July 12, 1932. H. W. WEINHART ET AL 1,867,340

ELECTROOPTICAL APPARATUS

Filed Oct. 23, 1929

FIG. 1

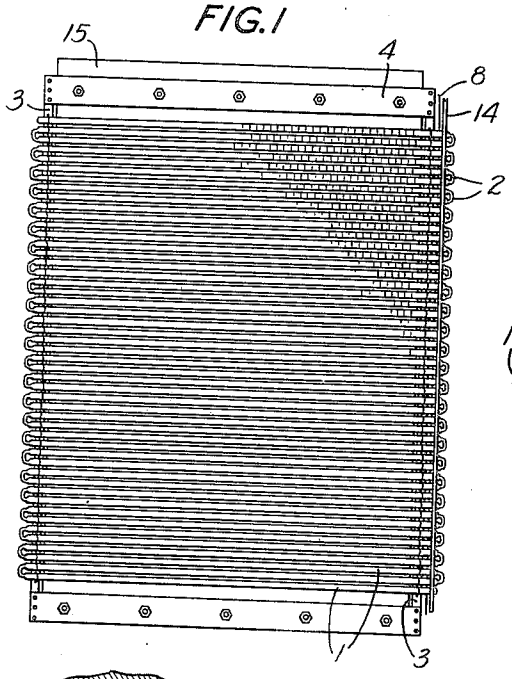


FIG. 2

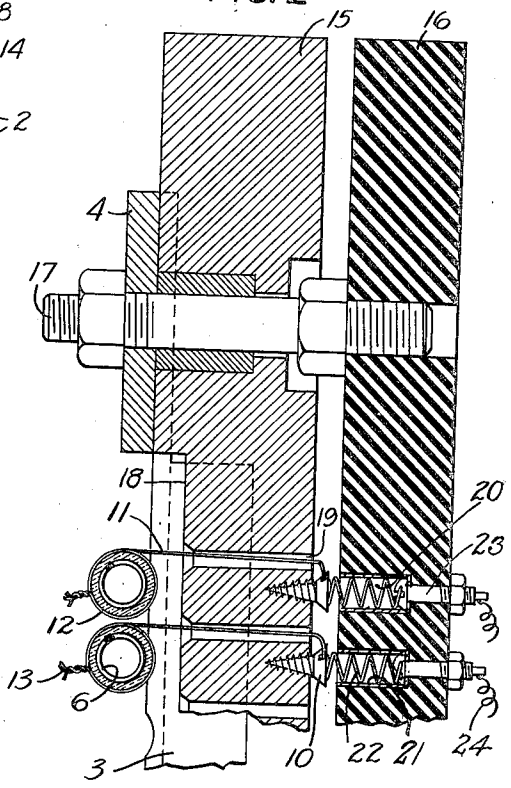


FIG. 3

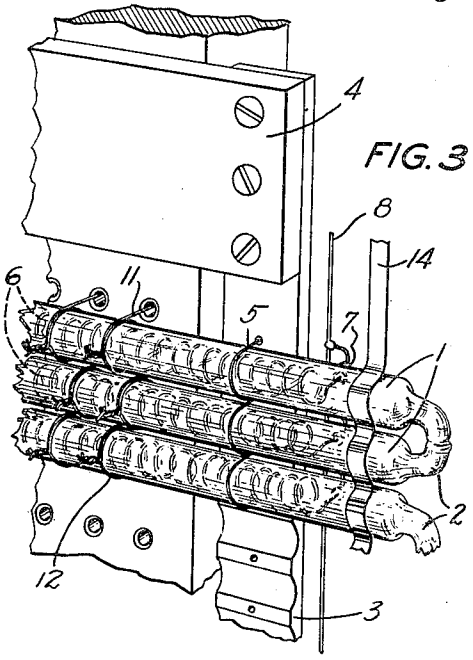
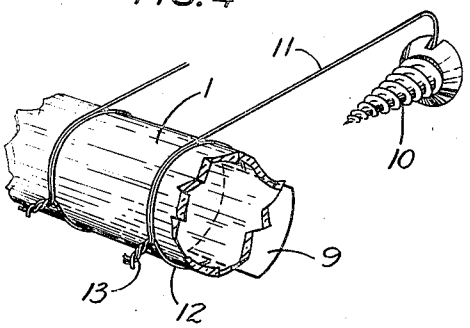


FIG. 4



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Patented July 12, 1932 1,867,340

UNITED STATES PATENT OFFICE

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ELECTROOPTICAL APPARATUS

Application filed October 23, 1929. Serial No. 401,662.

The present invention relates to electro-optical transmission, and more particularly to apparatus for producing an image which may be viewed by an audience.

Apparatus of the type referred to above is disclosed, for example, in U. S. Patent 1,673,828, issued June 19, 1928 to H. E. Ives and application Serial No. 181,537, filed April 6, 1927 by Frank Gray.

The present invention relates to apparatus of the type disclosed in the above noted application of Gray and is especially directed to features of the lamp structure and means for mounting it.

In a preferred construction, as in that disclosed by Gray, the lamp comprises a plurality of sections of glass tubing arranged side by side and connected together at the ends to form a continuous tube. Associated with each tube section is a conductive element which extends from one end of the section to the other. These elements are connected in series with each other to constitute a substantially continuous conductor. The tube is filled with a gas or good conductivity, at a low pressure. Traces of an active gas may also be included in the gaseous charge supplied to the tube.

One side of each tube section is provided with a number of electrodes, which are insulated from each other and each of which cooperates with a corresponding adjacent portion of the continuous conductor to constitute a separate glow discharge path. The continuous conductor, therefore, functions as a discharge electrode, common to the separate or individual electrodes. Obviously the common electrode may be enclosed within the tubular sections or may be mounted externally thereof on the side opposite the individual electrodes. However, whether applied internally or externally of the tube, the common electrode should be so mounted that it does not obstruct to any appreciable extent the light produced by the current discharge through the gas within the tube.

An object of the invention is to permit the separate external electrodes of a multiple electrode glow discharge lamp to be accurately adjusted with respect to the contacts for connecting them to a current supply source.

An ancillary object is to prevent dark spaces appearing in the viewing field.

Another object is to mount the glass tubing so that substantially no strain is applied thereto.

According to one specific embodiment of the present invention the continuously connected tube sections, with which the common electrode is associated are mounted side by side on a frame, which carries a panel provided with holes corresponding in number to the number of individual external electrodes. Each external electrode is secured to the outer face of the tube, and the tube and electrode are wrapped with one or more strands of conductive wire having projecting ends, which are twisted together to constitute a terminal. The terminal may constitute a lead, or may be connected to a lead, adapted to be threaded through an adjacent hole in the panel and soldered to a flat-headed contact mounted on the back of the panel.

A second panel is provided with spring contacts, one for each contact on the first panel. The two panels are supported so that the flat-headed contacts of the first panel are in axial alignment with the spring contacts carried by the second panel. Each of the spring contacts each engages a conductive element, which extends through the second panel and is connected to one segment of a commutator.

The different commutator segments are connected to different spring contacts of the second panel and the rotary contact thereof is connected to the incoming line to selectively supply high frequency current modulated by picture current to the respective discharge paths, identified by the individual electrodes of the viewing field, whereby the image scanned at the transmitter may be reproduced.

A more detailed description of the invention follows and is illustrated in the accompanying drawing.

Fig. 1 is a front view of a complete lamp structure.

Fig. 2 is a transverse section taken of line 2—2 of Fig. 1.

Fig. 3 is a perspective view of a portion of the lamp.

Fig. 4 is a detail of one tube section on an enlarged scale, showing an individual electrode secured to the tube and connected to a contact.

As shown in Fig. 1 the complete lamp, comprises a number of horizontally arranged tubular sections 1 of glass or other transparent material. The sections are connected together at their ends by elbow members 2 to constitute a zig-zag tube covering a square or rectangular surface of large superficial area.

The lamp is adapted to be charged with a gas of good conductivity and is provided with electrodes between which a glow discharge is produced. The gas charge may consist of pure helium, neon, argon, or other noble gas. Again, any one of the noble gases or a combination thereof may be used and may have added thereto a small percentage of active gas, for example, nitrogen, hydrogen, carbon dioxide, water vapor, etc.

The supporting frame comprises vertical members 3 connected together by horizontal members 4.

The tube sections are separately secured to the vertical members 3. As herein shown, tie wires 5 are employed to lace the sections to the members 3. Obviously any other suitable means may be used for this purpose.

Each tubular section 1 encloses a spirally wound conductive wire 6. The respective ends of the wires 6 are brought out through seals 7 in the glass and are connected to conductors 8. The spirally wound elements 6 are therefore connected in series to constitute a conductor, which extends substantially continuously throughout the length of the zig-zag tube.

Connected to the external surface of each section 1 are a number of electrodes 9. These electrodes are insulated from each other and are each connected to a contact screw 10 by means of a lead 11. A conductive wire 12, of one or more strands, is wound about the tube 1 and electrode 9 and has its ends twisted together at 13 to force the wire into intimate and good electric contact with the electrode 9. The lead 11 is secured in good electrical contact with the twisted portion 13 of the wire 12. Secured to the external surface of sections 1 is a conductor 14.

Associated with the extended tubular surface are panels 15 and 16 of insulating material. As herein shown the panel 15 is of wood, while the panel 16 is of rubber. The panels are secured to the horizontal frame members 4 by studs 17.

The outer face of the panel 15 is set back as shown at 18 in Fig. 2, so that it does not engage the tube 1. The panel 15 is held in spaced relation with respect to the panel 16 by cooperative elements mounted on the studs 17.

As shown in Fig. 2, the leads 11 extend through holes 19 in the panel 15 and the contacts 10, shown by way of example as screws, are secured to the back of the panel adjacent to the holes 19. Any flat-headed contact may be used in place of the screws 10.

The rubber panel 16 is provided with a number of holes 20, corresponding in number to the contacts 10 and in axial alignment therewith. Mounted in the holes 20 are metal cups 21 within which are mounted spring contacts 22 which engage corresponding contacts 10 on the back of the panel 15.

The cups are secured to the panel 16 by conductive screws 23 which in turn are connected by conductors 24 to the segments of a commutator (not shown) adapted to supply picture currents to the individual electrodes 9.

As stated above the lamp herein described is of the type disclosed in the above identified Gray application. As a matter of fact the lamp of the instant application was designed to be directly substituted for the lamp 200 disclosed by Gray. When so substituted, unmodulated high frequency oscillations will be supplied through the conductors 8 and 14 to produce a faint uniform glow over the whole tube surface to correspond to a dark or non-receiving condition.

As set forth in the above mentioned Gray application commutators are provided to supply picture currents to the individual electrodes 9 and common conductor or electrode comprising wires 6 in such manner that the individual paths of the lamp will glow with an intensity which corresponds to similarly positioned corresponding portions of the object scanned at the transmitting station.

The present invention provides a construction in which the lamp per se and the contact carrying panels are separately supported by a frame, while firm electrical contact is established through the one hundred or more spring contacts by which picture currents are supplied to individual electrodes of the lamp, and there is no mechanical strain applied to the glass tubing. By this construction, the tube sections may be independently and accurately adusted with respect to the panel 15 and a good contact is established to each external electrode; whereby the individual discharge paths of the lamp are supplied with current and hence no dark spots appear in the field.

Since in the operation of the lamp all that is essential is that the unitary enclosed space be provided, it will be apparent that the ends of the tubular sections may be connected by manifolds in parallel instead of in series as described in detail.

What is claimed is:

1. An electric glow lamp comprising a plurality of transparent tube sections arranged side by side and connected to consti-

tute a discharge space provided with a continuous conductor and enclosing a conductive gas, separate electrodes on the outer surfaces of said sections, a mount for said lamp including a support for said sections, and means independent of said support to provide an electrical connection for each external electrode.

2. An electric glow lamp comprising a plurality of transparent tube sections arranged side by side and connected to constitute a discharge space provided with a continuous conductor and enclosing a conductive gas, separate electrodes on the outer surfaces of said sections, a mount for supporting said sections, terminal contacts for said electrodes, and a strand of conductive wire engaging each electrode and providing a conductive lead connected to one of said terminal contacts.

3. An electric glow lamp comprising a plurality of transparent tubular sections in parallel planes, and connected together to constitute a discharge space provided with a continuous conductor and enclosing a conductive gas at low pressure, separate electrodes on the outer surfaces of said sections, a frame to which said sections are secured, a panel provided with contacts for said separate electrodes secured to said frame, and means for connecting said electrodes to said contacts.

4. A mount for a glow discharge lamp, including a common electrode and a plurality of cooperating electrodes, comprising a support for said lamp, two-part spring controlled contacts for said cooperating electrodes, and a pair of panels carrying the separate elements of said contacts.

5. A mount for a glow lamp and spring controlled contacts therefor, said lamp including a common electrode and a plurality of cooperating electrodes, comprising a support for said lamp, and separate supporting means for said spring controlled contacts.

6. A mount for a glow lamp and spring contacts therefor, said lamp having a common electrode and a multiplicity of cooperating electrodes and said contacts being individual to said cooperating electrodes, comprising a support for said lamp, and a separate support for said contacts.

In witness whereof, we hereunto subscribe our names this 21 day of October, 1929.

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HOWARD HALL.