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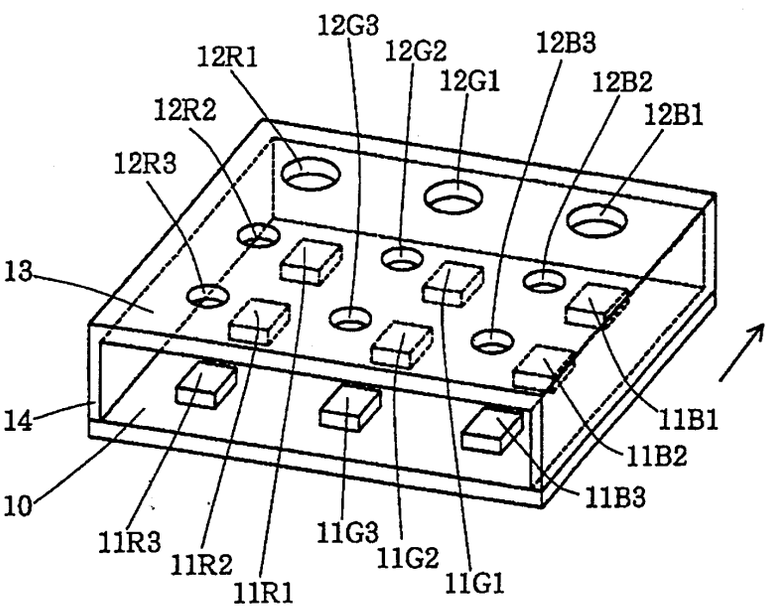
(54) Optical writing printer head and optical writing printer

(57) An optical writing printer head which can efficiently utilize, for optical writing, energy irradiated by a light emitting source to form a clear latent image on photosensitive print paper is disclosed. An optical writing printer head is formed of a light emitting module and an aperture plate. The light emitting module is formed of LEDs for preexposure (11R1, 11G1, and 11B1) and LEDs for printing (11R2, 11G2, and 11B2, and , 11R3, 11G3, and 11B3). The pore size of beam restricting pores (12R1, 12G1, and 12B1) formed in the aperture plate 13 correspondingly to the light emitting sources for preexposure is larger than the resolution of the printer, and the pore size of the beam restricting pores (12R2, 12G2, and 12B2, and, 12R3, 12G3, and 12B3) formed in the aperture plate 13 correspondingly to the light emitting sources for printing is about the resolution of the printer.

FIG. 1



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Description

[0001] The present invention relates to an optical writing printer head suitable for a printer capable of selecting a color to be printed by an optical writing wavelength and controlling the density of the developed color by optical writing power, for example, a printer using print paper with photosensitive microcapsules applied thereto, and to an optical writing printer provided with the printer head.

[0002] A printer using print paper with photosensitive microcapsules applied thereto scans the print paper with a printer head provided with three kinds of, (i.e., red, green, and blue) light emitting devices to form a latent image and applies mechanical pressure to the print paper with the latent image formed thereon using a print roller to carry out development. The print paper is formed by applying evenly photosensitive microcapsules having the diameter of about 4 microns on base paper, applying thereon an image receiving layer including developer, and laminating thereon a polyester film. The microcapsules themselves transmit light, and are mere transparent, minute capsules made of gelatin having such strength as to be collapsed by the mechanical pressure by the print roller.

[0003] When one kind of light among R, G, and B, i. e., monochromatic light is selected and irradiated onto full color print paper with three kinds of photosensitive microcapsules applied thereon, among the three kinds of, i.e., M, Y, and C photosensitive microcapsules, only the photosensitive microcapsules with a photo-curing material encapsulated therein which is in a complementary relation with the selected monochromatic light react with the light to cure, and the other two kinds do not cure. More specifically, in the case where the R light is irradiated, the photo-curing material encapsulated in the C photosensitive microcapsules react with the red light to cure, while the other two kinds of, (i.e., the M and Y) photosensitive microcapsules do not cure. In this state, when pressure is applied to the print paper using the print roller, the M and Y photosensitive microcapsules completely collapse while the C photosensitive microcapsules do not collapse or collapse incompletely depending on the extent of the cure. Thus, M and Y color developing materials get in contact with the image receiving layer of the print paper, and the region develops red color, which is the mixture of M and Y. The tone of the red color which is the mixture of M and Y varies depending on the extent of the cure of the C photosensitive microcapsules. This is because the C photosensitive microcapsules do collapse, though incompletely, and a C color developing material gets in contact with the image receiving layer. Similarly, in the case where the G light is irradiated, green color which is the mixture of Y and C is developed. Further, in the case where the B light is irradiated, blue color which is the mixture of M and C is developed.

[0004] In short, in the case where one among three kinds of light having different wavelength, i.e., R, G, and B is selected and irradiated onto the full color print paper with the three kinds of photosensitive microcapsules applied thereto, the region where the selected light is irradiated develops a color which is the mixture of M and Y, Y and C, or C and M. Further, in the case where two kinds of light among R, G, and B are selected and irradiated onto the full color print paper, the region where the selected two kinds of light are irradiated develops a color corresponding to M, Y, or C. A region where none of these kinds of light is irradiated develops a color which corresponds to all of M, Y, and C, i.e., black. The tone, chroma, and brightness of the printing is adjusted by adjusting the intensity of the irradiated light and the irradiation time.

[0005] A printer which carries out printing on a full color print paper with photosensitive microcapsules applied thereto according to the above-mentioned process comprises, for example, as shown in Fig. 6, a printer head 1 provided with light emitting devices for selectively irradiate light onto the print paper to form a latent image, a print roller 2 for applying pressure to the print paper with the latent image formed thereon to carry out development, a carriage 3, a paper feed mechanism 4 for moving the print paper at a predetermined speed in one direction, a display unit 5 provided with solid display devices, a drive portion 6, and a control portion 7. The drive portion 6 comprises a PWM type photosensitive control circuit for controlling the selective light emission and the amount of irradiation of the light emitting devices of the printer head 1, a carriage drive portion for reciprocating the carriage 3 perpendicularly to the direction of movement of the print paper, a roller drive portion for driving the print roller 2, a paper feed drive portion for driving the paper feed mechanism 4, and a display unit drive portion. The printer further comprises an input means 8 for inputting image data given by a flash memory card or transmission signals of image apparatus such as a digital camera, and a setting means 9 for setting various parameters of the printer and for image editing in the control portion 7.

[0006] An example of the conventional printer head 1 used for carrying out printing on full color print paper has, as shown in Fig. 7, nine LEDs attached to a head substrate 10 in three rows and three columns. The first column is a red LED group consisting of 11R1, 11R2, and 11R3, the second column is a green LED group consisting of 11G1, 11G2, and 11G3, and the third column is a blue LED group consisting of 11B1, 11B2, and 11B3. An aperture plate 13 has nine beam restricting pores formed in three rows and three columns. The first column is a beam restricting pore group for the red LEDs consisting of 12R1, 12R2, and 12R3, the second column is a beam restricting pore group for the green LEDs consisting of 12G1, 12G2, and 12G3, and the third column is a beam restricting pore group for the blue LEDs consisting of 12B1, 12B2, and 12B3. The respective beam restricting pores are provided so as to face the corre-

sponding LEDs concentrically.

[0007] As described in the above, the printer head 1 is provided with not one but three LEDs as the light emitting devices with regard to each of red, green, and blue. This is because, in order to form on the print paper with the photosensitive microcapsules applied thereto a latent image having resolution which can be rendered by the printer, light beams from the LEDs have to be restricted such that the color development diameter is about the resolution, and light energy of only one LED for each color is insufficient to attain this. Here, a color development diameter of a light beam means the diameter of a locus circle of irradiation by the light beam of an LED as a light emitting device of print paper with photosensitive microcapsules applied thereto, that is, the diameter of an exposure dot, which substantially equals to the pore size of the beam restricting pore in the aperture plate.

[0008] If the three light emitting devices are replaced by four or more light emitting devices for each color, sufficient light energy can be obtained. However, this disagrees with requirements for a small-sized printer such as lower cost, smaller apparatus, and more energy saving, and thus, is not realistic. Another thing which can be contemplated would be to improve the sensitivity of the print paper with photosensitive microcapsules applied thereto, but the present situation is that the sensitivity can not be improved so much for reasons of handling. Therefore, printer heads provided with not each one but each two or three red, green, and blue LEDs as the light emitting devices are put to practical use. In order to obtain sufficient light energy for printing with this restricted number of the light emitting devices, the pore size of the beam restricting pores in the aperture plate 13 can not be the resolution and is made to be about one and a half times as large as the resolution (see circles in Fig. 4). This causes a problem that pixels adjacent to a print pixel are also irradiated, the dispersive power of print pixels is decreased, and an image is blurred. Further, since the blur of an image is caused using light energy, there is a problem that the energy is wasted.

[0009] A problem to be solved by the invention is to provide an optical writing printer head capable of forming a clear latent image on photosensitive print paper such as print paper with photosensitive microcapsules applied thereto, and to provide an optical writing printer provided with the printer head. Another problem to be solved by the invention is, in an optical writing printer head comprising a light emitting module including a plurality of light emitting sources with regard to each of N (N is an integer which is 1 or larger) kinds attached onto a substrate and having different wavelengths and an aperture plate disposed at a predetermined distance from the light emitting module and having beam restricting pores formed therein at positions corresponding to the light emitting sources, to utilize efficiently in optical writing the energy irradiated by the light emitting sources.

[0010] In order to solve the above-mentioned problems, an optical writing printer head is formed of at least a light emitting module including N kinds of light emitting sources for printing attached onto a substrate and having different wavelengths and light emitting sources for preexposure provided for the respective wavelengths, and an aperture plate disposed at a predetermined distance from the light emitting module and having beam restricting pores formed therein at positions corresponding to the light emitting sources, and the pore size of the beam restricting pores in the aperture plate and corresponding to the light emitting sources for printing is determined so that the diameter of developed color of the light beam irradiated by the beam restricting pores is about the resolution of the printer, while the pore size of the beam restricting pores in the aperture plate and corresponding to the light emitting sources for preexposure is larger than that.

[0011] As the light emitting sources for preexposure, light emitting sources having the same wavelengths as those of the corresponding light emitting sources for printing, respectively, or, white light emitting sources such as white LEDs are used. As the N kinds of light emitting sources for printing having different wavelengths, ones formed of a red LED, a green LED, and a blue LED, ones formed of discharge light emitting lamps, or ones formed of filament lamps using a wavelength filter and optical shutters are used.

[0012] Further, in order to solve the above-mentioned problems, in an optical writing printer for scanning print paper with photosensitive microcapsules applied thereto with an optical writing printer head to form a latent image and applying mechanical pressure to the print paper with the latent image formed thereon using a print roller to carry out development, the optical writing printer head is formed of at least a light emitting module and an aperture plate disposed at a predetermined distance from the light emitting module. The light emitting module is formed of a red LED for printing, a green LED for printing, and a blue LED for printing attached onto a substrate and a red LED for preexposure, a green LED for preexposure, and a blue LED for preexposure provided for red, green and blue colors, respectively, and the aperture plate has beam restricting pores formed therein at positions corresponding to the LEDs for printing, the pore size of the beam restricting pores being determined so that the diameter of developed color of the light beam irradiated by the pores is about the resolution of the printer, and beam restricting pores formed therein at positions corresponding to the LEDs for preexposure, the pore size of the beam restricting pores being determined so that the diameter of developed color of the light beam irradiated by the beam restricting pores is larger than the resolution of the printer. Further, another optical writing printer is formed by replacing the red LED for preexposure, the green LED for preexposure, and the blue LED for preexposure with white LEDs.

[0013] For a more better understanding of the present

invention, reference is made of a detailed description to be read in conjunction with the accompanying drawings, in which:

Fig. 1 is a perspective view of an embodiment of an optical writing printer head according to the present invention;

Fig. 2 is a diagram showing printing characteristics of print paper with photosensitive microcapsules applied thereto, i.e., the relationship between irradiation energy and the density of the developed color;

Fig. 3 is an illustration of a red line which is printed on print paper with photosensitive microcapsules applied thereto and which is about the resolution of a printer;

Fig. 4 is an illustration for explaining the size and the number of irradiation locus circles and the number of irradiation in the case where the red line in Fig. 3 is printed and the print paper with photosensitive microcapsules applied thereto is irradiated;

Fig. 5 is a sectional view of an embodiment of a carriage provided with a printer head of a printer using print paper with photosensitive microcapsules applied thereto;

Fig. 6 is a block diagram showing the structure of a printer using print paper with photosensitive microcapsules applied thereto; and

Fig. 7 is a perspective view of a conventional optical writing printer head.

[0014] Fig. 1 shows an embodiment of the present invention and is a perspective view of a printer head 1 used in carrying out printing on full color print paper. In Fig. 1, the printer head 1 has a light emitting module formed of nine LEDs attached to a head substrate 10 in three rows and three columns. The first column is a red LED group consisting of 11R1, 11R2, and 11R3, the second column is a green LED group consisting of 11G1, 11G2, and 11G3, and the third column is a blue LED group consisting of 11B1, 11B2, and 11B3.

[0015] Among the nine LEDs forming the light emitting module, light emitting sources for preexposure attached onto the substrate are the red LED 11R1, the green LED 11G1, and the blue LED 11B1 disposed in the first row.

[0016] Here, preexposure means preliminary light irradiation immediately before printing is carried out on a medium on which printing can not be carried out by an optical writing printer head if light energy at a certain level is not given, for example, print paper with photosensitive microcapsules applied thereto, onto the media to give the media light energy at a level with which printing can not be carried out but printing operation immediately after that can be carried out efficiently. Fig. 2 shows printing characteristics of print paper with photosensitive microcapsules applied thereto. The horizontal axis denotes light energy given by an optical writing printer head to the print paper, while the vertical axis denotes the density of printing on the print paper. In case of the print paper with photosensitive microcapsules applied thereto having the characteristics shown in Fig. 2, the light energy used for the preexposure corresponds to a threshold level (a point P on the characteristic curve) at which there is a shift from a state where almost no change is observed to a state where remarkable change is observed as the light energy increases.

[0017] Among the nine LEDs forming the light emitting module, N kinds of light emitting sources for printing attached onto the substrate and having different wavelengths are three kinds of light emitting devices having different wavelengths, i.e., the red LED 11R2, the green LED 11G2, and the blue LED 11B2 disposed in the second row and the red LED 11R3, the green LED 11G3, and the blue LED 11B3 disposed in the third row.

[0018] An aperture plate 13 has nine beam restricting pores formed in three rows and three columns. The first column is a beam restricting pore group for the red LEDs consisting of 12R1, 12R2, and 12R3, the second column is a beam restricting pore group for the green LEDs consisting of 12G1, 12G2, and 12G3, and the third column is a beam restricting pore group for the blue LEDs consisting of 12B1, 12B2, and 12B3. The respective beam restricting pores are provided so as to face the corresponding LEDs concentrically.

[0019] Among the above-mentioned nine beam restricting pores, the pore size of the beam restricting pore 12R1 for the red LED, the beam restricting pore 12G1 for the green LED, and the beam restricting pore 12B1 for the blue LED in the first row corresponding to the red LED 11R1, the green LED 11G1, and the blue LED 11B1, respectively, disposed in the first row on the head substrate 10 is determined so that the diameter of developed color of the light beam irradiated by these beam restricting pores is larger than the resolution of the printer. It is considerably larger than the pore size of the beam restricting pores provided in the aperture plate 13 of the conventional printer head 1 shown in Fig. 7.

[0020] Among the above-mentioned nine beam restricting pores, the pore size of the beam restricting pore 12R2 for the red LED, the beam restricting pore 12G2 for the green LED, and the beam restricting pore 12B2 for the blue LED in the first row corresponding to the red LED 11R2, the green LED 11G2, and the blue LED 11B2, respectively, disposed in the second row on the head substrate 10, and of the beam restricting pore 12R3 for the red LED, the beam restricting pore 12G3 for the green LED, and the beam restricting pore 12B3 for the blue LED in the second row corresponding to the red LED 11R3, the green LED 11G3, and the blue LED

11B3, respectively, disposed in the third row on the head substrate 10 is determined so that the diameter of developed color of the light beam irradiated by these beam restricting pores is about the resolution of the printer.

[0021] A side plate 14 secures the aperture plate 13 at a predetermined distance from the head substrate 10, and also functions as a cover. Separator plates provided among LEDs for preventing horizontal leakage of light from the LEDs are also provided in the printer head according to the present invention, but are omitted in Fig. 1 for the purpose of clarifying the positional relationship between the LEDs and the beam restricting pores.

[0022] Fig. 5 is a partial sectional view of an embodiment of the carriage 3 with the printer head 1 and a print roller 2 attached thereto. The carriage 3 is substantially formed of a generally box-shaped carriage member 18 for running on a guide rail 21, and a printer head support member 19 and a print roller support member 20 both secured to a lower portion of the carriage member 18. The carriage 3 is reciprocated perpendicularly to the paper feed direction by a carriage drive portion. It is to be noted that a drive mechanism 22 for driving the carriage member 18 forms a part of a carriage drive portion including a drive motor and a power transmission mechanism which are not shown. Separator plates 15 omitted in Fig. 1 are provided between the red LED group in the first column and the green LED group in the second column and between the green LED group in the second column and the blue LED group in the third column, respectively.

[0023] An embodiment of an optical writing printer according to the present invention is, in an optical writing printer for scanning print paper with photosensitive microcapsules applied thereto with an optical writing printer head to form a latent image and applying mechanical pressure to the print paper with the latent image formed thereon using a print roller to carry out development, the optical writing printer head is structured as shown in Fig. 1.

[0024] More specifically, the optical writing printer head used in the optical writing printer according to the present invention comprises, as shown in Fig. 1, the light emitting module formed of the red LEDs 11R2 and 11R3 for printing, the green LEDs 11G2 and 11G3 for printing, and the blue LEDs 11B2 and 11B3 for printing attached onto the head substrate 10 and the red LED 11R1 for preexposure, the green LED 11G1 for preexposure, and the blue LED 11B1 for preexposure provided for red, green and blue colors, respectively, and the aperture plate 13 disposed at a predetermined distance from the light emitting module and having the beam restricting pores 12R2 and 12R3, 12G2 and 12G3, and 12B2 and 12B3 formed therein at positions corresponding to the LEDs for printing, the pore size of the beam restricting pores being determined so that the diameter of developed color of the light beam irradiated by said pores is about the resolution of the printer, and beam restricting pores 12R1, 12G1, and 12B1 formed therein at positions corresponding to the LEDs for preexposure, the pore size of the beam restricting pores being determined so that the diameter of developed color of the light beam irradiated by said beam restricting pores is larger than the resolution of the printer.

[0025] A printer which carries out printing on full color print paper with photosensitive microcapsules applied thereto according to the present invention comprises, for example, as shown in Fig. 6, the printer head 1, the print roller 2, the carriage 3, a paper feed mechanism 4, a display unit 5 provided with solid display devices, a drive portion 6, a control portion 7, an input means 8, and a setting means 9. The control portion 7 comprises a CPU, a ROM, a RAM, an input/output interface I/O, and a bus for interconnecting them. The drive portion 6 comprises a PWM type photosensitive control circuit for controlling the selective light emission and the amount of irradiation of the light emitting devices of the printer head 1, a carriage drive portion, a roller drive portion, a paper feed drive portion, and a display unit drive portion.

[0026] In the case where printing is carried out on the full color print paper with the photosensitive microcapsules applied thereto having the printing characteristics as shown in Fig. 2 with the optical writing printer head 1 shown in Fig. 1 provided with the light emitting module including the light emitting sources for printing and the light emitting sources for preexposure, the printer head 1 carries out exposure when it moves in a direction shown by an arrow in Fig. 1. More specifically, first, the light emitting sources for preexposure disposed in the first row, i.e., the red LED 11R1, the green LED 11G1, and the blue LED 11B1 carry out preexposure by irradiating light onto the print paper through the corresponding beam restricting pores 12R1, 12G1, and 12B1.

[0027] Immediately after the preexposure, the light emitting sources for printing disposed in the second row, i.e., the red LED 11R2, the green LED 11G2, and the blue LED 11B2 carry out printing at the first stage by irradiating light onto the print paper through the corresponding beam restricting pores 12R2, 12G2, and 12B2. Immediately after this printing at the first stage, the light emitting sources for printing disposed in the third row, i.e., the red LED 11R3, the green LED 11G3, and the blue LED 11B3 carry out printing at the second stage by irradiating light onto the print paper through the corresponding beam restricting pores 12R3, 12G3, and 12B3. This is the completion of printing with respect to a specific pixel.

[0028] By the way, Fig. 4 where eighteen circles having the same diameter are regularly positioned shows by the circles the loci of the light beams irradiated by the LEDs of the printer head 1 through the respective beam restricting pores in the case where a red line L shown in Fig. 3, i.e., a red line having the width corresponding to the resolution of the printer and having the length four times as long as the resolution of the printer is printed on full color print paper with photosensitive microcapsules applied thereto. It is to be noted that, in Fig. 3, the

fourteen squares W around the red line L denote white data.

[0029] In Fig. 4, in the case where a printer head provided with each one LED for red, green, and blue colors and each one corresponding beam restricting pore having the same diameter is used, to irradiate all of circles a, b, c, and d with a LED for one color, is discussed. In the case where if white data are printed in this region, since all the circles a, b, c, and d are irradiated by the LEDs for the three colors, a region A is irradiated twelve times. It is to be noted that in case of printing the pattern that is shown in Fig. 3, one of the twelve times is irradiation for printing red data. Therefore, the region A is irradiated ten times, a region B is irradiated five times, a region C is irradiated four times, and a region D is irradiated two times. In the case where the conventional printer head shown in Fig. 7 provided with each three LEDs and each one corresponding beam restricting pore having the same diameter is used, the numbers of irradiation are three times as large as those, respectively. As is clear from Figs. 3 and 4, with the conventional printer head, the number of irradiation by the LEDs is not the same in the printing range of the red line surrounded by the white data. The number is small in the center region, while the number is large in a peripheral region, which is five times as large as that in the center region at the maximum. This makes it impossible to print a clear red line as shown in Fig. 3.

[0030] On the other hand, the optical writing printer head for carrying out irradiation for preexposure and for printing according to the present invention carries out irradiation with the LEDs for preexposure through the beam restricting pores the pore size of which is determined so that the diameter of developed color of the light beam is larger than the resolution of the printer, more specifically, an irradiation locus circle of which is larger than the irradiation locus circle in Fig. 4, and carries out irradiation with the LEDs for printing through the beam restricting pores the pore size of which is determined so that the diameter of developed color of the light beam is about the resolution of the printer. According to the present invention, the irradiation locus circles of the preexposure overlap one another as ever, but since the irradiation energy by the LEDs for preexposure does not reach the threshold but is almost the threshold, the preexposure does not cause printing on the print paper with the photosensitive microcapsules applied thereto.

[0031] Immediately after the preexposure as preliminary preparation, irradiation by the LEDs for printing is carried out. Since irradiation for printing causes increase in the light energy and the light energy immediately exceeds the threshold shown in Fig. 2, the density of printing immediately begins to change, and decreases substantially linearly along the characteristic curve shown in Fig. 2. In addition, since the LEDs for printing carry out irradiation through the beam restricting pores the pore size of which is determined so that the diameter of developed color of the light beam is about the resolution of the printer, adjacent irradiation locus circles for printing do not overlap one another, and thus, the printing is extremely clear.

[0032] In the above-mentioned embodiment of the optical writing printer head where each three LEDs for red, green, and blue colors are disposed in the three columns and the three rows, the LEDs for preexposure are only in the first column. However, the second column may also be the LEDs for preexposure and the LEDs for printing may be only in the third column. In this case, it is preferable that the pore size of the beam restricting pores in the second column in the aperture plate 13 and corresponding to the LEDs for preexposure in the second column is, similarly to that of the beam restricting pores in the first column, determined so that the diameter of developed color of the light beam irradiated by these beam restricting pores is larger than the resolution of the printer.

[0033] It is to be noted that an optical printer head according to the present invention can be implemented not only by using, as the light emitting sources for preexposure, the light emitting sources having the same wavelengths as those of the corresponding light emitting sources for printing, respectively, as shown in Fig. 1, but also by using white light sources such as white LEDs.

[0034] Similarly, an optical printer head according to the present invention can be implemented not only by using, as the N kinds of light emitting sources for printing having different wavelengths, the ones formed of the red LEDs, the green LEDs, and the blue LEDs as shown in Fig. 1, but also by using ones formed of discharge light emitting lamps, ones formed of filament lamps using a wavelength filter and optical shutters are used.

[0035] An optical writing printer according to the present invention is an optical writing printer head comprising a light emitting module including light emitting sources for preexposure and light emitting sources for printing and an aperture plate disposed at a predetermined distance from the light emitting module and having beam restricting pores formed therein at positions corresponding to the light emitting sources, and the pore size of the beam restricting pores in the aperture plate and corresponding to the light emitting sources for printing is determined so that the diameter of developed color of the light beam irradiated by these beam restricting pores is about the resolution of the printer, while the pore size of the beam restricting pores in the aperture plate and corresponding to the light emitting sources for preexposure is larger than that, and thus, the optical writing printer head has an excellent advantage that it can carry out extremely clear printing.

[0036] In addition, while, with a conventional optical writing printer head, not only the printing is not clear but also light energy is wasted in carrying out such unclear printing, according to the present invention, such a thing does not happen, and the light energy is efficiently utilized to bring about various effects such as more energy saving, more power saving, and decrease in the amount

of heat generation. Therefore, not only the optical writing printer head according to the present invention but also a printer provided with this advantageous printer head has effects such as smaller apparatus and lower cost.

Claims

1. An optical writing printer head comprising:

   a light emitting module including N kinds of light emitting sources for printing attached onto a substrate and having different wavelengths and light emitting sources for preexposure provided for the respective wavelengths; and

   an aperture plate disposed at a predetermined distance from said light emitting module and having beam restricting pores formed therein at positions corresponding to said light emitting sources, wherein:

   the pore size of said beam restricting pores in said aperture plate and corresponding to said light emitting sources for printing is determined so that the diameter of developed color of the light beam irradiated by said beam restricting pores is about the resolution of the printer; and

   the pore size of said beam restricting pores in said aperture plate and corresponding to said light emitting sources for preexposure is larger than that.

2. An optical writing printer head as claimed in claim 1 wherein, said light emitting sources for preexposure have the same wavelengths as those of said corresponding light emitting sources for printing, respectively.

3. An optical writing printer head as claimed in claim 1 wherein, said light emitting sources for preexposure are white light sources.

4. An optical writing printer head as claimed in claim 3 wherein, said light emitting sources for preexposure are white LEDs.

5. An optical writing printer head as claimed in claim 1 wherein, said N kinds of light emitting sources for printing having different wavelengths are formed of a red LED, a green LED, and a blue LED.

6. An optical writing printer head as claimed in claim 1 wherein, said N kinds of light emitting sources for printing having different wavelengths are formed of discharge light emitting lamps.

7. An optical writing printer head as claimed in claim 1 wherein, said N kinds of light emitting sources for printing having different wavelengths are formed of filament lamps using a wavelength filter and optical shutters.

8. An optical writing printer for scanning print paper with photosensitive microcapsules applied thereto with an optical writing printer head to form a latent image and applying mechanical pressure to said print paper with the latent image formed thereon using a print roller to carry out development wherein, said optical writing printer head comprises:
   a light emitting module including:

   a red LED for printing, a green LED for printing, and a blue LED for printing attached onto a substrate; and

   a red LED for preexposure, a green LED for preexposure, and a blue LED for preexposure provided for red, green and blue colors, respectively; and

   an aperture plate disposed at a predetermined distance from said light emitting module and having:

   beam restricting pores formed therein at positions corresponding to said LEDs for printing, the pore size of said beam restricting pores is determined so that the diameter of developed color of the light beam irradiated by said pores is about the resolution of the printer; and

   beam restricting pores formed therein at positions corresponding to said LEDs for preexposure, the pore size of said beam restricting pores is determined so that the diameter of developed color of the light beam irradiated by said beam restricting pores is larger than the resolution of said printer.

9. An optical writing printer as claimed in claim 8 wherein, said red LED for preexposure, said green LED for preexposure, and said blue LED for preexposure are replaced by white LEDs.

FIG. 1

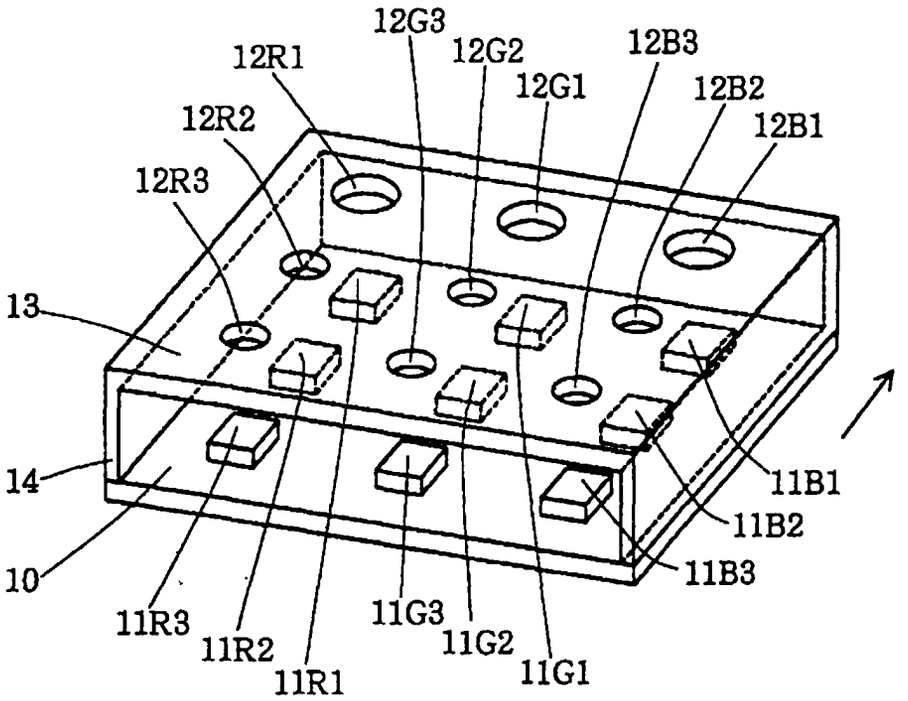

12G3
12R1
12G2
12B3
12G1
12B2
12R2
12B1
12R3
13
14
11B1
11B2
10
11B3
11R3
11G3
11R2
11G2
11R1
11G1

FIG. 2

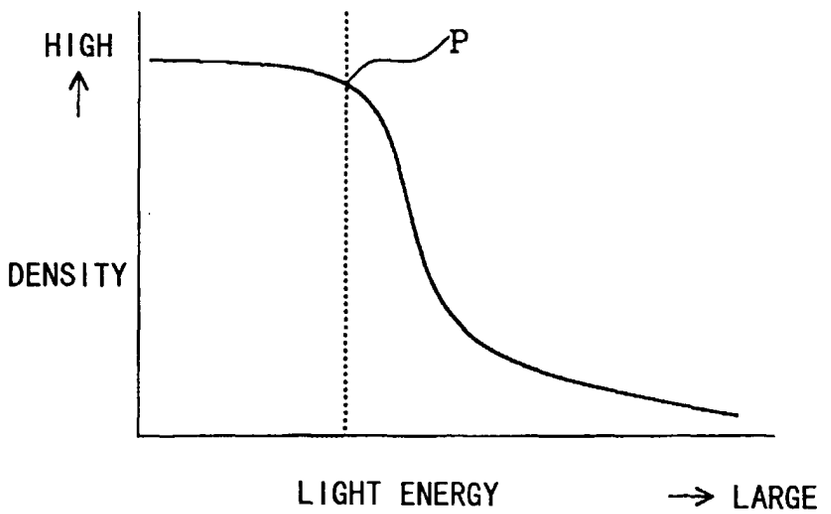

HIGH
P
DENSITY
LIGHT ENERGY
→ LARGE

FIG. 3

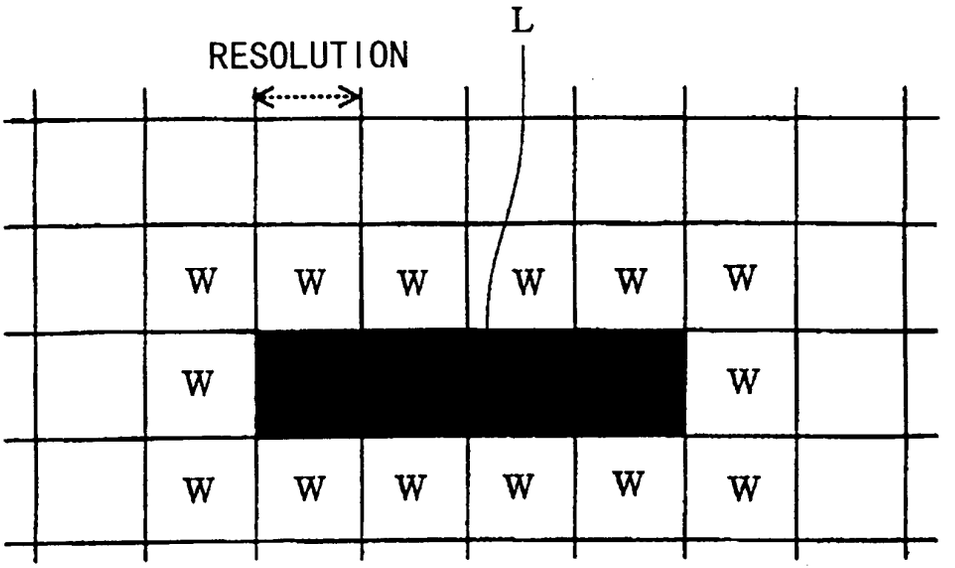


FIG. 4

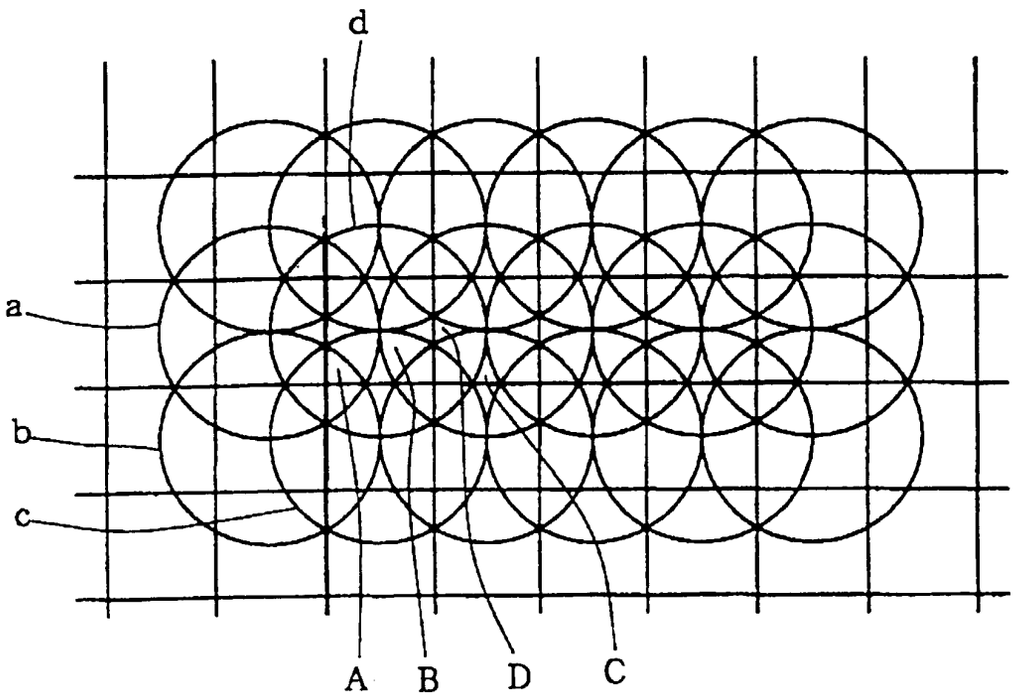
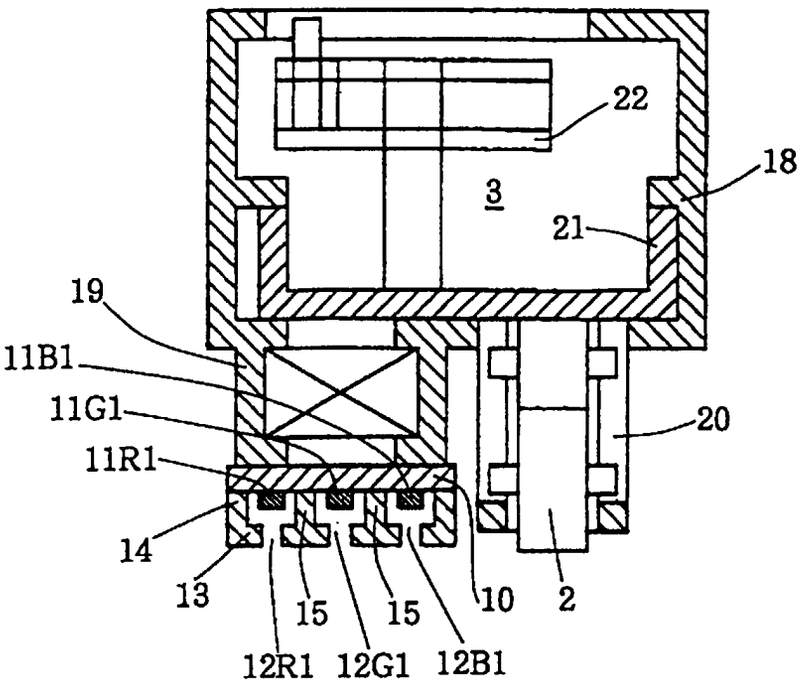


FIG. 5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18
3
21
19
11B1
11G1
11R1
20
14
13
15
15
10
2
12R1
12G1
12B1

FIG. 6

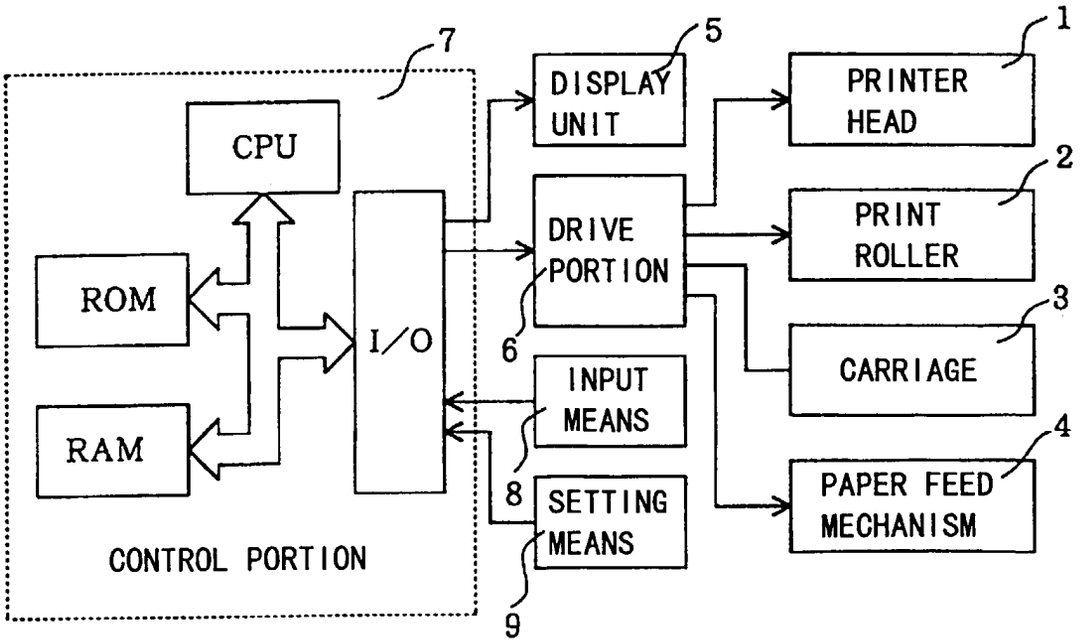
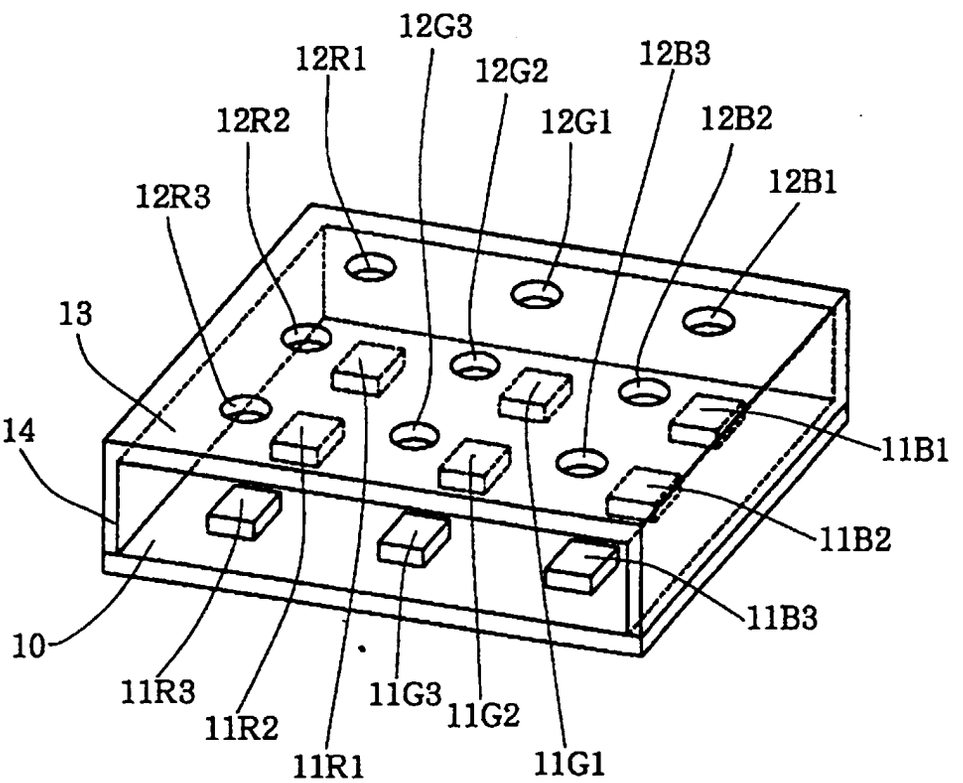

7
5
1
DISPLAY UNIT
PRINTER HEAD
CPU
2
PRINT ROLLER
DRIVE PORTION
ROM
I/O
6
3
CARRIAGE
INPUT MEANS
RAM
4
8
SETTING MEANS
PAPER FEED MECHANISM
CONTROL PORTION
9

FIG. 7
PRIOR ART



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EUROPEAN SEARCH REPORT

Application Number
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	24 November 1999	De Groot, R

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