April 28, 1931. G. H. MORSE 1,802,441

TELEVISION APPARATUS

Filed April 6, 1929

Fig. 1.

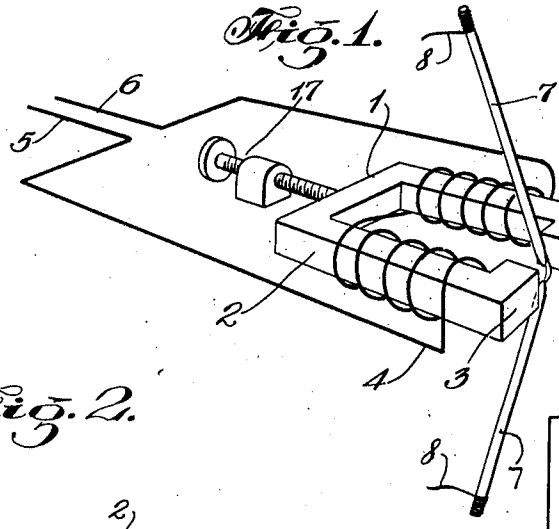


Fig. 6.

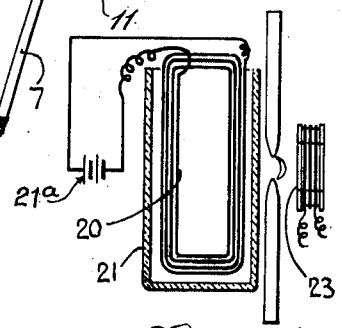


Fig. 2.

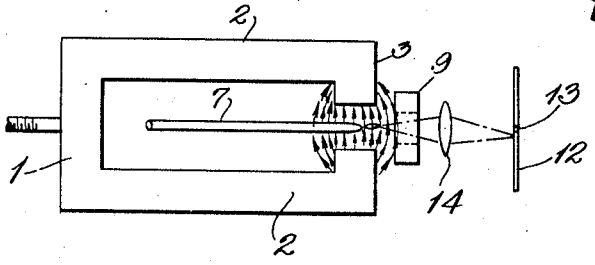
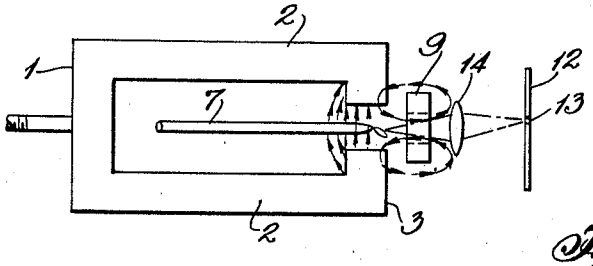


Fig. 4.

Fig. 3.



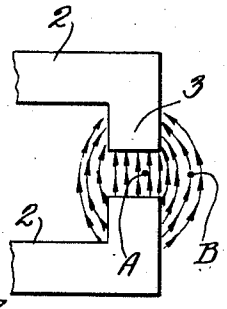
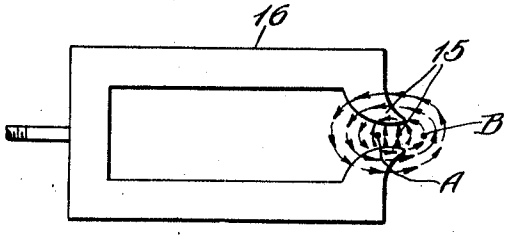


Fig. 7.

Fig. 5.





INVENTOR.
GEORGE H. MORSE
BY Meyers & Jones
ATTORNEYS.

Patented Apr. 28, 1931 1,802,441

UNITED STATES PATENT OFFICE

GEORGE H. MORSE, OF HARRISBURG, PENNSYLVANIA

TELEVISION APPARATUS

Application filed April 6, 1929. Serial No. 353,122.

This invention is an improvement in television apparatus, and more particularly in apparatus including a source of brilliant illumination controlled as to deflection by the variations of current in a radio circuit.

One of the primary objects of the invention is the provision in such equipment, of a source of light of a nature to enable weak television signals to be transformed into light values of great volume and intensity.

Another object is the provision of a light source of a character such that a relatively strong television signal will admit a great volume of light to the optical system, while the weakest of signals will affect the source to enable a small or moderate amount of light to pass.

With these and other objects in view the invention consists in the construction and novel combination of parts fully described hereinafter, illustrated in the accompanying drawings, and pointed out in the claims appended hereto, it being understood that various changes in the form, proportion, size and minor details of construction within the scope of the claims, may be resorted to without departing from the spirit of the invention.

In the drawings forming a part hereof:—

Fig. 1 is a perspective view of the improved device.

Fig. 2 is a plan view showing the arc when no television current is flowing.

Fig. 3 is a similar view showing the arc with television current flowing.

Fig. 4 is a plan view of a part of the magnet indicating the adjustment limits of the arc with respect to the field.

Fig. 5 is a plan view of an alternate construction.

Fig. 6 is a diagrammatic side view of an alternate arrangement.

Fig. 7 is a diagram at the line of the arc showing the magnetic field and the position of the arc in the field.

In the embodiment of the invention shown in Figs. 1 to 4 inclusive, an electro-magnet is provided, comprising a body 1, and arms 2 extending substantially parallel, each arm having an inwardly extending polar extremity 3 at its free end. A winding 4 of conducting wire encircles the arms, in series as shown, and the terminals 5 and 6 of the winding are connected with a suitable source of direct current of constant strength.

A pair of carbons 7, of the character formerly used in flaming arc lamps are provided, the members of the pair being arranged above and below the magnet, as shown, and with their adjacent ends so spaced that the arc between the said ends will be within the field of the magnet. The remote ends of the carbons are connected to the terminals 8 of a direct current circuit, as shown.

The carbons are, as before stated, of the character formerly used in flaming arc lamps, and they have chemically impregnated cores. Suitable regulating mechanism which may be of the character formerly used for the same purpose is provided to feed the carbons toward each other, as they are consumed by the arc, so that the arc is of constant length and intensity.

A solenoid comprising a core 9 having a central square opening 10, and a winding 11 about the core is provided, the terminals of the winding being connected to a radio circuit, to receive an amplified television receiver current of a suitable character, so that the arc or source of light passing through the central opening is subjected to the action of the current flowing through the winding, which in turn is varied by the varying light of the scene to be transmitted.

The improvement is used in connection with a screen 12, having a pin hole opening 13, a condensing lens 14 being arranged between the solenoid and the screen. Referring to Fig. 2, it will be seen that the screen is so arranged that the pin point opening 13 is out of the direct path of the maximum light of the arc when no television current is flowing through the winding 11. This opening is so placed, however, that when current is flowing, and the arc is deflected as shown in Fig. 3, the light will pass through the opening 13.

It will be apparent from the description and the drawings, that the amount of light passing through the opening 13 will be varied in accordance with the variations of

current in the winding 11, and the intensity of the light which reaches the screen or the eye of the observer, will vary in accordance with the deflection of the arc. The position of the arc will lie between the points A and B in Fig. 4, and either the arc or the magnet is adjustably mounted, so that this variation in adjustment is possible.

The arc has much less lateral stability when at B than when at A. Hence, when it is at B, it is more easily deflected by the current in the television receiver solenoid. Any suitable means of adjustment may be provided for the magnet, or for the arc. The most feasible adjustment is with the magnet, as shown at 17.

In Fig. 5, the polar extremities 15 of the magnet 16 are somewhat pointed, and are directed away from the body of the magnet, as shown. This construction of pole pieces will make the arc yet more sensitive to lateral deflection by the television current, when it is at the point B, the points A and B representing the limits of adjustment as mentioned for Fig. 4.

In operation, the long luminous flaming arc is continually bowed out in the direction of the optical system by the magnet of constant strength, the magnet receiving its current from a storage battery or other source. Directly in front of the bowed arc, with its axis coincident with the central radius of the arc is the solenoid, through which circulates the incoming television current.

A current in the solenoid will deflect the arc at right angles to the plane of the arc as it stands when no current is circulating in the solenoid. The arc is of very large candle power, the stream itself being the seat of illumination. The small opening in the screen is so positioned, that it does not permit the maximum light to enter the optical system, which may be of the character shown in my copending applications, but does permit more or less light to enter the system when the arc is deflected, as above described. Thus there is provided a source of strong illumination, controlled by the television current, and ready to be composed into a picture of great brilliance and size on a screen, by any of the well known methods now in use in television practice.

In the embodiment of the invention shown in Figures 6 and 7, the arc is arranged within a magnetic field of constant strength produced by a rectangular coil of insulated wire, and the carbons are arranged coaxial instead of at an inclination with respect to each other. The magnetic field is provided by a coil 20 of insulated wire, the coil being of rectangular shape, and it is supported in a quartz beaker 21, through which a cooling liquid, such as water, circulates, for cooling the coil. The terminals of the coil are connected with a suitable source of electrical energy indicated at 21*a*.

It will be noticed referring to Fig. 6, that the coil 20 has one of its long sides adjacent the carbons, so that the carbons are in the plane of the coil. The solenoid 23 for the television current is arranged with relation to the arc in the same manner as that shown in Fig. 1, and it will be understood that a perforated screen, and a lens similar to the screen and the lens 14 are used in connection with the present construction.

The magnetic field and the lines of force are indicated in Fig. 7, the coil being shown in cross section, and the position of the flaming arc in the magnetic field is indicated by *x*. Any suitable means is provided for feeding the carbons, and the side of the coil which lies adjacent to the carbons is close to them, and parallel with them.

The lines of force at the point marked *x* in Fig. 7, are of an ideal contour and trend to cause the flaming arc, when positioned at this point, to be very sensitive to deflection by the television currents in the solenoid. Both solenoids are flat, and arranged in vertical planes, the plane of the solenoid 23, however, being at right angles to the plane of the solenoid 20. If the carbons were so arranged that the axis should pass through the center of the loop of magnetism produced by the solenoid, there would be a strong urge to bow the arc radially, but with no lateral stability of position. By diverging from the coaxial arrangement, stability in the plane of the magnetizing solenoid and away from it, can be given the arc, as slight as may be desired, so that the arc may be deflected laterally by a very weak current circulating in the television solenoid 23.

While an electro-magnet is provided, for maintaining a field of constant strength, it is apparent that a permanent magnet would attain the same result, and in this case no winding of the magnet would be necessary.

What is claimed as new is:—

1. In apparatus of the class described, means to provide a magnetic field of constant strength, a flaming arc positioned in the field, and a deflecting solenoid arranged to produce a magnetic field substantially at right angles to the field of constant strength adapted for interposition in a radio circuit for deflecting the arc.

2. In apparatus of the class described, means to provide a magnetic field of constant strength, a flaming arc positioned in the field, a deflecting solenoid arranged to produce a magnetic field substantially at right angles to the field of constant strength adapted for interposition in a radio circuit for deflecting the arc, and a screen provided with a pin point opening normally out of line of the center of the arc, whereby deflec-

tion thereof will vary the light value transmitted to the opening.

3. In apparatus of the class described, means to provide a magnetic field of constant strength, a flaming arc positioned in the field, a deflecting solenoid arranged to produce a magnetic field substantially at right angles to the field of constant strength adapted for interposition in a radio circuit for deflecting the arc, and a screen provided with a pin point opening normally out of line of the center of the arc, whereby deflection thereof will vary the light value transmitted to the opening, and a focusing lens between the solenoid and the screen.

4. In apparatus of the class described, means to provide a magnetic field of constant strength, an electric arc positioned in the field, a solenoid arranged to produce a magnetic field substantially at right angles to the field of constant strength adapted to be interposed in a radio circuit and arranged with its axis at substantially the center of the arc, a screen provided with a pin point opening out of line with the solenoid axis, whereby deflection of the arc by current in the radio circuit will vary the light value transmitted through the opening, and a focusing lens between the solenoid and the screen.

5. In apparatus of the class described, means to provide a magnetic field of constant strength, an electric arc positioned in the field, said field and arc being relatively movable to vary the position of the arc in the field, a solenoid arranged to produce a magnetic field substantially at right angles to the field of constant strength adapted to be interposed in a radio circuit and arranged with its axis at substantially the center of the arc, a screen provided with a pin point opening out of line with the solenoid axis, whereby deflection of the arc by current in the radio circuit will vary the light value transmitted through the opening, and a focusing lens between the solenoid and the screen.

6. In apparatus of the class described, a magnet of constant strength, an electric arc positioned in the magnetic field, a solenoid arranged to produce a magnetic field substantially at right angles to the field of constant strength adapted to be interposed in a radio circuit and arranged with its axis at substantially the center of the arc, a screen provided with a pin point opening out of line with the solenoid axis. whereby deflection of the arc by current in the radio circuit will vary the light value transmitted through the opening, and a focusing lens between the solenoid and the screen.

7. In apparatus of the class described, means to provide a flaming arc, a magnet of constant strength within the field of which the arc is positioned, a solenoid arranged to produce a magnetic field substantially at right angles to the field of constant strength adapted to be interposed in a radio circuit with its axis coincident with the center of the arc, whereby fluctuations in the solenoid current will deflect the arc, a screen having a pin point opening normally out of register with the axis of the solenoid, and so positioned that deflection of the arc will increase the intensity of the light transmitted by the opening, and a focusing lens between the solenoid and the screen.

8. In apparatus of the class described, a magnet of constant strength, a flaming arc in the magnetic field of the magnet, said arc and magnet being relatively movable to vary the position of the arc in the field, a solenoid arranged to produce a magnetic field substantially at right angles to the field of constant strength adapted for interposition in a radio circuit and having its axis at the center of the arc, a screen having a pin point opening slightly out of line with the axis of the solenoid, whereby deflection of the arc by current in the solenoid will vary the light value transmitted by the opening, and a focusing lens between the solenoid and the screen.

9. In apparatus of the class described, a solenoid adapted to be interposed in a radio circuit, an electric arc at one end of the solenoid arranged to produce a magnetic field substantially at right angles to the field of constant strength in alinement with the axis, means to provide a magnetic field of constant strength in which the arc is positioned, a screen at the other end of the solenoid provided with a pin point opening out of line with the solenoid axis whereby deflection of the arc by current in the radio circuit will vary the light values transmitted through the opening, and a focusing lens between the solenoid and the screen.

Signed at Harrisburg, in the county of Dauphin and State of Pennsylvania, this 26th day of March, A. D. 1929.

GEORGE H. MORSE.