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(54) **Apparatus and method of fabricating organic light emitting display using a laser induced thermal printing apparatus**

Apparat und Methode zur Herstellung organischer Leuchtdioden mit einem laserthermischen Drucker

Appareil et méthode de fabrication d'un dispositif organique électroluminescent avec un appareil d'imprimant à laser thermique

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(56) References cited:
EP-A- 1 335 637 **EP-A- 1 344 652**
EP-A- 1 394 872 **DE-A1- 19 811 031**
US-A- 5 904 961 **US-B1- 6 476 842**

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Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention relates to an apparatus and, more particularly, to an apparatus capable of simultaneously performing lamination and laser irradiation, and a method for preparation of an organic light emitting display using the apparatus.

2. Description of the Related Art

[0002] In general, a laser induced thermal imaging (LITI) method requires at least a laser, an acceptor substrate, and a donor film. The donor film includes a base film, a light-heat conversion layer and a transfer layer. In an LITI process, the transfer layer is disposed opposite to the acceptor substrate to laminate the donor film on an entire surface of the acceptor substrate, and then to irradiate a laser beam on the base film. The beam irradiated on the base film is absorbed into the light-heat conversion layer to be converted into heat energy, and the transfer layer is transferred on the acceptor substrate by the heat energy. As a result, a transfer layer pattern is formed on the acceptor substrate. This is disclosed in US Patent Nos. 5,998,085, 6,214,520, 6,476,842 and 6,114,088 as well as EP 1 335 637 A1 and EP 1 344 652 A2.

[0003] However, when the donor film is laminated on the entire surface of the acceptor substrate as described above, bubbles may locally remain between the acceptor substrate and the donor film. These bubbles may cause transfer failures.

[0004] In order to solve the problem, US Patent No. 6,226,020 discloses a method and apparatus for producing a print by means of laser induced thermal transfer. In accordance with '020 patent, a pattern is formed on the substrate by contacting a transfer tape having a width smaller than that of the substrate on the substrate provided on a substrate cylinder, and irradiating a laser beam on the transfer tape. At this time, contacting the transfer tape on the substrate is performed using a contact roll adjacent to the substrate. Additionally, a nozzle is disposed in a direction inclined to the laser beam, and a gas is ejected on the transfer tape using the nozzle to improve contact force between the transfer tape and the substrate.

[0005] Specifically, the contact roll functions to allow the transfer tape to surround the substrate cylinder with a predetermined wrap angle, and the wrap angle may form contact force and friction force between the transfer tape and the substrate on the substrate cylinder. However, when the transfer layer of the transfer tape is an organic layer, the friction force generated as described above is sufficient to damage the organic layer.

[0006] In addition, the nozzle is disposed in the direc-

tion inclined to the laser beam, since a distance between the nozzle and the substrate is too far, it may be difficult to obtain sufficient contact force between the transfer tape and the substrate using only the nozzle. In this case, in order to obtain the sufficient contact force, the nozzle should eject a plenty of high-pressure gas on the transfer tape. In particular, differently from '020 patent, when the substrate is not wound on the cylinder but located on a plane surface and the transfer tape and the substrate should be closely adhered to each other using only the gas pressure ejected from the nozzle without the contact roll, it may be more difficult to sufficiently obtain uniform contact force all over a predetermined region due to the far distance.

SUMMARY OF THE INVENTION

[0007] The present invention, therefore, solves aforementioned problems associated with conventional devices by providing an apparatus for preparation of an organic light emitting display as defined in claim 1 and a method using the apparatus as defined in claim 15. The apparatus according to the present invention comprises a planar chuck for fixing an acceptor substrate; a donor film on the acceptor substrate; a printing unit located on the donor film and including a body having a cavity, a gas injection port for injecting a pressurized gas into the cavity, and a gas discharge port for discharging the gas injected into the cavity onto the donor film; and a laser irradiator located on the printing unit and arranged such that a laser beam can be irradiated through the cavity and the gas discharge port of the printing unit. The apparatus is characterized in that the printing unit further includes an exhaust port located at a lower section of the outer periphery of the body for exhausting the gas discharged onto the donor film and the exhaust port is connected to an exhaust pump.

[0008] The inventive method for preparation of an organic light emitting display comprises the steps of:

- (i) providing an apparatus as presented before;
- (ii) locating the organic light emitting display substrate on the chuck;
- (iii) locating a donor film having at least a light-heat conversion layer and a transfer layer to make the transfer layer opposite to the substrate; and
- (iv) injecting a pressurized gas into the cavity through the gas injection port thereby locally printing a portion of the donor film on the substrate and simultaneously irradiating a laser on the printed donor film through the printing unit to transfer at least a portion of the transfer layer on the substrate.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] The above and other features of the present invention will be described in reference to certain exemplary embodiments thereof with reference to the attached

drawings in which:

FIG. 1 is a schematic perspective view of an apparatus in accordance with an embodiment of the present invention;

FIG. 2 is an enlarged perspective view of A-portion shown in FIG. 1;

FIG. 3 is a cross-sectional view of a donor film in accordance with an embodiment of the present invention, which is taken along the line III-III' in FIG. 1; FIG. 4 is a cross-sectional view illustrating a partial region of an organic light emitting display substrate as an embodiment of the acceptor substrate in FIG. 1;

FIG. 5 is a cross-sectional view taken along the line I-I' in FIG. 1;

FIG. 6 is a cross-sectional view taken along the line II-II' in FIG. 1;

FIG. 7 is a cross-sectional view illustrating a partial region of an organic light emitting display substrate including a patterned transfer layer;

FIG. 8 is a cross-sectional view of an apparatus in accordance with the embodiment of the present invention;

FIG. 9 is a cross-sectional view of an apparatus illustrating further aspects of the apparatus;

FIG. 10 is a cross-sectional view of an apparatus illustrating further aspects of the apparatus;

FIG. 11 is a cross-sectional view of an apparatus illustrating further aspects of the apparatus;

FIG. 12 is a cross-sectional view of an apparatus illustrating further aspects of the apparatus;

FIG. 13 is a schematic perspective view of an apparatus in accordance with another embodiment of the present invention;

FIG. 14 is a cross-sectional view taken along the line I-I' in FIG. 13; and

FIG. 15 is a partially exploded perspective view schematically illustrating an apparatus in accordance with another embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0010] The present invention will now be described more fully hereinafter with reference to the accompanying drawings, in which preferred embodiments of the invention are shown. This invention may, however, be embodied in different forms and should not be construed as limited to the embodiments set forth herein. In the drawings, when it is described that a layer is existed "on" another layer or a substrate, the layer may be directly formed on another layer or a substrate, or a third layer may be interposed between them. Like reference numerals designate like elements throughout the specification.

[0011] FIG. 1 is a schematic perspective view of an apparatus in accordance with an embodiment of the present invention, and FIG. 2 is an enlarged perspective view of A-portion shown in FIG. 1.

[0012] Referring to FIGS. 1 and 2, an apparatus 100 includes a substrate stage 110. A chuck 115 is located on the substrate stage 110. The substrate stage 110 includes a chuck guide bar 113 for moving the chuck 115 in an X-direction. Therefore, the chuck 115 is movable along the chuck guide bar 113 in the X-direction. The chuck 115 fixes an acceptor substrate 50 to be located on the chuck 115.

[0013] An optical stage 120 disposed in a direction crossing the chuck 115 is located on the chuck 115. A laser irradiator 130 is installed on the optical stage 120. The laser irradiator 130 may include a light source 131, a beam shaping element 132, a mask 135, and a projection lens 137. The light source 131 is an apparatus for generating a laser beam L. The laser beam L generated from the light source 131 passes through the beam shaping element 132. The beam shaping element 132 may deform a beam having a Gaussian profile generated in the light source 131 to a beam L_i having a homogenized flat-top profile. The homogenized beam L_i may pass through the mask 135. The mask 135 includes at least one light transmission pattern or at least one light reflection pattern. While only the light transmission patterns 135a are shown in the drawings, it is not limited thereto. The beam passed through the mask 135 may have an image L_m patterned by the patterns 135a. The beam having the patterned image L_m passes through the projection lens 137.

[0014] The optical stage 120 includes a laser guide bar 123 for moving the laser irradiator 130 in a Y-direction. Further, the laser irradiator 130 is mounted on a top surface of the optical stage 120, specifically on the laser guide bar 123 through a laser irradiator base 125.

[0015] A printing unit 150 is mounted on a side of the optical stage 120. The printing unit 150 is an element for locally laminating a donor film 70 on the acceptor substrate 50. The laser irradiator 130 irradiates a laser beam passed through the projection lens 137 on the printing unit 150. The printing unit has a light transmission part in a passage through which the laser beam is passed. Therefore, the laser beam may be irradiated on the laminated donor film 70 through the printing unit 150, specifically, through the light transmission part of the printing unit 150. As a result, a process may be performed together with the lamination. In addition, since the lamination is locally performed, although bubbles are generated between the acceptor substrate 50 and the donor film 70 of the laminated part, the bubbles may escape through between the donor film 70 and the acceptor substrate 50 of the non-laminated part located at a periphery portion. Eventually, it is possible to prevent transfer failures due to the bubbles. Further, as the laser beam is irradiated through the printing unit 150, the laser beam may be irradiated on a portion where the lamination is sufficiently performed. As a result, it is possible to obtain an excellent transfer pattern profile.

[0016] The printing unit 150 may be an apparatus for

performing the lamination using air pressure. Specifically, the printing unit 150 may include a body 151 having a cavity 151 a, a gas injection port 151 b for injecting a compression gas Ca into the cavity 151a, and a gas discharge port 151c for discharging the gas injected into the cavity 151a onto the chuck. The donor film 70 may be laminated on the substrate 70 by the pressure of the compression gas Ca, and the gas discharged through the gas discharge port 151c is exhausted to the exterior of the printing unit 150, thereby forming a predetermined gap between the body 151 and the donor film 70.

[0017] The printing unit 150 may be installed at an upper portion of the body 151, and further include a light transmission window 155 in contact with the cavity 151a. In this case, the laser irradiated from the laser irradiator 130 may be irradiated on the donor film 70 through the light transmission window 155, the cavity 151a, and the gas discharge port 151c. Therefore, the light transmission window 155, the cavity 151 a and the gas discharge port 151c may constitute a light transmission part. At this time, the gas injection port 151 b may be installed to pass through a sidewall of the body 151. The body 151 of the printing unit 150 has a hexahedron shape as shown in figure, but it is not limited thereto, it may be a circular cylinder shape.

[0018] The donor film 70 may have a ribbon shape. Since the ribbon-shaped donor film 70 has a width smaller than that of the acceptor substrate 50, it is easy to obtain uniformity in manufacturing the film in comparison with the case of manufacturing the donor film having a width similar to or larger than that of the substrate 50. In this case, film supply means 143 may be installed at one side of the printing unit 150, and film winding means 144 may be installed at the other side of the printing unit 150. Preferably, the film supply means 143 and the film winding means 144 have roll shapes. The film supply means 143 and the film winding means 144 may apply a certain tension to the donor film 70.

[0019] The printing unit 150 and the laser irradiator 130 are simultaneously movable in a γ -direction being a moving direction of the laser irradiator 130. As an example for implementing this, the printing unit 150 is installed at a printing unit base 141, and the printing unit base 141 may be connected to the laser irradiator base 125. As a result, when the laser irradiator base 125 is moved in the γ -direction, the laser irradiator 130 installed on the laser irradiator base 125 and the printing unit base 141 may be also moved in the Y-direction. Eventually, the printing unit 150 installed at the printing unit base 141 may be also moved in the Y-direction.

[0020] Further, preferably, the film supply means 143 and the film winding means 144 are simultaneously movable in the Y-direction together with the printing unit 150. As an example for implementing this, the film supply means 143 and the film winding means 144 may be individually installed at the printing unit base 141 to be spaced apart from the printing unit 150. Therefore, the laser irradiator 130, the printing unit 150, the film supply

means 143 and the film winding means 144 are simultaneously movable in the γ -direction as a whole.

[0021] In addition, the printing unit base 141 may include a printing unit guide bar 142 for moving the printing unit 150 up and down.

[0022] FIG. 3 is a cross-sectional view of a donor film in accordance with an embodiment of the present invention, which is taken along the line III-III' in FIG. 3.

[0023] Referring to FIG. 3, a donor film 70 includes a base film 71, and a light-heat conversion layer 73 and a transfer layer 77, which are sequentially deposited on a surface of the base film 71. In addition, the donor film 70 is wound on the film winding means 144 (see FIG. 1) and the film supply means 143 (see FIG. 1) in a multi-layered manner. The base film 71 may be a substrate formed of a transparent polymer organic material such as polyethyleneterephthalate (PET) and so on. The light-heat conversion layer 73, as a layer for converting incident light to heat, may include a light absorbing material such as aluminum oxide, aluminum sulfide, carbon black, graphite, and infrared dye. When a bottom substrate A is an organic light emitting display substrate, the transfer layer 77 may be an organic transfer layer. The organic transfer layer 77 may be one layer selected from a group consisting of a hole injection organic layer, a hole transport organic layer, an emissive organic layer, a hole blocking organic layer, an electron transport organic layer, and an electron injection organic layer.

[0024] Protrusions 72 may be located on a surface opposite to a surface, at which the transfer layer 77 of the base film 71 is deposited. As described above, the protrusions 72 may prevent the transfer layer from being damaged, when the donor film is deposited in a multi-layered manner. Further, preferably, the protrusions 72 are located at both edges of the base film 71. In addition, preferably, a height of each of the protrusions 72 is larger than the sum of thicknesses of various layers deposited on the base film 71, i.e., the light-heat conversion layer 73 and the transfer layer 77.

[0025] FIG. 4 is an enlarged cross-sectional view illustrating a partial region of an organic light emitting display substrate of an embodiment of the acceptor substrate in FIG. 1.

[0026] Referring to FIG. 4, a semiconductor layer 52 is located on a predetermined region of a substrate 51. The semiconductor layer 52 may be an amorphous silicon layer or a polysilicon layer that the amorphous silicon layer is crystallized. A gate insulating layer 53 is located on the semiconductor layer 52. A gate electrode 54 overlapping the semiconductor layer 52 is located on the gate insulating layer 53. A first interlayer insulating layer 55 covering the semiconductor layer 52 and the gate electrode 54 is located on the gate electrode 54. Source and drain electrodes 56 and 57 passing through the first interlayer insulating layer 55 and the gate insulating layer 53 to be in contact with both ends of the semiconductor layer 52 respectively are located on the first interlayer insulating layer 55. The semiconductor layer 52, the gate

electrode 54, and the source and drain electrodes 56 and 57 constitute a thin film transistor T. A second interlayer insulating layer 58 covering the source and drain electrodes 56 and 57 is located on the source and drain electrodes 56 and 57. The second interlayer insulating layer 58 may include a passivation layer for protecting the thin film transistor T and/or a planarization layer for attenuating a step due to the thin film transistor. A pixel electrode 59 passing through the second interlayer insulating layer 58 to be in contact with the drain electrode 57 is located on the second interlayer insulating layer 58. The pixel electrode 59 may be, for example, an ITO (indium tin oxide) layer or an IZO (indium zinc oxide) layer. A pixel defining layer 60 having an opening 60a for exposing a portion of the pixel electrode may be located on the pixel electrode 59.

[0027] Hereinafter, a method and method of fabricating an organic light emitting display using the apparatus described in conjunction with FIGS. 1 and 2 will be described.

[0028] FIG. 5 is a cross-sectional view taken along the line I-I' in FIG. 1, and FIG. 6 is a cross-sectional view taken along the line II-II' in FIG. 1.

[0029] Referring to FIGS. 1, 5 and 6, an acceptor substrate 50 is located on a chuck 115. The acceptor substrate 50 may be the organic light emitting display substrate described in conjunction with FIG. 4.

[0030] A donor film 70 is located on the acceptor substrate 50. The donor film 70 includes at least a light-heat conversion layer 73 (see FIG. 3) and a transfer layer 77, and the transfer layer 77 is located opposite to the acceptor substrate 50. The donor film 70 may have a ribbon shape.

[0031] Next, a printing unit 150 moves downward along a printing unit guide bar 142. As a result, the donor film 70 under the printing unit 150 may be also moved onto the acceptor substrate 50. The printing unit 150 may be an apparatus for performing lamination using air pressure. Specifically, the printing unit 150 may include a body 151 having a cavity 151a, a gas injection port 151b for injecting a compression gas Ca into the cavity 151 a, and a gas discharge port 151c for discharging the gas injected into the cavity 151 a onto the chuck. Further, the printing unit 150 may be installed at an upper portion of the body 151 m, and further include a light transmission window 155 in contact with the cavity 151 a. In addition, the gas injection port 151 b may be installed to pass through a sidewall of the body 151.

[0032] Next, the compression gas Ca is injected into the cavity 151 a through the gas injection port 151 b of the printing unit 150. Herein, "compression gas" refers that its gas pressure is higher than atmospheric pressure of the exterior of printing unit 150. The compression gas injected into the cavity 151a is discharged through the gas discharge port 151c. At this time, a portion of the donor film 70 may be locally laminated on the acceptor substrate 50 by means of the pressure P of the compression gas, and the gas discharged through the gas dis-

charge port 151c may be exhausted to the exterior of the printing unit 150, thereby forming a predetermined gap between the body 151 and the donor film 70.

[0033] Simultaneously, a laser beam is emitted from a light source 131 (see FIG. 2) of a laser irradiator 130 to transmit a projection lens 137. The laser beam transmitted the projection lens 137 passes through the light transmission part of the printing unit 150, i.e., the light transmission window 155, the cavity 151 a and the gas discharge port 151c to be irradiated on the donor film 70. At this time, the pressure applied to the donor film by the printing unit 150, i.e., the pressure P of the compression gas may be parallel to a direction that the laser beam is irradiated. Therefore, the laser beam is irradiated on a portion, at which the donor film 70 is sufficiently laminated on the acceptor substrate 50, to enable to reduce transfer inferiority. As a result, it is possible to obtain an excellent transfer pattern profile.

[0034] The light-heat conversion layer 73 (see FIG. 3) absorbs the laser beam to generate heat at a region of the donor film 70, at which the laser beam is irradiated, and the transfer layer 77 under the light-heat conversion layer 73 is transferred on the acceptor substrate 50 due to variance of contact force with the light-heat conversion layer 73 caused by the heat. Finally, a patterned transfer layer 77a is formed on the acceptor substrate 50.

[0035] A laser irradiator base 125 continuously moves in a γ -axis direction along a laser guide bar 123. Therefore, the laser irradiator 130 installed at the laser irradiator base 125, a printing unit base 141 connected to the laser irradiator base 125, the printing unit 150 installed at the printing unit base 141, donor film supply means 143 and donor film winding means 144 may be also continuously moved in the γ -axis direction. As a result, the lamination and the laser irradiation may be continuously performed in the γ -direction.

[0036] At this time, the donor film winding means 144 winds the donor film at a speed synchronized with a speed that the laser irradiator base 125, i.e., the laser irradiator 130 moves. As a result, a portion having a non-patterned transfer layer 77 of the donor film 70 may be continuously located under the printing unit 150. At this time, the printing unit 150 may be moved on the donor film 70 without friction by a direct contact with the donor film 70 due to a gap between the body 151 and the donor film 70. As a result, when the transfer layer of the donor film 70 is an organic layer, it is possible to minimize damage of the organic layer.

[0037] When the laser irradiator 130 arrives at an edge of the acceptor substrate 50, the compression gas is not supplied to the printing unit 150, and the printing unit 150 moves upward along the printing unit guide bar 142. As a result, the donor film 70 under the printing unit 150 is detached from the acceptor substrate.

[0038] Subsequently, the chuck 115 moves one step along the chuck guide bar 113, and the lamination and the laser irradiation are repeated.

[0039] FIG. 7 is an enlarged cross-sectional view illus-

trating a partial region of an organic light emitting display (OLED) substrate including a patterned transfer layer.

[0040] Referring to FIG. 7, a transfer layer pattern 77a is located on a pixel electrode 55 exposed in an opening 60a of the OLED substrate described in conjunction with FIG. 4. The transfer layer pattern 77a may be an emission layer. Further, the transfer layer pattern 77a may further include at least one layer selected from a group consisting of a hole injection layer, a hole transport layer, a hole blocking layer, an electron transport layer, and an electron injection layer.

[0041] FIG. 8 is a cross-sectional view of an apparatus in accordance with another embodiment of the present invention. The apparatus in accordance with the embodiment is similar to the apparatus described in conjunction with FIG. 7, except for the following descriptions.

[0042] Referring to FIG. 8, a printing unit 150 may further include an exhaust port 151d for exhausting a gas discharged on a chuck 115 of an outer periphery of a body 151. The exhaust port 151 d is connected to an exhaust pump.

[0043] In this case, a compression gas Ca injected into a cavity 151a from a gas injection port 151b is discharged through a gas discharge port 151c. At this time, a donor film 70 may be laminated on an acceptor substrate 50 by means of the pressure of the compression gas Ca, and the gas discharged through the gas discharge port 151c is exhausted through the exhaust port 151d, thereby forming a predetermined gap between the body 151 and the donor film 70. The gas discharged through the gas discharge port 151c may escape through the exhaust port 151d as well as the exterior of the printing unit 150.

[0044] FIG. 9 is a cross-sectional view of an apparatus which is similar to the apparatus described in conjunction with FIGS. 1 to 7, except for the following descriptions.

[0045] Referring to FIG. 9, a gas injection port 151e of a printing unit passes through an upper portion of a body 151 of the printing unit. In addition, a gas discharge port 151c passes through a lower portion of the body 151. In this case, the laser irradiated from a laser irradiator 130 may be irradiated on the donor film 70 by passing through the gas injection port 151e, the cavity 151 a, and the gas discharge port 151c. Therefore, the gas injection port 151e, the cavity 151a, and the gas discharge port 151c may constitute a light transmission part. The apparatus may not require the light transmission window 155 (see FIG. 1), unlike the apparatus described in conjunction with FIG. 1.

[0046] The compression gas Ca injected into the cavity 151a from the gas injection port 151e is discharged through the gas discharge port 151c. At this time, the donor film may be laminated on the substrate by means of the pressure of the compression gas Ca, and the gas discharged through the gas discharge port 151c is exhausted to the exterior of the printing unit 150, thereby forming a predetermined gap between the body 151 and the donor film 70.

[0047] FIG. 10 is a cross-sectional view of an appara-

tus which is similar to the apparatus described in conjunction with FIGS. 1 to 7, except for the following descriptions.

[0048] Referring to FIG. 10, the apparatus further includes guide rolls 145 and 146 for closely adhering the donor film 70 on the acceptor substrate 50 to at least one side of the printing unit 150. The guide rolls 145 and 146 function to press the donor film 70 to closely adhere the donor film 70 on the acceptor substrate 50. As a result, the donor film 70 may be readily laminated on the acceptor substrate 50.

[0049] FIG. 11 is a cross-sectional view of an apparatus. The apparatus is similar to the apparatus described in conjunction with FIGS. 1 to 7, except for the following descriptions.

[0050] Referring to FIG. 11, a sidewall of the printing unit body 151 includes an upper sidewall and a lower sidewall, which are connected to each other by means of an elastic body 153. As a result, even when the printing unit 150 is too closely located on the donor film 70, it is possible to maintain a uniform gap between the body 151 and the donor film 70 due to the elastic body 153. Specifically, in order to sufficiently laminate the donor film 70 on the substrate 50, preferably, the printing unit 150 is closely located on the donor film 70. However, since the substrate 50 may have unevenness due to a structure on its surface, and the printing unit body 151 may be partially in contact with the donor film 70, in this case, friction between the printing unit body 151 and the donor film 70 may be generated. The donor film 70 may be damaged due to generation of the friction. However, since the elastic body 153 may shrink or release the sidewall of the printing unit body 151 depending on the pressure of the gas exhausted to the exterior of the printing unit 150 through the gas discharge port 151c, even though the surface of the substrate 50 has the unevenness, it is possible to form a uniform gap between the body 151 and the donor film 70.

[0051] For this, more preferably, a nozzle part 154 including a nozzle 154a may be attached to the gas discharge port 151c of the printing unit body 151. The nozzle 154a has a size smaller than that of the gas discharge port 151c to more effectively laminate the donor film 70, the nozzle part 154 is subjected to force in a direction of the donor film 70 due to the pressure P of the compression air Ca injected into the cavity 151 a from the gas injection port 151 b, and the nozzle part 154 is subjected to force due to the pressure of the gas discharged to the exterior of the printing unit 150 through the nozzle 154a, thereby forming a predetermined gap between the nozzle part 154 and the donor film 70. Further, although the surface of the substrate 50 has the unevenness due to the elastic body 153, it is possible to form a uniform gap between the body 151 and the donor film 70. As a result, it is possible to minimize friction between the printing unit 150 and the donor film 70.

[0052] Differently from this, the same effect may be obtained even when the nozzle part 154 is made of an

elastic material without individual elastic body 153.

[0053] Preferably, the printing unit 150 is installed at an upper portion of the body 151, and further includes a light transmission window 155 in contact with the cavity 151a. In this case, the laser passes through the light transmission window 155, the cavity 151a, and the nozzle 154a to be irradiated on the donor film 70. In addition, the gas injection port 151 b may pass through an upper sidewall of the body 151.

[0054] FIG. 12 is a cross-sectional view of an apparatus. The apparatus is similar to the apparatus described in conjunction with FIGS. 1 to 7, except for the following descriptions.

[0055] Referring to FIG. 12, the printing unit 150 further includes a pipe-shaped piston 156 attached to a lower end of the printing unit body 151, i.e., the gas discharge port of the printing unit body 151. The piston 156 is movable up and down along the printing unit body 151. At this time, a head part of the piston 156 is subjected to force in a direction of the donor film 70, i.e., a downward direction, due to the pressure P of the compression air Ca injected into the cavity 151 a from the gas injection port 151 b, and the piston 156 is subjected to force in an upward direction due to the pressure of the gas discharged to the exterior of the printing unit 150 through an inner part of the piston, thereby forming a predetermined gap between the piston 156 and the donor film 70. In addition, since the piston 156 is movable up or down along the printing unit body 151, even when the printing unit 150 is too closely located on the donor film 70, it is possible to maintain a uniform gap between the body 151 and the donor film 70 due to the pressure of the gas exhausted to the exterior of the printing unit 150 through the inner part of the piston. As a result, it is possible to minimize friction between the printing unit 150 and the donor film 70.

[0056] Further, a nozzle part 157 including a nozzle 157a may be additionally attached to a lower portion of the pipe-shaped piston 156. The nozzle part 157 has functions similar to the nozzle part 154 of the apparatus as described in conjunction with FIG. 11.

[0057] FIG. 13 is a partially exploded perspective view schematically illustrating an apparatus in accordance with another embodiment of the present invention, and FIG. 14 is a cross-sectional view taken along the line I-I' in FIG. 13. Differently from the apparatus described in conjunction with FIGS. 1 to 7, the apparatus in accordance with the embodiment employs a donor film covering an entire surface of the acceptor substrate.

[0058] Referring to FIGS. 13 and 14, a chuck 115 fixes an acceptor substrate 50 to be located on the chuck 115. A donor film 70-1 is disposed on the acceptor substrate 50. At least two corners of the donor film 70-1 are preferably fixed to a frame 80. As a result, the donor film 70-1 may maintain an appropriate tension, and it is possible to maintain a uniform gap between the donor film 70-1 and the acceptor substrate 50 at edges of the donor film 70-1. In this case, preferably, the chuck 115 also fixes

the frame 80.

[0059] Differently from the drawings, the printing unit 150 of the embodiment may include at least one of particular components of the printing unit described in conjunction with FIGS. 8 to 12.

[0060] Hereinafter, a method using the apparatus in accordance with an embodiment of the present invention will be described in conjunction with FIGS. 13 and 14.

[0061] Referring to FIGS. 13 and 14, an acceptor substrate 50 is located on a chuck 115. The acceptor substrate 50 may be an OLED substrate described in conjunction with FIG. 4. A donor film 70-1, at least two corners of which are fixed to a frame 80, is located on the acceptor substrate 50. Locating the donor film 70-1 on the acceptor substrate 50 may be performed as the chuck 115 fixes the frame 80. The donor film 70-1 includes at least a light-heat conversion layer 73 (see FIG. 3) and a transfer layer 77, and the transfer layer 77 is located opposite to the acceptor substrate 50.

[0062] Next, a printing unit 150 moves downward along a printing unit guide bar 142. As a result, the donor film 70-1 under the printing unit 150 is also movable onto the acceptor substrate 50.

[0063] Continuously, a compression gas Ca is injected into a cavity 151a through a gas injection port 151 b of the printing unit 150. The compression gas injected into the cavity 151a is discharged through a gas discharge port 151c. At this time, the donor film 70-1 may be laminated on the acceptor substrate 50 by the pressure P of the compression gas, and the gas discharged through the gas discharge port 151c is exhausted to the exterior of the printing unit 150, thereby forming a predetermined gap between the body 151 and the donor film 70-1.

[0064] In this case, although bubbles are generated between the acceptor substrate 50 and the donor film 70-1 due to the donor film 70-1 having an appropriate tension by virtue of the frame 80, the bubbles may escape through between the donor film 70-1 and the acceptor substrate 50 located adjacent to a portion where the lamination is not performed. As a result, it is possible to prevent transfer failures due to the bubbles.

[0065] Next, a laser beam is emitted from a light source 131 (see FIG. 2) of a laser irradiator 130 to pass through a projection lens 137. The laser beam passed through the projection lens 137 is irradiated on the donor film 70-1 through a light transmission part of the printing unit 150, i.e., a light transmission window 155, the cavity 151a, and the gas discharge port 151c. At this time, at least a portion of the transfer layer 77 is transferred on the acceptor substrate 50 at a region of the donor film 70-1 where the laser beam is irradiated. As a result, a patterned transfer layer 77a is formed on the acceptor substrate 50.

[0066] At this time, a laser irradiator base 125 moves continuously in a Y-direction along a laser guide bar 123. Therefore, the laser irradiator 130 installed at the laser irradiator base 125, a printing unit base 141 connected to the laser irradiator base 125, and the printing unit 150

installed at the printing unit base 141 also continuously move in the γ -axis direction. On the other hand, the donor film 70-1 is fixedly located on the chuck 115 by the frame 80. As a result, the lamination and the laser irradiation may be continuously performed in the γ -direction. At this time, the printing unit 150 may move on the donor film 70-1 without friction caused by a direct contact with the donor film 70-1, since a gap is generated between the body 151 and the donor film 70-1.

[0067] In addition, the laser irradiator 130 continuously irradiates a laser beam. Therefore, the transfer layer pattern 77a is continuously generated on the acceptor substrate 50 along the Y-axis direction.

[0068] When the laser irradiator 130 arrives at an edge of the acceptor substrate 50, the compression gas is not supplied to the printing unit 150, and the printing unit 150 moves upward along the printing unit guide bar 142. As a result, the donor film 70 under the printing unit 150 is detached from the acceptor substrate.

[0069] Next, the chuck 115 moves one step along the chuck guide bar 113, and the laser irradiation process is repeated.

[0070] FIG. 15 is a partially enlarged perspective view schematically illustrating an apparatus in accordance with another embodiment of the present invention. The apparatus in accordance with the embodiment is similar to the apparatus described in conjunction with FIG. 13, except for the following descriptions.

[0071] Referring to FIG. 15, a printing unit 150-1 has a line shape extending in a γ -direction crossing a chuck 115. Therefore, a donor film 70-1 may be laminated on an acceptor substrate 50 in a γ -direction crossing the chuck 115 in an extended manner. Further, a body of the printing unit 150-1 may include a plurality of compression gas injection ports to uniformly supply the compression gas into the cavity of the printing unit. In this case, a laser irradiator 130 may continuously irradiate a laser beam while moving along the printing unit 150-1 in the γ -direction. As a result, the laser beam may be irradiated along the laminated donor film in the γ -direction.

[0072] Differently from the drawings, the printing unit 150-1 of the embodiment may include at least one of particular components of the printing unit described in conjunction with FIGS. 8 to 12.

[0073] As can be seen from the foregoing, the donor film may be sufficiently laminated on the acceptor substrate without generating friction between the transfer layer of the donor film and the acceptor substrate, and it is possible to obtain an excellent transfer pattern profile by irradiating the laser beam on the sufficiently laminated donor film.

Claims

1. An apparatus (100) comprising:

a planar chuck (115) for fixing an acceptor sub-

strate (50);

a donor film (70) on the acceptor substrate (50); a printing unit (150) located on the donor film (70) and including a body (151) having a cavity (151a), a gas injection port (151b) for injecting a pressurized gas into the cavity (151a) and a gas discharge port (151c) for discharging the gas injected into the cavity (151 a) onto the donor film (70); and

a laser irradiator (130) located on the printing unit (150) and arranged such that a laser beam can be irradiated through the cavity (151a) and the gas discharge port (151 c) of the printing unit (150) **characterized in that**

the printing unit (150) further includes an exhaust port (151d) located at a lower section of the outer periphery of the body (151) for exhausting the gas discharged onto the donor film (70) and the exhaust port (151d) is connected to an exhaust pump.

2. The apparatus according to claim 1, wherein the printing unit (150) further includes a light transmission window (155) in contact with the cavity (151a).
3. The apparatus according to claim 2, wherein the gas injection port (151 b) passes through a sidewall of the body (151).
4. The apparatus according to claim 1, wherein the printing unit (150) is movable up and down with respect to the chuck (115).
5. The apparatus according to claim 1, further comprising a guide roll (145, 146) for contacting the donor film (70) on the acceptor substrate (50) to at least one side of the printing unit (150).
6. The apparatus according to claim 1, wherein the laser irradiator (130) and the printing unit (150) are simultaneously movable in a Y-direction crossing the chuck (115).
7. The apparatus according to claim 6, further comprising an optical stage (120) crossing the chuck (115) in the Y-direction, wherein the laser irradiator (130) is installed on a top surface of the optical stage (120) through a laser irradiator base (125), a printing unit base (141) is connected to the laser irradiator base (125), and the printing unit (150) is installed on the printing unit base (141).
8. The apparatus according to claim 1, wherein the printing unit (150) has a line shape extending in a γ -direction crossing the chuck (115).
9. The apparatus according to claim 8, wherein the la-

- ser irradiator (130) is adapted for irradiating a laser while moving in the Y-direction along the printing unit (150).
10. The apparatus according to claim 9, wherein the body (151) of the printing unit (150) includes a plurality of pressurized gas injection ports (70-1).
11. The apparatus according to claim 1, further comprising film supply means (143) for the donor film (70) at one side of the printing unit (150) and film winding means (144) for winding up the donor film (70) at the other side of the printing unit (150).
12. The apparatus according to claim 11, wherein the laser irradiator (130), the printing unit (150), the film supply means (143) and the film winding means (144) are simultaneously movable in a Y-direction crossing the chuck (115).
13. The apparatus according to claim 12, wherein the laser irradiator (130) is installed on the optical stage (120) through a laser irradiator base (125), a printing unit base (141) is connected to the laser irradiator base (125), the printing unit (150) is installed at the printing unit base (125), and the film supply means (143) and the film winding means (144) are spaced apart from the printing unit (150) and individually installed at the printing unit base (125).
14. The apparatus according to claim 1, wherein the acceptor substrate (50) is an organic light emitting display substrate.
15. A method for preparation of an organic light emitting display comprising:
- (i) providing an apparatus (100) comprising:
- a planar chuck (115) for fixing an organic light emitting display substrate (50);
a donor film (70) located on the substrate (50);
a printing unit (150) located on the donor film (70) and including a body (151) having a cavity (151a), a gas injection port (151b) for injecting a pressurized gas into the cavity (151a) and a gas discharge port (151c) for discharging the gas injected into the cavity (151a) onto the donor film (70), the printing unit (150) further comprising an exhaust port (151d) located at a lower section of the outer periphery of the body (151) for exhausting the gas discharged onto the donor film (70) and the exhaust port (151d) being connected to an exhaust pump; and
a laser irradiator (130) located on the printing unit (150) and arranged such that a laser beam can be irradiated through the cavity (151 a) and the gas discharge port (151 c) of the printing unit (150);
- (ii) locating the organic light emitting display substrate (50) on the chuck (115);
(iii) locating a donor film (70) having at least a light-heat conversion layer (73) and a transfer layer (77) to make the transfer layer (77) opposite to the substrate (50); and
(iv) injecting a pressurized gas into the cavity (151a) through the gas injection port (151 b) thereby locally printing a portion of the donor film (70) on the substrate (50) and simultaneously irradiating a laser on the printed donor film through the printing unit (150) to transfer at least a portion of the transfer layer (77) on the substrate (50).
16. The method according to claim 15, wherein the printing process and the laser irradiation process are continuously performed in a Y-direction crossing the chuck (115).
17. The method according to claim 15, wherein the printing process is performed in a γ -direction crossing the chuck (115) in an extended manner and the laser is irradiated along the donor film laminated in the Y-direction.
18. The method according to claim 15, wherein the donor film (70) is located on an entire surface of the substrate (50) and at least two corners of the donor film (70) are attached to a frame (80) and wherein the chuck (115) is fixed to the frame (80), before performing the printing process and the laser irradiation process.

40 Patentansprüche

1. Eine Vorrichtung (100), umfassend:
- eine ebene Spannvorrichtung (115) zum Fixieren eines Akzeptorsubstrats (50);
einen Donorfilm (70) auf dem Akzeptorsubstrat (50);
eine auf dem Donorfilm (70) angeordnete Druckeinheit (150), die einen Körper (151) mit einem Hohlraum (151a), eine Gasinjektionsöffnung (151b) zum Injizieren eines Druckgases in den Hohlraum (151a) sowie eine Gasableitungsöffnung (151c) zum Ableiten des in den Hohlraum (151a) injizierten Gases auf den Donorfilm (70) aufweist; und
einen auf der Druckeinheit (150) angeordneten Laserstrahler (130), der derart angeordnet ist, dass ein Laserstrahl durch den Hohlraum (151a)

- und die Gasableitungsöffnung (151c) der Druckeinheit (150) gestrahlt werden kann, **dadurch gekennzeichnet, dass** die Druckeinheit (150) ferner eine an einem unteren Abschnitt der äußeren Peripherie des Körpers (151) angeordnete Auslassöffnung (151d) zum Auslassen des auf den Donorfilm (70) abgeleiteten Gases beinhaltet und die Auslassöffnung (151d) mit einer Auslasspumpe verbunden ist.
2. Die Vorrichtung gemäß Anspruch 1, wobei die Druckeinheit (150) ferner ein mit dem Hohlkörper (151a) in Kontakt stehendes Lichtdurchtrittsfenster (155) beinhaltet.
 3. Die Vorrichtung gemäß Anspruch 2, wobei die Gasinjektionsöffnung (151b) durch eine Seitenwand des Körpers (151) hindurchführt.
 4. Die Vorrichtung gemäß Anspruch 1, wobei sich die Druckeinheit (150) bezüglich der Spannvorrichtung (115) nach oben und nach unten bewegen lässt.
 5. Die Vorrichtung gemäß Anspruch 1, ferner umfassend eine Leitwalze (145, 146) zur Herstellung eines Kontakts zwischen dem Donorfilm (70) auf dem Akzeptorsubstrat (50) und mindestens einer Seite der Druckeinheit (150).
 6. Die Vorrichtung gemäß Anspruch 1, wobei sich der Laserstrahler (130) und die Druckeinheit (150) gleichzeitig in einer die Spannvorrichtung (115) kreuzenden Y-Richtung bewegen lassen.
 7. Die Vorrichtung gemäß Anspruch 6, ferner ein die Spannvorrichtung (115) in der Y-Richtung kreuzendes optisches Gestell (120) umfassend, wobei der Laserstrahler (130) durch eine Laserstrahlerbasis (125) auf einer oberen Oberfläche des optischen Gestells (120) installiert ist, eine Druckeinheitsbasis (141) mit der Laserstrahlerbasis (125) verbunden ist und die Druckeinheit (150) auf der Druckeinheitsbasis (141) installiert ist.
 8. Die Vorrichtung gemäß Anspruch 1, wobei die Druckeinheit (150) eine sich in einer die Spannvorrichtung (115) kreuzenden Y-Richtung erstreckende Linienform aufweist.
 9. Die Vorrichtung gemäß Anspruch 8, wobei der Laserstrahler (130) dazu ausgelegt ist, einen Laser zu strahlen, während er sich in der Y-Richtung entlang der Druckeinheit (150) bewegt.
 10. Die Vorrichtung gemäß Anspruch 9, wobei der Körper (151) der Druckeinheit (150) eine Vielzahl von Druckgas-Injektionsöffnungen (70-1) beinhaltet.
 11. Die Vorrichtung gemäß Anspruch 1, ferner Filmzuführmittel (143) für den Donorfilm (70) an einer Seite der Druckeinheit (150) und Filmaufwickelmittel (144) zum Aufwickeln des Donorfilms (70) an der anderen Seite der Druckeinheit (150) umfassend.
 12. Die Vorrichtung gemäß Anspruch 11, wobei sich der Laserstrahler (130), die Druckeinheit (150), die Filmzuführmittel (143) und die Filmaufwickelmittel (144) gleichzeitig in einer die Spannvorrichtung (115) kreuzenden Y-Richtung bewegen lassen.
 13. Die Vorrichtung gemäß Anspruch 12, wobei der Laserstrahler (130) durch eine Laserstrahlerbasis (125) auf dem optischen Gestell (120) installiert ist, eine Druckeinheitsbasis (141) mit der Laserstrahlerbasis (125) verbunden ist, die Druckeinheit (150) an der Druckeinheitsbasis (125) installiert ist und die Filmzuführmittel (143) und die Filmaufwickelmittel (144) mit Abstand von der Druckeinheit (150) angeordnet und einzeln an der Druckeinheitsbasis (125) installiert sind.
 14. Die Vorrichtung gemäß Anspruch 1, wobei das Akzeptorsubstrat (50) ein Substrat für organische lichtemittierende Anzeigen ist.
 15. Ein Verfahren zur Herstellung einer organischen lichtemittierenden Anzeige, umfassend:
 - (i) Bereitstellen einer Vorrichtung (100), umfassend:
 - eine ebene Spannvorrichtung (115) zum Fixieren eines Substrats für organische lichtemittierende Anzeigen (50);
 - einen auf dem Substrat (50) angeordneten Donorfilm (70);
 - eine auf dem Donorfilm (70) angeordnete Druckeinheit (150), die einen Körper (151) mit einem Hohlraum (151a), eine Gasinjektionsöffnung (151b) zum Injizieren eines Druckgases in den Hohlraum (151a) sowie eine Gasableitungsöffnung (151c) zum Ableiten des in den Hohlraum (151a) injizierten Gases auf den Donorfilm (70) aufweist, wobei die Druckeinheit (150) ferner eine an einem unteren Abschnitt der äußeren Peripherie des Körpers (151) angeordnete Auslassöffnung (151d) zum Auslassen des auf den Donorfilm (70) abgeleiteten Gases beinhaltet und die Auslassöffnung (151d) mit einer Auslasspumpe verbunden ist; und
 - einen auf der Druckeinheit (150) angeordneten Laserstrahler (130), der derart angeordnet ist, dass ein Laserstrahl durch den Hohlraum (151a) und die Gasableitungsöffnung (151c) der Druckeinheit (150) ge-

strahlt werden kann;

(ii) Anordnen des Substrats für organische lichtemittierende Anzeigen (50) auf der Spannvorrichtung (115);

(iii) Anordnen eines Donorfilms (70) mit zumindest einer Licht/Wärme-Umwandlungsschicht (73) und einer Übertragungsschicht (77), so dass die Übertragungsschicht (77) dem Substrat (50) gegenübersteht; und

(iv) Injizieren eines Druckgases in den Hohlraum (151a) durch die Gasinjektionsöffnung (151b), wodurch ein Teil des Donorfilms (70) lokal auf das Substrat (50) gedruckt wird, und gleichzeitiges Strahlen eines Lasers auf den gedruckten Donorfilm durch die Druckeinheit (150), um mindestens einen Teil der Übertragungsschicht (77) auf das Substrat (50) zu übertragen.

16. Das Verfahren gemäß Anspruch 15, wobei der Druckprozess und der Laserstrahlprozess kontinuierlich in einer die Spannvorrichtung (115) kreuzenden Y-Richtung ausgeführt werden.

17. Das Verfahren gemäß Anspruch 15, wobei der Druckprozess in einer die Spannvorrichtung (115) kreuzenden Y-Richtung in ausgedehnter Weise ausgeführt wird und der Laser entlang des in der Y-Richtung laminierten Donorfilms gestrahlt wird.

18. Das Verfahren gemäß Anspruch 15, wobei der Donorfilm (70) auf einer gesamten Oberfläche des Substrats (50) angeordnet wird und mindestens zwei Ecken des Donorfilms (70) an einem Rahmen (80) befestigt werden und wobei die Spannvorrichtung (115) an dem Rahmen (80) fixiert wird, bevor der Druckprozess und der Laserstrahlprozess ausgeführt werden.

Revendications

1. Appareil (100) comportant :

un plateau de serrage plan (115) destiné à fixer un substrat accepteur (50) ;

un film donneur (70) sur le substrat accepteur (50) ;

une unité d'impression (150) placée sur le film donneur (70) et comprenant un corps (151) ayant une cavité (151a), un orifice (151b) d'injection de gaz pour injecter un gaz comprimé dans la cavité (151a) et un orifice (151c) de décharge de gaz pour décharger le gaz injecté dans la cavité (151a) sur le film donneur (70) ; et un dispositif d'irradiation à laser (130) placé sur l'unité d'impression (150) et agencé de manière

qu'un faisceau laser puisse être amené à irradier à travers la cavité (151a) et l'orifice (151c) de décharge de gaz de l'unité d'impression (150), **caractérisé en ce que** l'unité d'impression (150) présente en outre un orifice d'évacuation (151d) situé à une section inférieure de la périphérie extérieure du corps (151) pour évacuer le gaz déchargé sur le film donneur (70), et l'orifice d'évacuation (151d) est raccordé à une pompe d'évacuation.

2. Appareil selon la revendication 1, dans lequel l'unité d'impression (150) comprend en outre une fenêtre (155) de transmission de la lumière en contact avec la cavité (151a).

3. Appareil selon la revendication 2, dans lequel l'orifice (151b) d'injection de gaz passe à travers une paroi latérale du corps (151).

4. Appareil selon la revendication 1, dans lequel l'unité d'impression (150) peut monter et descendre par rapport au plateau de serrage (115).

5. Appareil selon la revendication 1, comportant en outre un rouleau de guidage (145, 146) destiné à entrer en contact avec le film donneur (70) sur le substrat accepteur (50) sur au moins un côté de l'unité d'impression (150).

6. Appareil selon la revendication 1, dans lequel le dispositif d'irradiation à laser (130) et l'unité d'impression (150) peuvent être déplacés simultanément dans une direction Y traversant le plateau (115).

7. Appareil selon la revendication 6, comportant en outre une platine optique (120) traversant le plateau (115) dans la direction Y, dans lequel le dispositif d'irradiation à laser (130) est installé sur une surface de dessus de la platine optique (120) par l'intermédiaire d'une base (125) de dispositif d'irradiation à laser, une base (141) d'unité d'impression est reliée à la base (125) du dispositif d'irradiation à laser, et l'unité d'impression (150) est installée sur la base (141) d'unité d'impression.

8. Appareil selon la revendication 1, dans lequel l'unité d'impression (150) a la forme d'une ligne s'étendant dans une direction Y traversant le plateau (115).

9. Appareil selon la revendication 8, dans lequel le dispositif d'irradiation à laser (130) est conçu pour effectuer une irradiation laser tout en se déplaçant dans la direction Y le long de l'unité d'impression (150).

10. Appareil selon la revendication 9, dans lequel le corps (151) de l'unité d'impression (150) présente

- de multiples orifices (70-1) d'injection de gaz comprimé.
11. Appareil selon la revendication 1, comportant en outre un moyen (143) débiteur de film pour le film donneur (70) sur un côté de l'unité d'impression (150) et un moyen (144) enrouleur de film pour enrouler le film donneur (70) sur l'autre côté de l'unité d'impression (150).
12. Appareil selon la revendication 11, dans lequel le dispositif d'irradiation à laser (130), l'unité d'impression (150), le moyen débiteur de film (143) et le moyen enrouleur de film (144) peuvent être déplacés simultanément dans une direction Y traversant le plateau (115).
13. Appareil selon la revendication 12, dans lequel le dispositif d'irradiation à laser (130) est installé sur la platine optique (120) par l'intermédiaire d'une base (125) de dispositif d'irradiation à laser, une base (141) d'unité d'impression est reliée à la base (125) du dispositif d'irradiation à laser, l'unité d'impression (150) est installée au niveau de la base (125) d'unité d'impression, et le moyen débiteur de film (143) et le moyen enrouleur de film (144) sont espacés de l'unité d'impression (150) et sont installés individuellement au niveau de la base (125) d'unité d'impression.
14. Appareil selon la revendication 1, dans lequel le substrat accepteur (50) est un substrat d'affichage organique à émission de lumière.
15. Procédé pour la préparation d'un dispositif d'affichage organique à émission de lumière, comprenant :
- (i) l'utilisation d'un appareil (100) comportant :
- un plateau de serrage plan (115) pour la fixation d'un substrat d'affichage organique à émission de lumière (50) ;
 - un film donneur (70) placé sur le substrat (50) ;
 - une unité d'impression (150) placée sur le film donneur (70) et contenant un corps (151) ayant une cavité (151a), un orifice d'injection de gaz (151b) pour l'injection d'un gaz comprimé dans la cavité (151a) et un orifice (151c) de décharge de gaz pour décharger le gaz injecté dans la cavité (151a) sur le film donneur (70), l'unité d'impression (150) comportant en outre un orifice d'évacuation (151d) placé à une section inférieure de la périphérie extérieure du corps (151) pour évacuer le gaz déchargé sur le film donneur (70) et l'orifice d'évacuation (151d) étant raccordé à une pompe
- d'évacuation ; et
- un dispositif d'irradiation à laser (130) placé sur l'unité d'impression (150) et agencé de manière qu'un faisceau laser puisse être amené à irradier à travers la cavité (151a) et l'orifice (151c) de décharge de gaz de l'unité d'impression (150) ;
- (ii) le positionnement du substrat d'affichage organique (50) d'émission de lumière sur le plateau (115) ;
- (iii) le positionnement d'un film donneur (70) ayant au moins une couche (73) de conversion de lumière-chaaleur et une couche de transfert (77) afin que la couche de transfert (77) soit opposée au substrat (50) ; et
- (iv) l'injection d'un gaz comprimé dans la cavité (151a) à travers l'orifice (151b) d'injection de gaz pour imprimer ainsi localement une partie du film donneur (70) sur le substrat (50) et, simultanément, l'irradiation par un laser du film donneur imprimé à travers l'unité d'impression (150) afin de transférer au moins une partie de la couche de transfert (77) sur le substrat (50).
16. Procédé selon la revendication 15, dans lequel le processus d'impression et le processus d'irradiation par laser sont exécutés en continu dans une direction Y traversant le plateau (115).
17. Procédé selon la revendication 15, dans lequel le processus d'impression est exécuté dans une direction Y traversant le plateau (115) d'une manière étendue et le laser irradie le long du film donneur stratifié dans la direction Y.
18. Procédé selon la revendication 15, dans lequel le film donneur (70) est situé sur une surface entière du substrat (50) et au moins deux angles du film donneur (70) sont attachés à un cadre (80), et dans lequel le plateau (115) est fixé au cadre (80), avant l'exécution du processus d'impression et du processus d'irradiation par laser.

FIG. 2

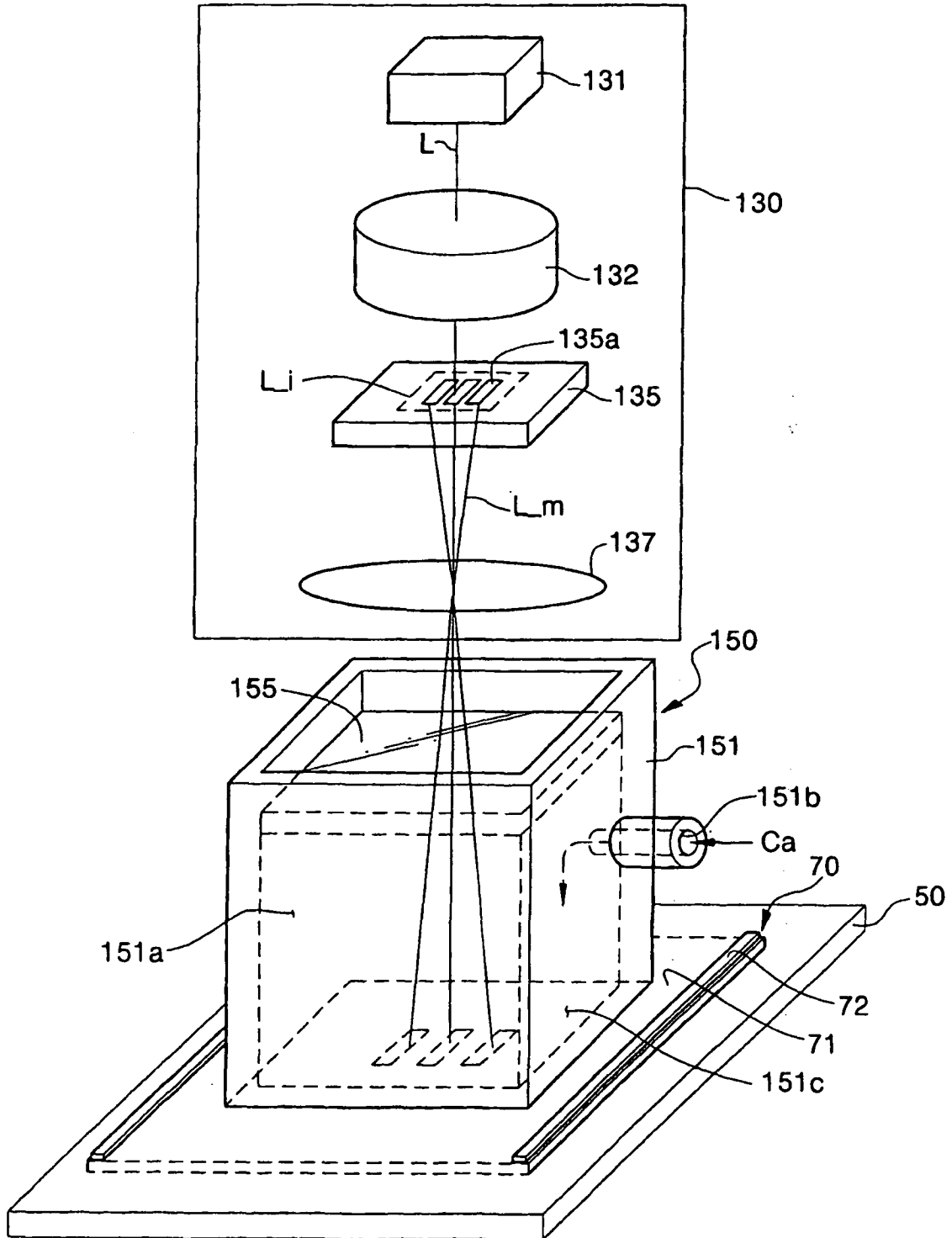


FIG. 3

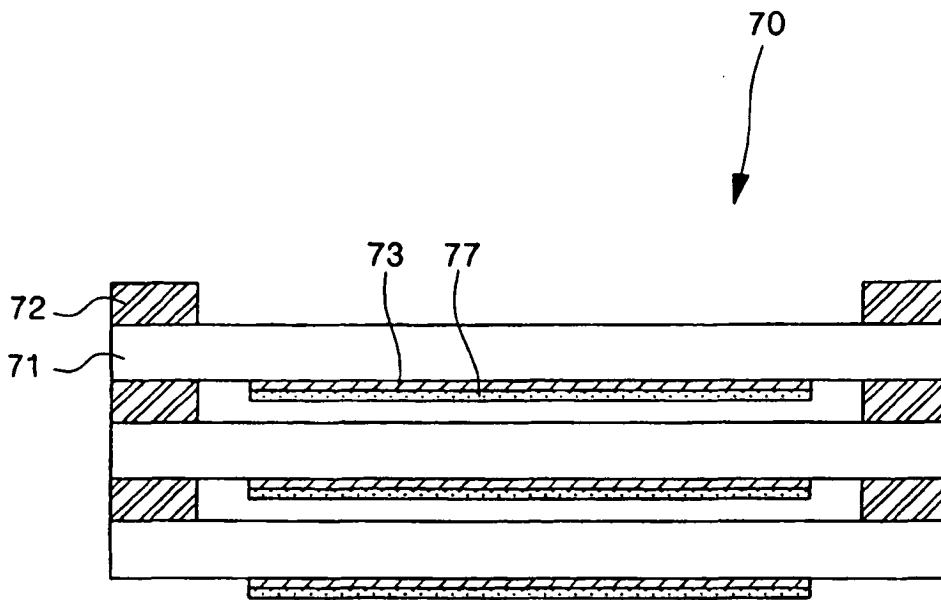


FIG. 4

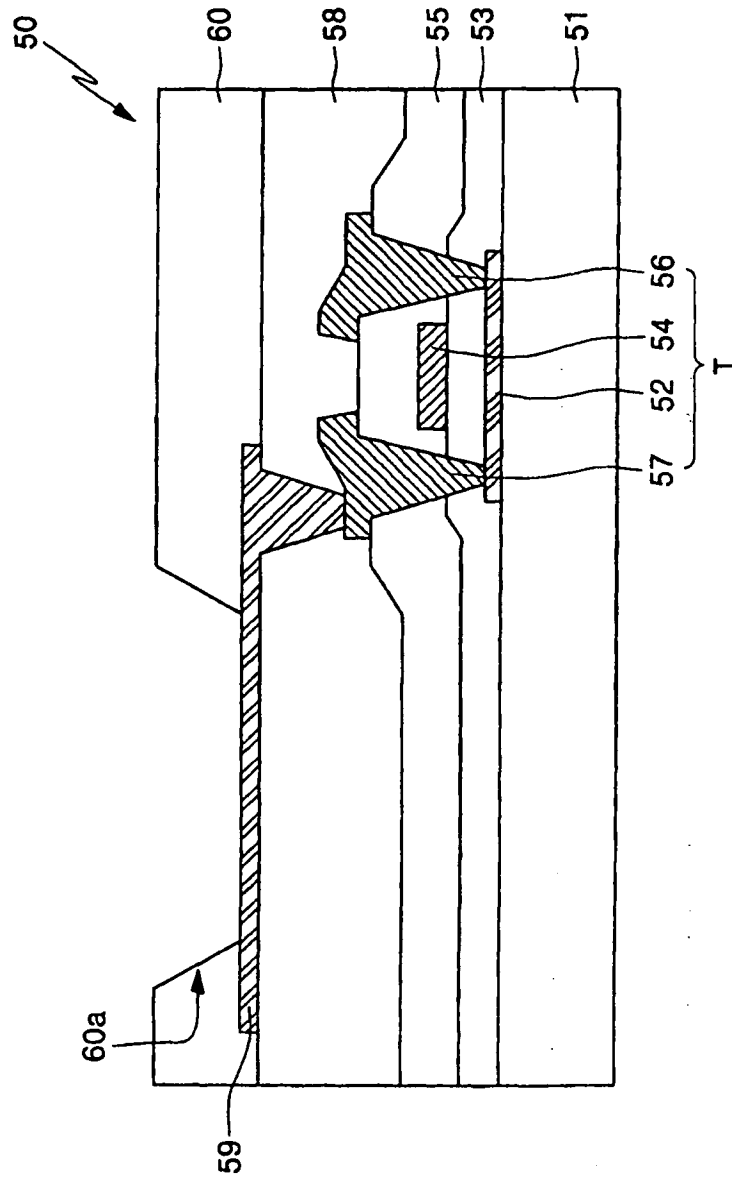


FIG. 5

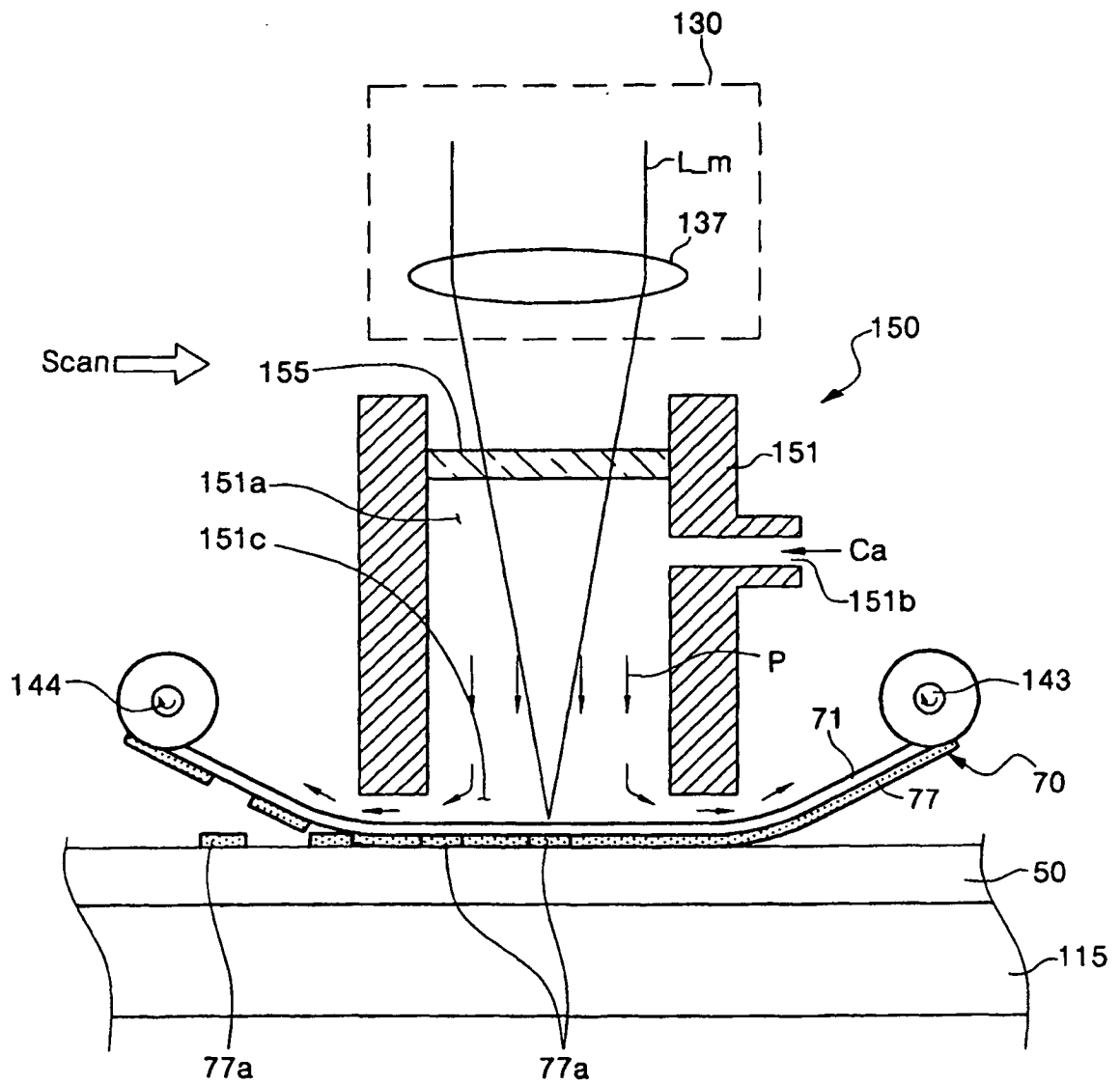


FIG. 6

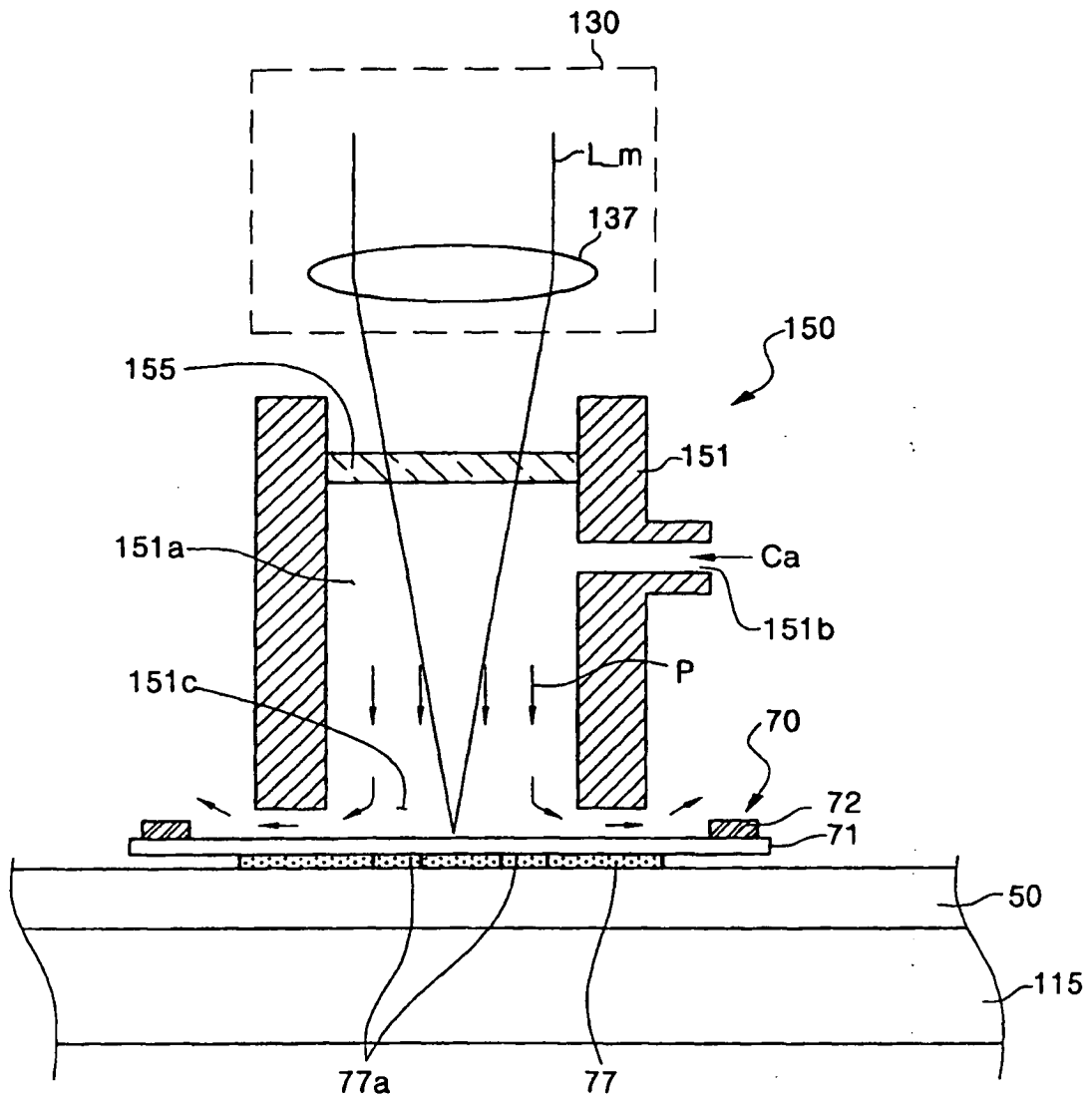


FIG. 7

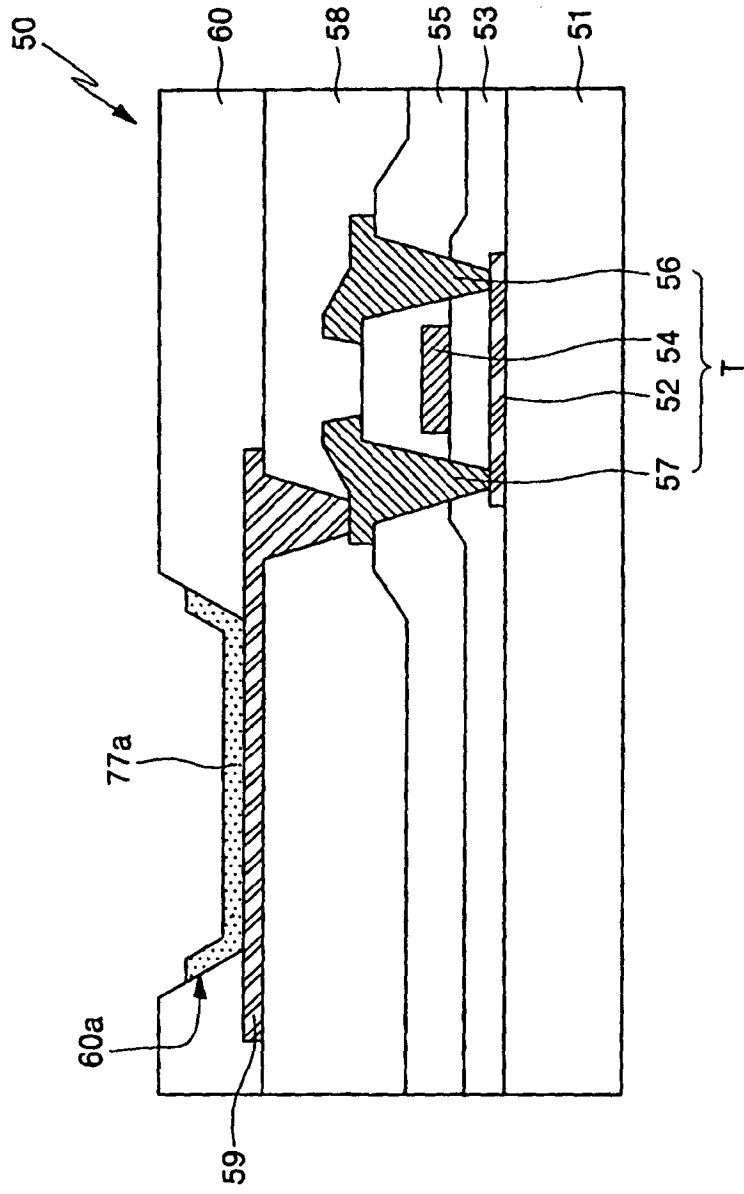


FIG. 8

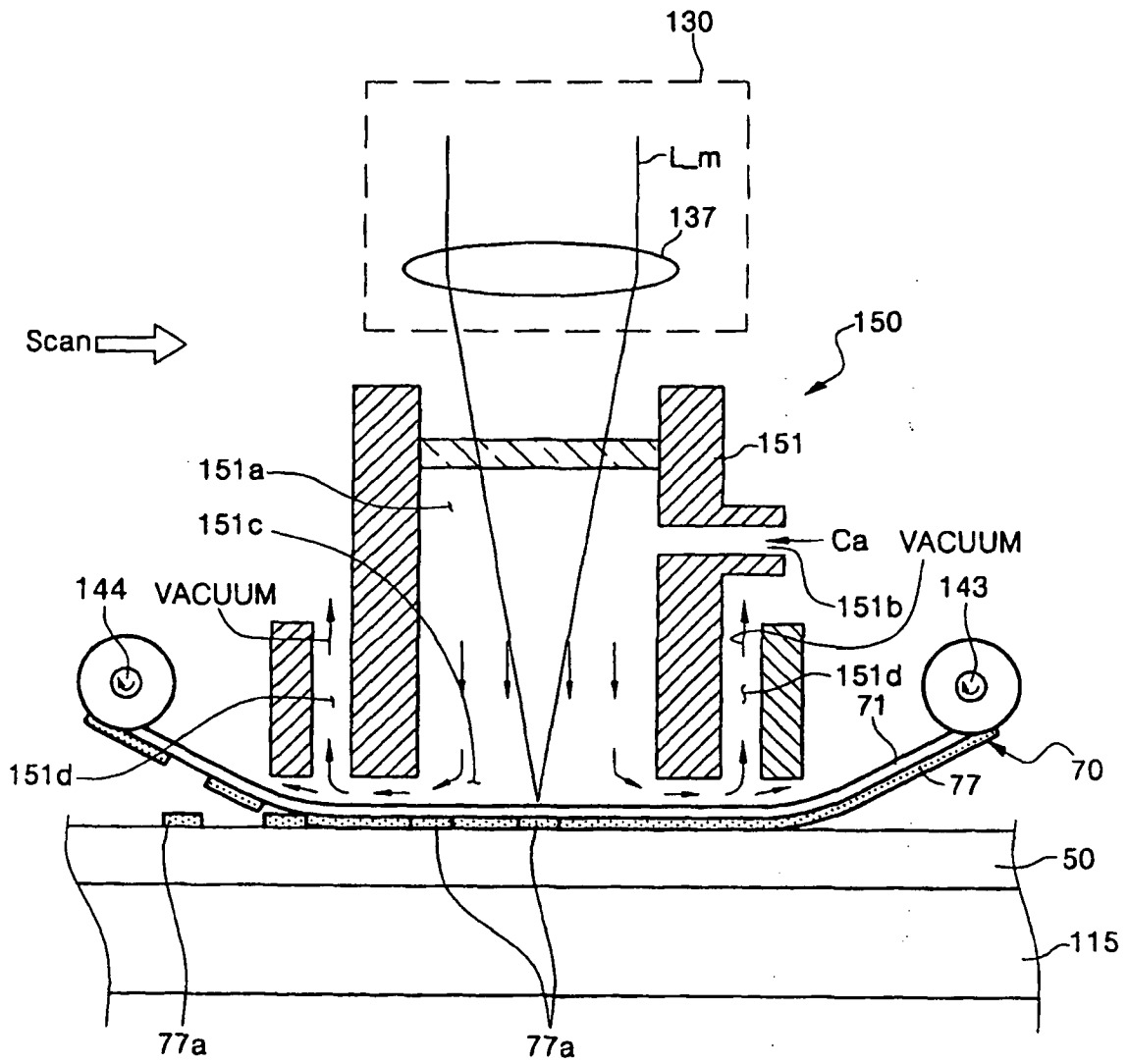


FIG. 9

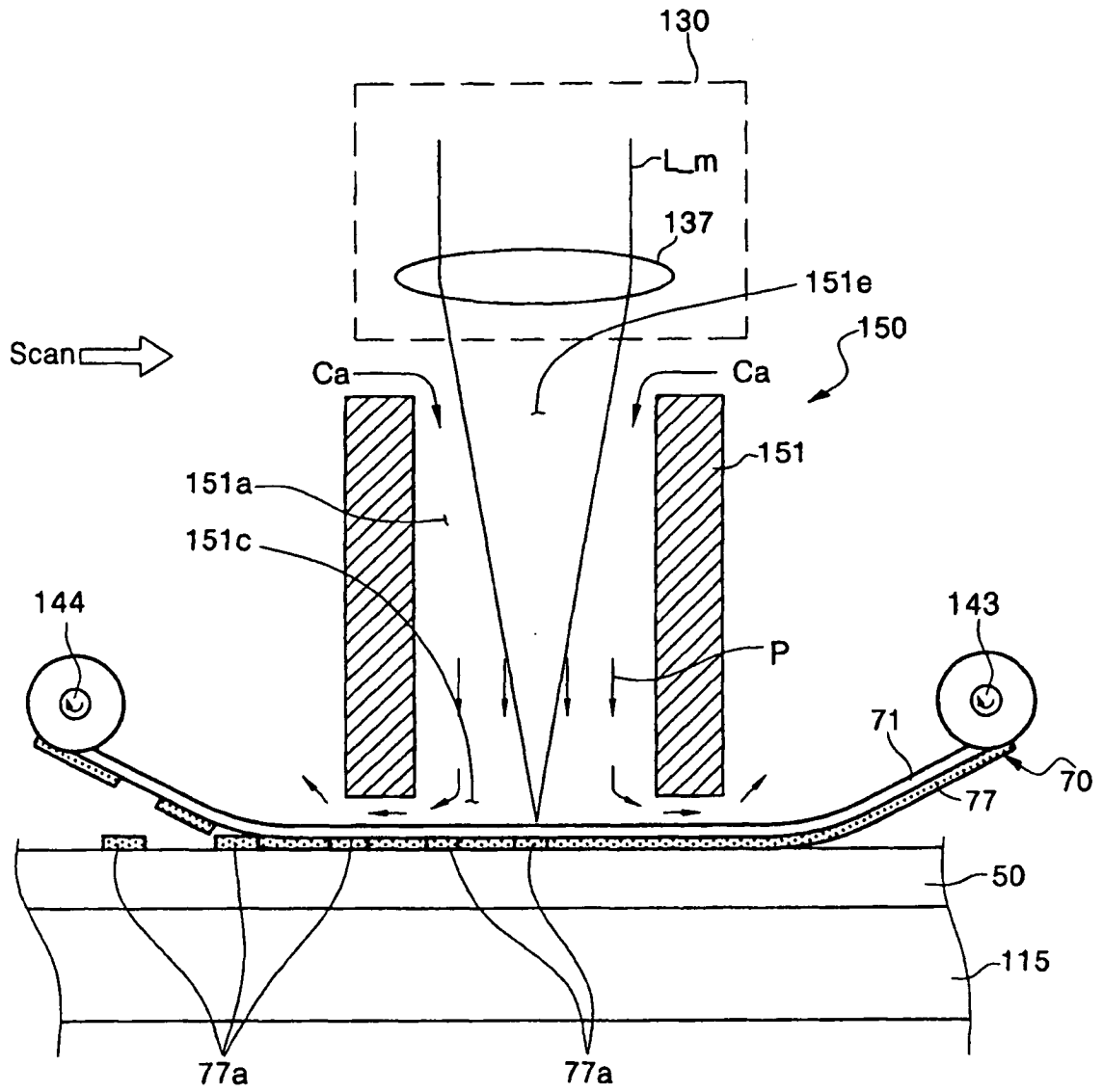


FIG. 10

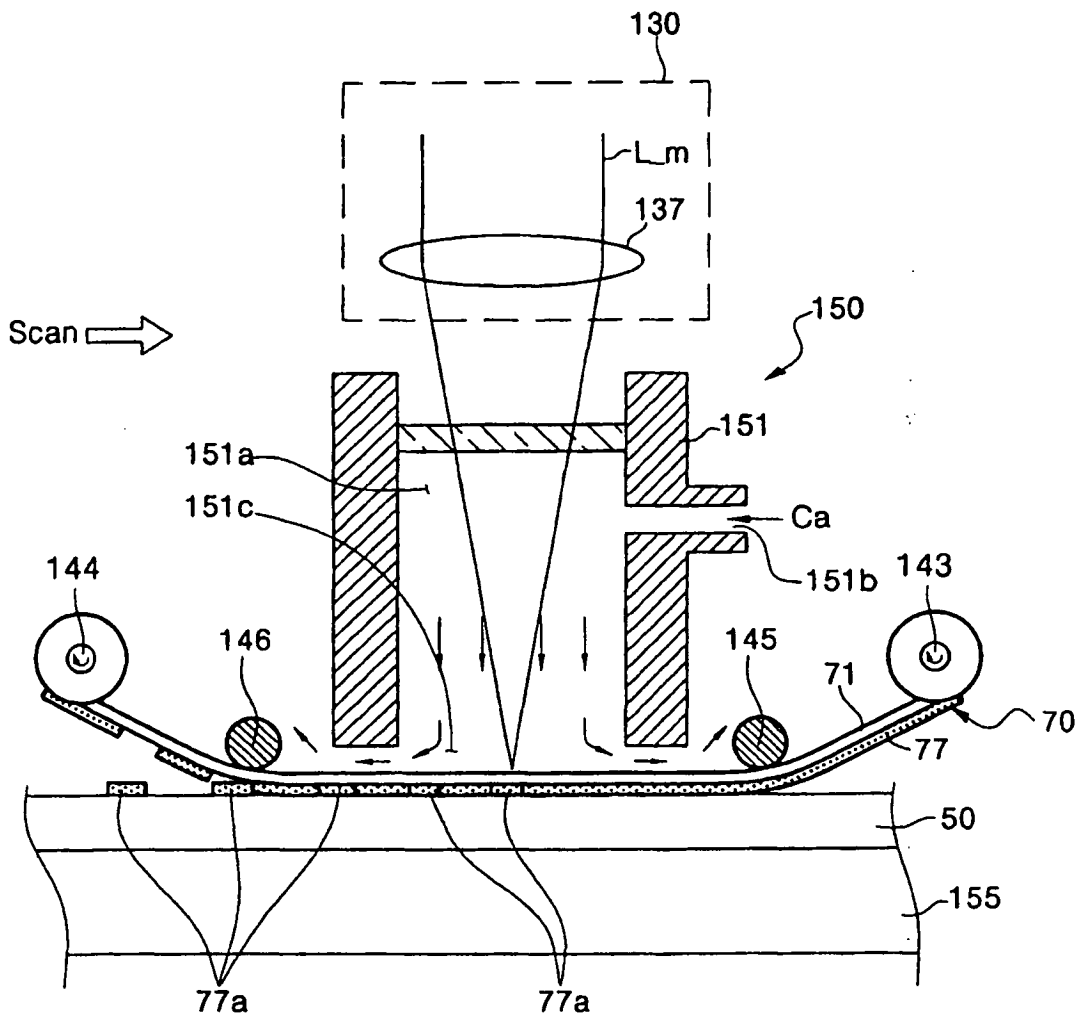


FIG. 11

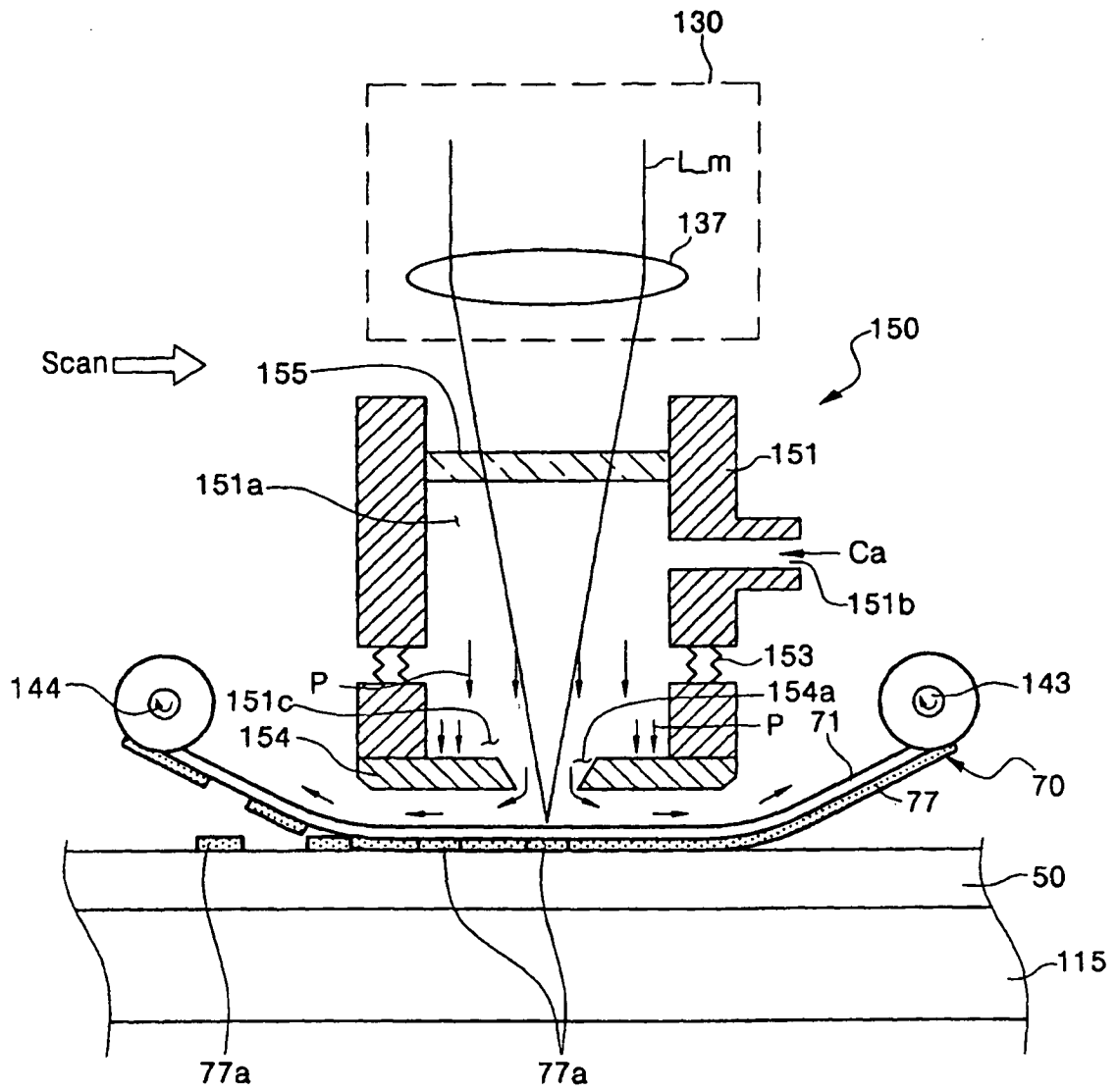


FIG. 12

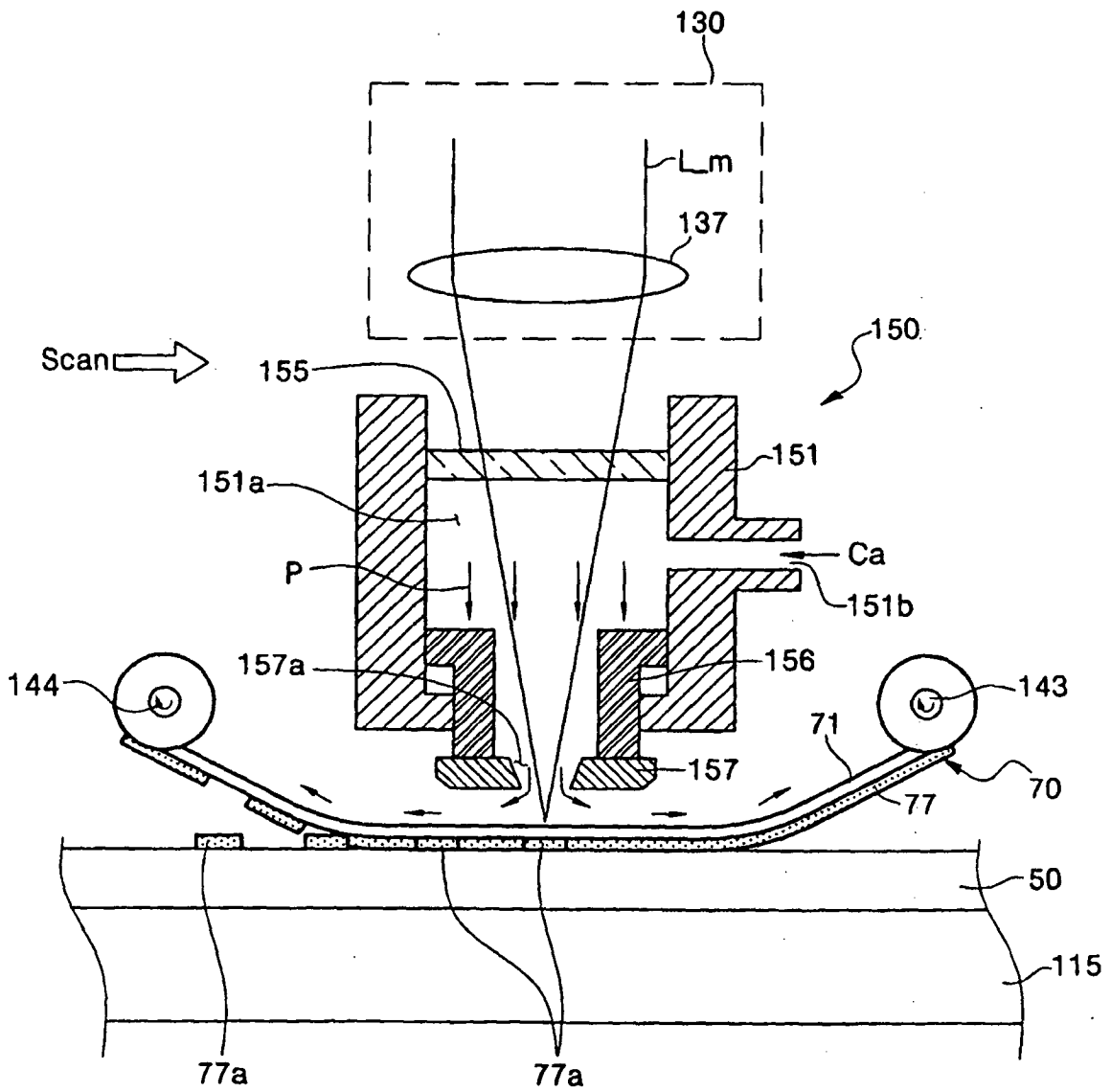


FIG. 13

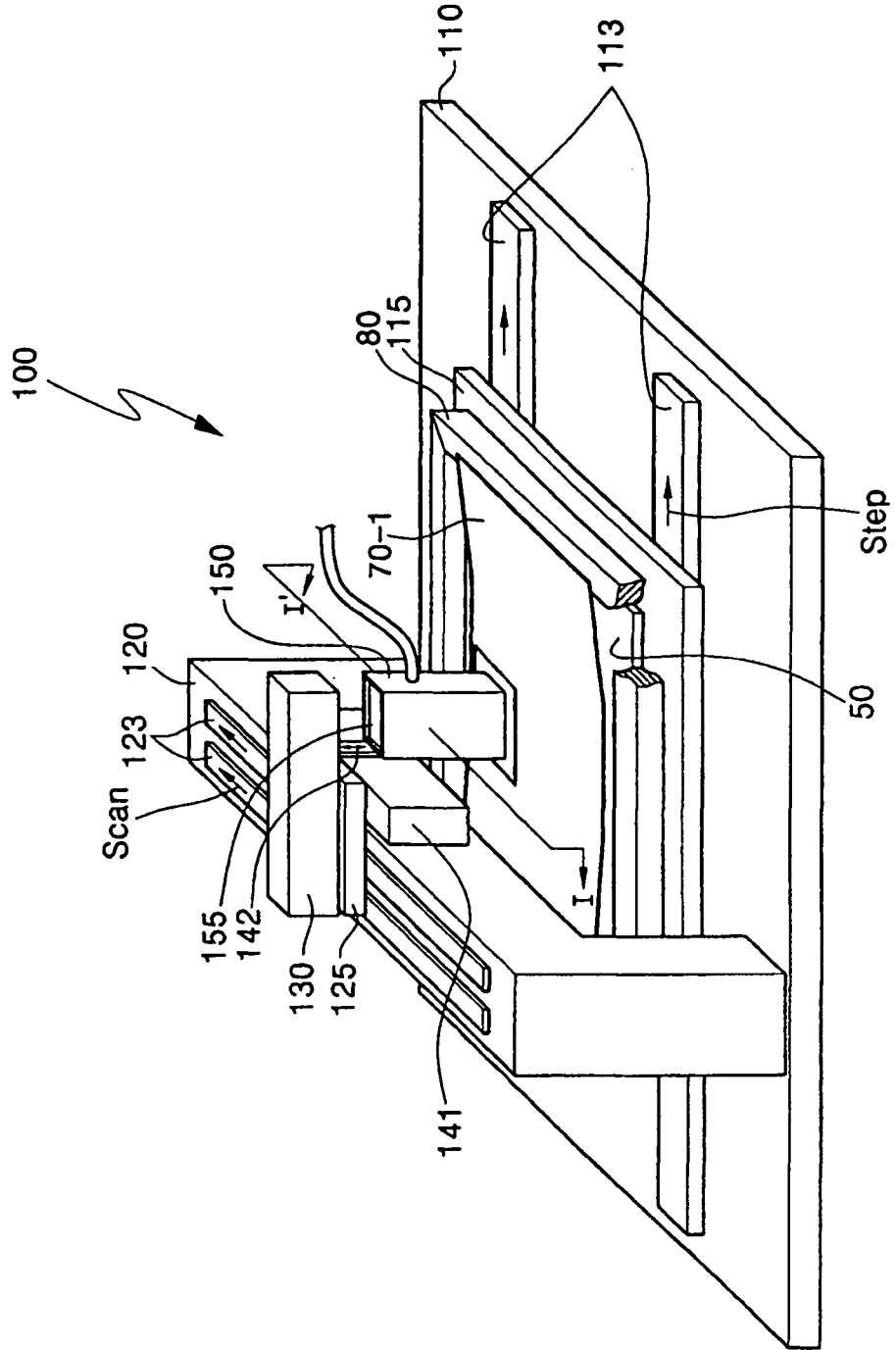
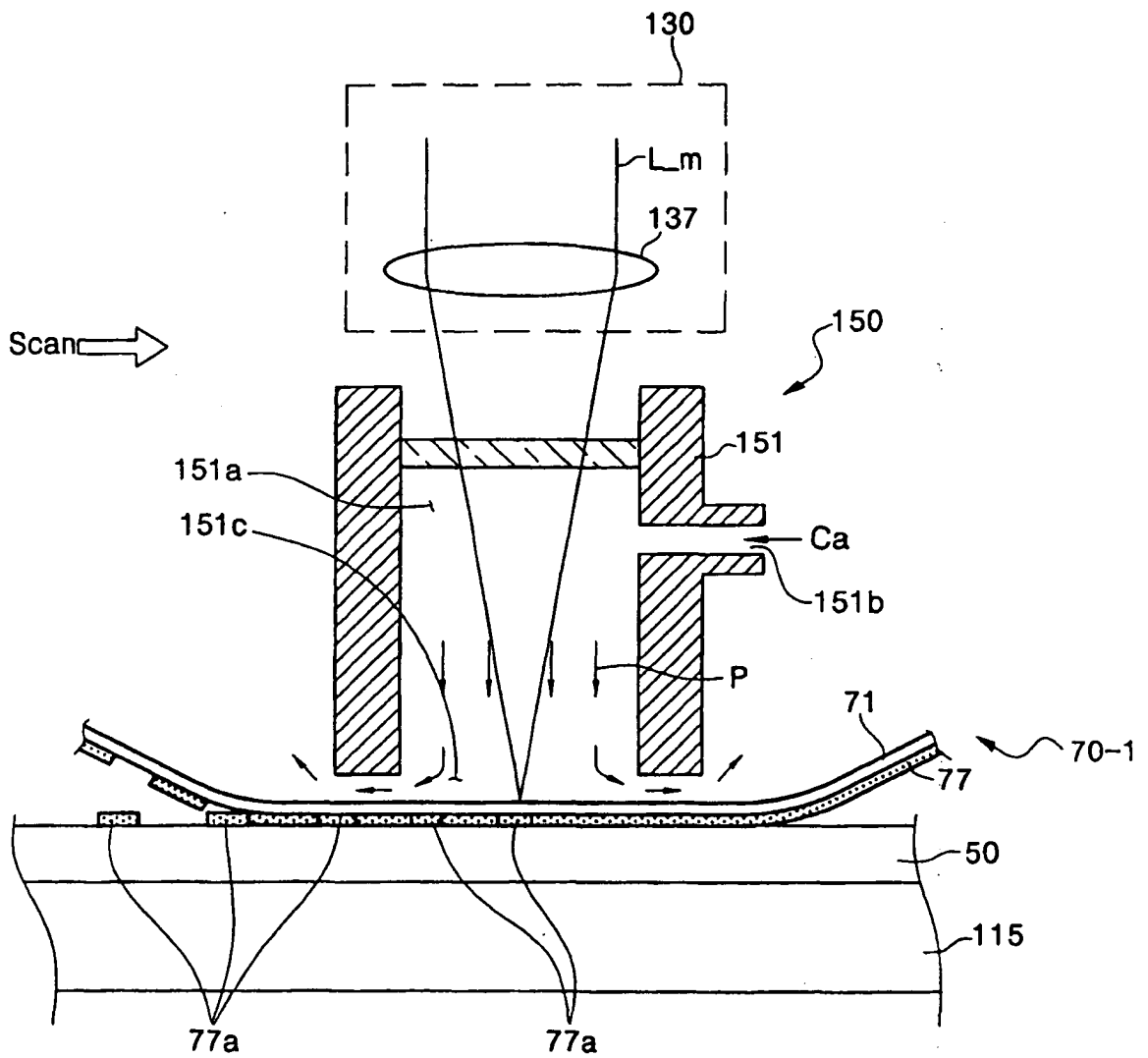


FIG. 14



REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- US 5998085 A [0002]
- US 6214520 B [0002]
- US 6476842 B [0002]
- US 6114088 A [0002]
- EP 1335637 A1 [0002]
- EP 1344652 A2 [0002]
- US 6226020 B [0004]

专利名称(译)	使用激光诱导热敏打印设备制造有机发光显示器的设备和方法		
公开(公告)号	EP1672716B1	公开(公告)日	2009-04-08
申请号	EP2004090517	申请日	2004-12-27
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IPC分类号	H01L51/40		
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代理机构(译)	hengelhaupt , Jürgen		
优先权	1020040108992 2004-12-20 KR		
其他公开文献	EP1672716A1		
外部链接	Espacenet		

摘要(译)

提供了一种激光诱导热成像设备，以及激光诱导热成像方法和使用该设备制造有机发光显示器的方法。激光诱导热成像设备包括用于固定受体基板的卡盘。用于在供体基板上层压供体膜的层压单元位于卡盘上。层压单元包括具有空腔的主体，用于将压缩气体注入空腔的气体注入入口和用于将注入空腔的气体排出到基板上的气体排出口。用于通过层压单元在层压的供体膜上照射激光束的激光照射器位于层压单元上。

FIG. 1

