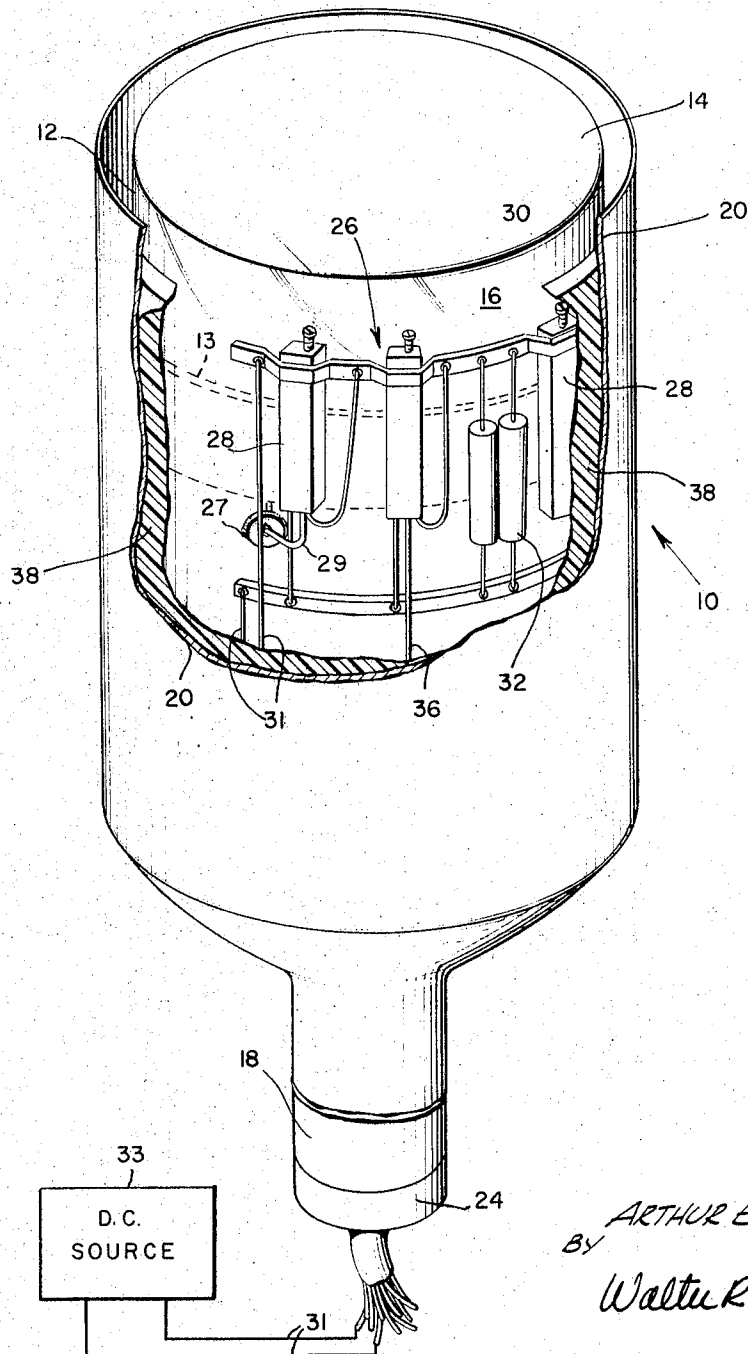


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VOLTAGE DIVIDER NETWORK ENCAPSULATED IN
THE HOUSING OF A STORAGE TUBE
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**VOLTAGE DIVIDER NETWORK ENCAPSULATED
IN THE HOUSING OF A STORAGE TUBE**

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2 Claims. (Cl. 315—52)

The present invention relates to a voltage dividing network and more particularly to an encapsulated voltage dividing network for a direct-viewing storage tube.

In a direct-viewing storage tube, as is generally known, an electric charge pattern is produced on a target element or storage grid assembly by a beam of electrons emanating from a writing gun. The resulting electric charge pattern controls the flow of flood electrons from a flood gun to a viewing screen to produce a visual presentation of the charge pattern. Generally, to control the deflection and intensity of the electrons produced by the writing and flood guns a plurality of electrodes and control grids are positioned at various locations within the envelope of the tube, and have applied to them a D.-C. voltage which is obtained by connecting each of the electrodes and control grids to taps of a potentiometer which is, in turn, connected to a source of power, the negative terminal of which is connected to ground. Heretofore, the potentiometer-power circuit was located remote from the storage tube and was coupled to the electrodes and control grids by conductors extending from the tube envelope. Since, in a conventional direct-viewing storage tube, there are at least three electrodes and three control grids each requiring a D.-C. voltage, the bundle of conductors running from the tube envelope to the potentiometer-power circuit is rather large and cumbersome.

Therefore, an object of the present invention is to provide a voltage dividing network which is integrated into the encapsulating layer surrounding the glass envelope of a direct-viewing storage tube.

Another object of the present invention is to provide a voltage dividing network which is arranged in the encapsulating layer surrounding the glass envelope of a direct-viewing storage tube to enable the components thereof to be adjusted even though the network is hermetically sealed.

Briefly, the integrated storage tube D.-C. voltage dividing system of the present invention includes a storage tube having a glass envelope, electrical terminals on the periphery of said envelope and a plurality of control elements enclosed within said envelope each connected to a different one of said terminals. A voltage dividing network circumscribes said envelope and is connected to each of said terminals. Said network includes a plurality of electrical components and is adapted to supply a direct current electrical signal of a predetermined magnitude to each of said elements. To hermetically seal the network it is enclosed within an encapsulating layer surrounding a portion of said envelope.

Other advantages of the invention will hereinafter become more fully apparent from the following description of the drawing the single figure of which illustrates a perspective view of a portion of a conventional direct-viewing storage tube having a portion of the encapsulating layer cut away to show the voltage dividing network. The electrical components of the network have been shown slightly enlarged, relative to the size of the tube envelope, to facilitate the illustration of their positioning and encapsulation.

Referring now to the drawing there is shown a conventional direct-viewing storage tube 10 which includes generally a glass envelope 12 having a viewing face 14. Typically the envelope 12 is cylindrically shaped having a

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first portion 16 of one diameter at the end adjacent to the viewing face 14 and, at the other end, a second portion 18 of a substantially smaller diameter. A shielding enclosure 20 of a material such as a conventional ferrous base shielding material circumscribes the envelope 12 and terminates at the second portion 18 in an encapsulating tip 24 of a material such as silicon rubber. Enclosed within the envelope 12 is a plurality of control elements each of which is connected to a different terminal on the periphery of the envelope 12, such as shown at 27. Shown in dashed lines in the figure as illustrative of the plurality of control elements of a conventional storage tube is a collator grid 13. The grid 13 is electrically coupled to the terminal 27 and in a like fashion all the other elements (not shown) are coupled to different terminals and correspondingly to the voltage divider network. For simplicity, a showing of the other elements and terminals has been omitted from the figure.

In the preferred embodiment a voltage dividing network 26 circumscribes the periphery of the first portion 16 at a location generally adjacent to viewing face 14. Typically, the network 26 includes electrical components such as a plurality of potentiometers 28 each having an adjustment screw 30 and a plurality of resistors 32 and is coupled to the control elements by a suitable conductor 29 such as that shown extending from the potentiometer 28 to the terminal 27 and to a source of D.-C. power 33 such as a battery by a pair of conductors 31 that extend from the encapsulating tip 24 along with other conductors necessary for the operation of the tube. Although, the conductors 31 have been shown extending from the tip 24, this is merely for illustration since they may extend from the shielding enclosure at any desired location.

While the voltage dividing network 26 is shown to include three adjustable potentiometers 28 and two fixed resistors 32 these specific electrical components are shown only for descriptive purposes since the invention is thought to reside in the combination of a voltage dividing network with a direct-viewing storage tube and not in the specific electrical components of the dividing network 26.

In its preferred embodiment the network 26 is positioned near the viewing face 14 so that the terminals extending from the envelope 12 near the viewing face 14 may be coupled thereto, while the other terminals, not located near the network 26, are connected thereto by a conductor, such as that shown at 36, which runs from the network 26 to the terminal in the region between the envelope 12 and the enclosure 20.

To hermetically seal and protect the electrical components of the network 26 after it is placed around the envelope 12 and connected to the terminals it is covered with a layer of encapsulating material 38 such as silicon rubber. The layer 38 is of a thickness and width sufficient to protect and cover the components, but still enable the enclosure 20 to be placed over the envelope 12. The magnitude of the D.-C. voltage applied to each of the control elements is determined and adjusted to a predetermined value prior to the sealing of the network 26 in the encapsulating material 38; however, it may be necessary, during the life of the tube to readjust these values. To accomplish this, the adjustment screws 30 of the potentiometers 28 is covered with a layer of encapsulating material of sufficient thickness to protect the screw 30 and potentiometer 28 but of a thickness that permits it to be easily ruptured and the screw exposed. Thus, after the proper readjustment the rupture may be easily sealed again by filling it with additional encapsulating material.

While the voltage dividing network 26 has been shown to be positioned adjacent to the viewing face 14 it should be understood that, as desired, it may be positioned at many different locations along the periphery of the envelope such as in the encapsulating tip 24. In this loca-

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tion the only difference in the arrangement of the network 26 and envelope 12 would be the increased number and length of conductors extending from the network to the terminals.

While one embodiment of this invention has been illustrated it will be appreciated by those skilled in the art that variations in the disclosed arrangement both as to their details and as to the organization of such details may be made without departing from the spirit and scope thereof. Accordingly, it is intended that the foregoing disclosure and the showings made in the drawing shall be considered only as illustrative of the principles of this invention and not construed in a limiting sense.

What is claimed is:

1. In combination with a source of D.-C. voltage an integrated storage tube voltage dividing system comprising:
 - a storage tube having an envelope and a plurality of control elements enclosed therein, each of said elements being connected to an electrical terminal on the periphery of said envelope;
 - a voltage dividing network circumscribing said envelope and coupled to said electrical terminals and to said source of D.-C. voltage to supply a voltage of a predetermined magnitude to each of said control elements; and
 - an encapsulating member in contact with a portion of said envelope for enclosing and hermetically sealing said network, said member having a reduced thickness portion adapted to be ruptured to expose predetermined portions of said voltage dividing network.
2. In combination with a source of D.-C. voltage an integrated storage tube voltage dividing system comprising:

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- a storage tube having a housing and including first and second control elements enclosed therein each of said elements being connected to an electrical terminal on the periphery of said housing;
- a voltage dividing network circumscribing said housing including a plurality of electrical resistors and potentiometers, and coupled to said electrical terminals and to said source of D.-C. voltage, each of said potentiometers having a housing portion and an adjustment portion, said network being connected to said first element to supply thereto a D.-C. voltage of a predetermined fixed magnitude and to said second element to supply a D.-C. voltage of a variable magnitude;
- an encapsulating member in contact with a portion of said housing and covering said resistors and said housing portion of said potentiometer with a first layer of encapsulating material and covering said adjustment portion of said potentiometer with a second layer of encapsulating material of a thickness less than that of said first layer, said second layer being adapted to be ruptured to expose said adjustment portion whereby the D.-C. voltage supplied to said second element may be easily varied.

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