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CHARACTER GENERATOR

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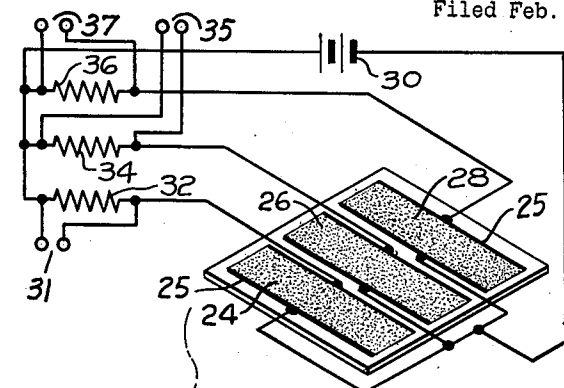


Fig. 1

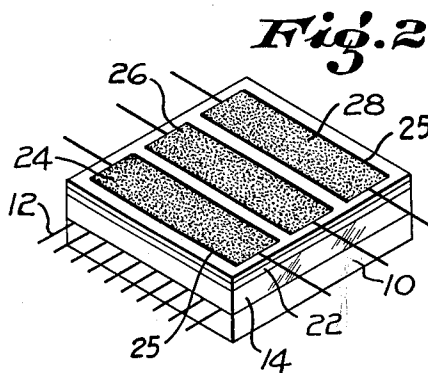


Fig. 2

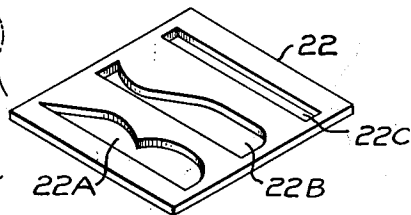


Fig. 3

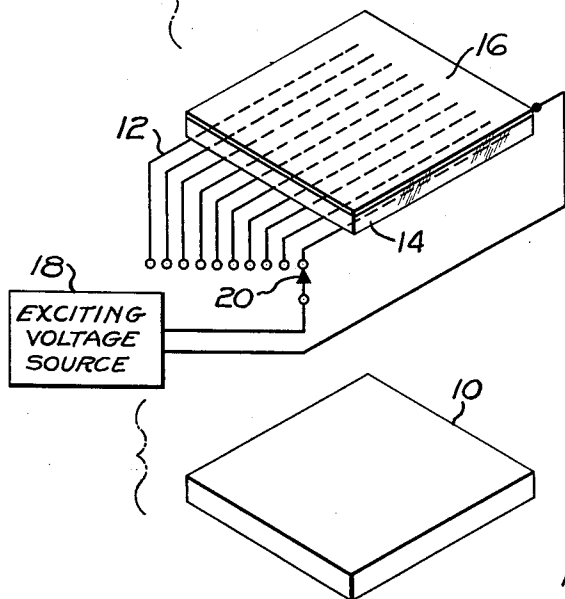
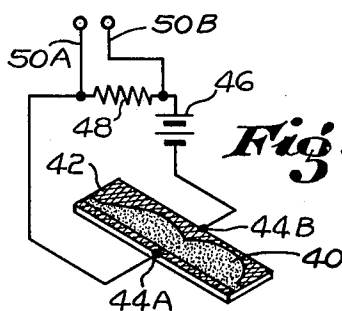


Fig. 4



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3,134,907

CHARACTER GENERATOR

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6 Claims. (Cl. 250-237)

This invention relates to apparatus which generates time-varying electrical signals representative of functions and, more particularly to improvements therein.

Waveform character generators have been devised employing a cathode ray tube as a scanning light source, a photoelectric pickup means, and a mask positioned between the photoelectric pickup means and the cathode ray tube face, which mask has cut therein an aperture in the shape of the desired character. Devices of this sort are bulky, expensive, and consume a great deal of electric power.

An object of the present invention is to provide a novel, wave-shaped generator which is more compact than those used heretofore.

Another object of the present invention is the provision of a novel waveform generator which consumes less power than those employed heretofore.

Yet another object of the present invention is the provision of an inexpensive, simple, solid-state waveform generator.

These and other objects of the present invention may be achieved in an arrangement wherein a scanning light source is constructed from a panel of electroluminescent material. This panel of material is excited in a manner to cause successive areas thereof to luminesce. There are then provided means responsive to the light from said electroluminescent material to provide electrical signals having a desired waveform shape. This includes a layer of photoconductive material. The waveforms generated may be supplied to the *x* and *y* deflection plates of a cathode ray tube to cause character image displays to be drawn on the screen in the manner shown and described in my copending application Serial No. 753,031, filed August 4, 1958, now Patent No. 3,025,342 and assigned to the common assignee hereof.

The novel features that are considered characteristic of this invention are set forth with particularity in the appended claims. The invention itself, both as to its organization and method of operation, as well as additional objects and advantages thereof, will best be understood from the following description when read in connection with the accompanying drawings, in which:

FIGURE 1 shows an exploded isometric view of the embodiment of this invention;

FIGURE 2 shows the embodiment of the invention as it appears when it is assembled;

FIGURE 3 shows a modification of the photosensitive device in accordance with this invention; and

FIGURE 4 shows an embodiment of the modification of the invention.

Referring now to the drawings, in FIGURE 1 may be seen an isometric view of the components of the embodiment of the invention which are separated one from the other. A scanning light source is comprised of a backing layer or substrate 10 on which there is placed a parallel grid of a plurality of conductors 12. On top of this grid there is placed a layer of electroluminescent material 14. On top of the layer of electroluminescent material is a layer of translucent conducting material which comprises a conductive sheet 16. The conductive sheet is connected to an exciting-voltage source 18. This exciting-voltage source successively is connected to the

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plurality of conductors 12 by any suitable means, such as a selector switch 20. As a result, successive areas of the electroluminescent material will luminesce in response to the application of the exciting voltage.

The luminescent material may comprise phosphors which are set in a dielectric material and then sandwiched between the conductor grid and the conductive sheet. This may then be potted in an epoxy resin, to keep out moisture.

A mask 22 has three apertures 22A, 22B, and 22C cut therein, by way of example, which apertures have the form of a desired function for which a representative electrical wave shape is sought. This mask is placed in proximity to the scanning light electroluminescent panel, so that only the light from the apertures will fall upon three adjacent photoconductive layers, respectively 24, 26, 28. These layers are opposite the three apertures in the mask. A source of potential 30 is connected across the three layers by ohmic contacts 25 through three resistors 32, 34, 36. The output waveform may be derived from across these three resistors at the respective output terminals 31, 35, 37.

The photoconductor material has a high resistance when dark and a much lower resistance when illuminated. Thus, as the luminescence on the scanning electroluminescent light panel occurs successively at a different area, photoconductor elements 24, 26, and 28 have different resistances depending upon the light passing through the apertures 22A, 22B, and 22C and illuminating the photoconductor elements. This causes the amplitude of the electrical energy passing through resistors 32, 34, and 36 to vary in amplitude in accordance with the size of the apertures cut in the mask. The electrical energy waveforms generated are taken off of the contacts placed across the resistors. With reference to the disclosure in my copending application Serial No. 753,031, filed August 4, 1958, now Patent No. 3,025,342, the waveform generated as a result of aperture 22A may be used to deflect an electron beam in a cathode ray tube in the *x* axis. The waveform generated through aperture 22B may be used to deflect the electron beam in the *y* axis and the waveform resulting from aperture 22C can be used to blank and unblank the beam generating unit in the cathode ray tube. It will be appreciated that the form of the apertures cut in the mask are by way of example and should not be construed as a limitation. Further, a set of masks may be used interchangeably if the photoconductive layers are not permanently clamped to the rest of the assembly. FIGURE 2 shows the assembled waveform generator. It will be appreciated that this is a compact, solid-state device which does not require a large amount of power to be operated.

A modification of the present invention is shown in FIGURE 3 with a semi-embodiment shown in FIGURE

4. The scanning light electroluminescent panel 14 which was previously shown is used here, and its operation therefore will not be redescribed. The photoconductive layer 40 itself is given the shape of the waveform desired. Contact is made with the edges of this layer by means of ohmic contact material 42. Terminals 44A, 44B make contact with the edges of the ohmic material. If desired, the photoconductive area may also be shaped with the ohmic contact running along the edges. Although only one shape is provided for the photoconductive layer, it will be appreciated that as many shapes and variations thereof as are desired may be used. Exciting voltage for the photoconductive layer is derived from a source 46 and applied to the ohmic contact area through a resistor 48. Terminals 50A and 50B are connected across the resistor 48 to provide the output from the waveform generator, consisting of a voltage whose amplitude varies as the scanning electroluminescent panel light source suc-

cessively excites the successive different-sized areas of the photoconductive layer.

The completed device is shown in FIGURE 4. The photoconductive layer 40 is placed on the luminescent layer 14, and the selector switch 20 is operated to cause a scanning light type of luminescence to occur. Output is obtained at the terminals 50A, 50B. One or more different shaped photoconductive layers may be employed simultaneously with the one light source.

There has been accordingly described and shown here a novel, useful, compact, and simple function generator which can be simply and quickly arranged for providing electrical signals representative of any function.

I claim:

1. Apparatus for generating electrical waveforms representative of a derived function comprising a layer of electroluminescent material, scanning means for supplying an exciting voltage to said electroluminescent layer to cause successive areas of said electroluminescent material to emit luminous energy, photoconductive means including at least one photoconductive element having a portion exposed to said luminous energy from successive areas of said luminescent material, the configuration of said portion exposed to said luminous energy being representative of the desired configuration of said visual presentation, said photoconductive element being characterized by a resistance which varies with the amount of luminous energy impinging thereupon, means for supplying a fixed potential to said photoconductive element, and output means including an impedance element connected in circuit with said photoconductive element for providing at least one variable output voltage during operation of said scanning means whose amplitude variation follows the resistance variation of said photoconductive element.

2. Apparatus for generating electrical waveforms representative of a derived function comprising a layer of electroluminescent material, scanning means for supplying an exciting voltage to said electroluminescent layer to cause successive areas of said electroluminescent material to emit luminous energy, photoconductive means including a photoconductive element having a portion exposed to said luminous energy from successive areas of said electroluminescent material, the configuration of said portion exposed to said luminous energy being representative of the desired configuration of said visual presentation, said photoconductive means being characterized by a resistance which varies with the amount of luminous energy impinging thereupon, an impedance element connected in series with said photoconductive element, means for providing a potential across said series combination of said impedance element and said photoconductive element, and output terminal means connected to said impedance element across which a variable output voltage is derived whose amplitude variation follows the resistance variation of said photoconductive element during operation of said scanning means.

3. Apparatus for generating electrical waveforms representative of a derived function comprising an array of spaced electrical conductors, a layer of electroluminescent material having one surface disposed adjacent said array, a sheet of translucent electrically conductive material disposed on the opposite surface of said layer, scanning means for successively connecting an exciting voltage between said sheet and individual ones of said conductors to cause successive areas of said electroluminescent material to emit luminous energy, photoconductive means including a photoconductive element having a configuration representative of the desired configuration of said visual presentation, said photoconductive element being juxtaposed with said electroluminescent layer and characterized by a resistance which varies with the amount of luminous energy impinging thereupon, means for supplying a potential across opposite edges of said photoconductive means, and output means including an impedance element connected in circuit with said photoconductive ele-

ment for providing a variable output voltage during operation of said scanning means whose amplitude variation follows the resistance variation of said photoconductive element.

4. Apparatus for generating electrical waveforms representative of a derived function comprising an array of spaced electrical conductors, a layer of electroluminescent material having one surface disposed adjacent said array, a sheet of translucent electrically conductive material disposed on the opposite surface of said layer, scanning means for successively connecting an exciting voltage between said sheet and individual ones of said conductors to cause successive areas of said electroluminescent material to emit luminous energy, photoconductive means including a photoconductive element juxtaposed with said layer of electroluminescent material and characterized by a resistance which varies with the amount of luminous energy impinging thereupon, means for providing a potential across opposite edges of said photoconductive element, masking means having at least one aperture therein of configuration representative of the desired configuration of said visual presentation, said masking means being disposed between said photoconductive element and said layer of electroluminescent material for masking off all luminous energy from said photoconductive element except that passing through said mask aperture, and output means including an impedance element connected in series with said photoconductive element across which a variable output voltage is derived during operation of said scanning means whose amplitude variation follows the resistance variation of said photoconductive element.

5. Apparatus for generating electrical waveforms representative of a derived function comprising an array of spaced electrical conductors, a layer of electroluminescent material having one surface disposed adjacent said array, a sheet of translucent electrically conductive material disposed on the opposite surface of said layer, scanning means for successively connecting an exciting voltage between said sheet and individual ones of said conductors to cause successive areas of said electroluminescent material to emit luminous energy, photoconductive means including a photoconductive element having a portion exposed to said luminous energy from said layer of electroluminescent material, the configuration of said portion being representative of the desired configuration of said visual presentation, said photoconductive means being characterized by a resistance which varies with the amount of luminous energy impinging thereupon, means for providing a potential across opposite edges of said photoconductive element, an impedance element connected in circuit with said photoconductive element, and output terminals connected to said impedance element across which a variable output voltage is derived during operation of said scanning means whose amplitude variation follows the resistance variation of said photoconductive element.

6. Apparatus for generating electrical waveforms representative of a derived function comprising a layer of electroluminescent material, scanning means for supplying an exciting voltage to said electroluminescent layer to cause successive areas of said electroluminescent material to emit luminous energy, photoconductive means including a plurality of photoconductive elements equal to the number of output voltages desired, each of said photoconductive elements having a distinct portion exposed to said luminous energy from successive areas of said luminescent material, the configuration of each of said portions exposed to said luminous energy being representative of the desired configuration of said visual presentation, said photoconductive element being characterized by a resistance which varies with the degree of luminous energy impinging thereupon, means for supplying a fixed potential to each of said photoconductive elements, and output means including an impedance element connected in circuit with each of said photoconductive elements for providing a variable output voltage during operation of

said scanning means whose amplitude variation follows the resistance variation of said photoconductive element.

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