with different sizes, wherein a long side of the first display panel is parallel to the plurality of banks, and a short side of the second display panel is parallel to the plurality of banks, wherein the first display panel comprises a first sub-pixel group located between two adjacent banks, and the first sub-pixel group comprises a first sub-pixel and a second sub-pixel adjacent to each other.

An embodiment of the present application further provides a display device including any one of the above display panels.

Compared with conventional technologies, an embodiment of the present application provides a display panel, a display mother board, and a display device. The display panel includes: a plurality of banks, wherein each of the plurality of banks extends in a first direction, and the plurality of banks are arranged in a second direction; and a first sub-pixel group is located between two adjacent banks, wherein the first sub-pixel group comprises a first sub-pixel and a second sub-pixel adjacent to each other, so as to reduce number of banks in the display panel by having no banks between the first sub-pixel and the second sub-pixel, thereby improving a pixel area ratio. This display panel can take into account both requirements of an aperture ratio and a printing process, which is beneficial to mass production.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

FIG. **1**A to FIG. **1**B are schematic structural diagrams of a display panel according to an embodiment of the present application;

FIGS. **2**A, **2**B, **20**, **2**D, **2**E, **2**F, **2**G, **2**H and FIG. **2**I are schematic structural diagrams of pixel repeating units according to embodiments of the present application;

FIG. **3**A to FIG. **3**B are structural schematic diagrams of light-emitting materials and banks according to embodiments of the present application;

FIGS. **4**A, **4**B and FIG. **4**C are schematic structural diagrams of pixel repair according to embodiments of the present application; and

FIGS. **5**A, **5**B, **5**C and FIG. **5**D are schematic structural diagrams of a display motherboard according to an embodiment of the application.

DESCRIPTION OF SPECIFIC EMBODIMENTS OF THE INVENTION

In order to make purposes, technical solutions and effects of the present application are clearer and more unambiguous, the following further describes the application in detail with reference to drawings and embodiments. It should be understood that specific embodiments described here are only used to explain the application, and not used to limit the application.

Specifically, referring to FIG. **1**A to FIG. **1**B, which are schematic structural diagrams of a display panel according to an embodiment of the present application. FIG. **2**A to FIG. **2**I are schematic structural diagrams of pixel repeating units according to embodiments of the present application.

An embodiment of the present application provides a display panel including: a plurality of banks **101**, wherein each of the plurality of banks **101** extends in a first direction x, and the plurality of banks **101** are arranged in a second direction y; and a first sub-pixel group **201** located between two adjacent banks **101**, wherein the first sub-pixel group **201** comprises a first sub-pixel **2011** and a second sub-pixel **2012** adjacent to each other. That is, no banks **101** between the first sub-pixel **2011** and the second sub-pixel **202**, so as to reduce number of banks **101** in the display panel, thereby improving a pixel area ratio of the display panel. This display panel can take into account both requirements of an aperture ratio and a printing process, which is beneficial to mass production.

The display panel includes a plurality of pixel repeating units **300**, wherein each of the pixels includes a first color pixel, a second color pixel, and a third color pixel. Optionally, light-emitting colors of the first color pixel, the second color pixel, and the third color pixel are different. The first color pixel, the second color pixel, and the third color pixel have light-emitting colors including red, green, blue, yellow, or white.

At least one of the pixels includes the first sub-pixel **2011** and/or the second sub-pixel **2012**. That is, the first sub-pixel **2011** and the second sub-pixel **2012** may be located in different pixels, as shown in FIG. **2**A to FIG. **2**F. The first sub-pixel **2011** and the second sub-pixel **2012** may also be located in a same pixel, as shown in FIG. **2**G to FIG. **2**I.

Please continue to refer to FIG. **2**A to FIG. **2**F, taking the first sub-pixel **2011** and the second sub-pixel **2012** in different pixels as an example for description. The first sub-pixel **2011** and the second sub-pixel **2012** are adjacent to each other along the second direction y. The display panel includes a plurality of pixel repeating units **300**. Each pixel repeating unit **300** includes a first pixel **301** and a second pixel **302** arranged along a second direction y, the first pixel **301** includes the first sub-pixel **2011**, and the second pixel **302** includes the second sub-pixel **2012**. Specifically, the first color pixel **3011** of the first pixel **301** is formed by the first sub-pixel **2011**, and the first color pixel **3021** of the second pixel **302** is formed by the second sub-pixel **2012**, such that there are no banks **101** between the first sub-pixel **2011** and the second sub-pixel **202**. Therefore, number of banks **101** is reduced, thereby improving an area ratio of the first pixel **301** and the second pixel **302**.

Optionally, light-emitting colors of the first sub-pixel **2011** and the second sub-pixel **2012** are the same. The light-emitting colors of the first sub-pixel **2011** and the second sub-pixel **2012** include one of blue, red, green, yellow, or white.

Further, the first pixel **301** and the second pixel **302** both include a second color pixel and a third color pixel. Optionally, light-emitting colors of the first color pixel, the second color pixel, and the third color pixel include red, green, blue, yellow, white, and the like.

Further, the light-emitting colors of the first color pixel, the second color pixel, and the third color pixel are red, green, and blue in order. In order to make the third color pixel that emits blue light have a larger aperture ratio while ensuring aperture ratios of the first color pixel emitting red light and the second color pixel emitting green light, aperture ratios of the first color pixel, the second color pixel, and the third color pixel can be determined according to a light-emitting lifetime and a light-emitting intensity of the first color pixel, the second color pixel, and the third color pixel, respectively. That is, by setting widths of the first color pixel, the second color pixel, and the third color pixel, the aperture ratio of the third color pixel emitting blue light is greater than the aperture ratios the first color pixel emitting red light and the second color pixel emitting green light. Specifically, assuming that an initial value of a white balance of the display panel is set to Wb, a ratio relationship of red light, green light, and blue light is r1:g1:b1. Lifetimes of light emitting devices emitting red, green, and blue light (T95: brightness attenuation is 95% of the original) are Lr hours, Lg hours and Lb hours, respectively. Widths of the first color pixel, the second color pixel, and the third color pixel are W1=r1/Lr; W2=g1/Lg; W3=b1/Lb, wherein: W1 is a width of the first color pixel emitting red light, W2 is a width of the second color pixel emitting green light, and W3 is a width of the third color pixel emitting blue light.

Assuming that the initial white balance value of the display panel Wb=9600K (the corresponding color coordinate value is (0.29, 0.31)), a ratio relationship between red light, green light and blue light is r1:g1:b1=35:105:12. The lifetimes of light emitting devices emitting red, green, and blue light (T95:brightness attenuation is 95% of the original) are Lr=600 hours, Lg=1500 hours and Lb=44 hours, respectively. The widths of the first color pixel, the second color pixel, and the third color pixel are W1=35/600; W2=103/1500; W3=12/44.

The second color pixel and the third color pixel may be respectively located between the two banks **101**, as shown in FIG. **2**A. The second color pixel or the third color pixel may also be formed in a form of a sub-pixel group, as shown in FIG. **2**B. The second color pixels of the first pixel **301** and the second pixel **302** together with the first color pixels of the first pixel **301** and the second pixel **302** may also be located in the first sub-pixel group **201**. The third color pixel is located on a side of the bank **101** away from the first color pixel and the second color pixel, as shown in FIG. **2**C to FIG. **2**F.

Please continuing to refer to FIG. **2**A, the second color pixel **3012**, the third color pixel **3013** of the first pixel **301**, and the second color pixel **3022** and the third color pixel **3023** of the second pixel **302** are respectively located between two banks **101**. The second color pixel **3012** and the third color pixel **3013** of the first pixel **301** are located at a side of the first color pixel **3011** of the first pixel **301** away from the first color pixel **3021** of the second pixel **302**. The second color pixel **3022** and the third color pixel **3023** of the second pixel **302** are located at a side of the first color pixel **3021** of the second pixel **3024** away from the first color pixel **3011** of the first pixel **301**. Optionally, the light-emitting colors of the first color pixel, the second color pixel, and the third color pixel are blue, green, and red in order.

Please continuing to refer to FIG. **2**B, the second color pixel or the third color pixel is formed in a form of a sub-pixel group. That is, the display panel further includes a second sub-pixel group **202** spaced apart from the first sub-pixel group **201**, and the second sub-pixel group **202** is located between two adjacent banks **101**. The two sub-pixel group **202** includes a third sub-pixel **2021** and a fourth sub-pixel **2022** adjacent to each other along the second direction y. The first pixel **301** includes the fourth sub-pixel **2022** of the second sub-pixel group **202**, and the second pixel **302** includes the third sub-pixel **2021** of another second sub-pixel group **202**. It is understood that the third sub-pixel **2021** and the fourth sub-pixel **2022** may also be adjacent along the first direction x.

Specifically, the bank **101** includes a first bank **1011** and a second bank **1012** periodically arranged along the second direction y, and the first bank **1011** and the second bank **1012** extends respectively along the direction x. The first bank **1011** includes a first main bank **1011***a* and a first slave bank **1011***b*, and the second bank **1012** includes a second main bank **1012***a* and a second slave bank **1012***b*. The first sub-pixel group **201** is located between the first main bank **1011***a* and the second main bank **1012***a*. The second sub-pixel group **202** is located between the first slave bank **1011***b* and the second slave bank **1012***b*.

The first color pixel **3011** of the first pixel **301** is formed by the first sub-pixel **2011**. The second color pixel **3012** of the first pixel **301** is formed by the fourth sub pixel **2022** of the second sub pixel group **202***a*. The third color pixel **3013** of the first pixel **301** is located between the first main bank **1011***a* and the first slave bank **1011***b*. The first color pixel **3021** of the second pixel **302** is formed by the second sub-pixel **2012**. The second color pixel **3022** of the second pixel **302** is formed by the third sub-pixel **2021** of the second sub-pixel group **202***b*. The third color pixel **3023** of the second pixel **302** is located between the second main bank **1012***a* and the second slave bank **1012***b*. Therefore, both the first pixel **301** and the second pixel **302** include two banks **101**. Compared with the prior art of a design of a pixel including three banks on average, the present disclosure can reduce number of banks and improve the area ratio of pixels, so that the display panel can take into account both the aperture ratio requirement and the printing process requirement, which is beneficial to realize mass production.

Optionally, the light-emitting colors of the third sub-pixel **2021** and the fourth sub-pixel **2022** are the same. The first

sub-pixel **2011**, the second sub-pixel **2012**, the third sub-pixel **2021**, and the fourth sub-pixel **2022** have different light-emitting colors. Further, the light-emitting colors of the third sub-pixel **2021** and the fourth sub-pixel **2022** include one of blue, red, or green. Furthermore, the light-emitting color of the first sub-pixel **2011** and the second sub-pixel **2012** is one of red and green, and the third sub-pixel **2021** and the light-emitting color of the third sub-pixel **2021** and the fourth sub-pixel **2022** of the second sub-pixel group **202** is the other of red and green.

Further, if the light-emitting color of the third color pixel **3013** is blue; the emission color of the first color pixel **3011** is one of red or green, and the emission color of the second color pixel **3012** is the other red or green. A distance WL1 between two adjacent first banks **1011** is equal to the width W3 of a third color pixel **3013**, and/or a distance WL2 between two adjacent second banks **1012** is equal to the width W3 of a third color pixel **3013**. The distance WL1 between two adjacent first banks **1011** and/or the distance WL2 between two adjacent second banks **1012** may be less than or equal to a distance WL3 between the first bank **1011** and the second bank **1012** (that is, a width of the first sub-pixel group **201** or width of the second sub-pixel group **202**). Therefore, the aperture ratio of the third color pixel emitting blue light is greater than the aperture ratio of the first color pixel **3011** emitting red light and the second color pixel **3012** emitting green light, thereby improving a problem of poor light-emitting efficiency of the third color emitting blue light.

Further, the light-emitting color of the first sub-pixel **2011** and the second sub-pixel **2012** is red. The light-emitting color of the third sub-pixel **2021** and the fourth sub-pixel **2022** is green. The distance between the first main bank **1011***a* and the second main bank **1012***a* is less than or equal to the distance between the first slave bank **1011***b* and the second slave bank **1012***b*. Therefore, the aperture ratio of the second color pixel emitting green light is greater than or equal to the aperture ratio of the first color pixel emitting red light.

For example, widths of the first color pixel, the second color pixel, and the third color pixel that emit red, green, and blue light are W1=35/600; W2=103/1500; W3=12/44. The distance between the first main bank **1011***a* and the first slave bank **1011***b* is WL11. The distance between the second main bank **1012***a* and the second slave bank **1012***b* is WL22. The distance between the first main bank **1011***a* and the second main bank **1012***a* is WL12. The distance between the first slave bank **1011***b* and the second slave bank **1012***b* is WL21. The widths of WL11, WL22, WL12 and WL21 are WL11=12/44=WL22; WL12=2*35/600; WL21=2*103/1500, respectively.

To simplify a calculation process, when the light-emitting color of the first sub-pixel group **201** is red and the light-emitting color of the second sub-pixel **202** is green, the width ratio of the first sub-pixel group **201** (i.e., width WL12), and the second sub-pixel group **201** (i.e., width WL21) to the distance WL11 or WL22 can be set to 1:1:1-2:2:1.

Please refer to FIG. **2**C to FIG. **2**F. The second color pixel of the first pixel **301** and the second pixel **302** together with the first color pixel of the first pixel **301** and the second pixel **302** are both located in the first sub-pixel group **201**. The third color pixel is located on a side of the bank **101** away from the first color pixel and the second color pixel. That is, the first sub-pixel group **201** further includes a fifth sub-pixel **2013** and a sixth sub-pixel **2014** that are adjacent along the second direction y. The fifth sub-pixel **2013** is arranged on a side of the first sub-pixel **2011** along the first direction x. The sixth sub-pixel **2014** is arranged on a side of the second sub-pixel **2012** along the first direction x. The first pixel **301** includes the fifth sub-pixel **2013**, and the second pixel **302** includes the sixth sub-pixel **2014**.

Specifically, please continuing to refer to FIG. **2**C~FIG. **2**D, the second color pixel **3012** of the first pixel **301** is formed by the fifth sub-pixel **2013**. The second color pixel **3022** of the second pixel **302** is formed by the sixth sub-pixel **2014**. The third color pixel **3013** of the first pixel **301** and the third color pixel **3023** of the second pixel **302** are respectively located on both sides of the first sub-pixel group **201**. Therefore, the first pixel **301** and the second pixel **302** each include 1.5 banks **101**, and number of banks **101** is further reduced.

Further, please continuing to refer to FIG. **2**E~FIG. **2**F, the display panel further includes a third sub-pixel group **203**. The third sub-pixel group **203** includes a seventh sub-pixel **2031** and an eighth sub-pixel **2032**, and the seventh sub-pixel **2031** and the eighth sub-pixel **2032** are adjacent to each other. The third sub-pixel group **203** and the first sub-pixel group **201** share a same bank **101**.

Further, the third sub-pixel group **203** is located between two first sub-pixel groups **201**, and the bank **101** is located between the first sub-pixel group **201** and the third sub-pixel group **203**, please referring to FIG. **2**E~FIG. **2**F. Or, the third sub-pixel group **203** is located between the first sub-pixel group **201** and the second sub-pixel group **202**, and the bank **101** is located among the first sub-pixel group **201**, the second sub-pixel group **202**, and the third sub-pixel group **203**.

Please continuing to refer to FIG. **2**E~FIG. **2**F, the first color pixel **3011** of the first pixel **301** is formed by the first sub-pixel **2011**, the second color pixel **3012** of the first pixel **301** is formed by the third sub-pixel **2013** of the first sub-pixel group **201**, and the third color pixel **3013** of the first pixel **301** is formed by the seventh sub pixel **2031** of the third sub pixel group **203**. The first color pixel **3021** of the second pixel **302** is formed by the second sub-pixel **2012** of the first sub-pixel group **201**. The second color pixel **3022** of the second pixel **302** is formed by the fourth sub pixel **2014** of the first sub pixel group **201**. The third color pixel **3023** of the second pixel **302** is formed by the eighth sub pixel **2032** of the third sub pixel group **203**. Therefore, each of the first pixel **301** and the second pixel **302** includes only one bank **101**, which reduces number of the banks **101** thereby improving a pixel area ratio. This display panel can take into account both requirements of an aperture ratio and a printing process, which is beneficial to mass production

Optionally, the seventh sub-pixel **2031** and the eighth sub-pixel **2032** have a same light-emitting color. Further, the light-emitting color of the seventh sub-pixel **2031** and the eighth sub-pixel **2032** includes one of blue, red, green, or white. Furthermore, the light-emitting color of the first sub-pixel **2011** and the second sub-pixel **2012** is one of red and green, the light-emitting color of the fifth sub-pixel **2013** and the sixth sub-pixel **2014** is the other of red and green, and the light-emitting color of the seventh sub-pixel **2031** and the eighth sub-pixel **2032** is blue.

A width of the first sub-pixel group **201** may be greater than or equal to a width of the third sub-pixel group **203**, so that the aperture ratio of the first color pixel emitting blue light is greater than that of the second color pixel emitting red light and the third color pixel emitting green light. The problem of poor light-emitting efficiency of the first color pixels emitting blue light is improved. Further, a ratio of the

width of the first sub-pixel group **201** to the width of the third sub-pixel group **203** is 1:1 to 2:1.

Further, please continue to refer to FIG. **2**A~FIG. **2**F. Each pixel repeating unit **300** further includes a third pixel **303** and a fourth pixel **304** arranged along the second direction y. The third pixel **303** is arranged on a side of the first pixel **301** along the first direction x. The third pixel **303** and the first pixel **301** are arranged symmetrically or repeatedly along an adjacent edge of the first pixel **301** and the third pixel **303**. The fourth pixel **304** is arranged on a side of the second pixel **302** along the first direction x. The fourth pixel **304** and the second pixel **302** are arranged symmetrically or repeatedly along an adjacent edge of the second pixel **302** and the fourth pixel **304**.

Specifically, the third pixel **303** and the fourth pixel **304** each include a first color pixel, a second color pixel, and a third color pixel. Optionally, a design of the first color pixel **3031**, the second color pixel **3032**, and the third color pixel **3033** of the third pixel **303** can refer to the design of the first color pixel **3011**, the second color pixel **3012** and the third color pixel **3013** of the first pixel **301**. A design of the first color pixel **3041**, the second color pixel **3042**, and the third color pixel **3043** of the fourth pixel **304** can be referred to the design of the first color pixel **3021**, the second color pixel **3022** and the third color pixel **3023** of the second pixel **3021**. It is not repeated here again.

Referring to FIG. **2**G to FIG. **2**I, the first sub-pixel **2011** and the second sub-pixel **2012** of the first sub-pixel group **201** may also be located in a same pixel. That is, the display panel further includes a plurality of pixel repeating units **300**, each of the pixel repeating units **300** includes a first pixel **301**, and the first pixel **301** includes the first sub-pixel **2011** and the second sub-pixel **2012**. Optionally, the light-emitting colors of the first sub-pixel **2011** and the second sub-pixel **2012** are different, and the light-emitting colors of the first sub-pixel **2011** and the second sub-pixel **2012** include red, green, blue, yellow, and white.

Specifically, the first pixel **301** includes a first color pixel **3011**, a second color pixel **3012**, and a third color pixel **3013**. The first color pixel **3011** is formed by the first sub-pixel **2011** of the first sub-pixel group **201**. The second color pixel **3012** is formed by the second sub-pixel **2012** of the first sub-pixel group **201**. The third color pixel **3013** is located on a side of the bank **101** away from the first color pixel **3011** and the second color pixel **3012**.

Further, the first sub-pixel **2011** and the second sub-pixel **2012** may be arranged along the first direction x, as shown in FIG. **2**G. The first sub-pixel **2011** and the second sub-pixel **2012** can also be arranged along the second direction y, as shown in FIG. **2**H. Therefore, that the first pixel **301** includes two banks **101** on average.

Further, as shown in FIG. **2**I, the display panel further includes a fourth sub-pixel group **204** located between two first sub-pixel groups **201**. The bank **101** is provided between the first sub-pixel group **201** and the fourth sub-pixel group **204**. The fourth sub-pixel group **204** includes a ninth sub-pixel **2041** and a tenth sub-pixel **2042** adjacent to each other. The third color pixel **3013** of the first pixel **301** is formed by the ninth sub-pixel **2041**, and the third color pixel of the second pixel **302** is formed by the tenth sub-pixel **2042**. The ninth sub-pixel **2041** and the tenth sub-pixel **2042** are adjacent along the second direction y, such that the first pixel **301** and the second pixel **302** each include 1.5 banks **101**.

Optionally, the light-emitting colors of the first color pixel, the second color pixel, and the third color pixel include red, green, blue, yellow, or white. Further, the light-emitting colors of the first color pixel, the second color pixel, and the third color pixel are red, green, and blue in order. A width of the first sub-pixel group **201** may be less than or equal to a width of the fourth sub-pixel **204**, such that an aperture ratio of the third color pixel emitting blue light is greater than those of the first color pixel emitting red light and the second color pixel emitting green light, so as to improve a problem of the poor light-emitting efficiency of the third color pixel emitting blue light.

Further, the second pixel **302** is arranged on one side of the first pixels **301** along the second direction y. The third pixel **303** is arranged on one side of the first pixels **301** along the first direction x. The fourth pixel **304** is arranged on a side of the third pixel **303** along the second direction y. The fourth pixel **304** is arranged on a side of the second pixel **302** along the first direction x. The second pixel **302** and the first pixel **301** are arranged symmetrically or repeatedly along an adjacent edge of the second pixel **302** and the first pixel **301**. The third pixel **303** and the first pixel **301** are arranged symmetrically or repeatedly along an adjacent edge of the first pixel **301** and the third pixel **303**. The fourth pixel **304** and the second pixel **302** are arranged symmetrically or repeatedly along an adjacent edge of the second pixel **302** and the fourth pixel **304**.

Specifically, the second pixel **302**, the third pixel **303**, and the fourth pixel **304** all include a first color pixel, a second color pixel, and a third color pixel. Optionally, a design of the first color pixel **3021**, the second color pixel **3022**, and the third color pixel **3023** of the second pixel **302** can refer to the design of the first color pixel **3011**, the second color pixel **3012** and the third color pixel **3013** of the first pixel **301**. A design of the first color pixel **3041**, the second color pixel **3042**, and the third color pixel **3043** of the fourth pixel **304** can refer to the design of the first color pixel **3021**, the second color pixel **3022** and the third color pixel **3023** of the second pixel **3021**. It is not repeated here again.

As shown in FIG. **3**A to FIG. **3**B, which are structural schematic diagrams of light-emitting materials and banks according to embodiments of the present application. The display panel further includes a light-emitting material **400**. The light-emitting material **400** is located between two adjacent banks **101**.

Further, the light-emitting material **400** includes a first light-emitting material **401**, a second light-emitting material **402**, and a third light-emitting material **403**. The first light-emitting material **401** and the second light-emitting material **402** may be located between the same two banks **101**, as shown in FIG. **3**A. As a result, the first light-emitting material **401** and the second light-emitting material **402** can be made the same and integrally formed, thereby reducing a manufacturing process of the display panel and saving cost. The first light-emitting material **401** and the second light-emitting material **402** may also be located between two different banks **101**, as shown in FIG. **3**B. In this way, the first light-emitting material **401** and the second light-emitting material can be made of different light-emitting materials to ensure that the display panel has a higher display quality.

Specifically, please refer to FIG. **3**A. The first light-emitting material **401** and the second light-emitting material **402** are located between the same two banks **101**. The first sub-pixel of the first sub-pixel group includes the first light-emitting material **401**. The second sub-pixel of the first sub-pixel group includes the second light-emitting material **402**. Further, the third sub-pixel of the first sub-pixel group includes the first light-emitting material **401**. The fourth sub-pixel of the first sub-pixel group includes the second

light-emitting material **402**. The first light-emitting material **401** of the first sub-pixel and the second light-emitting material **402** of the second sub-pixel between two adjacent banks are made the same and integrally formed, so as to reduce the manufacturing process.

The third light-emitting material **403** is located on a side of the first light-emitting material **401** and the second light-emitting material **403**. The bank **101** is provided between the third light-emitting material **403** and the first light-emitting material **401** and the second light-emitting material **402**.

Further, the first light-emitting material **401** has a first width, the second light-emitting material **402** has a second width, and the third light-emitting material **403** has a third width (that is, a width of one-color pixel). If the first sub-pixel and the second sub-pixel are arranged along the first direction x, the first width or the second width is less than or equal to the third width. If the first sub-pixel and the second sub-pixel are arranged along the second direction y, a sum of the width of the first width and the second width is greater than or equal to the third width.

Furthermore, the display panel further includes a third sub-pixel group, and the third sub-pixel group and the first sub-pixel group are located on two sides of the same bank **101**. The first sub-pixel and the second sub-pixel of the first sub-pixel group are adjacent along the second direction y. The seventh sub-pixel and the eighth sub-pixel of the third sub-pixel group are adjacent to each other along the second direction y. The first sub-pixel includes the first light-emitting material **401**, and the second sub-pixel includes the second light-emitting material **402**. The seventh sub-pixel and the eighth sub-pixel include the third light-emitting material **403**. A sum of the width of the first width and the second width is less than or equal to the third width.

Optionally, the light-emitting colors of the first light-emitting material **401**, the second light-emitting material **402**, and the third light-emitting material **403** include red, green, blue, yellow, or white. Further, the light-emitting colors of the first light-emitting material **401** and the second light-emitting material **402** are yellow, and the light-emitting color of the third light-emitting material **403** is blue.

Specifically, please refer to FIG. **3**B. The first light-emitting material **401** and the second light-emitting material **402** are respectively located between two different banks **101**, the third light-emitting material **403** is located between the first light-emitting material **401** and the second light-emitting material **402**, and the bank **101** is provided among the third light-emitting material **403**, the first light-emitting material **401** and the second light-emitting material **402**. The display panel includes a first sub-pixel group and a second sub-pixel group arranged at intervals. Both the first sub-pixel and the second sub-pixel of the first sub-pixel group include the first light-emitting material **401**. The third sub-pixel and the fourth sub-pixel of the second sub-pixel group both include the second light-emitting material **402**. In this way, the first sub-pixel group and the second sub-pixel group can be made of different light-emitting materials, so that the display panel has a higher display quality. It is understood that the first light-emitting material **401** and the second light-emitting material **402** can also be made of the same material. It is not repeated here again.

Further, the first light-emitting material **401** has a first width, the second light-emitting material **402** has a second width, and the third light-emitting material **403** has a third width (that is, the width of one-color pixel). The first width and the second width are greater than or equal to the third width. That is, the first sub-pixel and the second sub-pixel of the first sub-pixel group are adjacent along the second direction y. The third sub-pixel and the fourth sub-pixel of the second sub-pixel group are adjacent along the second direction y. The first width and the second width are greater than or equal to the third width.

Furthermore, the sub-pixel group further includes a third sub-pixel group located between the first sub-pixel group and the second sub-pixel group. The bank **101** is provided among the third sub-pixel group, the first sub-pixel group and the second sub-pixel group. The seventh sub-pixel and the eighth sub-pixel of the third sub-pixel group both include the third light-emitting material **403**. The light-emitting color of the first sub-pixel group is one of red or green, and the light-emitting color of the second sub-pixel group is the other of red or green. When the light-emitting color of the third sub-pixel group is blue, the first width and the second width are less than or equal to the third width.

Furthermore, the light-emitting color of the first sub-pixel group is red, the light-emitting color of the second sub-pixel group is green, and the first width is less than or equal to the second width.

Optionally, the light-emitting colors of the first light-emitting material **401**, the second light-emitting material **402**, and the third light-emitting material **403** include red, green, blue, yellow, or white. Further, the first light-emitting material **401** is red, the light-emitting color of the second light-emitting material **402** is green, and the light-emitting color of the third light-emitting material **403** is blue. In addition, the light-emitting color of the first light-emitting material **401** may be the same as the light-emitting color of the second light-emitting material **402**. For example, the light-emitting color of the first light-emitting material **401** and the second light-emitting material **402** is yellow or the like.

Further, the display panel further includes a color filter. The color filter includes a color filter unit. Each of the color filter units is arranged corresponding to the color pixels in the pixel, so that the first color pixel, the second color pixel, and the third color pixel in each pixel cooperate with the color filter unit to realize a full-color display of the display panel.

Further, the color filter includes: a first color filter unit corresponding to the first sub-pixel **2011**, and a second color filter unit corresponding to the second sub-pixel **2012**; wherein colors of the first color filter unit and the second color filter unit are different.

Optionally, the first light-emitting material **401**, the second light-emitting material **402**, and the third light-emitting material **403**, and/or the color filter unit also includes quantum dot materials, perovskite materials, fluorescent materials, etc., so as to improve a light emitting efficiency.

As shown in FIG. **4**A to FIG. **4**C, which are schematic diagrams of the pixel repair structure according to embodiments of the present application. In the manufacturing process of the display panel, due to factors such as the manufacturing process, the pixel driving circuit in the display panel and the color pixels may be disconnected or short-circuited, which affects the display quality of the display panel. Therefore, in order to reduce an influence of the disconnection or short-circuit problem on the display panel during the manufacturing process, a repair method shown in FIG. **4**A to FIG. **4**C is adopted to realize the electrical connection between the color pixels and the pixel driving circuit.

Specifically, the pixel driving circuit includes a 3T1C (3 transistors and 1 capacitor) structure for description. If there is a disconnection or short connection between the fourth

color pixel **404** and the first pixel driving circuit G**1**, laser can be used to cut point A to disconnect a link between the fourth color pixel **404** and the first pixel driving circuit G**1**. Then, a laser welding is used to realize the electrical connection between the fourth color pixel **404** and the second pixel driving circuit G**2**, so that the second pixel circuit G**2** can simultaneously drive the fourth color pixel **404** and the fifth color pixel **405**. In this way, the electrical connection between the fourth color pixel **404** and the pixel driving circuit is realized. The fourth color pixel **404** and the fifth color pixel **405** have a same light-emitting color. Vdata is a data signal. Cst is a storage capacitor. T**1**, T**2**, and T**3** are transistors. VDD and VSS are power signals. WR and RD are control signals Monitor is a detection signal.

Specifically, please refer to FIG. **2**B, FIG. **3**A-FIG. **3**B, and FIG. **4**A-FIG. **4**B. The display panel includes a first electrode layer **406**. The first light-emitting material **401**, the second light-emitting material **402**, and the third light-emitting material **403** are respectively located on the first electrode layer **406**. The first electrode layer **406** includes a plurality of electrode portions **4061** and a bridge portion **4062** extending from the electrode portions **4061**. The bridge portion **4062** is electrically connected to the pixel driving circuit. In a top view, a plurality of bridge portions **4062** are included between the banks **101** located on both sides of the first sub-pixel group **201**, and the plurality of bridge portions are located on two sides of a center line between two adjacent banks **101** and are neighboring the center line.

Further, the fourth color pixel **404** and the fifth color pixel **402** may be the first color pixel **3011** of the first pixel **301** and the first color pixel **3031** of the third pixel **303**, respectively. The electrode portion **4061** includes a first electrode portion **4061***a* and a second electrode portion **4061***b* arranged along the first direction x. The bridge portion **4062** includes a first bridge portion **4062***a* extending from the first electrode portion **4061***a* and a second bridge portion **4062***b* extending from the second electrode portion **4061***b*. The pixel driving circuit includes a first pixel driving circuit electrically connected to the first bridge portion **4062***a* and a second pixel driving circuit electrically connected to the second bridge portion **4062***b*. The first color pixel **3011** of the first pixel **301** includes the first electrode portion **4061***a*, and the first color pixel **3031** of the third pixel **303** includes the second electrode portion **4061***b*. When the electrical connection between the first bridge portion **4062***a* and the first pixel drive circuit fails, the first bridge portion **4062***a* cuts off the connection with the first pixel driving circuit through a laser process, and the second bridge portion **4062***b* is welded to the first electrode portion **4061***a* through a laser process.

Similarly, the fourth color pixel **404** and the fifth color pixel **405** may also be the third color pixel **3013** of the first pixel **301** and the third color pixel **3033** of the third pixel **303**, respectively. Or, the fourth color pixel **404** and the fifth color pixel **405** may also be the first color pixel **3011** of the first pixel **301** and the first color pixel **3021** of the second pixel **302**, respectively, as shown in FIG. **4**C. Or, the fourth color pixel **404** and the fifth color pixel **405** are the second color pixel **3012** of the first pixel **301** and the second color pixel **3022** of the third pixel **303**, etc., such that adjacent color pixels with a same color can be repaired by laser welding.

Further, please continuing to refer to FIG. **1**B, the display panel further includes a substrate **111**. The plurality of pixel driving circuits **112** and the pixel repeating unit **102** are all located on the substrate **111**. A groove **101***b* is formed between two adjacent banks **101**. The first light-emitting material and/or the second light-emitting material are located in the same groove **101***b*, and the third light-emitting material is located in the groove **101***b*. The bank **101** may be made of double-layer bank materials Bank1 and Bank2 to improve a wettability of the bank **101** to a planarization layer PLN and the first electrode layer **403**.

The display panel further includes a light shielding layer LS, a buffer layer BL, an insulating layer IL, and a protective layer PVS on the substrate **111**. The pixel driving circuit **112** includes a transistor. The transistor includes: an active layer AL; a gate insulating layer GI on the active layer AL; a gate G located on the gate insulating layer GI and arranged opposite to the active layer AL; and a source S and a drain D electrically connected to the active layer AL.

Please continue to refer to FIG. **1**B and FIG. **2**A. The planarization layer PLN includes a via **407**, so that the first electrode layer **406** and the pixel driving circuit **112** are electrically connected through the via **407**. In a top view angle, the vias **407** included in each pixel are located in different columns. The first electrode layer **406** covers the via **407**, as shown in FIGS. **4**B to **4**C. Further, in a top view angle, the via **407** is arranged close to an edge of the first electrode layer **406** to reduce difficulty of pixel repair, as shown in FIG. **4**B.

In addition, the display panel also includes: a capacitor substrate layer AL**1** prepared in the same layer as the active layer AL, and a source-drain layer SD prepared in the same layer as the source electrode S and the drain electrode D. The capacitor substrate layer AL**1** forms a capacitor with the light shielding layer LS and a source and drain layer SD, respectively.

As shown in FIG. **5**A to FIG. **5**D, which are schematic diagrams of the structure of the display motherboard provided by the embodiments of the application. An embodiment of the present application further provides a display motherboard including: a plurality of banks **501**, each of the plurality of banks **501** extending in a first direction x, the plurality of banks **501** arranged in a second direction y; and a plurality of display panels comprising a first display panel **510** and a second display panel **511** with different sizes, wherein a long side of the first display panel **510** is parallel to the plurality of banks **101**, and a short side of the second display panel **511** is parallel to the plurality of banks **501**. Each of the first display panels **510** and each of the second display panel **511***s* includes a plurality of pixel repeating units **502**. Each of the pixel repeating units **502** includes a plurality of pixels, and each of the pixels includes a first color pixel, a second color pixel, and a third color pixel.

Each of the first display panels **510** and each of the second display panels **511** includes a first sub-pixel group **503**. The first sub-pixel group **503** is located between two adjacent banks **501**. The first sub-pixel group **503** includes a first sub-pixel **5031** and a second sub-pixel **5032**, wherein the first sub-pixel **5031** and the second sub-pixel **5032** are adjacent to each other. That is, there are no banks **501** between the first sub-pixel **5031** and the second sub-pixel **5032**. Therefore, number of the bank **501** is reduced, thereby improving an area ratio of pixels. Thus, this display panel can take into account both requirements of an aperture ratio and a printing process, which is beneficial to mass production.

Specifically, please continue to refer to FIG. **5**B to FIG. **5**C. Each of the first display panels **510** includes a plurality of the pixel repeating units **502**. Each pixel repeating unit **502** includes a first pixel **512**. The first pixel **512** includes the first sub-pixel **5031** and the second sub-pixel **5032**. That is, the first pixel **512** includes a first color pixel **5121**, a second

color pixel **5122**, and a third color pixel **5123**. The first color pixel **5121** is formed by the first sub-pixel **5031**, the second color pixel **5122** is formed by the second sub-pixel **5032**, and the third color pixel **5123** is located on the side of the bank **101** away from the first color pixel **5121** and the second color pixel **5122**. The first sub-pixel **5031** and the second sub-pixel **5032** may be arranged along the second direction y, as shown in FIG. **5**B. The first sub-pixel **5031** and the second sub-pixel **5032** may be arranged along the first direction x, as shown in FIG. **5**C, such that the first pixel **512** includes two banks **101** on average. Compared with the prior art of a pixel including three banks **101** on average, the present disclosure can reduce number of banks **101**, thereby improving the ratio of pixels, and enabling the display panel to take into account requirements of the manufacturing process and the aperture ratio.

Further, the third color pixel **5123** of the first pixel **512** may also be formed in a form of a sub-pixel group, so that the first pixel **512** includes only 1.5 banks **101**, and number of the banks **101** is further reduced.

In addition, the first sub-pixel **5031** and the second sub-pixel **5032** may also be located in different pixels. Specifically, each pixel repeating unit **502** includes a second pixel **513** arranged on a side of the first pixel **512** along the second direction y. The first pixel **512** includes the first sub-pixel **5031**, and the second pixel **513** includes the second sub-pixel **5032**. That is, one of the first color pixel **5121**, the second color pixel **5122**, or the third color pixel **5123** of the first pixel **512** is formed by the first sub-pixel **5031**. One of the first color pixel **5131**, the second color pixel **5132**, or the third color pixel **5133** of the second pixel **513** is formed by the second sub-pixel **5032**.

Please referring FIG. **5**D, the first display panel **510** further includes a second sub-pixel group **504** spaced apart from the first sub-pixel group **503** along the second direction y. The second sub-pixel group **504** is located between two adjacent banks **501**, and the second sub-pixel group **504** includes a third sub-pixel **5041** and a fourth sub-pixel **5042**, wherein the third sub-pixel **5041** and the fourth sub-pixel **5042** are adjacent to each other. Further, the first sub-pixel **5031** and the second sub-pixel **5032** are adjacent to each other along the second direction y, and the third sub-pixel **5041** and the fourth sub-pixel **5042** are adjacent to each other along the second direction y. Each display panel includes a plurality of pixel repeating units **502**. Each pixel repeating unit **502** includes a first pixel **512** and a second pixel **513** arranged along the second direction y. The first pixel **512** includes the fourth sub-pixel **5042** of the second sub-pixel group **504**. The second pixel **513** includes the third sub-pixel **5041** of the other second sub-pixel group **504**.

Specifically, the first pixel **512** and the second pixel **513** both include a first color pixel, a second color pixel, and a third color pixel. The first color pixel **5121** of the first pixel **512** is formed by the first sub-pixel **5031** of the first sub-pixel group **503**. The second color pixel **5122** of the first pixel **512** is formed by the fourth sub pixel **5042** of the second sub pixel group **504**. The third color pixel **5123** of the first pixel **512** is located between the first sub-pixel group **503** and the second sub-pixel group **504**. The first color pixel **5131** of the second pixel **513** is formed by the second sub-pixel **5032** of the first sub-pixel group **503**. The second color pixel **5132** of the second pixel **513** is formed by the third sub-pixel **5041** of the other second sub-pixel group **504**. The third color pixel **5133** of the second pixel **513** is located between the first sub-pixel group **503** and the other second sub-pixel group **504**, so that the first pixel **512** and the second pixel **513** both includes two banks **101**. Compared with the prior art of a design in which each pixel includes three banks **101** on average, the present disclosure has a reduced number of banks **101**.

In addition, the first sub-pixel group **503** further includes a fifth sub-pixel and a sixth sub-pixel. The fifth sub-pixel is arranged on a side of the first sub-pixel **5011** along the first direction x, and the sixth sub-pixel is arranged on a side of the second sub-pixel **5012** along the first direction x. The second color pixel **5122** of the first pixel **512** is formed by the fifth sub-pixel. The second color pixel **5132** of the second pixel **513** is formed by the sixth sub-pixel. The third color pixel **5123** of the first pixel **512** and the third color pixel **5133** of the second pixel **513** are respectively located on two sides of the sub-pixel group **500**.

Further, the display panel further includes a third sub-pixel group, and the third sub-pixel group includes a seventh sub-pixel and an eighth sub-pixel. The seventh sub-pixel and the eighth sub-pixel are adjacent to each other. The third sub-pixel group and the first sub-pixel group **503** share a same bank **501**. The arrangement of the third sub-pixel group can refer to FIG. **2**E to FIG. **2**F, which is not repeated here again.

Please continue to refer to FIG. **5**A-FIG. **5**D. The pixel repeating unit **502** further includes: a third pixel **514** arranged on a side of the first pixel **512** along the first direction x, and a fourth pixel **515** arranged on a side of the second pixel **513** along the first direction x. The third pixel **514** and the first pixel **512** are arranged symmetrically or repeatedly along an adjacent edge of the first pixel **512** and the third pixel **514**. The fourth pixel **515** and the second pixel **513** are arranged symmetrically or repeatedly along an adjacent edge of the second pixel **513** and the fourth pixel **515**. Specifically, the third pixel **514** and the fourth pixel **515** both include a first color pixel, a second color pixel, and a third color pixel. A design of the first color pixel **5141**, the second color pixel **5142**, and the third color pixel **5143** of the third pixel **514** can refer to the design of the first color pixel **5121**, the second color pixel **5122**, and the third color pixel **5123** of the first pixel **512**. A design of the first color pixel **5151**, the second color pixel **5152**, and the third color pixel **5153** of the fourth pixel **515** can refer to the design of the first color pixel **5131**, the second color pixel **5132**, and the third color pixel **5133** of the second pixel **5131**.

The display panel further includes a light-emitting material, and the light-emitting material includes a first light-emitting material, a second light-emitting material, and a third light-emitting material. The first sub-pixel **5031** includes a first light-emitting material, and the second sub-pixel **5032** includes a second light-emitting material. The first light-emitting material of the first sub-pixel **5031** and the second light-emitting material of the second sub-pixel **5032** between two adjacent banks are the same and are integrally formed. That is, the first light-emitting material and the second light-emitting material can be located between the same two banks, so that the first light-emitting material and the second light-emitting material can be made of the same and integrally made. Therefore, the manufacturing process of the display panel is reduced, and the cost is saved.

In addition, the first light-emitting material and the second light-emitting material may also be located between two different banks **501**, so that the first light-emitting material and the second light-emitting material can be made of different light-emitting materials to ensure that the display panel has a higher display quality.

Optionally, light-emitting colors of the first light-emitting material, the second light-emitting material, and the third

light-emitting material include red, green, blue, yellow, or white. Further, light-emitting colors of the first light-emitting material and the second light-emitting material include red, yellow, green, or white. Furthermore, the light-emitting color of the first light-emitting material and the second light-emitting material is yellow, and the light-emitting color of the third light-emitting material is blue. Or, the light-emitting color of the first light-emitting material is red, the light-emitting color of the second light-emitting material is green, and the light-emitting color of the third light-emitting material is blue.

Further, the display panel further includes a color filter. The color filter includes a color filter unit, and each of the color filter units corresponds to a color pixel arrangement in a pixel. The first color pixel, the second color pixel and the third color pixel in each pixel cooperate with the color filter unit to realize a full-color display of the display panel.

Optionally, the first light-emitting material, the second light-emitting material, and the third light-emitting material, and/or the color filter unit includes quantum dot materials, perovskite materials, fluorescent materials, etc., so as to improve light-emitting efficiency.

The present application also provides a display device including any of the above-mentioned display panels.

In the above-mentioned embodiments, the description of each embodiment has its own emphasis. For parts that are not described in detail in an embodiment, reference may be made to related descriptions of other embodiments. The description of the above embodiment is only used to help understand the technical solution of the application and its core idea. Those of ordinary skill in the art should understand that they can still modify the technical solutions described in the foregoing embodiments, or equivalently replace some of the technical features. These modifications or replacements do not cause the essence of the corresponding technical solutions to deviate from the scope of the technical solutions of the embodiments of the present application.

What is claimed is:

1. A display panel, comprising:

a plurality of banks, each of the plurality of banks extending in a first direction, the plurality of banks arranged in a second direction;

a first sub-pixel group located between two adjacent banks, wherein the first sub-pixel group comprises a first sub-pixel and a second sub-pixel adjacent to each other; and

a second sub-pixel group spaced apart from the first sub-pixel group along the second direction, wherein the second sub-pixel group is located between two adjacent banks, and two adjacent banks are arranged between the first sub-pixel group and the second sub-pixel group adjacent to the first sub-pixel group,

wherein the first sub-pixel is adjacent to the second sub-pixel along the second direction, wherein the display panel comprises a plurality of pixel repeating units, each of the plurality of pixel repeating units comprises a first pixel and a second pixel, and the first pixel and the second pixel are arranged along the second direction, wherein the first pixel comprises the first sub-pixel, and the second pixel comprises the second sub-pixel,

the second sub-pixel group comprises a third sub-pixel and a fourth sub-pixel adjacent to each other along the second direction, wherein the first pixel comprises the fourth sub-pixel of the second sub-pixel group, and the second pixel comprises the third sub-pixel of another second sub-pixel group,

wherein each of the plurality of pixel repeating units further comprises a third pixel and a fourth pixel, the third pixel is adjacent to the fourth pixel along the second direction, the third pixel is arranged on a side of the first pixel along the first direction, the third pixel and the first pixel are symmetrically arranged along adjacent edges of the first pixel and the third pixel, the fourth pixel is arranged on a side of the second pixel along the first direction, and the fourth pixel and the second pixel are symmetrically arranged along adjacent edges of the second pixel and the fourth pixel,

the bank is not arranged between the first pixel and the third pixel, and the bank is not arranged between the second pixel and the fourth pixel, and

wherein each of the plurality of pixel repeating units comprises a first color pixel, a second color pixel, and a third color pixel, wherein light-emitting colors of the first color pixel, the second color pixel, and the third color pixel are different.

2. The display panel according to claim **1**, wherein the first sub-pixel comprises a first light-emitting material, the second sub-pixel comprises a second light-emitting material, wherein the first light-emitting material of the first sub-pixel and the second light-emitting material of the second sub-pixel are the same and are integrally formed.

3. The display panel according to claim **1**, wherein the first sub-pixel group further comprises a fifth sub-pixel and a sixth sub-pixel, the fifth sub-pixel and the sixth sub-pixel are arranged along the second direction, the fifth sub-pixel is arranged on a side of the first sub-pixel along the first direction, and the sixth sub-pixel is arranged on a side of the second sub-pixel along the first direction, wherein the first pixel comprises the fifth sub-pixel, and the second pixel comprises the sixth sub-pixel.

4. The display panel according to claim **1**, further comprising a third sub-pixel group, wherein the third sub-pixel group and the first sub-pixel group share a same bank, the third sub-pixel group comprises a seventh sub-pixel and an eighth sub-pixel, and the seventh sub-pixel and the eighth sub-pixel are adjacent to each other, wherein the first pixel comprises the seventh sub-pixel of the third sub-pixel group, and the second pixel comprises the eighth sub-pixel of the third sub-pixel group.

5. The display panel according to claim **1**, further comprising a plurality of pixel repeating units, wherein each of the pixel repeating units comprises a first pixel, and the first pixel comprises the first sub-pixel and the second sub-pixel.

6. The display panel according to claim **5**, wherein each of the pixel repeating units further comprises a second pixel, a third pixel, and a fourth pixel, the second pixel is arranged on a side of the first pixel along the second direction, the third pixel is arranged on a side of the first pixel along the first direction, the fourth pixel is arranged on a side of the third pixel along the second direction, the fourth pixel is arranged on a side of the second pixel along the first direction, the second pixel and the first pixel are symmetrically arranged along adjacent edges of the second pixel and the first pixel, the third pixel and the first pixel are symmetrically arranged along adjacent edges of the first pixel and the third pixel, and the fourth pixel and the second pixel are symmetrically arranged along adjacent edges of the second pixel and the fourth pixel.

7. The display panel according to claim **2**, further comprising a pixel driving circuit and a first electrode layer,

wherein the first light-emitting material and the second light-emitting material are respectively located on the first electrode layer, the first electrode layer comprises a plurality of electrode portions and a plurality of bridge portions extending from the plurality of electrode portions, and the plurality of bridge portions are electrically connected to the pixel driving circuit, wherein, in a top view, the plurality of bridge portions are located on two sides of a center line between two adjacent banks and are neighboring the center line.

8. The display panel according to claim **7**, wherein each of the plurality of electrode portions comprises a first electrode portion and a second electrode portion, the first electrode portion and the second electrode portion are arranged in a first direction, wherein each of the plurality of bridge portion comprises a first bridge portion extending from the first electrode portion and a second bridge portion extending from the second electrode portion, wherein the pixel driving circuit comprises a first pixel driving circuit electrically connected to the first bridge portion and a second pixel driving circuit electrically connected to the second bridge portion, wherein when an electrical connection between the first bridge portion and the first pixel driving circuit fails, the first bridge portion cuts off a connection with the first pixel driving circuit through a laser process, and the second bridge portion is welded to the first electrode portion through the laser process.

9. The display panel according to claim **2**, wherein a light-emitting color of the first light-emitting material and the second light-emitting material is red, yellow, green, or white.

10. The display panel according to claim **2**, further comprising a color filter, wherein the color filter comprises a first color filter unit corresponding to the first sub-pixel, and a second color filter unit corresponding to the second sub-pixel, wherein colors of the first color filter unit and the second color filter unit are different.

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