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ADAPTOR DEVICE FOR IMAGE TUBES

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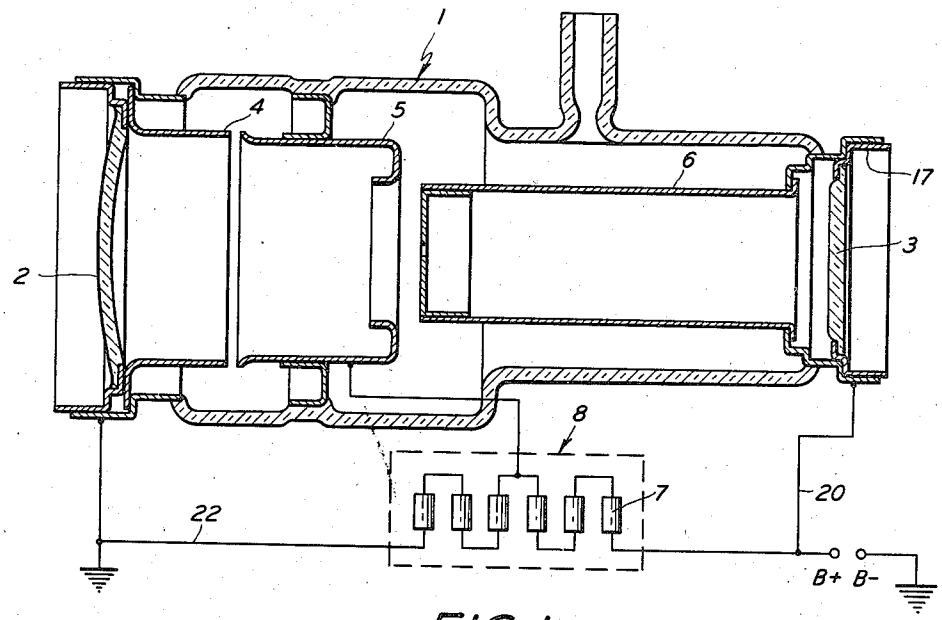


FIG. 1

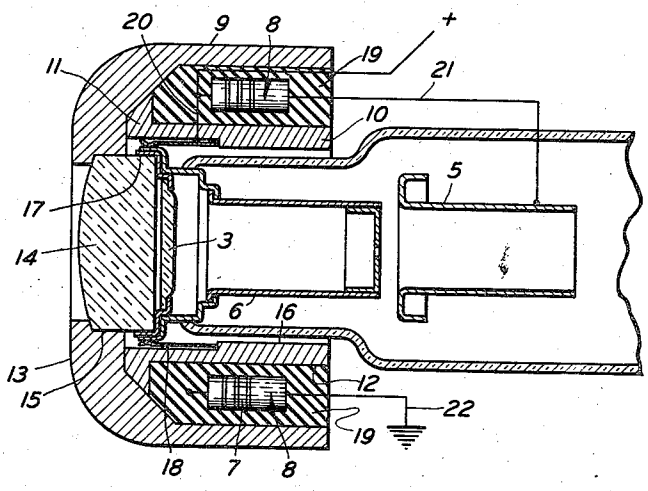


FIG. 2

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# ADAPTOR DEVICE FOR IMAGE TUBES

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1 Claim. (Cl. 340—369)

The present invention relates to an adaptor device for image tubes and more particularly to a combination safety device and voltage distributing network especially adapted for use with image tubes.

Image tubes of the type which convert infra-red ray images into visible light are usually comprised of a plurality of electrodes which serve to project an extended electron image onto a fluorescent screen. One of the electrodes is a photosensitive cathode upon which a viewed image is cast, and serves to emit an electron image which is guided through space inside the tube and focused onto the fluorescent screen. One essential feature in achieving adequate image brightness on the screen is that the electrons of the extended image be projected with adequate velocity to cause fluorescence of the screen material. In one type of image tube, adequate electron velocity is achieved by the use of sixteen kilovolts electron-accelerating voltage applied to the anode electrode. Other type tubes have been operated successfully at both lower and higher potentials.

In most instances, however, a relatively large anode voltage is required which complicates, to some extent, supply of such potentials to the tube. For one thing, such potentials are normally regarded as dangerous to an operator, as well as to associated equipment which could be damaged severely either by arc-overs or shorting conditions. Further, these potentials contribute to tube operating deficiencies such as image distortion and signal leakage. Thus, extreme care must be taken in providing well insulated wiring and equipment. In actual practice, such care is evidenced in the form of bulky equipment which is either difficult to manipulate in operation or occupies excessive space.

In view of the foregoing, it is an object of this invention to provide an adaptor device for image tubes which supplies the necessary electrode potentials thereto while simultaneously occupying a minimum of space as well as providing safety for an operator.

It is a still further object of this invention to provide such an adaptor device which in addition to the features of the foregoing object provides optical correction without requiring any additional space.

In accordance with this invention, an adaptor device for image tubes having a plurality of electrode elements comprises a housing made of insulating material, voltage-dividing means contained in said housing and having terminal leads extending therefrom for providing different voltages for said electrode elements, an image tube-receiving means disposed adjacent said voltage-dividing means, and optical correction means in said housing adjacent said tube-receiving means for providing optical correction of the images reproduced by the image tube.

For a better understanding of the invention, together with other and further objects thereof, reference is made to the following description taken in connection with the accompanying drawing, the scope of the invention being defined by the appended claim.

In the accompanying drawing:



Fig. 1 is an axial section of a typical image tube adapted for use with this invention; and

Fig. 2 is a sectional illustration of an embodiment of this invention.

Referring to the drawings, and particularly to Fig. 1, the image tube is comprised of an evacuated glass envelope 1, having a photosensitive cathode 2 in the left-hand end and a fluorescent screen-anode 3 in the opposite end. Suitable focusing and accelerating electrodes internally of the tube appear as the cathode sleeve 4 (conductively coupled to the cathode 2), a focusing grid 5, and an anode cylinder 6 conductively coupled to the fluorescent screen 3. An infra-red ray or the like image projected upon the photosensitive cathode 2 is formed into and extended electron image by means of these tubular electrodes 4, 5 and 6 and are also accelerated thereby for projection onto the screen 3. This latter screen is composed of suitable fluorescent material, such as willemite, and serves to reproduce the electron image in visible form.

In the typical instance, the cathode 2, 4 is connected to ground potential, while the focusing sleeve 5 is supplied with an intermediate potential. The anode 3, 6 has the maximum voltage applied thereto which is usually in the order of 16,000 volts.

In one possible application of the tube just described, a housing containing the necessary optical system and supports for the tube itself is fed by a multi-conductor cable having wires for the three connections just described. Another housing containing the necessary power supply encloses the usual voltage-dividing network to which the other end of the connecting cable is coupled. Such a voltage-dividing network is illustrated as being comprised of a plurality of resistors 7 connected in series and enclosed in a dashed-line box indicated by reference numeral 8.

Referring now to Fig. 2, the adaptor device of this invention is illustrated as comprising an annular housing, made of suitable plastic insulating material, and is composed of inner and outer sleeves 9 and 10, respectively, which are bonded together along the inclined surfaces indicated at 11. These two sleeves are so sized and arranged that when assembled, an annular cavity 12 is provided.

On the left-hand end of the outer ring 9 is provided an annular lens-piece holder 13 adapted to support a circular eyepiece or lens 14. This lens 14 may be composed of the usual glass or plastic material made to any suitable shape, such as convex or concave, and in the present instance, is provided with a cylindrical outer surface or shoulder 15 which serves a purpose to be explained more fully hereinafter.

As clearly shown, the lens 14 constitutes the bottom of a socket 16 in the housing for receiving the anode-end portion of the tube of Fig. 1. The cylindrical lens-shoulder 15 is of such a diameter as to fit snugly inside the axially projecting anode terminal ring 17 (Fig. 1) of the image tube.

A contactor ring 18 is suitably mounted in the bottom of socket 16 and is arranged to engage slidably the ring terminal 17 as the tube 1 is fitted into the socket 16. By this means, anode potential is applied to the tube anode electrodes 3, 6, and the tube is securely mounted in place.

A plurality of circumferentially arranged resistors 7 are fitted within the annular cavity 12, and are supported therein by a suitable plastic material which completely fills the cavity. This material is indicated by the reference numeral 19 and may consist of any of the well known insulating plastics, such as cellulose acetate, polystyrene, etc. From one end of a terminating resistor a wire 20 extends through the housing material to the con-

tactor ring 18, and a suitable connection to one of the intermediate resistors, indicated by the reference numeral 21, leads to the focusing electrods 5. A ground connection 22 is made from the other terminating resistor.

As seen in the diagrammatical illustration of Fig. 1, the "B" plus voltage is connected to the anode end of the voltage-divider 8 and tube screen 3, whereas "B" minus voltage is connected to ground.

The peripheral shoulder 15 of the lens 14 and the cooperating contactor ring 18 are so designed as to provide a convenient mounting or tube socket for the image tube. Thus, the tube may be replaced in a minimum of time.

With the voltage divider and corrector lens mounted as described in a single housing type tube socket, a minimum of space is occupied while achieving the advantage of operator safety. Considering other advantages of this singular assembly, a convenient lens for viewing the image reproduced on the screen 3 is provided as well as convenient connections for the image tube itself. The assembly is the ultimate in compactness, and furthermore provides a small but effective barrier of insulation between an operator's eye and the dangerous potentials applied to the anode ring 17. While accomplishing these things, the illustrated embodiment also provides a mounting for the tube thereby serving to simplify the design of tube-supporting accessories.

With the voltage divider 8 completely encased in a plastic material, generation of corona is kept at a minimum and a corona discharge arc-over path from the image tube terminal 17 around to the operator is made desirably long, since such discharge path extends toward the right, away from the operator.

While there has been described what is at present considered a preferred embodiment of the invention, it will be obvious to those skilled in the art that changes and modifications may be made therein without departing from the invention, and it is, therefore, intended in the appended claim to cover all such changes and modifications as fall within the true spirit and scope of the invention.



What is claimed is:

An adaptor device for an image tube having anode, cathode, and grid electrodes and terminal leads therefor, the terminal lead for the anode electrode projecting beyond the end of the tube in ring form; comprising an annular housing made of insulating material, a plurality of circumferentially arranged series connected resistors embedded in said housing about the axis thereof, the central portion of the housing being shaped in the form of a socket, a lens mounted in the bottom of the socket and including an annular shoulder for receiving the anode ring of said tube, spring contacts carried by said housing and operatively engageable with said anode ring, a connection between the high voltage point of said resistors and said spring contactor, and other connections leading from said resistors for supplying said grid and cathode electrodes with successively lower voltages respectively.

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