

Aug. 7, 1956

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 APPARATUS FOR AND METHOD OF PRODUCING CHARACTER
 TYPE FONTS ON A CATHODE RAY DISPLAY TUBE
 Filed April 22, 1955

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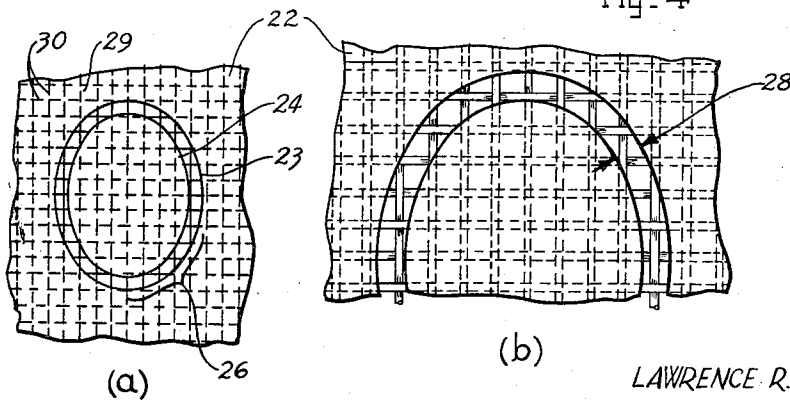
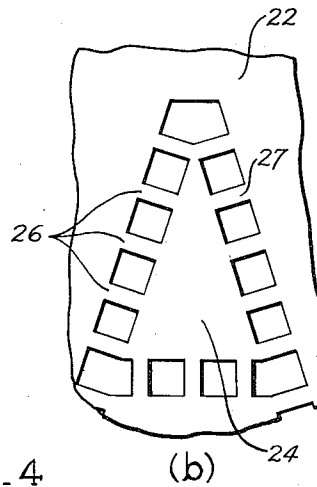
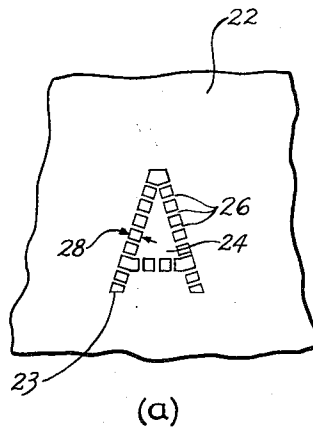
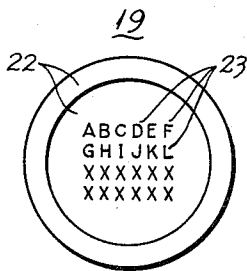
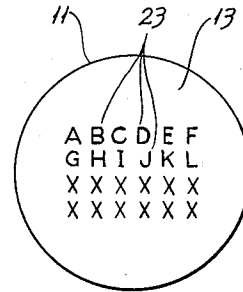
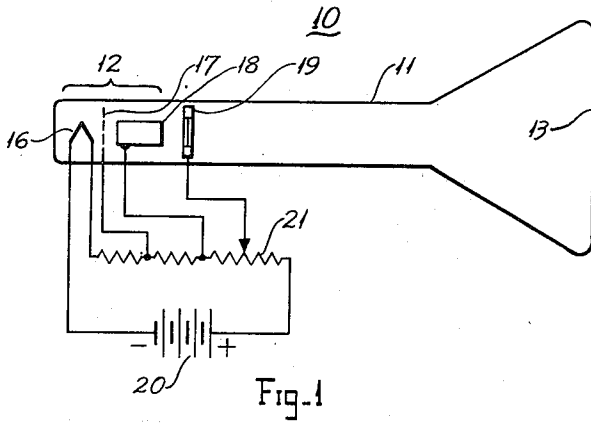


Fig. 5

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APPARATUS FOR AND METHOD OF PRODUCING CHARACTER TYPE FONTS ON A CATHODE RAY DISPLAY TUBE

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Application April 22, 1955, Serial No. 503,229

6 Claims. (Cl. 313—86)

This invention relates generally to a matrix such as is employed in the formation of characters in cathode-ray display tubes. More particularly, the invention relates to the construction of the symbols or characters formed in said matrix and the method of visually presenting such characters as type fonts.

In cathode-ray display tubes such as are exemplified by the patent to McNaney U. S. No. 2,283,383, and in his co-pending application Serial No. 298,603, now U. S. Number 2,735,956 a matrix, having cutout sections corresponding to characters, such as numbers, letters or other information symbols, is utilized intermediate a cathode and a screen to permit formation of the cathode-ray electron stream into a desired symbol for display on the display tube screen. In the manufacture of the matrix, it is the practice to support the cutout portion of such letters as A, B, D, O, P, Q, and others by providing bridges from the cutout portion to the surrounding metal of the matrix. These bridges then appear on the screen of the tube, giving the characters the appearance of stencil like letters. Such an appearance may be undesirable and an objectionable corruption of the letters. The ideal letter appearance desired is that of a printer's character type font which has no bridges or like corruptions.

This invention eliminates the objectionable nature of bridges and provides means of supporting the letters in the matrix by bridging means, in such a manner, when employed with the novel method of operation, as to eliminate corruption or recordation of the bridging means upon the screen.

The practice of this invention includes fabrication of a matrix embodying the desired characters wherein the cutout portion of some of these characters is suspended in the matrix by supports or bridging means, such as metallic bridging or strands, for supporting and electrically connecting the cutout portion to the matrix. The bridging has a maximum limiting size equivalent to about one-half the line weight of the character. The matrix so constructed, is then employed, with a necessary source of potential in the novel method to effect elimination of the bridges upon the screen. Such elimination of bridges being possible because the image of the wires forming the bridging is very small as compared to the image of the character itself. And therefore, by varying the degree of potential applied to the matrix, relative to the beam potential, the image of the wires will visually disappear from the character presentation on the screen. The new and novel structure described utilized with the novel method will result in presentation of clear character type fonts.

Accordingly, it is an object of the present invention to provide a structure and method of utilizing the structure in which bridging means of certain characters requiring such support in the matrix, are eliminated from visual presentation upon the screen.

It is a further object of the present invention to provide a network of metallic bridges as bridging means for portions of characters electroformed in a matrix which

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bridges may be the method disclosed be eliminated from the visual presentation of the character upon the display tube.

It is a further object of the present invention to provide a matrix which may be manufactured by relatively unskilled persons and still present a clear character type font;

It is a further object of the present invention to provide a novel method which may be employed by relatively unskilled persons to produce character type fonts upon the screen of the display tube.

Objects and advantages other than those set forth above will be apparent from the following description when read in connection with the accompanying drawings, in which:

Figure 1 is a diagrammatic representation of a cathode ray display tube embodying the invention;

Figure 2 is a view showing a visual presentation of characters upon the screen of the display tube;

Figure 3 is an enlarged view, in elevation, of a matrix;

Figures 4a and 4b show enlarged views of one of the characters of the matrix of Figure 3 utilizing the preferred bridging means;

Figures 5a and 5b show enlarged views of another of the characters of the matrix of Figure 3 utilizing a modification of the bridging means.

A diagrammatic representation of the apparatus necessary to the practice of the invention is shown in Figure 1, wherein the numeral 10 represents the cathode-ray display tube as a whole. Cathode-ray display tube 10 includes an evacuated envelope 11. At one end of the evacuated envelope is mounted an electron gun 12 which, in operation, emits an electron beam so directed as to impinge upon a screen 13 mounted at the other end of said envelope for visual presentation of the impinging electrons. The electron gun 12 includes a cathode or electron emitting element 16, a control electrode 17 and a focusing electrode 18, as is well known in the art.

Intermediate the electron emitting element 16 and the screen 13, within envelope 11 is positioned a matrix or character shaping means 19. The matrix 19 shapes the electron beam into characters 23 for visual presentation upon screen 13 as is shown in Figure 2.

A source of electrical potential 20 is supplied to provide the necessary cathode current and electrode potentials. The cathode 16 is connected across the potential source 20 and is provided with a voltage divider 21 which furnishes positive electrode voltages to the control electrode 17, the focusing electrode 18 and an adjustable voltage to matrix 19.

Matrix 19, shown in an enlarged view in Figure 3, comprises generally metallic or electrical conducting material construction with a base member 22 forming the general support for characters 23. Base member 22 may be of any desired construction, but is preferably of a solid or a webbed construction as shown in Figures 4 and 5, respectively. The characters 23 may be formed by any well known process into the base member 22 and are preferably electroformed or etched as is well known in the art. The character, so formed, then becomes a stencil type opening for forming the electron beam into a character shaped electron beam. The difficulty arises in certain characters or letters, such as A, B, D, O, P, Q and others, in which formation thereof, cutout portions remain. For example, in the letters A and O as shown in Figures 4a and 5a, a cutout portion 24 remains after formation of the respective character. Supports or bridging means 26 for both mechanical and electrical support of the cutout portion 24 with the base member 22 are necessary. Bridging means 26 may be formed or constructed in a variety of manners but are preferably electroformed or etched as metallic bridges 27 for connect-

ing cutout portion 24 both electrically and mechanically with base member 22. It has been experimentally determined that an optimum width of bridges 27 should be about one-half or less of the line width or weight 28 of the characters 23. In practice, bridges 27 are very small. As an example of the size relationships involved, matrices, such as matrix 19, are presently being fabricated in which the entire character format, as shown in Figure 3 and containing 64 characters, occupies slightly less than a 0.250 inch square. The characters have a maximum height of about 0.012 inch and having line widths of less than 0.002 inch. Bridges 27, therefore, in the preferred embodiment would have a width of about 0.001 inch or less.

A modification of the bridging means 26 is shown in Figure 5, in which, an electrically conducting mesh 29 is utilized for support of cutout portion 24. Mesh 29 and base member 22 form a sandwich type construction. Characters 23 are then formed in base member 22 with the cutout portion 24 being supported by the mesh 29.

Mesh 29 comprises strands 30 which are interlaced to form a network support for all parts of the character and for base member 22. The maximum diameter or width of the strands is likewise limited to about one-half that of line weight 28. Mesh 29 mechanically and electrically connects the cutout portion 24 to the base member 22. Any known means of forming a mechanical and electrical connection between the mesh 29, base member 22, strands 30 and the cutout portion 24 may be utilized.

Matrix 19, embodying the invention, can also be positioned intermediate cathode 16 and control electrode 17 as disclosed in the co-pending application of Joseph T. McNaney, Serial No. 414,551, entitled "Cathode Ray Apparatus" and employ the teachings of the present invention.

Display tube 10 has proper predetermined potentials applied to its constituent parts from potential source 20. The potential being applied to matrix 19, may be varied, and is positive with respect to cathode 16.

In operation, the cathode 16 emits the electron beam which may be controlled by control electrode 17 and focused by focusing electrode 18. The beam is then shaped into the desired character cross-section beam by matrix 19 for presentation upon screen 13. The potential being applied from source 20 to matrix 19 may be varied to effect elimination of the image of the bridging means 26 from visual presentation upon the screen 13. The characters 23 will then be displayed upon screen 13 as clear character type fonts showing none of the supports or bridging means 26.

In practice, it has been found that a positive voltage applied to the matrix 19, relative to the beam operating voltage, of an order of 15 volts will eliminate from visual presentation on screen 13 bridging means 26 having a diameter of .003 inch, with 60 volts eliminating bridging means 26 having a diameter of .00065 inch. This method has shown considerable stability in practice. Experimentation has shown that the correct positive voltage will completely eliminate the image of bridging means from visual presentation. Whereas an excess of positive voltage results in a very bright image presentation and insufficient positive voltage produces a very dark image presentation.

The particular embodiment of the invention illustrated and described herein is illustrative only and the invention includes such other modifications and equivalents as may readily appear to those skilled in the art, within the scope of the appended claims.

I claim:

1. In combination, a cathode ray display tube including an evacuated envelope, an electron gun mounted within and at one end of said envelope, a screen positioned within said envelope at the opposite end thereof, character shaping means mounted within said envelope

intermediate said gun and said screen, said character shaping means comprising a base member, a plurality of characters formed in said base member, said characters having a predetermined line width, bridging means for supporting at least a portion of one of said characters with respect to said base member, said bridging means comprising an electrically conducting mesh having interlaced strands electrically and mechanically connecting said portion to said base member, each of said strands having a line width of substantially at most one-half of the predetermined width.

2. In combination, a cathode ray display tube including an evacuated envelope, an electron gun mounted within and at one end of said envelope, a screen positioned within said envelope at the opposite end thereof, character shaping means mounted within said envelope intermediate said gun and said screen, said character shaping means comprising a base member, a plurality of characters formed in said base member said characters having a predetermined line width, bridging means for supporting at least a portion of one of said characters with respect to said base member, said bridging means having a line width of about one-half of said predetermined width.

3. In combination, a cathode ray display tube including an evacuated envelope, an electron gun mounted within and at one end of said envelope, a screen positioned within said envelope at the opposite end thereof, character shaping means mounted within said envelope intermediate said gun and said screen, said character shaping means comprising a base member, a plurality of characters formed in said base member said characters having a predetermined line width, bridging means for supporting at least a portion of one of said characters with respect to said base member, said bridging means comprising a plurality of bridges each electrically and mechanically connecting said portion to said base member, said bridges having a width limited to about one-half of said predetermined width.

4. In combination, a cathode ray tube including an evacuated envelope, an electron gun mounted within and at one end of said envelope, a screen positioned within said envelope at the opposite end thereof, character shaping means mounted within said envelope intermediate said gun and said screen, said character shaping means comprising a base member, a plurality of characters formed in said base member said characters having a line width of substantially 0.002 inch, bridging means for supporting at least a portion of one of said characters with respect to said base member, said bridging means comprising a plurality of supports electrically and mechanically connecting said portion of said base member, said supports having a line width of substantially less than 0.001 inch.

5. In a cathode ray tube having therewithin an electron emitting element which emits a stream of electrons so directed as to impinge upon a screen in the tube, there being positioned in the electron stream a character shaping means having at least a portion of one of its characters bridged to its base member by supports, said supports having a maximum width of substantially one-half the character line width, the method, utilizing a source of electrical potential, of eliminating the image of said supports from visual presentation upon said screen, comprising, applying said electrical potential to said shaping means, said potential being positive with respect to said emitting element, and adjusting the intensity of said potential to eliminate the image of said supports from said screen.

6. In a cathode ray tube having therewithin an electron emitting element which emits a stream of electrons so directed as to impinge upon a screen in the tube, there being positioned in the electron stream a character shaping means whose characters have a line width of substantially less than 0.002 inch, said shaping means having at least a portion of one of its characters bridged to its base

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member by a plurality of supports having a line width of about 0.001 inch, the method, utilizing a source of electrical potential, of eliminating images of said supports from visual presentation upon said screen comprising, applying said electrical potential to said shaping means, said potential being positive with respect to said emitting element, and selectively adjusting the intensity of said potential from about +15 volts to +60 volts to eliminate the image of said supports from said screen.

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References Cited in the file of this patent

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