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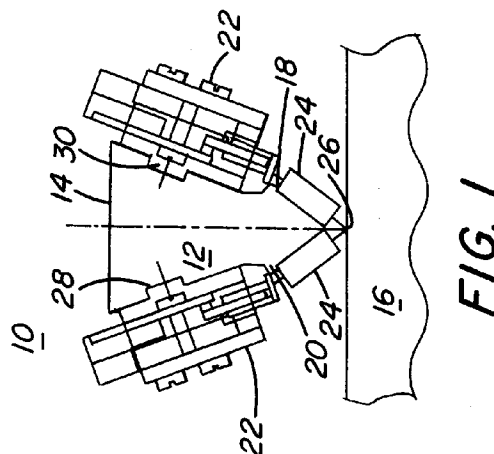
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(54) **Wide track edge emitter assembly.**

(57) A wide track edge emitter assembly is provided which includes a series of edge emitter assemblies provided on the opposing bottom surfaces of an angled rod. The edge emitter assemblies are provided on opposing angled surfaces in an overlapping and alternating arrangement. The focal point of each of the edge emitter assemblies is adjusted so that it falls along the same line on the light receiving surface for the wide track assembly. In this manner, oversized documents having a width greater than 8.5 inches can be printed using a single wide track assembly.



BACKGROUND OF THE INVENTION

1. Field Of The Invention

This invention relates generally to a high resolution light source formed from a thin film electroluminescent edge emitter assembly and, more particularly, to a wide track edge emitter assembly adapted for greater than standard width applications.

2. Description of the Prior Art

It is well known that an electroluminescent device generally, and particularly a thin film electroluminescent edge emitting device, may be utilized to provide an electronically controlled, high resolution light source. One such type of application is disclosed in United States Patent No. 4,535,341 to Kun et al. which is assigned to the assignee of the present invention.

This patent discloses a thin film electroluminescent line array emitter structure which includes a first dielectric layer disposed on a common electrode, a second dielectric layer spaced from the first dielectric layer, a phosphor layer interposed between the first and second dielectric layers and an excitation or top electrode disposed on the second dielectric layer. At least one of the electrodes, for example, the excitation or top electrode, is segmented to form a plurality of individual control electrodes. The plurality of individual control electrodes in combination with the remaining structure define a plurality of individual light-emitting pixels.

Another example of a device which utilizes an electroluminescent light-emitting unit as a light source is illustrated in United States Patent No. 4,734,723. This patent discloses an electrophotographic printer which includes an optical head formed from a plurality of electroluminescent devices positioned along one edge of a substrate. A plurality of light wave guide strips are also formed on the substrate in association with the electroluminescent devices, and the wave guide strips serve to transmit the light from the electroluminescent devices to the other edge of the substrate which is brought into a face-to-face relationship with the printer photoreceptor.

Japanese Laid-Open Patent Application KoKi Number 63-91998 discloses an EL luminescent edge emitter array in which the upper side of metallic electrode wraps around the reflecting end surface of the luminescent layer. Each of the EL elements in the array is surrounded by an insulating film whose refractive index is lower than that of the EL layer. The array further includes a discharge prevention area between the bottom electrode and the reflecting end of the top metallic electrode.

United States Patent No. 4,951,064 discloses a thin film electroluminescent edge emitter assembly

which includes a packaging assembly surrounding at least a portion of the edge emitter structure to enclose the linear array of light-emitting pixels in a contaminant-free environment. The wall of the packaging assembly adjacent to the array of pixels is made from a translucent material which permits light energy emitted by selected pixels of the array interior to the packaging assembly to pass through the wall of the packaging assembly. In one embodiment of the assembly shown as Figure 7, a series of edge emitter assemblies are provided within the same packaging to permit wide track printing. In this embodiment, adjacent edge emitter end portions overlap. However, because of the translucent material, light emitting edges of adjacent edge emitters are offset. As a result, the focal point of the adjacent edge emitter assemblies do not converge on the photoreceptor. Thus, the emitter assembly does not provide a continuous line.

Therefore, there is a need for a thin film electroluminescent edge emitter assembly adapted to provide wide track printing wherein the edge emitter assembly provides a composite, continuous light source for a light-receiving surface.

SUMMARY OF THE INVENTION

A thin film electroluminescent, composite light source assembly for directing light onto a light-receiving surface or photoreceptor is provided. An elongated rod means is positioned above the light-receiving surface. The rod means preferably has two angled bottom surfaces which are provided axially on the rod means.

A plurality of edge emitter assemblies are axially arranged on the rod means. Each of the edge emitter assemblies includes a thin film electroluminescent edge emitter structure disposed on a layer of substrate material. Each edge emitter structure has a configuration to define a linear array of spaced-apart light-emitting pixels. Each of the pixels includes a first surface disposed on the layer of substrate material associated therewith. A second surface spaced apart from the first surface, and a light-emitting edge surface extending between the first and second surfaces.

The plurality of edge emitter assemblies is oriented relative to each other on the rod means so that each assembly is positioned on the opposite bottom surface as that of its adjacent assemblies. In this arrangement, the light emitting edge surfaces of the pixels of each of the edge emitter assemblies are focused on the same line of the light receiving surface. Each end portion of one of the edge emitter assemblies overlaps an end portion of one of its adjacent assemblies. This arrangement enables the light-emitting pixels of the plurality of edge emitter assemblies to form a composite array of light-emitting pixels

of a desired overall length.

Lens means can be provided on the rod means immediately in the path of the light from each edge emitter assembly to the light-receiving surface. The lens means is adapted to focus and direct the light from the edge emitter assembly to the desired line on the light-receiving surface.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a schematic end view of a first presently preferred embodiment of the wide track edge emitter assembly of the present invention.

Figure 2 is a schematic bottom view of the wide track edge emitter assembly of Figure 1.

Figure 3 is a schematic end view of a second presently preferred embodiment of the wide track edge emitter assembly of the present invention.

Figure 4 is a schematic end view of a third presently preferred embodiment of the wide track edge emitter assembly of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The wide track edge emitter assembly design of the present invention includes two or more edge emitters mounted to a central rod to expose a page greater than 8.5 inches wide to the assembly. A standard edge emitter requires approximately 10 inches of space to expose 8.5 inches. Accordingly, when two or more edge emitters are used, the units must join or overlap the active part of each other and print in coincidence but without overlap to avoid double exposure. Two or more sections of a line being exposed may be aligned physically at the focal point on the photoreceptor or photo-sensitive paper. In an alternate mounting method, the emitters may be physically offset, with electronics controlling time delays between information arrivals at the various segments of the assembly.

Figure 1 is a cross section of wide track edge emitter assembly 10. Assembly 10 includes a central rod 12, preferably having a generally triangular cross section. Rod 12 includes base 14 by which assembly 10 can be secured above a light-receiving surface 16. Rod 12 also includes angled sides 18 and 20 upon which a plurality of edge emitter assemblies 22 are provided. A lens 24 may also be provided on each of sides 18 and 20 below each edge emitter assembly 22. The light emitted by edge emitter assembly 22 and focused by lens 24 is directed to a single focal point 26 provided on light-receiving surface 16. Assembly 10 is positioned at an appropriate height above light-receiving surface 16 so that the focal point 26 for the light emitted by the assemblies 22 on both sides 18 and 20 is at the same point.

Edge emitter assemblies 22 provided on sides 18

and 20 are axially offset from one another as shown in Figure 2. This alternating and overlapping arrangement is known in the art as stitching. By being axially offset on opposing sides 18 and 20, edge emitter assemblies 22 provide a continuous, composite array of light-emitting pixels of a desired overall length. Electrical interconnection of the edge emitter assemblies 22 enables the continuous printing of a line on light-receiving surface 16.

In the embodiment shown in Figure 1, rod 12 is provided with grooves 28 on each of sides 18 and 20. Grooves 28 cooperate with lips 30 provided in each edge emitter assembly 22 to provide axial adjustment of edge emitter 22 along the length of rod 12. Thus, each edge emitter assembly 22 can be precisely located relative to its adjacent assemblies 22. In addition, edge emitter assemblies 22 are also adapted to be adjustable transverse to the longitudinal axis of rod 12.

Figures 3 and 4 show alternative embodiments for wide track edge emitter assembly 10. In each of Figures 3 and 4, the stitching arrangement of edge emitter assemblies 22 shown in Figure 2 is applied. The wide track edge emitter assembly 32 of Figure 3 and wide track assembly 34 of Figure 4 merely provide different arrangements for the rod 12. Wide track assembly 32 of Figure 3 is narrower in cross-section but deeper in height than wide track assembly 10. Wide track assembly 34 of Figure 4 is wider in cross-section but shorter in height than wide track assembly 10. The particular arrangement of rod 12 chosen for wide track edge emitter assembly 10 is merely a function of the space available for the wide track assembly 10.

The angle of sides 18 and 20 of rod 12 is selected so that the focal points of the edge emitting light on either side of the rod converge on light receiving surface 16 along the line to be printed.

One advantage of the wide track edge emitter assembly 10 of the present invention is the ease with which electrical connections can be made in the assembly. A single conduit provided in rod 12 can be used to connect each of the edge emitter assemblies 22 to one another. This electrical connection can be easily arranged because the electrical connection for each edge emitter assembly 22 are made on the upper end of the assembly. Such electrical connection is strongly desirable to enable a continuous and sequential printing of a line by the combination of edge emitter assemblies 22.

In the face-to-face edge emitter assemblies of the prior art, the protective coating provided on the edge emitter surface prevents the convergence of the focal points on the same line on the photoreceptor. Moreover, electrical connections are much more difficult in the face-to-face assembly because electrical connections cannot be made in the buss bar because the connectors are on opposing sides of the

bar.

Each of lenses 24 provided on rod 12 are hard fastened to the rod 12. All the lenses are cofocused. Each edge emitter assembly 22 can be adjusted up or down along its respective side 18 or 20 so that it has a proper focal point 26 on light receiving surface 16.

In the foregoing specification certain preferred practices and embodiments of this invention have been set out, however, it will be understood that the invention may be otherwise embodied within the scope of the following claims.

Claims

1. A thin film electroluminescent, composite light source assembly (10) for directing light on to a light-receiving surface (16), comprising:
 - a. elongated rod means (12) provided above said surface (16), said rod means (12) having two angled bottom surfaces (18, 20) provided axially thereon; and
 - b. a plurality of edge emitter assemblies (22) axially arranged on said rod means (12), each of said plurality of edge emitter assemblies (22) including a thin film electroluminescent edge emitter structure disposed on a layer of substrate material, each structure having a configuration to define a linear array of spaced-apart, light-emitting pixels, each said pixel of each said structure including a first surface disposed on the layer of substrate material associated therewith, a second surface spaced from said first surface and a light-emitting edge surface extending between said first and second surfaces, said plurality of edge emitter assemblies (22) being oriented relative to each other on said rod means (12) so that each assembly (22) is positioned on the opposite bottom surface (18, 20) as that of its adjacent assemblies (22), with the light emitting edge surfaces of said pixels of each of said edge emitter assemblies being focussed (26) on the same line of said light-receiving surface (16), adjacent end portions of each of said plurality of edge emitter assemblies (22) overlapping each other to provide that the light-emitting pixels of said plurality of edge emitter assemblies (22) form a composite array of light-emitting pixels of desired overall length.
2. The assembly (10) of claim 1 further comprising a plurality of lens means (24) provided on said rod means (12), each of said plurality of lens means (24) positioned on one of said two angled bottom surfaces (18, 20) of said rod means (12) adjacent

to one of said plurality of edge emitter assemblies (22), said lens means (24) adapted to focus (26) and direct the light from said assembly (22) to said light-receiving surface (16).

3. The assembly (10) of claim 2 wherein each of said plurality of edge emitter assemblies (22) is adjustable axially on said rod means (12).
4. The assembly (10) of claim 1 wherein each of said plurality of edge emitter assemblies (22) is adjustable axially on said rod means (12).
5. The assembly (10) of claim 1 wherein each of said plurality of edge emitter assemblies (22) is transversely adjustable on said rod means (12).
6. The assembly (10) of claim 1 wherein said rod means (12) is generally triangular in cross-section, said cross-section including a base (14) and two sides (18, 20), each of said plurality of edge emitter assemblies (22) provided on one of said sides (18, 20) of said cross-section.
7. The assembly (10) of claim 6 wherein each side of said cross-section is grooved, said groove (28) corresponding to a lip (30) provided on each of said plurality of edge emitter assemblies (22) to permit axial adjustment of each of said edge emitter assemblies (22) on said rod means (12).

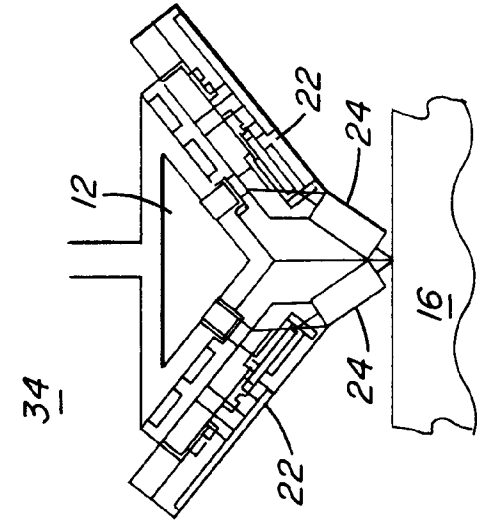


FIG. 1

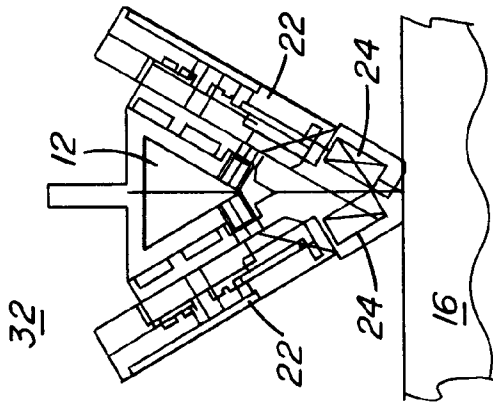


FIG. 2

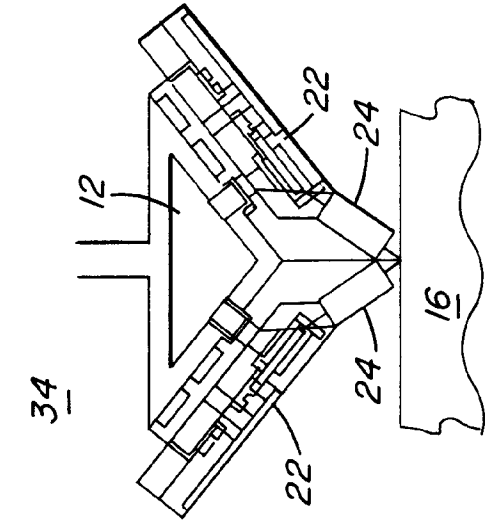


FIG. 3

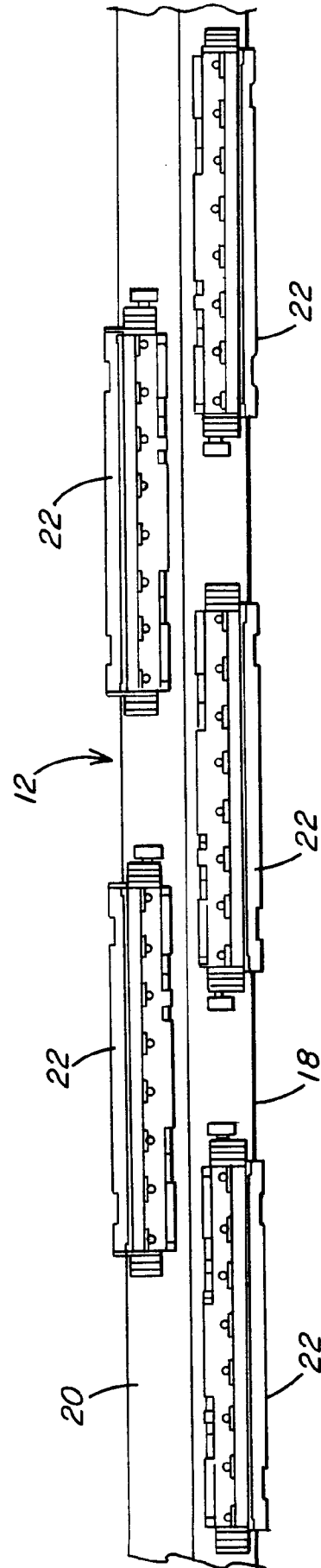


FIG. 4