Sept. 4, 1956 J. T. McNANEY 2,761,988

CATHODE RAY APPARATUS

Filed March 8, 1954 2 Sheets-Sheet 1

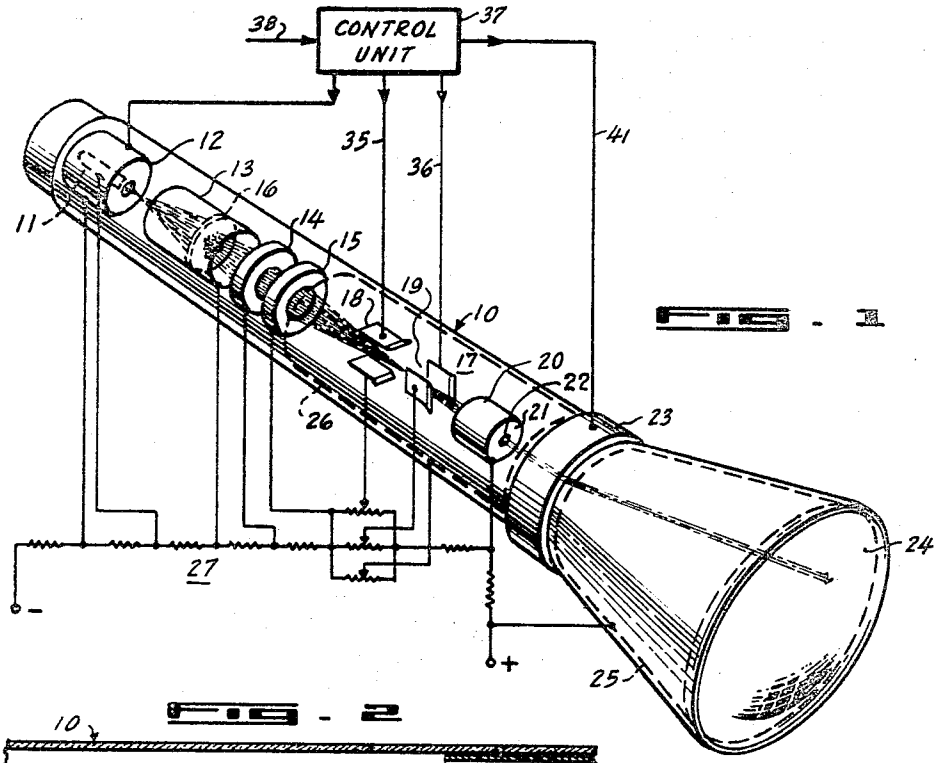


FIG. 1

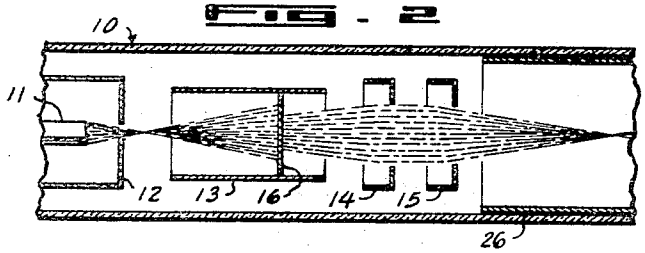
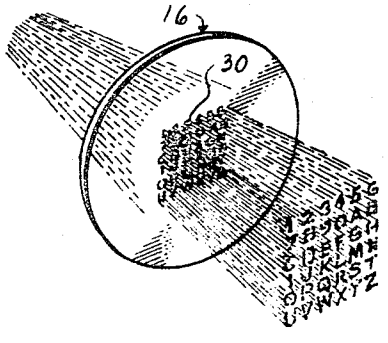


FIG. 2



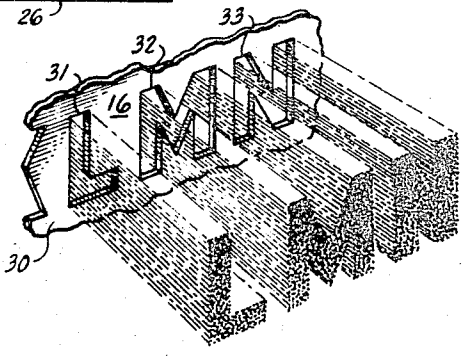


FIG. 3

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CATHODE RAY APPARATUS

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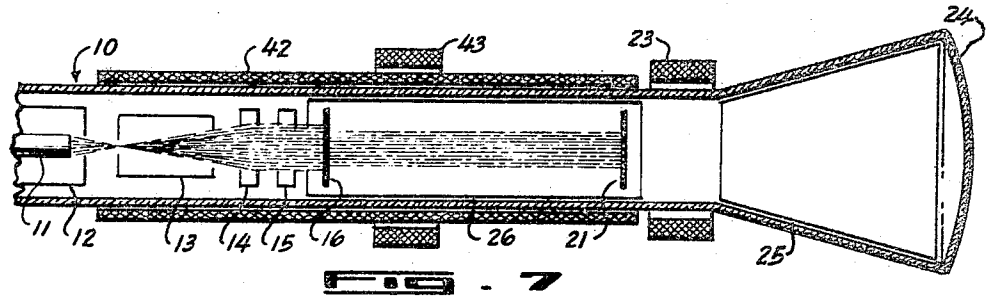


FIG. 7

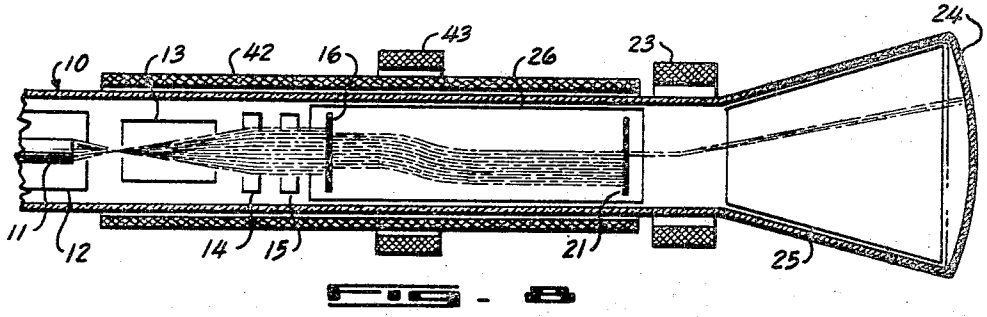


FIG. 8

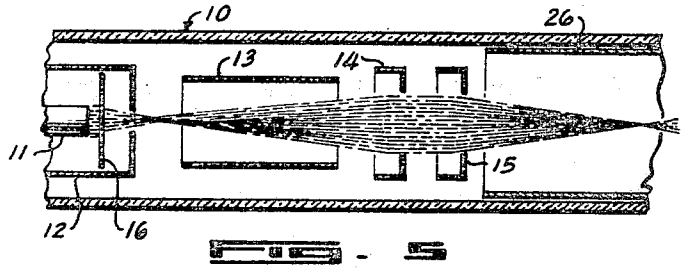


FIG. 5

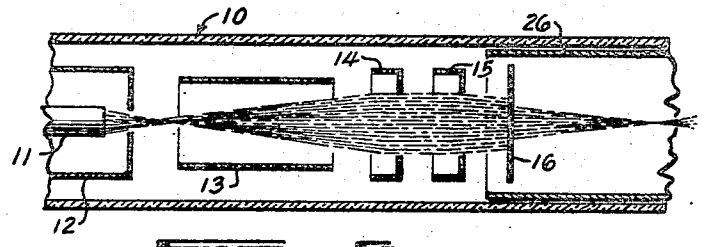


FIG. 6

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CATHODE RAY APPARATUS

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Application March 8, 1954, Serial No. 414,551

23 Claims. (Cl. 313—69)

This invention relates to cathode ray apparatus and more specifically to cathode ray apparatus for producing cathode ray images having predetermined shapes such as symbols, numerals, and characters.

A species of cathode ray tubes has developed for producing letters, numerals, or symbols upon a target without utilizing scanning techniques nor generating complex electrostatic fields which, when applied to the electron beam, cause the beam to scribe a path on the target in accordance with the desired letter, numeral, or symbol. Broadly, the principle underlying this class of cathode ray tubes is that within an evacuated vessel a beam of electrons is generated and directed toward a target, and interposed in the path of the beam is a member having letter, numeral, or symbol shaped openings therein through which the electron beam is directed. Passage of the beam through an opening in this member results in its being shaped accordingly. This direct method of producing letters, numerals or symbols as contrasted with the indirect facsimile or Lissajous methods, results in distinct advantages. A higher degree of picture sharpness with a minimum of signal elements involved is readily achieved. Bandwidth requirements of associated equipment may be considerably lower. Furthermore, in many applications this direct method, due to its simplicity and inherent speed of response, offers the only real solution to a problem.

Where a particular symbol or character is desired to be produced, it has been the practice heretofore to selectively direct the rather sharply focused electron beam onto the corresponding aperture in the beam shaping member. Thus, the beam emerging from the shaping member has a cross sectional configuration corresponding with the shape of the aperture. In tubes utilizing this principle, close control over the diameter of the electron beam must be provided in order to prevent the beam from overlapping adjacent apertures and thereby reducing the effectiveness of the tube. Spacing between adjacent apertures in the beam shaping member must likewise be controlled and a minimum spacing must be maintained with limits the minimum usable physical size of the beam shaping member for a given size of apertures. Moreover, registration problems appear in these prior tubes in that the fields required for positioning a shaped electron beam at a predetermined location on the target is a function of the spatial relationship of the aperture from which the beam emerged.

It is, therefore, an object of this invention to provide an improved cathode ray tube for directly producing displays of letters, numerals, or symbols wherein the displays have increased definition and legibility.

It is another object of this invention to provide a cathode ray tube for producing letters, numerals, or symbols upon a target wherein accurate registration is realized.

It is another object of this invention to provide a cathode ray tube for producing a shaped electron beam wherein the beam shaping member may be substantially

reduced in size thereby reducing electron optical problems as well as the size of the cathode ray tube.

It is another object of this invention to provide an improved cathode ray tube for directly producing indicia on a target wherein increased deflection sensitivity in positioning the indicia upon the target is realized.

It is a further object of this invention to provide a reliable, simplified, and inexpensive cathode ray tube for directly producing letters, numerals, or symbols on a target.

Other objects and features of this invention will be readily apparent to those skilled in the art from the following specification and appended drawings illustrating certain preferred embodiments of this invention in which:

Figure 1 is a perspective representation in accordance with the principles of the invention;

Figure 2 is an enlarged sectional view of a portion of the cathode ray tube shown in Figure 1;

Figure 3 is a perspective view illustrating the manner in which the bundle of shaped electron streams are produced from an electron beam by the beam shaping member;

Figure 4 is a perspective view of an enlarged portion of the beam shaping member of Figure 3 showing the formation of a plurality of shaped electron streams;

Figure 5 is a sectional view illustrating a modification of the present invention wherein the beam shaping member is incorporated as an element of the electron gun in the cathode ray tube;

Figure 6 is a sectional view of a modification of the present invention wherein the beam shaping member is positioned outside the beam directing elements;

Figure 7 is a sectional view showing the parallel trajectory of the bundle of shaped electron streams and in the absence of selection signals for directing different electron streams toward the target; and

Figure 8 shows the effect of selection signals upon the stream trajectory shown in Figure 7.

Basically, the present invention comprises a cathode ray tube which includes within an evacuated vessel, a target or screen, a source of electrons directed toward the target, and a beam shaping member positioned in the path of the beam between the source of electrons and the target. The electron beam is superimposed upon a plurality of apertures in the shaping member and a bundle of shaped electron streams is simultaneously produced. Associated with the bundle of shaped electron streams are means for selectively directing different streams to the target.

Referring to Figure 1, a cathode ray type tube is shown comprising a plastic, glass, or metallic evacuated vessel **10** in which is mounted an electron source **11**, control grid **12**, accelerating electrode **13**, first anode **14**, and second anode **15**. In operation, a beam of electrons is emitted from the source **11** and directed through control grid **12** en route to the target. Control grid **12** is spaced from source **11** and may be in the form of a cylinder having an aperture therein through which the electron beam may pass. As is well known to those skilled in the art, control grid **12** performs the same function as a control grid in an ordinary vacuum tube. Electrode **13**, first anode **14**, and second anode **15** in cooperation with control grid **12** function as an electrostatic lens which causes the electron beam generated by the source **11** to be focused along a predetermined path. Beam shaping means **16**, which may be in the form of a member having letter, numeral, or symbol shaped openings therein, is positioned in the path of the electron beam and a plurality of shaped electron streams is derived therefrom by directing the electron beam onto a plurality of the shaped openings. Electrode means **17** comprising

vertical selection plates **18**, horizontal selection plates **19**, and electrode **20** is positioned along the path of the electron streams and serves to select different electron streams for transmission toward the target. Selection voltages developed by a control unit and applied to selection plates **18** and **19** provide the electrostatic fields which selectively deflect the electron streams toward electrode **20**. Electrode **20** may be a cylindrically shaped conducting member closed at one end by a conductive plate **21** having a centrally located aperture **22** therein approximating the cross-sectional dimensions of the electron stream; however, it should be understood that the conductive plate **21** with the selection aperture **22** will serve as effectively as the cylindrically shaped electrode **20**. Vertical and horizontal deflection of the electron streams by the vertical and horizontal plates **18** and **19** causes individually shaped electron streams to selectively pass through the centrally located aperture **22** and travel toward the target, whereas, the other electron streams, which are not directed through the aperture **22**, are intercepted by electrode **20**. Character positioning means **23** associated with the tube **10** serve to direct the different selected electron streams to predetermined positions on electron responsive target member **24**. The specific type of target **24** forms no part of the present invention, and either a fluorescent screen for visually displaying the data or a storage type target may be utilized.

Although in Figure 1 electromagnetic means are utilized for positioning the different electron streams on the target **24**, it will be apparent that electrostatic means, such as horizonal and vertical deflection plates, would also suffice. Anodes **25** and **26** serve in a conventional manner as acceleration anodes and may be aquadag coatings about the interior of vessel **10**. As shown, anodes **25** and **26**, together with other elements associated with vessel **10**, are connected to suitable operating potentials by interconnection with voltage divider network **27** which is connected across a source of voltage (not shown).

In operation the electron beam emitted from the source **11** is directed through electrode **13** and anodes **14** and **15** where divergent focusing forces are impressed upon the beam by the electrostatic fields developed by accelerating electrode **13** and anode **14** and convergent focusing forces are applied to the beam between anode **14** and anode **15**. As will be apparent to those familiar with electron optics, the angles of divergence and convergence of the beam may be readily controlled by the shape or position of the electrodes **13**, **14**, and **15** as well as the voltages applied thereto and hence the cross-sectional size or shape of the electron beam may be readily controlled. Beam shaping member **16** is positioned in the path of the electron beam and a plurality of shaped electron streams is derived therefrom. The principle of operation of beam shaping member **16** is that the impingement of an electron beam upon a particular shaped aperture of the beam shaping member **16** causes the electron beam to take the shape of that aperture. Hence, by providing member **16** with letters of the alphabet and numerals zero through nine, an electron stream may be produced having the configuration of all possible letters or numerals. A plurality of shaped electron streams may be simultaneously derived from the incident electron beam by causing the beam to be superimposed over several apertures of the beam shaping member **16** simultaneously, and in Figure 3 which shows an enlarged view of the beam shaping member **16** and the manner in which the electron beam is converted into a plurality of shaped electron streams, the electron beam is shown flooding the apertured area of the beam shaping member **16** thereby producing shaped electron streams corresponding to all the apertures appearing in the shaping member. As shown more clearly in Figure 4, beam shaping member **16** may comprise a solid member **30** having character shaped apertures therein such as **31**, **32**, and **33** and arranged in any desired configuration. The shaped apertures may be

made as small as .009 inch square with .003 inch therebetween, and under such conditions the size of the shaping member for accommodating all letters of the alphabet and numerals zero through nine is in the order of one sixteenth of an inch. It should be understood, however, that the size of configuration of the particular apertures of beam shaping means **16** forms no part of the present invention although definite advantages may be realized by reducing the size of the member **16** as will be pointed out hereinafter.

In Figure 2 beam shaping member **16** is illustrated as positioned within the accelerating anode **13** and at a location where the incident electron beam completely overlaps the pattern of shaped apertures, as shown in Figure 3. This overlapping may be readily accomplished by controlling the cross-sectional dimensions of the incident electron beam so as to be equal to or larger than the pattern of apertures, such as by providing divergent focusing forces to the beam. However, the diameter of the electron beam generated by the source **11** may be suitable to overlap the desired pattern of apertures, then no divergent focusing forces are necessary. In any event, where the electron beam overlaps the pattern of apertures, electron streams will be produced from the incident electron beam which are equal in number to the apertures in the beam shaping member **16** and which are cross-sectionally shaped accordingly.

As stated hereinbefore, the cross-sectionally shaped electron streams may be focused by the lens action of the first anode **14** and second anode **15** along a predetermined path to a cross-over point where the vertical and horizontal selection plates **18** and **19** may be ideally located. Since the size of the beam shaping member **16** may be made physically small, the slope of the converging shaped electron streams is very slight, and, hence, the cross-over point becomes more nearly a line than a point thereby making the optimum location of selection plates **18** and **19** of deflection system **17** non-critical. Furthermore, by having the beam shaping member **16** small the spacing between each pair of plates **18** and **19** may be substantially reduced which produces a corresponding increase in the deflection sensitivity of the tube. However, even though the angle of convergence is small and the cross-over approaches a line rather than a point, the shaped electron streams are divergent after passing the cross-over, and the divergent bundle of shaped electron streams may be caused to essentially pivot vertically and horizontally about this cross-over point as varying electrostatic fields are established between the plates **18** and **19**, respectively. Thus, the shaped electron streams may be directed to any position on the apertured plate **21** of electrode **20** in accordance with the electrostatic fields established between the plates by external signals supplied to plates **18** and **19**.

Electrostatic selection means **18** and **19** are illustrated in Figure 1, however, the invention obviously is not limited thereto for electromagnetic selection means may also be effectively employed. Actually, electromagnetic selection means may be utilized such that vertical and horizontal deflection of the shaped electron streams could be performed in the same plane along the longitudinal axis of the vessel **10** and the deflection of the bundle of divergent shaped electron streams upon selection electrode **20** would more nearly approach optimum conditions wherein the bundle of electron streams is caused to pivot about a single point in response to control signals applied to the selection means.

The electrostatic fields utilized for selecting different shaped electron streams may be produced by control potentials applied to the vertical and horizontal plates **18** and **19** over leads **35** and **36**, respectively, from a selection control unit **37** such as that described in my copending application Serial No. 340,245 filed March 4, 1953. Control unit **37** serves to transform coded data representing letters, numerals, or related symbols applied

to input terminal 38 into pairs of horizontal and vertical potential combinations related to the data received. Control unit 37 also serves to develop signals which when applied to deflection means 23 successively space and lineally position successive shaped electron streams on the target 24. The selection potential applied to the vertical selection plate 18 provides the vertical deflection component to the bundle of electron streams, whereas, the potential applied to horizontal plate 19 provides the horizontal deflection component to the electron streams. By the application of these potential combinations to the horizontal and vertical plates, the bundle of shaped electron streams may be made, in effect, to pivot about the cross-over point so as to project any desired electron stream toward the target 24 through the apertured electrode 22. As illustrated in Figure 1, the selected electron streams emanating from electrode 20 are projected along a path which is essentially coaxial with the longitudinal axis of the vessel 10 and each stream is projected along essentially the same path irrespective of its origin in the beam shaping member 16. Since each selected stream is projected along approximately the same path, deflection nonlinearities are minimized and accurate registration and alignment of the shaped beam upon the target 24 may be realized. Furthermore, any shaped electron stream may be positioned upon a predetermined location on the target 24 by signals which are independent of the transverse position of the aperture in the shaping member utilized to produce the shaped stream.

Means for positioning the shaped electron streams upon a predetermined location on the target 24 are provided in the form of positioning member 23. Although electrostatic deflection methods may be utilized with equal effect, member 23 produces electromagnetic fields in response to position control signals produced by the control unit 37. These signals are applied to member 23 over cable 41 and serve to direct the shaped electron stream to the desired position on the target 24. Where a single line of shaped electron streams are desired to be positioned along the centerline of target 24, member 23 may comprise but a single coil to provide purely vertical or horizontal deflection fields in response to a positioning signal from unit 37. Where, however, successive lines of data or single lines of data displaced from the center of the target are desired to be displayed, member 23 will then include a pair of coils for providing both horizontal and vertical deflection components in response to the positioning signals developed by control unit 37.

Figure 5 is a modification of the device shown in Figure 1 and further illustrates the principles of the present invention. As illustrated in Figure 5, electron source 11, control grid 12, accelerating electrode 13, first anode 14, and second anode 15 are positioned within the evacuated envelope 10 the same as shown in Figure 1. The beam shaping member 16 is positioned in the path of the electron beam, however, in this embodiment it is located between source 11 and control grid 12. The geometry of the electron beam actually generated by source 11 is directed upon and is sufficient to overlap the configuration of shaped openings in beam shaping member 16 thereby producing a bundle of shaped electron streams in conformance with the pattern of openings superimposed by the beam. Member 16 may be electrically connected to and maintained at the same potential as the cathode 11 and hence the plurality of shaped electron streams emanating therefrom is essentially emitted from cathode 11 thereby providing an electron gun for generating shaped electron streams. Electrode 14, first anode 15, and second anode 16, as described hereinbefore, also serve in this embodiment to focus the bundle of shaped streams along a predetermined path and to a cross-over point where the vertical and horizontal selection plates 18 and 19 may be established for optimum performance. Selection of the different electron streams for transmission to the target is provided in a manner described hereinbefore whereby the desired stream is directed through the aperture 22 of electrode 20 by applying appropriate vertical and horizontal selection potentials developed by control unit 37 to the plates 18 and 19. The different selected streams are projected coaxially along the longitudinal axis of the tube and are positioned upon target 24 by the application of spacing and positioning signals developed by the control unit 37 and applied to positioning member 23.

Figure 6, which illustrates the principle of the present invention, is a further modification of the cathode ray tube shown in Figure 1. As in the aforedescribed illustrations, electron source 11, control grid 12, electrode 13, anode 14, and second anode 15 are positioned within the vessel 10. Beam shaping member 16 is located in the path of the electron beam but is positioned outside the elements generally considered to constitute the electron gun of a cathode ray tube. Elements 12 to 15 serve to direct the incident electron beam along a predetermined path and the geometry of the incident beam is such that when directed upon the beam shaping member 16 it will overlap the desired configuration of character-shaped openings therein and thus develop the plurality of shaped electron streams. The shaped electron streams derived from the incident electron beam continue along the preestablished trajectory and, as shown, in this modification are directed to a cross-over point where, as in Figure 1, the vertical and horizontal selection plates may be located for optimum performance.

It should be understood that focusing of the shaped electron streams to a predetermined point is not an indispensible requirement of the present invention. The electron streams emitted from shaping member 16 may be directed along predetermined paths which are essentially mutually parallel. Referring to Figures 7 and 8, an electron beam is generated by the source 11 and through the focusing action of control grid 12, accelerating electrode 13, first anode 14, and second anode 15 the electrons comprising this incident beam are directed along substantially mutually parallel trajectories. In accordance with the invention the cross-sectional dimensions of the beam are sufficient to simultaneously overlay or flood a plurality of shaped openings in the beam shaping member 16 which may be positioned as shown in Figures 7 or 8 or as shown in Figures 2 or 5. As will be obvious to one familiar with electron optics, substantial parallelism of the incident electron rays may be provided by a coil 42 which extends along the length of the vessel 10 such that electrode 13 and anodes 14 and 15 are sufficiently within the magnetic field of the coil 42 to establish lines of force parallel with the longitudinal axis of container 10. Then, the individual electron streams passing through member 16 will be cross-sectionally shaped in accordance with the aperture through which they passed and will maintain their parallel trajectories. This plurality of individually shaped electron streams with mutually parallel trajectories is directed along the vessel 10 and projected upon the apertured plate 21. Selection of different shaped streams may be accomplished by suitable horizontal and vertical selection signals applied to a pair of mutually perpendicular coils 43 mounted on the vessel 10 whereby the desired stream is deflected through the aperture 22. When conductive plate 21 is mounted with the aperture 22 aligned with the longitudinal axis of the vessel 10, the selected electron stream will be directed along a path essentially coaxial with the longitudinal axis of the tube. Figure 7 shows the parallel trajectory of the bundle of shaped electron streams in the absence of selection signals produced by an associated control unit, such as 37, and applied to coils 43. Hence, each stream comprising the bundle of parallel streams is directed along a path substantially parallel with the axis of the vessel 10 and is intercepted by electrode 21. Figure 8 illustrates the effect of selection signals applied to coils 43 upon the stream trajectory shown in Figure 7, and it becomes ap-

parent that the field produced by coil 43 in response to selection signals serves to locally bend the path of the bundle of parallel electron streams. Suitable degrees of horizontal and vertical deflection of the electron streams provides means for causing individually shaped streams to selectively pass through the aperture 22 and travel toward the target 24. As described hereinbefore, the path of the selected stream in this case will be substantially coaxial with the axis of the vessel 10 and spacing and positioning of the different selected electron streams upon the target 24 may be accomplished by control signals applied to positioning member 23 in a manner hereinbefore described.

Where the shaped electron streams are directed along the vessel 10 in substantially parallel trajectories, as shown in Figures 7 and 8 or where the trajectory of the streams is divergent on convergent, it is contemplated that selection of different streams may be accomplished by other means. For example, where the application of the tube allows single characters, numerals, or symbols to be registered in succession on the same area of target 24 this area only may be made electron sensitive. This electron responsive portion of the target in such applications may be limited to dimensions in the order of the cross-sectional dimensions of each shaped electron stream to be registered or displayed. Then, by the application of selection signals applied to a pair of mutually perpendicular coils, such as the coils 43, the bundle of shaped electron streams may be deflected to direct the desired stream upon the appropriate electron sensitive section of target 24. Thus, only the selected streams are registered or displayed on this operative portion of the target whereas the other shaped electron streams are directed to the insensitive areas.

While certain embodiments of the invention have been specifically disclosed, it is understood that the invention is not limited thereto as many variations will be readily apparent to those skilled in the art and the invention is to be given its broadest possible interpretation within the terms of the following claims.

What is claimed is:

1. In a cathode ray tube having an electron responsive target and means for producing a beam of electrons, means for focusing the electron beam toward a predetermined point, a beam shaping member positioned in the locus of said beam for producing a plurality of character-shaped electron streams, and means intermediate said member and said target for selectively directing different electron streams toward said target.

2. A cathode ray tube comprising, a member having character-shaped apertures therein, means for generating an electron beam, means for directing the electron beam through said member to produce a plurality of character-shaped electron streams therefrom, an electron responsive target, and means intermediate said member and said target for selectively directing different electron streams toward said target.

3. A cathode ray tube comprising within an evacuated vessel, generating means for supplying and directing a beam of electrons along a given path, a target adapted to receive electrons, beam shaping means positioned between said generating means and said target for deriving a plurality of shaped electron streams from said electron beam, and means intermediate said target and said beam shaping means for selectively directing different electron streams to said target.

4. A cathode ray tube comprising generating means for supplying and directing a beam of electrons along a given path, a target adapted to receive electrons, a beam shaping member positioned across the path of electrons between said generating means and said target for simultaneously deriving a plurality of shaped electron streams from said electron beam, and means intermediate said target and said beam shaping means for selectively directing different electron streams toward said target.

5. A cathode ray tube comprising generating means for supplying and directing a beam of electrons along a given path, a target adapted to receive electrons, a beam shaping member positioned across the path of electrons for simultaneously deriving a plurality of shaped electron streams from said electron beam, said member having a pattern of character-shaped apertures therein smaller than the cross-sectional area of said electron beam, and means intermediate said target and said beam shaping means for selectively directing different electron streams toward said target.

6. A cathode ray tube comprising generating means for supplying a beam of electrons, a beam shaping member having character-shaped apertures therein, means for directing the beam of electrons upon a plurality of apertures to produce character-shaped electron streams, a target positioned to receive electrons, and means intermediate said beam shaping member and said target for selectively directing different electron streams to said target.

7. A cathode ray tube comprising generating means for supplying a beam of electrons, a beam shaping member having a configuration of character shaped apertures therein, means for superimposing the beam of electrons upon said configuration of apertures for simultaneously producing a shaped electron stream from each aperture, a target positioned to receive electron streams, and means intermediate said beam shaping member and said target for selectively directing different electron streams toward said target.

8. A cathode ray tube comprising an evacuated vessel having therein, a target, electron generating means for simultaneously generating a plurality of character-shaped electron streams directed toward said target, first electrode means for focusing said electron streams toward a predetermined location, and second electrode means positioned at substantially said location for selectively directing different electron streams toward said target.

9. A cathode ray tube comprising an evacuated vessel, generating means for supplying a beam of electrons, means for focusing the beam toward a predetermined point, a beam shaping member having character-shaped apertures therein and positioned in the path of said beam whereby the beam of electrons is directed upon a plurality of apertures to produce a plurality of character-shaped electron streams, a target positioned to receive electrons, and means intermediate said beam shaping member and said target for selectively directing different electron streams toward said target.

10. A cathode ray tube comprising generating means for supplying and directing a beam of electrons along a given path, a target adapted to receive electrons, a beam shaping member positioned across the path of electrons for simultaneously deriving a plurality of shaped electron streams from said electron beam, said member having a pattern of character-shaped apertures therein smaller than the cross-sectional area of said electron beam, and selection means intermediate said target and said beam shaping means for selectively directing different electron streams toward the target, said selection means including a beam deflection system and an electrode having an aperture therein through which selected electron streams are directed.

11. In a cathode ray tube having a target and means for producing an electron beam, means for directing the electron beam along a predetermined path, a beam shaping member positioned in the locus of said beam for producing a plurality of character-shaped electron streams directed along the predetermined path, and means including a beam deflection system and an electrode having an aperture therein for selectively directing different electron streams through said aperture along a selected path toward the target.

12. In a cathode ray tube having means for producing an electron beam and a target means for focusing the

electron beam toward a predetermined point, a beam shaping member positioned in the locus of said beam for producing a plurality of character-shaped electron streams, and means including a beam deflection system positioned in the area of said point for selectively directing different streams toward the target.

13. A cathode ray tube comprising generating means for supplying a beam of electrons, a beam shaping member having a pattern of shaped apertures therein, means for directing the electron beam along a given path and superimposing said beam upon said pattern of apertures for producing a plurality of shaped electron streams directed along said given path, a target positioned to receive electron streams, and means intermediate said beam shaping member and said target for selectively directing different electron streams for registration upon said target.

14. A cathode ray tube comprising generating means for supplying a beam of electrons, a beam shaping member having a pattern of shaped apertures therein, means for focusing the electron beam along a given path toward a predetermined point and superimposing said beam upon said pattern of apertures for producing a plurality of shaped electron streams focused toward said predetermined point, a target positioned to receive electron streams, and means intermediate said beam shaping member and said target for selectively directing different electron streams toward said target.

15. A cathode ray tube comprising generating means for supplying a beam of electrons, a beam shaping member having a pattern of shaped apertures therein, means for focusing the electron beam along a given path towards a predetermined point and superimposing said beam upon said pattern of apertures for producing a plurality of shaped electron streams focused toward said predetermined point, a target positioned to receive electron streams, and means including a beam deflection system positioned in the area of said point for selectively directing different electron streams toward said target.

16. A cathode ray tube comprising generating means for supplying a substantially parallel beam of electrons, a beam shaping member having a pattern of shaped apertures therein, means for superimposing said beam of electrons upon said pattern of apertures for producing a plurality of shaped electron streams therefrom, a target positioned to receive electron streams, and means intermediate said beam shaping member and said target for selectively directing different electron streams toward said target.

17. A cathode ray tube comprising generating means for supplying a substantially parallel beam of electrons, a beam shaping member having a pattern of character-shaped apertures therein, means for directing said beam of electrons upon said pattern of apertures for producing a plurality of shaped electron streams therefrom each having substantially parallel trajectories, a target positioned to receive electron streams, and means intermediate said beam shaping member and said target for selectively directing different electron streams upon said target.

18. A cathode ray tube comprising generating means for supplying a sustantially parallel beam of electrons, a beam shaping member having a pattern of character-shaped apertures therein, means for directing said beam of electrons upon said pattern of apertures to produce a bundle of shaped electron streams therefrom each having substantially parallel trajectories, a target positioned to receive electron streams, and means intermediate said beam shaping member and said target for deflecting said entire bundle of shaped electron streams to selectively direct different electron streams toward said target.

19. A cathode ray tube comprising an evacuated vessel having therein, a target, an electron gun assembly for simultaneously generating a plurality of character-shaped electron streams directed toward said target, first electrode means for directing each of said electron streams toward a predetermined location, and means including a beam deflection system positioned at substantially said location for selectively directing different electron streams toward said target.

20. An electron gun assembly for generating a beam of electrons for a cathode ray tube and having a cathode, a control electrode, and first and second accelerating anodes, said assembly including a member having character-shaped apertures therein positioned in the path of said beam for simultaneously producing a plurality of character-shaped electron streams.

21. An electron gun assembly for generating a beam of electrons for a cathode ray tube and having a cathode, a control electrode, and first and second accelerating anodes, said assembly including a member positioned in the path of said beam for producing character-shaped electron streams therefrom, said member having a plurality of character-shaped openings therein upon which said beam is directed to produce said electron streams.

22. An electron gun assembly for generating a beam of electrons for a cathode ray tube and having a cathode, a control electrode, and first and second accelerating anodes, said assembly including a member positioned in the path of said beam between said cathode and said control grid for producing character-shaped electron streams.

23. An electron gun assembly gun assembly for generating a beam of electrons for a cathode ray tube and having a cathode, a control electrode, and first and second accelerating anodes, said assembly including a member positioned in the path of said beam within said first accelerating anode for producing character-shaped electron streams.

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