

[54] **CATHODE RAY TUBE CHARACTER MASK WITH PLURALITY OF PERFORATIONS FOR EACH CHARACTER**

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[52] U.S. Cl.....313/86 KM, 313/78

[51] Int. Cl.....H01j 29/06, H01j 29/46

[58] Field of Search.....313/78, 86

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[57] ABSTRACT

A cathode ray tube for displaying characters and the like is provided with a character forming means comprising a character substrate provided with a plurality of character pattern perforations arranged in the form of characters, a plurality of parallel X-axis electrode elements each having a plurality of perforations and a plurality of parallel Y-axis electrode elements each having a plurality of perforations and these X- and Y-axis electrode elements are arranged in a matrix so that a desired character pattern region is determined by selecting the matrix coordinates of the electrode elements to shape the electron beam passing through the region by the character perforations of the character substrate.

5 Claims, 5 Drawing Figures

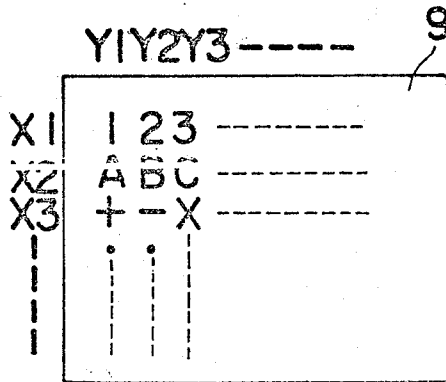


FIG. 1

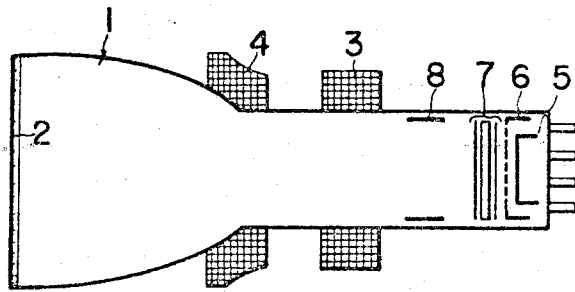


FIG. 2

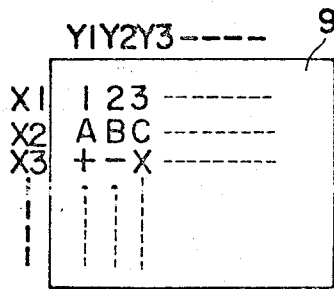


FIG. 3

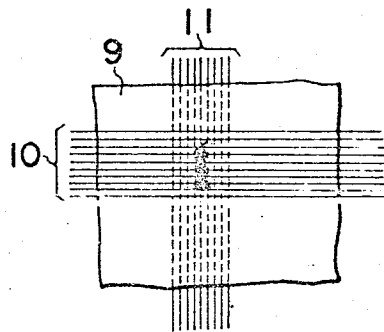


FIG. 4

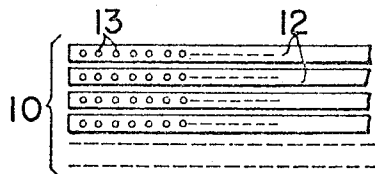
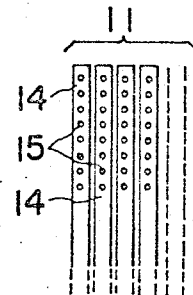


FIG. 5



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CATHODE RAY TUBE CHARACTER MASK WITH PLURALITY OF PERFORATIONS FOR EACH CHARACTER

BACKGROUND OF THE INVENTION

This invention relates to a novel cathode ray tube for displaying characters, numerals patterns and symbols (hereinafter merely termed as characters).

Among heretofore proposed cathode ray tubes for displaying characters may be mentioned the Typotron and Charactron. However, as these prior cathode ray tubes utilize deflecting electrodes for selecting characters strict accuracies are required to fabricate their electron guns, thus rendering difficult to manufacture them.

SUMMARY OF THE INVENTION

It is an object of this invention to provide a novel cathode ray tube wherein it is possible to readily display the desired character with the desired size on the desired position of the fluorescent screen.

According to this invention there is provided a cathode ray tube for displaying characters and the like comprising a cathode electrode for emitting electrons, an electron lens means, a deflection means and a character forming means disposed between the cathode electrode and the electron lens means. The character forming means comprises a character substrate provided with a plurality of character pattern perforations which are arranged in the form of characters, a X-axis selector electrode including a plurality of X-axis electrode elements each having a plurality of perforations for passing electrons and a Y-axis selector electrode including a plurality of Y-axis electrode elements each having a plurality of perforations for passing electrons, said X- and Y-axis electrode elements being arranged in a matrix so that a desired character pattern region is determined by selecting the matrix coordinates of the electrode elements to shape the electron beam passing through the region by the character pattern perforations of the character substrate.

BRIEF DESCRIPTION OF THE DRAWINGS

In the accompanying drawing:

FIG. 1 diagrammatically shows a longitudinal section of a cathode ray tube embodying this invention;

FIG. 2 is a plan view of a character substrate utilized in this invention;

FIG. 3 is a diagram to show the relationship between a character and selector electrodes for selecting the character;

FIG. 4 is an enlarged plan view of a X-axis selector electrode and

FIG. 5 is an enlarged plan view of a Y-axis selector electrode.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The cathode ray tube embodying this invention and diagrammatically shown in FIG. 1 comprises an evacuated envelope 1 having a fluorescent screen 4 at one end and a neck portion surrounded by a focusing coil 3 and a deflection coil 4 constituting an electron lens system. Inside the neck portion are disposed a cathode electrode 5 of an electron gun, a grid electrode 6 in the form of a mesh electrode to uniformly dispersing the electrons emitted from the cathode electrode 6 to have a uniform density, a character forming means embodying this invention and an accelerating electrode 8.

In accordance with this invention, when passing through the character forming means 7 the electron current passed through the grid electrode 6 is converted into an electron beam acting to form the desired character. After entering into the electron lens system, the electron beam is caused to focus on the desired position of the fluorescent screen by the action of the deflection coil 4 to display the desired character.

The character forming means constituting an essential element of this invention comprises a character substrate 9 and

two selector electrodes arranged in a matrix. As shown in FIG. 2, the substrate 9 is a thin flat sheet of insulator such as mica or ceramic. The substrate is provided with a number of perforations (character pattern perforations) arranged in the form of numerals, alphabets or symbols. Selector electrodes are disposed to constitute a matrix and include a X-axis selector electrode 10 shown in FIG. 4 and a Y-axis selector electrode 11 shown in FIG. 5. In this example, the X-axis selector electrode 10 is disposed on the front side of the character substrate 9 in close proximity thereto whereas the Y-axis selector electrode 11 on the rear side of the character substrate in close proximity thereto. Each of these electrodes is comprised by a plurality of closely adjacent parallel electrode elements or strips, each provided with a number of perforations for passing electrons.

FIG. 4 shows an enlarged plan view of the X-axis selector electrode 10 comprising a plurality of parallel electrode elements 12 which are disposed in the same plane. Each of the electrode elements 12 is formed with numerous perforations 13 for passing electrons.

FIG. 5 shows an enlarged plan view of the Y-axis selector electrode 11, similarly comprising a plurality of parallel electrode elements 14 disposed in the same plane. Each of the electrode elements 14 is formed with numerous perforations 15 for passing electrons. As diagrammatically shown in FIG. 3, electrode elements 12 and 14 are disposed with respect to the character substrate 9 to form a matrix. Thus, by selecting some of the electrode elements of the X- and Y-axis selector electrodes it is possible to select the desired character pattern region on the character substrate 9. For example, FIG. 3 shows the selection of the region of a numeral 1 at the cross point between a row X1 and Y1 shown in FIG. 2 by electrode elements of the X-axis selector electrode 10 and the Y-axis selector electrode 11. Accordingly, the region shown in FIG. 3 in which electrode elements are shown crossed represents a character (in this example a numeral 1) pattern region.

Referring again to FIG. 1 electrons emanated by the cathode electrode 5 are caused to have a uniform density by the action of the mesh grid electrode 6 and then arrive at the character forming means 7. When both the X-axis selector electrode and the Y-axis selector electrode of the character forming means are at a negative potential the incoming electrons will not be attracted by the negative electric field. On the other hand, when both X- and Y-axis selector electrodes are at a positive potential incoming electrons will be attracted by these electrodes. As a result, by imparting a positive potential to some electrode elements of the X- and Y-axis selector electrodes, electrons will be attracted by the region comprised by these selected electrode elements. This invention is based on this principle as discussed in detail hereinbelow.

While electrons of uniform density pass through the grid electrode 6 in the form of a mesh when a positive potential is impressed upon electrode elements of X- and Y-axis selector electrodes that determine a character pattern region of a character to be displayed of the character substrate 9, the character pattern region will create a high positive electric field than remaining regions. The resulted field attracts electrons at high speed toward said character pattern region. At this time, arrived electrons will collide against portions of the electrode elements 12 of the X-axis electrode 10 which are included in the pattern region and electrons directed to the perforations 13 of electrode elements 12 will reach the character substrate with a spread corresponding to the character pattern region. However, since the substrate 9 is provided with perforations that shape the electron beam, or character pattern perforations after passing through substrate 9 the electron beam pattern will be given the given configuration of the selected character. After passing through perforations 15 of electrode elements 14 of the Y-axis selector electrode 11 the electron beam will be accelerated by the accelerating electrode 8 shown in FIG. 1 toward the fluorescent screen 2. The cross section of the electron beam impinging upon the fluorescent screen corresponds to the configuration of the

character pattern perforations of the character substrate 9, so that the selected character will be displayed on the screen 2. The position and magnitude of the displayed character are determined by the focusing coil 3 and the deflection coil 4. By successively exciting the character selector electrodes it is possible to simultaneously display a number of characters on the screen 2 by utilizing its residual property.

While in the above described embodiment the X-axis selector electrode and the Y-axis selector electrode are positioned on the opposite sides of the character substrate it should be understood that this invention is not limited to this particular arrangement but X- and Y-axis selector electrodes may be fabricated in close proximity to form a matrix and the character substrate may be positioned on the front or rear side of the assembly. It will also be clear that it is desirable to align as far as possible numerous perforations 13 and 15 of electrode elements 12 and 14 when they are assembled to form the matrix.

As above described, in accordance with this invention the character pattern perforations provided for the character substrate and the pattern region of the character pattern perforations are selected by the selection of the matrix coordinates comprised by the X- and Y-axis selector electrodes thereby displaying the desired character. Accordingly the construction of the novel display cathode ray tube is more simple than conventional display devices.

What is claimed is:

1. A cathode ray tube for displaying characters, numerals and patterns comprising a cathode electrode for emitting electrons, a grid mesh electrode for uniformly dispersing electrons emitted from said cathode, an electron lens means, a deflec-

tion means, and a character forming means disposed between said cathode electrode and said electron lens means, said character forming means being characterized by comprising a character substrate provided with a plurality of character pattern perforations which are arranged in the form of characters, and providing for each of said character pattern perforations an X-axis selector electrode including a plurality of X-axis electrode elements each having numerous perforations for passing electrons and a Y-axis selector electrode including a plurality of Y-axis electrode elements each having numerous perforations for passing electrons, said X- and Y-axis electrode elements being arranged in a matrix so that a desired character pattern region constituting numerous elemental beams is determined by selecting the matrix coordinates of said electrode elements to shape the electron beam passing through said region by the corresponding said character pattern perforation of said character forming substrate.

2. The cathode ray tube according to claim 1 wherein said character substrate is a thin sheet of insulator.

3. The cathode ray tube according to claim 1 wherein said X- and Y-axis selector electrodes are disposed on the opposite sides of said character substrate but closely spaced therefrom.

4. The cathode ray tube according to claim 1 wherein said X- and Y-axis electrodes are assembled in close proximity to form a matrix and the assembly is positioned one side of said character substrate.

5. The cathode ray tube according to claim 1 wherein the character pattern perforations of said character substrate and perforations of said X- and Y-axis electrode elements align with each other when they are assembled.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,651,361 Dated March 21, 1972
Inventor(s) Shigeaki Tanaka; Yoshimasa Tamanaka;
Tadashi Nakamura

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 2, line 33, before "Y1" insert -- a column --.

Signed and sealed this 1st day of August 1972.

(SEAL)
Attest:

EDWARD M. FLETCHER, JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents