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2,735,038

READ-OUT TUBE

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Fig. 1

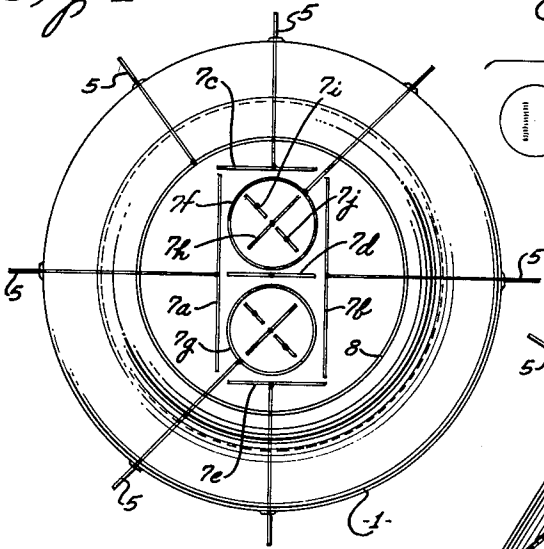


Fig. 4

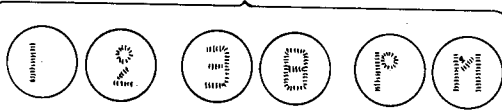


Fig. 2

LEADS COVERED TO PREVENT GLOW

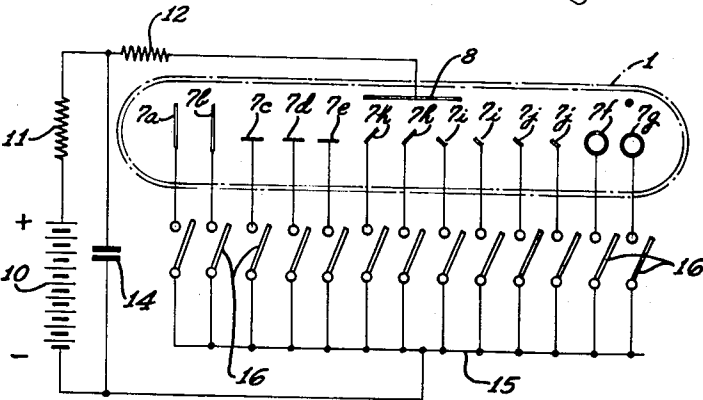
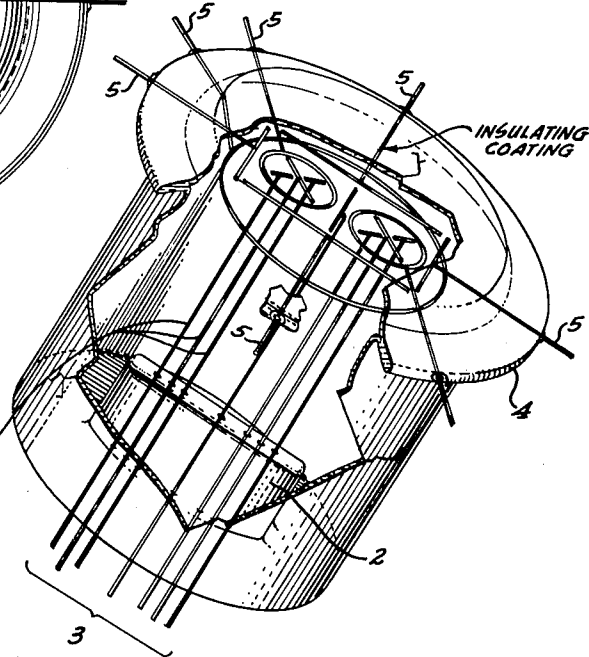


Fig. 3

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2,735,038

READ-OUT TUBE

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Application August 18, 1950, Serial No. 180,205

5 Claims. (Cl. 315-334)

My invention relates to read-out tubes and more particularly to a read-out tube of the cold cathode glow type.

It is an object of the invention to provide a single cold cathode glow discharge tube capable of forming a plurality of intelligible symbols made visible by cathode glow within the tube.

Briefly, the invention includes the use of a tube having an envelope enclosing an ionizable gas, an anode, and a plurality of cathodes. The cathodes are arranged preferably in the same plane, in a pattern, so that by energizing selected groups of cathodes, illuminated symbols, greater in total number than the number of cathodes, can be formed. In a preferred form, a pattern is used employing thirteen cathodes by which all of the numerals of the decimal system, and nearly all of the letters of the alphabet can be clearly formed by the glow on selected cathode groups in the pattern.

The invention will be more clearly understood by reference to the drawings in which:

Figure 1 shows a top view of a glow tube having a preferred cathode pattern.

Figure 2 is a perspective view, somewhat diagrammatic, of a complete tube having cathodes in the pattern of Figure 1.

Figure 3 is a circuit diagram showing one way of selectively energizing cathodes in groups to form visible numbers and letters.

Figure 4 is a schematic top view of five tubes having cathodes energized to indicate a time value.

Referring first to Figures 1 and 2, an envelope 1, formed from a material such as glass, is provided with a re-entrant stem 2 having stem leads 3 passing therethrough and extending toward the top of the tube, parallel to the axis of the tube. A ring seal 4 is made at the top of the tube, this seal 4 having ring leads 5 passing therethrough.

Mounted on the stem leads 3 and all of the ring leads 5, except one, are a plurality of coplanar cathodes 7, in this case of wire, a ring anode 8 being mounted on the extra lead in a plane just below the plane of the cathodes 7.

Cathodes 7 consist of eleven straight bars and two circles arranged in a preferred pattern. This pattern consists of two spaced long bars 7a and 7b, and three cross bars 7e, 7d and 7c, therebetween, of intermediate length to define an outer rectangle made up of two squares. Circle cathodes 7f and 7g are placed one in each square. Within each circle are positioned three cathodes 7h, 7i and 7j in the shape of a cross. Thirteen cathodes are used in all. With these thirteen cathodes, all of the numerals in the decimal system and most of the letters of the alphabet, as well as other symbols, can be formed by energizing selected groups of cathodes to produce a cathode glow thereon. The cathodes preferably are in the same plane but may be spaced, if desired, in different planes so long as the cathodes do not obscure each other when viewed. A coplanar relationship provides the widest viewing angle. All leads to the cathodes are covered, as is well known in the art, to prevent glow appearing thereon.

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One circuit by which selected groups of cathodes can be energized is schematically shown in Figure 3. This general type of circuit is shown described and claimed in a copending application, Serial No. 167,571, filed June 12, 1950.

Here a potential source 10 is connected through a current limiting resistor 11 and a peak limiting resistor 12 to anode 8 of the tube. The tube, as shown in Figure 3, represents the tube of Figure 1, but with the cathodes 7 separated for clarity of circuit connection illustration. A capacity 14 is placed across the current limiting resistor 11 and the source 10. The negative side of source 10 is connected to a switch line 15, and each cathode 7 is connectable to the switch line 11 by a switch 16. By closure of the proper switches 16, any group of cathodes can be selected to form a desired numeral or letter. Switches 16, however, are merely illustrative of cathode connection means, as mechanical switches can readily be replaced by electronic gates or the like, wholly electrically operated, in response to the operation of an electronic counter, an intervalometer clock, an add or a cash register, for example. Figure 4 shows six of the tubes energized to indicate the time of 12:38 p. m., for example, as controlled by a clock. Other uses will be apparent to those skilled in the art.

From the above description it will be apparent that there is thus provided a device of the character described possessing the particular features of advantage before enumerated as desirable, but which obviously is susceptible of modification in its form, proportions, detail construction and arrangement of parts without departing from the principle involved or sacrificing any of its advantages.

While in order to comply with the statute, the invention has been described in language more or less specific as to structural features, it is to be understood that the invention is not limited to the specific features shown, but that the means and construction herein disclosed comprise a preferred form of putting the invention into effect, and the invention is, therefore, claimed in any of its forms or modifications within the legitimate and valid scope of the appended claims.

What is claimed is:

1. A read-out tube, including, an envelope having a light-transmitting portion, an ionizable gas disposed in the envelope at a pressure for producing a glow discharge upon ionization, an anode disposed within the envelope, a plurality of cathodes disposed within the envelope in energizable relationship with respect to the anode, the cathodes in the plurality being disposed in substantially the same plane adjacent to the light-transmitting portion of the envelope, a first group of cathodes in the plurality being disposed relative to one another to define a plurality of enclosures, a second group of cathodes in the plurality being disposed within the enclosures defined by the first group of cathodes and having curvilinear configurations, a third group of cathodes in the plurality being disposed within the enclosures defined by the first group of cathodes and having rectilinear configurations, and means for selectively energizing predetermined cathodes in each group to provide different numerical and alphabetical indications.

2. A read-out tube, including, an envelope having a light-transmitting portion, an ionizable gas disposed in the envelope at a pressure for producing a glow discharge upon ionization, an anode disposed within the envelope, a plurality of cathodes disposed within the envelope in energizable relationship with respect to the anode, the cathodes in the plurality being disposed in a common plane adjacent said light-transmitting portion of said envelope, a first group of cathodes in the plurality being disposed in two substantially perpendicular directions

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relative to one another, a second group of cathodes in the plurality being disposed in substantially oblique directions relative to the first group of cathodes, and a third group of cathodes in the plurality being provided with arcuate shapes, and means for selectively energizing predetermined cathodes in each group to provide different numerical and alphabetical indications.

3. A read-out tube, including, an envelope having a light-transmitting portion, an ionizable gas disposed in the envelope at a pressure for producing a glow discharge upon ionization, an anode disposed within the envelope, a plurality of cathodes disposed within the envelope in energizable relationship with respect to the anode and disposed in a particular plane adjacent to the light-transmitting portion of the envelope, a first group of cathodes in the plurality being disposed in perpendicular relationship to one another to form a pair of rectangles having a common boundary, a second group of cathodes in the plurality being disposed within the pair of rectangles to form circles, a third group of cathodes being disposed within the rectangles and the circles in oblique relationship to the boundaries of the rectangles to form diagonals, and means for selectively energizing predetermined cathodes in each group to provide different numerical and alphabetical indications.

4. A read-out tube, including, an envelope having a light-transmitting portion, an ionizable gas disposed in the envelope at a pressure for producing a glow discharge upon ionization, an anode disposed within the envelope, a plurality of cathodes disposed within the envelope in energizable relationship with respect to the anode, the cathodes in the plurality being disposed in a particular plane adjacent to the light-transmitting portion of the envelope, a first group of cathodes in the plurality being disposed relative to one another to form at least one

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rectangle, a second group of cathodes in the plurality being disposed within the rectangle formed by the first group of cathodes and in oblique relationship to the first group of cathodes, a third group of cathodes in the plurality having curvilinear shapes and being disposed within the rectangle, and means for selectively energizing predetermined cathodes in each group to provide different numerical and alphabetical indications.

5. A read-out tube, including, an envelope having a light-transmitting portion, an ionizable gas disposed in the envelope at a pressure for producing a glow discharge upon ionization, an anode disposed within the envelope, a plurality of cathodes disposed within the envelope in energizable relationship with respect to the anode, the cathodes in the plurality being disposed in a plane substantially parallel to the light-transmitting portion of the envelope, a first group of cathodes in the plurality being disposed in intersecting relationship with respect to one another, a second group of cathodes in the plurality being disposed to have curved configurations, a third group of cathodes in the plurality being disposed to enclose the first and second groups of cathodes, and means for selectively energizing predetermined cathodes in each group to provide different numerical and alphabetical indications.

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