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CARRIAGE WITH PLURAL MATRIXES OF
BEAM-SHAPING APERTURES
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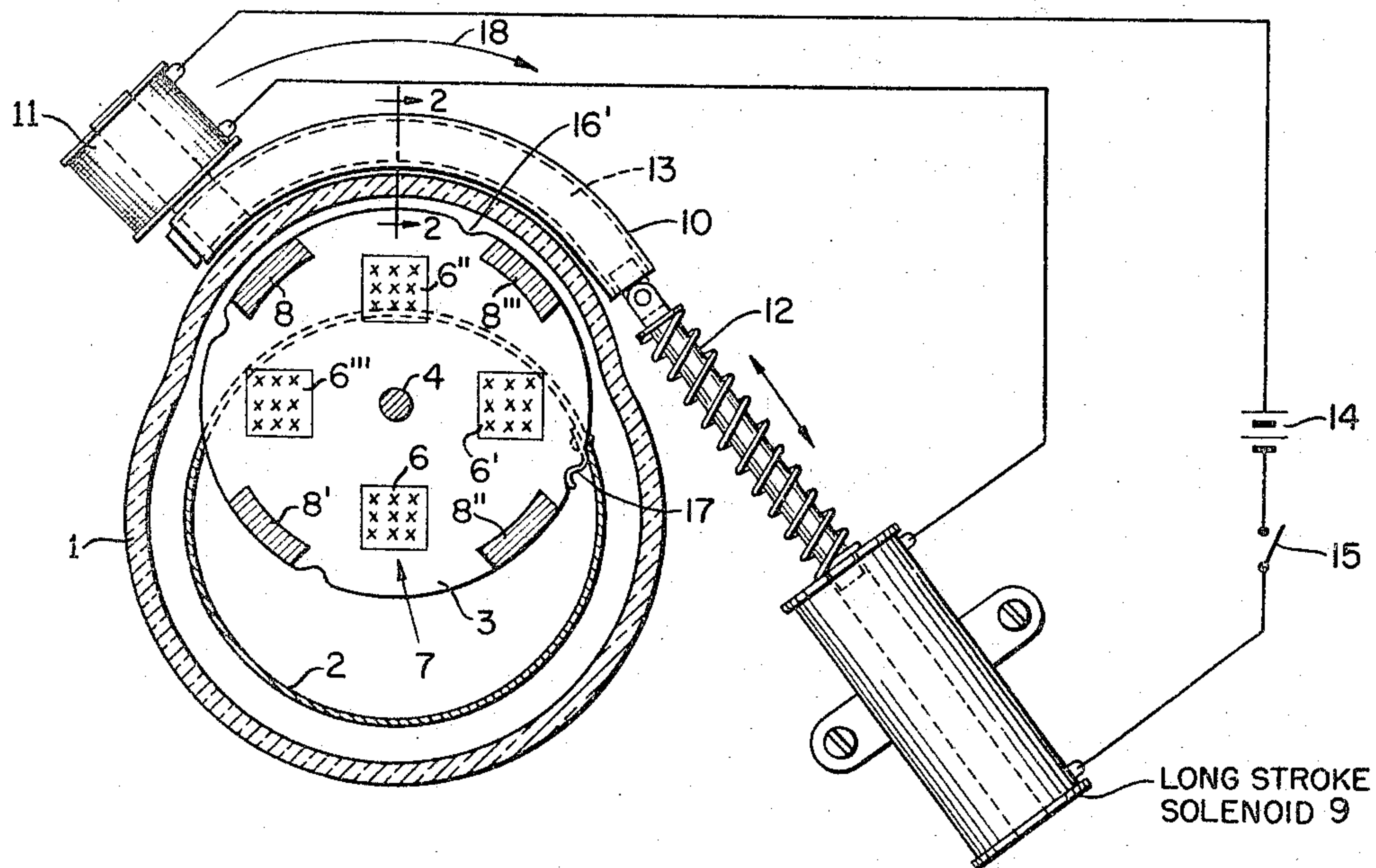


Fig. 1

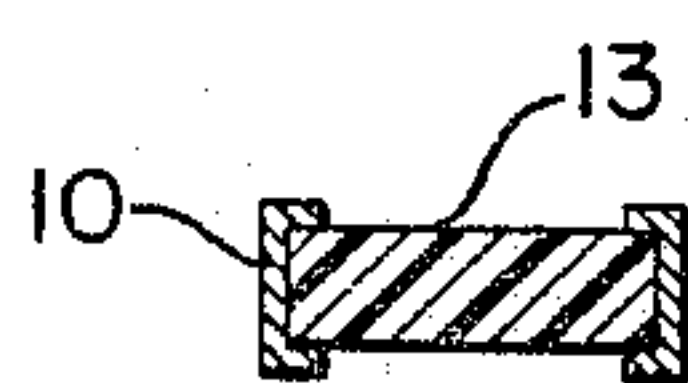


Fig. 2

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CATHODE RAY TUBE HAVING INTERNAL MOVABLE CARRIAGE WITH PLURAL MATRIXES OF BEAM-SHAPING APERTURES

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4 Claims. (Cl. 313-152)

The present invention relates to shaped-beam tubes.

In shaped-beam cathode-ray tube display systems, such as that system disclosed in United States Patent 2,824,250 to Joseph T. McNaney, an electron beam is selectively directed at one of a plurality of variously shaped apertures in a matrix to shape the beam in accordance with the shape of the selected aperture, which, in turn, corresponds to the shape of a particular character to be manifested or displayed. The shaped beam is thereafter redirected along the longitudinal axis of the tube by electron lenses before it is subjected to the influence of area selecting lenses which direct the beam to a desired area of the tube face. Such tubes are manufactured by General Dynamics Corporation under the trademark "Charactron."

The present state of the art of shaped-beam tubes permits the installation of only one matrix per tube, thereby to limit the possible number of displayed characters. The present invention provides for a multiplicity of matrices which may be selectively inserted into the path of an electron beam to be shaped. Consequently, a single shaped-beam tube may be utilized to display a very large number of characters including foreign language data, mathematical symbols, italics, and lower case lettering, in addition to upper case lettering and ordinary numbers.

Accordingly, it is the principal object of the present invention to provide a novel multiple matrix shaped-beam tube.

Other objects and advantages of the invention will become apparent as the following description proceeds, and the features of novelty which characterize the invention will be pointed out with particularity in the claims annexed to and forming a part of this specification.

For a better understanding of the invention, reference may be had to FIGS. 1 and 2 which disclose one embodiment of the present invention.

Referring now to the figures, a cross-sectional view of a shaped-beam tube having a modified neck is disclosed therein. Tube wall 1 supports a rigid tubular member 2 which in turn supports rotary disc member 3 at pivot point 4. Disc 3 functions as a carriage to support conventional shaped-beam character-forming matrices 6. The disc member 3 is pivoted to sequentially present fields of apertures or matrices 6 to the character-forming portion 7 of the tube, which portion is defined as that area covered by an electron gun, not shown. Disc member 3 also carries magnetic inserts 8 spaced about its periphery. A long stroke solenoid 9 is mechanically coupled to a movable electromagnet 11 via spring-biased plunger 12 and flexible connecting member 13, which could be made of rubber, and which is mounted within fixed track 10. The terminals of movable electromagnet 11 and solenoid 9 are connected in series with battery 14 and switch 15, as shown. Rotary member 3 also carries four indexing grooves 16 which coast with detent member 17 which is mounted upon tubular member 2. When the system is positioned as shown in the drawing, only matrix 6 is positioned in the character-forming portion of said tube.

Now, let it be assumed that it is desired to remove matrix 6 from the character-forming portion 7 of the tube

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and to position matrix 6' within the character-forming portion of the tube. Switch 15 is actuated thereby to energize solenoid 9 and electromagnet 11. Magnetic flux generated by electromagnet 11 passes through glass tube wall 1 to attract magnetic insert 8. At this time, plunger 12 is drawn into solenoid 9 and tension is produced in flexible connecting member 13 to pull movable electromagnet 11 in an arc indicated by arrow 18. Owing to magnetic insert 8, rotary member 3 is rotated until indexing groove 16' coacts with detent member 17. At this time, switch 15 is opened and the return spring surrounding plunger 12 causes the movable electromagnet 11 to be repositioned, as shown in the drawing.

The device for controlling switch 15 is not shown since such devices are notoriously well known in the art. A timer could be utilized to reopen switch 15 or a limit switch could be mounted on plunger 12 to reopen switch 15 after the ninety degree shift of disc member 3. The reactivation of switch 15 will cause a ninety degree rotation of rotary member 3, thereby to position matrix 6' in the character-forming portion of the tube.

Other embodiments of my basic concept might utilize a pivotable swing plate having magnetic inserts on its left and right sides, each insert coacting with an electromagnet positioned on the outside of the tube. The energization of one electromagnet would cause the swing plate to pivot to the right to position a first matrix carried by the swing plate within the character-forming portion; whereas, the energization of the other electromagnet would cause the swing plate to pivot to the left to position a second matrix carried by the plate within the character-forming portion. Or, if desired, the carriage member holding the matrices could be made to slide across a cross section of the tube in a straight line rather than being pivoted about any particular point.

While there has been shown and described a specific embodiment of the invention, other modifications will readily occur to those skilled in the art. It is not, therefore, desired that this invention be limited to the specific arrangement shown and described, and it is intended in the appended claims to cover all modifications within the spirit and scope of the invention.

What is claimed is:

1. In a shaped-beam cathode-ray tube, an electron gun for directing a stream of electrons to a character-forming portion of said tube, a movable carriage within said tube for bearing at least two fields of beam-shaping apertures located in different areas of said carriage, and means for moving said carriage to selectively present said fields to said character-forming portion within said tube, said carriage including a portion of magnetic material and said means for moving said carriage including a solenoid, an electromagnet adjacent to the outside wall of said tube for exerting a force upon said portion of magnetic material by creating magnetic flux which passes through the wall of said tube upon the energization of said electromagnet, and means for coupling said electromagnet to the plunger of said solenoid to cause the movement of said electromagnet and hence said carriage upon the actuation of said solenoid.

2. The combination as set forth in claim 1 wherein said plunger is flexible and conforms to the general shape of the outside wall of said tube.

3. In a shaped-beam cathode-ray tube, an electron gun for directing a stream of electrons to a character-forming portion of said tube, a movable carriage within said tube for bearing at least two beam-shaping matrices located in different areas of said carriage, and means for moving said

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carriage to selectively present said matrices to said character-forming portion within said tube, said carriage including a portion of magnetic material and said means for moving said carriage including a solenoid, an electromagnet adjacent to the outside wall of said tube for exerting a force upon said portion of magnetic material by creating magnetic flux which passes through the wall of said tube upon the energization of said electromagnet, and means for coupling said electromagnet to the plunger of said solenoid to cause the movement of said electromagnet and hence said carriage upon the actuation of said solenoid.

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4. The combination as set forth in claim 3 wherein said plunger is flexible and conforms to the general shape of the outside wall of said tube.

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10 JAMES W. LAWRENCE, *Primary Examiner*.
R. SEGAL, *Assistant Examiner*.