

Description

BACKGROUND OF THE INVENTION

FIELD OF THE INVENTION

The present invention relates to a display element which forms a light source, for example, for a single cell of an outdoor large-scale display unit, and particularly to a color display element provided with a condensing lens with a filter.

DESCRIPTION OF THE RELATED ART

When a large-screen display unit is formed by arranging monochromatic display tubes each utilizing the light emitted from a fluorescent substance and serving as one pixel in the form of a matrix, it is difficult to improve the resolution because of the occurrence of spaces in the connection portions between the respective display tubes, and an increase in the resolution creates an increase in the production cost. For example, the composite display tube for a light source disclosed in Japanese Patent Laid-Open JP-A-62-10849 has been thus proposed.

Figs. 1 to 3 are respectively a front view of the basic structure of such a composite display tube for a light source, a sectional view taken along the line II-II in Fig. 1 and a perspective view of a principal portion thereof. In the drawings, fluorescent screens 5R, 5G, 5B each serve as a single pixel and are arranged in a matrix of 3 x 3 in terms of pixel number. A case 1 comprises a front panel 2 made of a transparent member such as glass, a back panel 3 and a cylindrical side panel 4, the interior being in a vacuum state. Red (R) florescent screens 5R, green (G) fluorescent screens 5G and blue (B) fluorescent screen are arranged in the form of a matrix comprising 3 lines and 3 columns, as shown in Fig. 1, on the back side of the front panel 2. Accelerating electrodes 6 are respectively disposed in the peripheries of the fluorescent screens 5R, 5G and 5B in correspondence with the fluorescent screens. Back electrodes 10 for selecting a line are disposed on the inner side of the back panel 3 in a form with stripes corresponding to the line directions of the fluorescent screens 5R, 5G, 5B. Cathodes 7 are provided above the back electrodes 10 in correspondence with the respective fluorescent screen 5R, 5G, 5B. For example, an indirectly heated cathode in which an oxide is coated on an Ni sleeve, or a directly heated cathode in which an oxide is coated on tungsten is used as each of these cathodes. These cathodes 7 are also supported on the back panel 3 by supporting members 15a, 15b. Control grids 8 for controlling the columns are disposed between the fluores-

cent screens 5R, 5G, 5B and the cathodes 7 in a form with stripes corresponding to the column directions. Each of the control grids 8 is provided with holes 9 through which electron beams pass. The electron beams 11 are respectively emitted from the cathodes 7 and applied to the fluorescent screens 5R, 5G, 5B. A high voltage is supplied to each of anodes 6 from a terminal 16. A given voltage is supplied to each of the control grids 8 and the back electrodes 10 from terminal pins 12.

In addition, a filter and a condensing lens are provided on the surface of the front panel 2, as shown in Figs. 4 and 5, so as to prevent any decrease in the contrast owing to the effect of external light (for example, the sunlight or the like) on the fluorescent screens. In Figs. 4 and 5, on the front panel 2 are provided a filter 13 comprising color filters 13R, 13G, 13B and a condensing lens 14 disposed on the color filters 13R, 13G, 13B, the condensing lens 14 provided with the filter 13 being bonded to the front panel 2 by an adhesive 18a. Fig. 5 shows the case 1 which is mounted on a substrate 17 and which has an interior provided with the cathodes 7, the control grids 8 and the back electrodes 10, which are not shown in the drawing, in the same way as in Fig. 2.

A description will now be given of the operation of the conventional display element. When a negative potential relative to the cathodes 7 is applied to each of the back electrodes 10, since the periphery of each of the cathodes 7 is at a negative potential, the electrons emitted from each of the cathodes 7 do not flow to the control grids 8 and the accelerating anodes 6, thereby bringing the display element into a cut-off state. When a potential of 0 V or a positive potential of several V relative to the cathodes 7 is then applied to the back electrodes 10, the electron beam 11 is emitted from each of the cathodes 7 and flows toward the control grids 8. If the potential of the control grids 8 is negative relative to the cathodes 7, the electron beams 11 respectively cannot pass through the holes 9 and thus cannot reach the accelerating electrodes 6. If the potential of the control grids 8 is positive relative to the cathodes 7, the electron beams respectively pass through the holes 9 and are accelerated by the accelerating electrodes 6 and then applied to the fluorescent screens 5R, 5G, 5B which thus emit light. It is therefore possible to selectively emit light from the fluorescent screens 5R, 5G, 5B, which are disposed at the positions corresponding to the intersections between the back electrodes 10 and the control grids 8 to which voltages are applied by selectively applying a given voltage to the back electrodes 10 for selecting a line in the arrangement of the fluorescent screen 5R, 5G, 5B and the control grids for selecting a column. Further, if a large number of such display elements

each serving as one cell are arranged to form a large screen, it is possible to form a color display comprising the fluorescent screens 5R, 5G, 5B each serving as a pixel.

The conventional display element configured as described above has a problem in that, when the filter 13 and the condensing lens 14 are bonded to the surface of the front panel 2 by using the adhesive 18a, the bonding work cannot be easily performed in such a manner that the positions of the color filters 13R, 13G, 13B and the condensing lens 14 respectively agree with the positions of the fluorescent screens 5R, 5G, 5B, and thus easily produces deviations in the positions.

SUMMARY OF THE INVENTION

The present invention as claimed in claim 1 or 9 has been achieved with a view to resolving the above-described problem, and it is an object of the present invention to provide a display element which allows the filter lens 13 and the condensing lens 14 to be fixed by adhesion to the front panel 2 without producing any deviation in the positions thereof.

A display element in accordance with the present invention comprises:

emission means which has a front panel divided into a plurality of pixel units and a side panel and which selectively generates red, green or blue light for emission from each of said units of said front panel;

a filter comprising a plurality of color filters for said colours which are disposed in front of said front panel in correspondence with said respective units of said emission means for transmitting said coloured light generated by said emission means so that the contrast can be improved by reducing the effect of external light; and

a condensing lens provided in front of said filter for condensing light generated by said emission means and transmitted through said filter; characterised in that

a position regulating means is provided along the peripheral edge of said condensing lens so as to be fixed thereto and to extend towards the side of said emission means for the purpose of aligning respective side portions the condensing lens and filter with a side of the front panel of the emission means, whereby the condensing lens and filter are positively located in register with the pixel units; and

transparent adhesive means are provided for bonding said emission means, said condensing lens and said position regulating means fixed thereto together.

The position regulating plate of the present invention is capable of regulating the filter and the

condensing lens to a given position and thus facilitating the bonding work.

This application contains one other invention which is linked to form a single inventive concept with the foregoing invention. The second invention as claimed in claim 10 or 13 sets out to provide a structure of a display element which is capable of preventing the separation of the condensing lens from the filter and the case even if thermal stress or other external force is applied to the display element, and further which is capable of preventing the occurrence of an inclination in the condensing lens during the bonding.

According to this second invention there is provided a display element comprising:

emission means having a front panel which is divided into a plurality of pixel units and a side panel, the said emission means being suitable for the purpose of selectively generating red, green or blue light from each of said units of said front panel;

a filter provided for transmitting light emitted from the said front panel of the emission means and restricting transmission of external light; and

a condensing lens provided in front of said front panel of said emission means for the purpose of condensing light generated from said emission means,

characterised in that the condensing lens comprises at least three projections which are provided on its rear side for the purpose of keeping a given distance between the said front panel and the lens,

the said rear side of the said lens is roughened for improving adhesion;

a resin layer having the same refractive index as that of said condensing lens is formed on said roughened rear side of said condensing lens by coating and curing so as to form a gap between the resin layer and said front panel;

the filter is formed by coating and curing on said resin layer; and

a buffer layer made of transparent resin is charged in said gap between the filter and the said resin layer and said front panel with an adhesive primer.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a plan view of a conventional display element;

Fig. 2 is a sectional view taken along the line II-II in Fig. 1;

Fig. 3 is an exploded perspective view of a principal portion of the display element shown in Fig. 2;

Fig. 4 is a perspective view which shows the positional relationship of a filter to the fluorescent screens of the front panel shown in Fig. 1;

Fig. 5 is a sectional side view of a principal portion in a state wherein the case shown in Fig. 2 is provided with a filter and a condensing lens; Fig. 6 is a sectional side view of a display element in an embodiment of the first invention; Fig. 6A is an enlarged sectional view of the portion A surrounded by a dashed line in Fig. 6; Fig. 7 is a sectional side view of a display element in another embodiment of the first invention;

Fig. 8 is a partially sectional side view of a display element in an embodiment of the second invention; and

Fig. 9 is a front view of the display element shown in Fig. 8.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

An embodiment of the first invention will be described below with reference to the drawings. In Figs. 6, 6A and 7, the portions corresponding to those shown in Fig. 5 are denoted by the same reference numerals and are not described below. Although the interior of the case 1 is not shown in the drawings, the cathodes 7, the control grids 8 and the back electrodes 10 are provided therein in the same way as in Fig. 2. In Figs. 6 and 6A, a position regulating plate 19 has a hook-shaped sectional form, as shown in the drawings, and is bonded to the peripheral portion and the side of the condensing lens 14 through a transparent adhesive 18b (the same as the adhesive 18a), as well as being extended from the side of the front panel 2 to an upper portion of the side panel 4, an extended portion 19a being bonded to the front panel 2 and the side panel 4 through the adhesive 18a. The front panel 2 and the side panel 4 are bonded together by an adhesive 20.

The operation of this display element will be described below. When the filter 13 and the condensing lens 14 are bonded to the front panel 2, the position regulating plate 19 is first bonded to the peripheral portion and the side of the condensing lens 14 by using the adhesive 18b. The filter 13 and the condensing lens 14 to which the position regulating plate 19 is bonded are then mounted on the surface of the front panel 2 and bonded thereto by the adhesive 18a. At this time, the extended portion 19a of the position regulating plate 19 is pressed against the side of the front panel 2 and the upper portion of the side panel 4 so that the sides of the filter 13 and the condensing lens 14 are positioned on substantially the same planes as the sides of the front panel and the side panel 4. That is, these side ends are arranged on the same line. At the same time, the positions of the color filters 13R, 13G, 13B and the condensing lens 14

respectively agree with the positions of the fluorescent screens 5R, 5G, 5B opposite thereto, and the filter and the condensing lens 14 are held at the positions without loosening. The adhesive 18b does not unnecessarily rise and an excess adhesive 18b downwardly flows along the side of the side panel 4. When the adhesive 18b is dried, the filter 13 and the condensing lens 14 are respectively fixed by adhesion at the proper positions.

In the above-mentioned embodiment, although the condensing lens 14 provided with the filter 13 and the position regulating plate 19 are separately formed, the position regulating plate 19 may be formed integrally with the condensing lens 14. In this case, the adhesive 18b is made unnecessary.

Alternatively, the filter 13 and the condensing lens 14 may be bonded together by the adhesive 18a and the position regulating plate 19 may be then mounted on them. In this case, the adhesive 18b is made unnecessary.

Although the filter 13 is mounted (or bonded) on the inner side of the condensing lens 14 in the above-described display, this invention can be applied to a structure in which the filter 13 is directly mounted (or bonded) on the front panel 2 of the display, and the condensing lens 14 is bonded to the filter 13 by the adhesive 18a, as shown in Fig. 7. In this case, the same effect as that described above can be exhibited.

As described above, in the first invention, when the condensing lens and the front panel of the case are combined by using the adhesive with the filter therebetween, the position regulating plate which extends from the peripheral edge of the condensing lens to the side thereof and to the upper portion of the side of the case and which has a hook-shaped sectional form is provided or it is provided integrally with the condensing lens. The first invention thus enables the formation of a display element which exhibits a high level of precision without producing any mutual deviation in the positions thereof and facilitates the bonding work and which allows the position regulating plate to serve as a protection cover for protecting the four corners of the case and the condensing lens from shocks and the like. The position regulating plate is also capable of preventing rain water and dust particles from entering into the portions between the condensing lens, the filter and the case.

On the other hand, in the conventional display element shown in Fig. 5, separation easily occurs between the condensing lens 14, the filter 13, the transparent adhesive 18a and the case 1 on the basis of the occurrence of a curve in the condensing lens caused by differences between the coefficients of thermal expansion produced owing to a temperature change during the use. This applies to the structure in which the filter 13 is mounted on

the case 1 and the condensing lens 14 is bonded to the filter 13 by the transparent adhesive 18a as shown in Fig. 7. For example, when the adhesive 18a is cured while the condensing lens 14 is elastically deformed by the load applied during junction, a stress occurs between the condensing lens 14 and the adhesive 18a, resulting in the occurrence of separation. Further, it is difficult to joint the face of the condensing lens 14 and the face of the case 1 in parallel with each other.

The occurrence of such separation causes a decrease in luminance owing to the reflection of light from the separated surface and causes the loss of the colors owing to the total reflection from the separated surface when the display element is seen at an angle. There is also a problem in that, if the condensing lens 14 is inclined, the optical characteristics are impaired.

The second invention thus provides the structure of a display element which is capable of preventing the occurrence of separation between the condensing lens and the case for receiving the filter and the emission element and which produces no inclination of the lens during junction.

Figs. 8 and 9 are a side view and a front view, respectively, of an embodiment of the second invention, the upper portion of Fig. 8 being a sectional view. In the drawings, on the front panel 2 of a case 1, which receives an emission element (not shown) and which is made of a transparent member such as glass, are provided a filter 29 for cutting off external light, which is formed by curing a material composed of ultraviolet curing silicone resin as a main component, and a condensing lens 21 made of heat resistant acrylic resin for condensing light transmitted through the filter and emitted from the emission element (refer to Fig. 2) received in the case 1. The rear side 23 of the condensing lens 21 is roughened, and at least three projections 24 are provided thereon. The fine unevenness of the roughened rear side 23 of the condensing lens 21 causes an increase in the adhesive area of the rear side of the condensing lens 21 and exhibits an anchor effect. Each of the projections 24 serves to uniform the distance between the condensing lens 21 and the front panel 2. A resin layer 25 (an undercoat resin layer) which has a refractive index equivalent to that of the condensing lens 21 is formed between the condensing lens 21 and the filter 29 by coating and curing it on the roughened rear side 23, and a buffer layer 26 composed of soft and transparent resin is formed between the filter 29 and the front panel 2 by charging through an adhesive primer. The buffer layer 26 absorbs the thermal stress during use and the residual stress during bonding. Although each of a substrate 17 and terminal pins 12 has a shape different from that of conventional display elements but is equiv-

alent thereto, the shape is not particularly important in the present invention. Fig. 9 is a front view of a case in which red (R) pixels 27R, green (G) pixels 27G and blue (B) pixels 27B are formed in an arrangement comprising 4 lines and 4 columns on the front panel of the emission element (the case 1). The above-described configuration is described in detail below.

The roughened rear side 23 of the condensing lens 21 is first described below. The rear side 23 of the condensing lens 21 is roughened by using sand paper in order to improve the adhesion of the rear side 23 of the condensing lens 21 made of heat resistant acrylic resin. As a method of roughening the rear side 23, a method in which the rear side 23 of the condensing lens 21 is directly roughened by sanding using sand paper, liquid honing or sandblasting is the most effective to improving the adhesion, but a mold for the condensing lens 21 may be roughened. An increase in the adhesion of the roughened rear side 23 of the condensing lens 21 is caused by an increase in the surface area, the attainment of the anchor effect, and an improvement in the wetting properties of the acrylic resin surface, which are all produced owing to the roughening. If an attempt is made to form the resin layer 25 by directly coating and curing an undercoating agent without roughening the rear side 23 of the condensing lens 21, the undercoating agent is repelled and thus the uniform resin layer 25 cannot be formed. The roughness R_{max} of the rear side 23 is preferably 3 to 15 μm .

A description will now be given of the undercoating agent used for forming the resin layer 25. The undercoating agent obtained by dissolving 20% of ultraviolet curing silicone resin (X-62-7509 produced by Shin-etsu Chemical Industry Co., Ltd.) which is the main component of the material for the filter 29 in xylene is spray-coated on the roughened rear side 23, air-dried so that the solvent is removed, and then cured by being irradiated with ultraviolet rays to form the resin layer 25. The filter material is then coated and cured on the cured resin layer 25 to obtain the lens with the filter. The solvent for the undercoating agent is preferably a solvent such as xylene, toluene or the like which are compatible with acrylic resin and liquid silicone resin. The concentration of the undercoating agent is preferably 5 to 70%, more preferably 10 to 40%. Since the undercoating agent contains a solvent (xylene, toluene or the like) which is compatible with acrylic resin, it has good wetting properties for acrylic resin and thus causes the surface of the acrylic resin to slightly dissolve therein. In addition, since the undercoating agent is diluted by the solvent, it has a low viscosity and completely flows into the unevenness of the roughened acrylic resin. These effects cause the formation of the resin layer

25 which is strongly bonded to the acrylic resin. Since the filter material is composed of the same main component as that of the resin layer 25, the filter 29 coated on the resin layer 25 is strongly bonded. If the filter material is coated directly on the roughened acrylic resin surface 23, the filter material incompletely flows into the unevenness because of its higher viscosity than that of the undercoating agent, resulting in the occurrence of a defect. In this case, the filter material also has a low level of adhesion because it has no compatibility with the acrylic resin.

Each of the projections 24 provided on the rear side 23 of the condensing lens 21 has a size of 3 mm in diameter and 0.5 mm in height and so that the distance between the rear side 23 of the condensing lens and the front panel 2 can be set to be as large as possible, and the thickness of the buffer layer 26 charged and cured can be increased. In addition, a curve produced in the condensing lens 21 during the molding of the lens can be removed by precisely adjusting the height of the projections 24. The formation of the buffer layer 26 is lastly described below. A silane coupling agent (Primer A or Primer X-33-144 produced by Shin-etsu Chemical Industry Co., Ltd.) which is an adhesive primer is first coated over the entire surfaces of the filter 29 and the resin layer 25 and the entire surface of the front panel 2 which are opposite to each other. A two-liquid addition reaction-type silicone RTV resin (KE 1603A/B produced by Shin-etsu Chemical Industry Co., Ltd.) is charged between them and cured to form the buffer layer 26 made of soft and transparent resin. The cured product of the two-liquid addition reaction-type silicone RTV resin is colorless, transparent and excellent in light transmittance (95% with a thickness of 1 mm), as well as having a refractive index of 1.50 which is substantially equal to 1.52 of glass, 1.49 of the condensing lens and 1.49 of the filter. Further, since the cured product exhibits flexibility and a high level of elongation (elongation, 400%), it is possible to relieve the thermal stress produced by differences in the coefficients of thermal expansion of the front panel 2, the condensing lens 21 and the filter 29 and sufficiently follow the deformation of the condensing lens 21 caused by an increase in the temperature due to the light emitted from the display tube or the sunlight. In addition, there is substantially no occurrence of discoloration by the light emitted from the emission element in the case 1 or the sunlight or the heat thereof and a low degree of volume shrinkage during the curing. As this resin itself exhibits no adhesion but excellent release properties, it cannot be bonded to a surface to which no silane coupling agent is applied. While this resin exhibits strong adhesion to a surface when a silane coupling agent is applied

thereto. It is therefore preferable that no silane coupling agent is applied to portions to which the excess resin should not be adhered when the condensing lens with the filter and the front panel are bonded together. This enables the excess resin to be easily separated after the resin has been cured. In contrary, when the silane coupling agent is applied to not only the upper surface of the front panel 2 of the case 1 but also the external surface of the junction with the outer wall, the resin which overflows when the condensing lens with the filter and the front panel are bonded together strongly adheres to the outer periphery of the connection portion with the front panel and the side wall thereof, whereby the airtightness of the connection portion can be improved, and the glass can be protected from being broken by shocks.

The display element configured as described above showed no abnormal between the condensing lens 21 and the filter 29 and between the lens with the filter and the front panel 2 in any of a boiling test in boiling water at 100 °C for 2 hours, a low-temperature test at -40 °C for 168 hours, a heat shock test of 400 cycles at -40 °C for 2 hours and 85 °C for 2 hours, a hot-air test in which hot air at 130 °C was blown against the surface of the condensing lens for 1 hour, and a lighting test in an atmosphere at 60 °C. When no undercoating agent was applied so that the resin layer 25 was not formed, however, separation occurred between the roughened surface 23 of the condensing lens 21 and the filter 29 in a low-temperature test for 8 hours, a hot-air test for 1 minute and a lighting test for 24 hours. In addition, when the rear side of the condensing lens 21 was not roughened and no undercoating agent was applied, a separation occurred between the condensing lens 21 and the filter 29 in a low-temperature test for 2 hours, a heat shock test in 10 cycles, a hot-air test for 1 minute and a lighting test for 2 hours.

The above-mentioned display element in the second invention enables the prevention of separation between the condensing lens and the filter and the case receiving the emission element even if thermal stress or another external force is applied to the display element, as well as the achievement of the effect of preventing the occurrence of an inclination of the condensing lens during connection.

Claims

1. A display element comprising:
emission means which has a front panel (2) divided into a plurality of pixel units (5R, 5G, 5B) and a side panel (4) and which selectively generates red, green or blue light for emission from each of said units (5R, 5G, 5B)

25 which is strongly bonded to the acrylic resin. Since the filter material is composed of the same main component as that of the resin layer 25, the filter 29 coated on the resin layer 25 is strongly bonded. If the filter material is coated directly on the roughened acrylic resin surface 23, the filter material incompletely flows into the unevenness because of its higher viscosity than that of the undercoating agent, resulting in the occurrence of a defect. In this case, the filter material also has a low level of adhesion because it has no compatibility with the acrylic resin.

Each of the projections 24 provided on the rear side 23 of the condensing lens 21 has a size of 3 mm in diameter and 0.5 mm in height and so that the distance between the rear side 23 of the condensing lens and the front panel 2 can be set to be as large as possible, and the thickness of the buffer layer 26 charged and cured can be increased. In addition, a curve produced in the condensing lens 21 during the molding of the lens can be removed by precisely adjusting the height of the projections 24. The formation of the buffer layer 26 is lastly described below. A silane coupling agent (Primer A or Primer X-33-144 produced by Shin-etsu Chemical Industry Co., Ltd.) which is an adhesive primer is first coated over the entire surfaces of the filter 29 and the resin layer 25 and the entire surface of the front panel 2 which are opposite to each other. A two-liquid addition reaction-type silicone RTV resin (KE 1603A/B produced by Shin-etsu Chemical Industry Co., Ltd.) is charged between them and cured to form the buffer layer 26 made of soft and transparent resin. The cured product of the two-liquid addition reaction-type silicone RTV resin is colorless, transparent and excellent in light transmittance (95% with a thickness of 1 mm), as well as having a refractive index of 1.50 which is substantially equal to 1.52 of glass, 1.49 of the condensing lens and 1.49 of the filter. Further, since the cured product exhibits flexibility and a high level of elongation (elongation, 400%), it is possible to relieve the thermal stress produced by differences in the coefficients of thermal expansion of the front panel 2, the condensing lens 21 and the filter 29 and sufficiently follow the deformation of the condensing lens 21 caused by an increase in the temperature due to the light emitted from the display tube or the sunlight. In addition, there is substantially no occurrence of discoloration by the light emitted from the emission element in the case 1 or the sunlight or the heat thereof and a low degree of volume shrinkage during the curing. As this resin itself exhibits no adhesion but excellent release properties, it cannot be bonded to a surface to which no silane coupling agent is applied. While this resin exhibits strong adhesion to a surface when a silane coupling agent is applied

thereto. It is therefore preferable that no silane coupling agent is applied to portions to which the excess resin should not be adhered when the condensing lens with the filter and the front panel are bonded together. This enables the excess resin to be easily separated after the resin has been cured. In contrary, when the silane coupling agent is applied to not only the upper surface of the front panel 2 of the case 1 but also the external surface of the junction with the outer wall, the resin which overflows when the condensing lens with the filter and the front panel are bonded together strongly adheres to the outer periphery of the connection portion with the front panel and the side wall thereof, whereby the airtightness of the connection portion can be improved, and the glass can be protected from being broken by shocks.

The display element configured as described above showed no abnormal between the condensing lens 21 and the filter 29 and between the lens with the filter and the front panel 2 in any of a boiling test in boiling water at 100 °C for 2 hours, a low-temperature test at -40 °C for 168 hours, a heat shock test of 400 cycles at -40 °C for 2 hours and 85 °C for 2 hours, a hot-air test in which hot air at 130 °C was blown against the surface of the condensing lens for 1 hour, and a lighting test in an atmosphere at 60 °C. When no undercoating agent was applied so that the resin layer 25 was not formed, however, separation occurred between the roughened surface 23 of the condensing lens 21 and the filter 29 in a low-temperature test for 8 hours, a hot-air test for 1 minute and a lighting test for 24 hours. In addition, when the rear side of the condensing lens 21 was not roughened and no undercoating agent was applied, a separation occurred between the condensing lens 21 and the filter 29 in a low-temperature test for 2 hours, a heat shock test in 10 cycles, a hot-air test for 1 minute and a lighting test for 2 hours.

The above-mentioned display element in the second invention enables the prevention of separation between the condensing lens and the filter and the case receiving the emission element even if thermal stress or another external force is applied to the display element, as well as the achievement of the effect of preventing the occurrence of an inclination of the condensing lens during connection.

Claims

1. A display element comprising:
emission means which has a front panel (2) divided into a plurality of pixel units (5R, 5G, 5B) and a side panel (4) and which selectively generates red, green or blue light for emission from each of said units (5R, 5G, 5B)



of said front panel (2);

a filter (13) comprising a plurality of color filters (13R, 13G, 13B) for said colours which are disposed in front of said front panel (2) in correspondence with said respective units (5R, 5G, 5B) of said emission means for transmitting said coloured light generated by said emission means so that the contrast can be improved by reducing the effect of external light; and

a condensing lens (14) provided in front of said filter (13) for condensing light generated by said emission means and transmitted through said filter (13); characterised in that

a position regulating means (19) is provided along the peripheral edge of said condensing lens (14) so as to be fixed thereto and to extend towards the side of said emission means for the purpose of aligning respective side portions of the condensing lens (14) and filter (13) with a side of the front panel (2) of the emission means, whereby the condensing lens (14) and filter (13) are positively located in register with the pixel units (5R, 5G, 5B); and

transparent adhesive means (18a) are provided for bonding said emission means, said condensing lens and said position regulating means fixed thereto together with said filter between said emission means and said condensing lens.

2. A display element according to Claim 1, wherein said position regulating means (19) comprises a position regulating plate (19) which extends along the side of said condensing lens (14), the side of said front panel (2) of said emission means and the side panel (4) of said emission means.
3. A display element according to Claim 1, wherein said position regulating means (19) comprises a position regulating plate (19), which is bent over the edge of the upper surface of said condensing lens (14), extends along the side of said condensing lens (14) toward said emission means and is fixed to said condensing lens (14) by an adhesive (18b), for the purpose of aligning the position of the side of said front panel (2) of said emission means in substantially the same plane as the respective sides of said filter (13) and said condensing lens (14).
4. A display element according to Claim 1, wherein said position regulating means comprises a position regulating plate (19), which extends along the side of said condensing lens (14) toward said emission means and which is

formed integrally with said condensing lens (14), for the purpose of aligning the position of the side of said front panel of said emission means in substantially the same plane as the respective sides of said filter (13) and said condensing lens (14).

5. A display element according to any preceding Claim, wherein said filter (13) is mounted on said condensing lens (14), and said condensing lens (14) with said filter (13) is bonded to said front panel (2) of said emission means by said transparent adhesive (18a).
6. A display element according to Claim 5, wherein said filter (13) is bonded to said condensing lens (14) by a transparent adhesive.
7. A display element according to any preceding Claim, wherein said filter (13) is mounted on said front panel (2) of said emission means, and said condensing lens (14) is bonded to said filter (13) by said transparent adhesive (18a).
8. A display element according to Claim 7, wherein said filter (13) is bonded to said front panel (2) of said emission means by a transparent adhesive.
9. A method of assembling a display element according to Claim 1 in which a filter (13), a condensing lens (14) and a position regulating means (19) are provided in front of a front panel (2) of an emission means, comprising the steps of:
 - fixing said position regulating means (19) to said condensing lens (14) so that the position regulating means (19) extends along the peripheral edge of said condensing lens (14) and projects in a direction from which said emission means is to be fitted; and
 - bonding said condensing lens (14) to said front panel (2) of said emission means with said filter (13) therebetween so that the sides of said condensing lens (14), said filter (13) and said front panel (2) of said emission means are aligned in substantially the same plane by being located by said position regulating means (19).
10. A display element comprising:
 - emission means having a front panel (2) which is divided into a plurality of pixel units (27R, 27G, 27B) and a side panel (4), the said emission means being suitable for the purpose of selectively generating red, green or blue light from each of said units (27R, 27G, 27B) of



said front panel (2);

a filter (29) provided for transmitting light emitted from the said front panel (2) of the emission means and restricting transmission of external light; and

a condensing lens (21) provided in front of said front panel (2) of said emission means for the purpose of condensing light generated from said emission means,

characterised in that the condensing lens (21) comprises at least three projections (24) which are provided on its rear side (23) for the purpose of keeping a given distance between the said front panel (2) and the lens (21),

the said rear side (23) of the said lens is roughened for improving adhesion;

a resin layer (25) having the same refractive index as that of said condensing lens (21) is formed on said roughened rear side (23) of said condensing lens (21) by coating and curing so as to form a gap between the resin layer (25) and said front panel (2);

the filter (29) is formed by coating and curing on said resin layer (25) so that a part of the gap remains; and

a buffer layer (26) made of transparent resin is charged in the remaining part of the said gap between the filter and the said resin layer (25) and said front panel (2) with an adhesive primer.

11. A display element according to Claim 10, wherein the roughness (Rmax) of the rear side (23) of the condensing lens (21) is 3 to 15 μm .

12. A display element according to Claim 10 or 11, wherein said projections (24) provided on said rear side (23) of said condensing lens (21) are 0.5 mm long.

13. A method of producing a display element according to Claim 10, 11 or 12, in which a condensing lens 21, a resin layer (25), a filter (29) and a buffer layer (26) are provided in front of a front panel (2) of emission means, comprising the steps of:

forming at least three projections (24) on the rear side of (23) said condensing lens (21) made of heat resistant acrylic resin and roughening said rear side (23) by a direct method for example by sanding by sandpaper, by liquid honing, by sand blasting or by moulding the said condensing lens (21) in a roughened mould;

forming said resin layer (25) by spray-coating an undercoating agent obtained by dissolving 20% of ultraviolet curing silicone resin in xylene on said roughened rear side (23) of

said condensing lens (21), air-drying the solvent, and curing said agent by applying ultraviolet rays thereto;

forming a filter (29) by coating an undercoating agent containing about 5 to 70% of a solvent which is compatible with acrylic resin and liquid silicone resin on said resin layer (25) and then curing said agent;

mounting said condensing lens (21) on the front panel (2) of said emission means; and

forming a soft and transparent buffer layer (26) by coating an adhesive primer over the entire surfaces of said filter (29) and said resin layer (25) and the entire surface of said front panel (2) of said emission means, which are opposite to each other, charging two-liquid addition reaction-type silicone RTV resin between said filter (29) and said front panel (2) and then curing said resin.

14. A method of producing a display element according to Claim 13, wherein said solvent for said undercoating agent used for forming said filter is xylene or toluene.

15. A method of producing a display element according to Claim 14, wherein the concentration of xylene or toluene in said undercoating agent is 10 to 40%.

Patentansprüche

1. Anzeigeelement, das folgendes aufweist:

- eine Emissionseinrichtung, die eine Frontplatte (2), die in eine Vielzahl von Pixeleinheiten (5R, 5G, 5B) unterteilt ist, und eine Seitenplatte (4) hat und die selektiv rotes, grünes oder blaues Licht zur Emission von jeder der Einheiten (5R, 5G, 5B) der Frontplatte (2) erzeugt;
- ein Filter (13), das eine Vielzahl von Farbfiltern (13R, 13G, 13B) für die Farben aufweist, die vor der Frontplatte (2) entsprechend den jeweiligen Einheiten (5R, 5G, 5B) der Emissionseinrichtung angeordnet sind, um das von der Emissionseinrichtung erzeugte farbige Licht durchzulassen, damit der Kontrast verbessert werden kann, indem die Wirkung von Außenlicht herabgesetzt wird; und
- eine Kondensorlinse (14), die vor dem Filter (13) vorgesehen ist, um Licht, das von der Emissionseinrichtung erzeugt und durch das Filter (13) durchgelassen wird, zu bündeln;

dadurch gekennzeichnet,

- daß eine Positionsregleinrichtung (19) entlang dem Umfangsrand der Kondens-



- sorlinse (14) vorgesehen ist, so daß sie daran befestigt ist und sich zu der Seite der Emissionseinrichtung erstreckt, um die jeweiligen Seitenbereiche der Kondensorlinse (14) und des Filters (13) mit einer Seite der Frontplatte (2) der Emissionseinrichtung auszufluchten, so daß die Kondensorlinse (14) und das Filter (13) tatsächlich in Übereinstimmung mit den Pixeleinheiten (5R, 5G, 5B) angeordnet sind;
- und daß lichtdurchlässige Klebstoffmittel (18a) vorgesehen sind, um die Emissionseinrichtung, die Kondensorlinse und die daran befestigte Positionsregeleinrichtung gemeinsam mit dem Filter zwischen der Emissionseinrichtung und der Kondensorlinse zu verbinden.
2. Anzeigeelement nach Anspruch 1, wobei die Positionsregeleinrichtung (19) eine Positionsregelplatte (19) aufweist, die sich entlang der Seite der Kondensorlinse (14), der Seite der Frontplatte (2) der Emissionseinrichtung und der Seitenplatte (4) der Emissionseinrichtung erstreckt.
 3. Anzeigeelement nach Anspruch 1, wobei die Positionsregeleinrichtung (19) eine Positionsregelplatte (19) aufweist, die über den Rand der oberen Oberfläche der Kondensorlinse (14) gebogen ist, sich entlang der Seite der Kondensorlinse (14) zu der Emissionseinrichtung erstreckt und an der Kondensorlinse (14) mit einem Klebstoff (18b) befestigt ist, um die Position der Seite der Frontplatte (2) der Emissionseinrichtung im wesentlichen in der gleichen Ebene wie die jeweiligen Seiten des Filters (13) und der Kondensorlinse (14) auszufluchten.
 4. Anzeigeelement nach Anspruch 1, wobei die Positionsregeleinrichtung eine Positionsregelplatte (19) aufweist, die sich entlang der Seite der Kondensorlinse (14) zu der Emissionseinrichtung erstreckt und die mit der Kondensorlinse (14) integral ausgebildet ist, um die Position der Seite der Frontplatte der Emissionseinrichtung im wesentlichen in der gleichen Ebene wie die jeweiligen Seiten des Filters (13) und der Kondensorlinse (14) auszufluchten.
 5. Anzeigeelement nach einem der vorhergehenden Ansprüche, wobei das Filter (13) an der Kondensorlinse (14) angebracht ist und die Kondensorlinse (14) mit dem Filter (13) mit der Frontplatte (2) der Emissionseinrichtung durch den lichtdurchlässigen Klebstoff (18a) verbunden ist.
 6. Anzeigeelement nach Anspruch 5, wobei das Filter (13) mit der Kondensorlinse (14) durch einen lichtdurchlässigen Klebstoff verbunden ist.
 7. Anzeigeelement nach einem der vorhergehenden Ansprüche, wobei das Filter (13) an der Frontplatte (2) der Emissionseinrichtung angebracht und die Kondensorlinse (14) mit dem Filter (13) durch den lichtdurchlässigen Klebstoff (18a) verbunden ist.
 8. Anzeigeelement nach Anspruch 7, wobei das Filter (13) mit der Frontplatte (2) der Emissionseinrichtung durch einen lichtdurchlässigen Klebstoff verbunden ist.
 9. Verfahren zum Zusammenbauen eines Anzeigeelements nach Anspruch 1, wobei ein Filter (13), eine Kondensorlinse (14) und eine Positionsregeleinrichtung (19) vor einer Frontplatte (2) einer Emissionseinrichtung vorgesehen werden, wobei das Verfahren die folgenden Schritte aufweist:
 - Befestigen der Positionsregeleinrichtung (19) an der Kondensorlinse (14), so daß sich die Positionsregeleinrichtung (19) entlang dem Umfangsrand der Kondensorlinse (14) erstreckt und in einer Richtung vorspringt, aus der die Emissionseinrichtung angebracht werden soll; und
 - Verbinden der Kondensorlinse (14) mit der Frontplatte (2) der Emissionseinrichtung mit dem Filter (13) dazwischen, so daß die Seiten der Kondensorlinse (14), des Filters (13) und der Frontplatte (2) der Emissionseinrichtung im wesentlichen in der gleichen Ebene ausgefluchtet werden, indem sie durch die Positionsregeleinrichtung (19) positioniert werden.
 10. Anzeigeelement, das folgendes aufweist:
 - eine Emissionseinrichtung, die eine Frontplatte (2), die in eine Vielzahl von Pixeleinheiten (27R, 27G, 27B) unterteilt ist, und eine Seitenplatte (4) hat, wobei die Emissionseinrichtung geeignet ist, selektiv rotes, grünes oder blaues Licht von jeder der Einheiten (27R, 27G, 27B) der Frontplatte (2) zu erzeugen;
 - ein Filter (29), das vorgesehen ist, um Licht, das von der genannten Frontplatte (2) der Emissionseinrichtung emittiert wird, durchzulassen und um das Durchlassen von Außenlicht zu begrenzen; und



- eine Kondensorlinse (21), die vor der Frontplatte (2) der Emissionseinrichtung vorgesehen ist, um von der Emissionseinrichtung erzeugtes Licht zu bündeln, dadurch gekennzeichnet,
 - daß die Kondensorlinse (21) mindestens drei Vorsprünge (24) aufweist, die an ihrer Rückseite (23) vorgesehen sind, um einen gegebenen Abstand zwischen der genannten Frontplatte (2) und der Linse (21) einzuhalten;
 - daß die Rückseite (23) der Linse angeraut ist, um die Haftung zu verbessern;
 - daß eine Harzschicht (25), die die gleiche Brechzahl wie die Kondensorlinse (21) hat, auf der angerauten Rückseite (23) der Kondensorlinse (21) durch Beschichten und Härten gebildet ist, um einen Spalt zwischen der Harzschicht (25) und der Frontplatte (2) zu bilden;
 - daß das Filter (29) durch Beschichten und Härten auf der Harzschicht (25) gebildet ist, so daß ein Teil des Spalts verbleibt;
 - und daß eine Pufferschicht (26) aus lichtdurchlässigem Harz in den verbleibenden Teil des Spalts zwischen dem Filter und der Harzschicht (25) und der Frontplatte mit einem Haftprimer eingebracht ist.
11. Anzeigeelement nach Anspruch 10, wobei die Rauigkeit (Rmax) der Rückseite (23) der Kondensorlinse (21) 3 bis 15 μm beträgt.
12. Anzeigeelement nach Anspruch 10 oder 11, wobei die Vorsprünge (24), die an der Rückseite (23) der Kondensorlinse (21) vorgesehen sind, 0,5 mm lang sind.
13. Verfahren zum Herstellen eines Anzeigeelements nach Anspruch 10, 11 oder 12, wobei eine Kondensorlinse (21), eine Harzschicht (25), ein Filter (29) und eine Pufferschicht (26) vor einer Frontplatte (2) einer Emissionseinrichtung vorgesehen werden, wobei das Verfahren die folgenden Schritte aufweist:
- Bilden von mindestens drei Vorsprüngen (24) an der Rückseite (23) der Kondensorlinse (21) aus warmfestem Acrylharz und Anrauen der Rückseite (23) mit einem direkten Verfahren, beispielsweise durch Schmirgeln mit Sandpapier, Flüssigkeitshonen, Sandstrahlen oder durch Formen der Kondensorlinse (21) in einer angerauten Form;
- Bilden der Harzschicht (25) durch Aufsprühen eines Grundbeschichtungsmittels, das durch Lösen von 20 % UV-härtendem Siliconharz in Xylol erhalten ist, auf die angeraute Rückseite (23) der Kondensorlinse (21), Lufttrocknen des Lösungsmittels und Härten des Mittels durch Aufbringen von UV-Strahlen;
 - Bilden eines Filters (29) durch Auftragen eines Grundbeschichtungsmittels, das ca. 5 bis 70 % eines Lösungsmittels enthält, das mit Acrylharz und flüssigem Siliconharz kompatibel ist, auf die Harzschicht (25) und anschließendes Härten des Mittels;
 - Anbringen der Kondensorlinse (21) auf der Frontplatte (2) der Emissionseinrichtung; und
 - Bilden einer weichen und lichtdurchlässigen Pufferschicht (26) durch Aufbringen eines Haftprimers auf die gesamten Oberflächen des Filters (29) und der Harzschicht (25) und die gesamte Oberfläche der Frontplatte (2) der Emissionseinrichtung, die einander gegenüberliegen, Einbringen von Zweiflüssigkeits-Silicon-RTV-Harz vom Additionsreaktionstyp zwischen dem Filter (29) und der Frontplatte (2) und anschließendes Härten des Harzes.
14. Verfahren zum Herstellen eines Anzeigeelements nach Anspruch 13, wobei das Lösungsmittel für das Grundbeschichtungsmittel, das verwendet wird, um das Filter zu bilden, Xylol oder Toluol ist.
15. Verfahren zum Herstellen eines Anzeigeelements nach Anspruch 14, wobei die Konzentration von Xylol oder Toluol in dem Grundbeschichtungsmittel 10 bis 40 % beträgt.

Revendications

1. Élément d'affichage comprenant :

un moyen d'émission qui a un panneau frontal (2) divisé en un certain nombre d'unités d'éléments d'image (5R, 5G, 5B) et un panneau latéral (4) et qui produit sélectivement une lumière rouge, verte ou bleue pour émission à partir de chacune desdites unités (5R, 5G, 5B) du panneau frontal (2);

un filtre (13) comprenant un certain nombre de filtres de couleurs (13R, 13G, 13B) pour lesdites couleurs qui sont disposés en avant du panneau frontal (2) en correspondance avec lesdites unités respectives (5R, 5G, 5B) dudit



moyen d'émission pour transmettre la lumière colorée produite par le moyen d'émission de sorte que le contraste peut être amélioré en réduisant l'effet de lumière externe; et

une lentille de champ (14) prévue en avant dudit filtre (13) pour condenser la lumière produite par le moyen d'émission et transmise à travers le filtre (13);

caractérisé en ce qu'un moyen de régulation de position (19) est prévu le long du bord périphérique de la lentille de champ (14) afin d'être fixé à celle-ci et s'étend vers le côté du moyen d'émission dans le but d'aligner des portions latérales respectives de la lentille de champ (14) et le filtre (13) avec un côté du panneau frontal (2) du moyen d'émission, de la sorte la lentille de champ (14) et le filtre (13) sont positivement situés en correspondance avec les unités d'éléments d'image (5R, 5G, 5B); et

des moyens adhésifs transparents (18a) sont prévus pour lier ledit moyen d'émission, la lentille de champ et le moyen de régulation de position fixé à ceux-ci ensemble avec le filtre entre le moyen d'émission et la lentille de champ.

2. Élément d'affichage selon la revendication 1, dans lequel le moyen de régulation de position précité (19) comprend une plaque de régulation de position (19) qui s'étend le long du côté de la lentille de champ (14) précitée, du côté du panneau frontal précité (2) du moyen d'émission précité et du panneau latéral (4) du moyen d'émission.

3. Élément d'affichage selon la revendication 1, dans lequel le moyen de régulation de position précité (9) comprend une plaque de régulation de position (19), qui est pliée sur le bord de la surface supérieure de la lentille de champ (14) précitée, s'étend le long du côté de la lentille de champ (14) vers le moyen d'émission précité et est fixée à la lentille de champ (14) par un adhésif (18b), dans le but d'aligner la position du côté du panneau frontal (2) précité du moyen d'émission dans sensiblement le même plan que les côtés respectifs du filtre (13) précité et de la lentille de champ (14).

4. Élément d'affichage selon la revendication 1, dans lequel le moyen de régulation de position précité comprend une plaque de régulation de position (19) qui s'étend le long du côté de la lentille de champ (14) précitée vers le moyen d'émission précité et qui est formée intégralement avec la lentille de champ (14), dans le but d'aligner la position du côté du panneau

frontal précité du moyen d'émission dans sensiblement le même plan que les côtés respectifs du filtre (13) précité et de la lentille de champ (14).

5. Élément d'affichage selon l'une quelconque des revendications précédentes, dans lequel le filtre (13) précité est monté sur la lentille de champ (14) précitée et la lentille de champ (14) avec le filtre (13) et liée au panneau frontal (2) précité du moyen d'émission précité par l'adhésif transparent précité (18a).

6. Élément d'affichage selon la revendication 5, dans lequel le filtre (13) précité est lié à la lentille de champ (14) précitée par un adhésif transparent.

7. Élément d'affichage selon l'une quelconque des revendications précédentes, dans lequel le filtre (13) précité est monté sur le panneau frontal précité (2) du moyen d'émission précité, et la lentille de champ (14) précitée est liée au filtre (13) par l'adhésif transparent (18a) précité.

8. Élément d'affichage selon la revendication 7, dans lequel le filtre (13) précité est lié au panneau frontal (2) précité du moyen d'émission précité par un adhésif transparent.

9. Procédé d'assemblage d'un élément d'affichage selon la revendication 1, dans lequel un filtre (13), une lentille de champ (14) et un moyen de régulation de position (19) sont prévus en avant d'un panneau frontal (2) d'un moyen d'émission, comprenant les étapes de :

fixer le moyen de régulation de position (19) à la lentille de champ (14) de sorte que le moyen de régulation de position (19) s'étende le long du bord périphérique de la lentille de champ (14) et fait saillie dans une direction de laquelle le moyen d'émission doit être fixé; et

lier la lentille de champ (14) au panneau frontal (2) du moyen d'émission avec le filtre (13) entre eux de sorte que les côtés de la lentille de champ (14), du filtre (13) et du panneau frontal (2) du moyen d'émission sont alignés dans sensiblement le même plan en étant positionnés par le moyen de régulation de position (19).

10. Élément d'affichage comprenant :

un moyen d'émission ayant un panneau frontal (2) qui est divisé en un certain nombre d'unités d'éléments d'image (27R, 27G, 27B) et un panneau latéral (4), le moyen d'émission étant convenable dans le but de sélectivement



produire une lumière rouge, verte ou bleue à partir de chacune desdites unités (27R, 27G, 27B) du panneau frontal (2);

un filtre (29) prévu pour transmettre de la lumière émise par le panneau frontal (2) du moyen d'émission et restreindre la transmission de lumière externe; et

une lentille de champ (21) prévue en avant du panneau frontal (2) du moyen d'émission dans le but de condenser de la lumière produite par le moyen d'émission,

caractérisé en ce que la lentille de champ (21) comprend au moins trois saillies (24) qui sont prévues sur son côté arrière (23) dans le but de garder une distance donnée entre le panneau frontal (2) et la lentille (21),

le côté arrière (23) de la lentille est rendu rugueux pour améliorer l'adhésion;

une couche de résine (25) ayant le même indice de réfraction que celui de la lentille de champ (21) est formée sur le côté arrière rugueux (23) de la lentille de champ (21) par revêtement et polymérisation afin de former un espace entre la couche de résine (25) et le panneau avant (2);

le filtre (29) est formé par revêtement et polymérisation sur la couche de résine (25) de sorte qu'une partie de l'espace reste; et

une couche tampon (26) réalisée en résine transparente est chargée dans la partie restante de l'espace entre le filtre et la couche de résine (25) et le panneau avant (2) par une couche adhésive.

11. Élément d'affichage selon la revendication 10, dans lequel la rugosité (R max) du côté arrière (23) de la lentille de champ (21) est de 3 à 15 µm.

12. Élément d'affichage selon la revendication 10 ou 11, dans lequel les saillies précitées (24) prévues sur le côté arrière (23) de la lentille de champ (21) précitée sont longues de 0,5 mm.

13. Procédé de production d'un élément d'affichage selon la revendication 10, 11 ou 12, dans lequel une lentille de champ (21), une couche de résine (25), un filtre (29) et une couche tampon (26) sont prévues en avant d'un panneau frontal (2) d'un moyen d'émission, comprenant les étapes de :

former au moins trois saillies (24) sur le côté arrière (23) de la lentille de champ (21) réalisée en résine acrylique résistante à la chaleur et en rendant rugueuse le côté arrière (23) par un procédé direct par exemple par ponçage au papier de verre, par rodage au liquide, par sablage ou en moulant la lentille

de champ (21) dans un moule rugueux;

former la couche de résine (25) en revêtant par pulvérisation un agent de couche de base obtenu en dissolvant 20% de résine de silicone polymérisant dans l'ultraviolet dans du xylène sur le côté arrière rugueux (23) de la lentille de champ (21), sécher à l'air le solvant et polymériser l'agent en appliquant des rayons ultraviolet à celui-ci;

former un filtre (29) en revêtant un agent de couche de base contenant environ 5 à 70% d'un solvant qui est compatible avec la résine acrylique et la résine de silicone liquide sur la couche de résine (25) et polymériser ensuite l'agent;

monter la lentille de champ (21) sur le panneau frontal (2) du moyen d'émission; et

former une couche tampon transparente et douce (26) en revêtant une couche d'adhésif sur les surfaces entières du filtre (29) et la couche de résine (25) et la surface entière du panneau frontal (2) du moyen d'émission, qui sont opposés les uns aux autres, charger une résine RTV de silicone du type à réaction par addition de deux liquides entre le filtre (29) et le panneau frontal (2) et ensuite polymériser ladite résine.

14. Procédé de production d'un élément d'affichage selon la revendication 13, dans lequel le solvant précité pour l'agent de couche de base utilisé pour former le filtre précité est du xylène ou du toluène.

15. Procédé de production d'un élément d'affichage selon la revendication 14, dans lequel la concentration en xylène ou toluène dans l'agent de couche de base précité est de 10 à 40%.

