June 28, 1932. E. R. MORTON ET AL 1,864,547

INCANDESCENT LAMP

Filed Aug. 7, 1929

FIG. 1

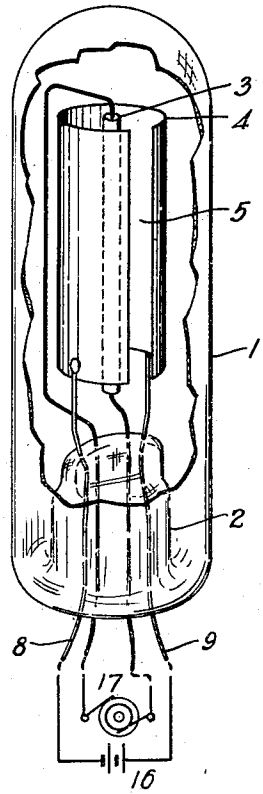


FIG. 2

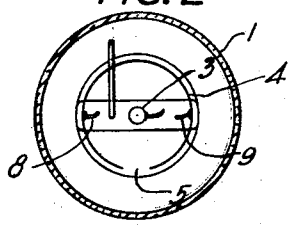


FIG. 3

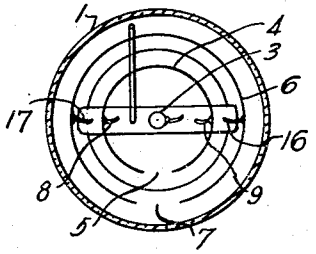
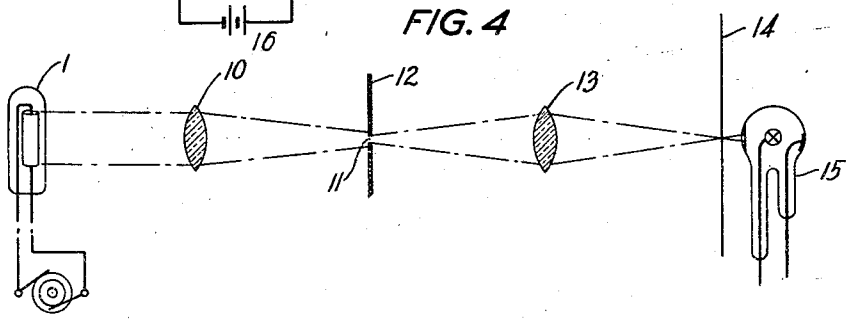


FIG. 4



INVENTORS: E. R. MORTON
H. M. STOLLER

BY

G. H. Heydt

ATTORNEY

Patented June 28, 1932 1,864,547

UNITED STATES PATENT OFFICE

EDMUND R. MORTON, OF NEW YORK, N. Y., AND HUGH M. STOLLER, OF MOUNTAIN LAKES, NEW JERSEY, ASSIGNORS TO BELL TELEPHONE LABORATORIES, INCORPORATED, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK

INCANDESCENT LAMP

Application filed August 7, 1929. Serial No. 384,032.

This invention relates to incandescent lamps and more particularly, to incandescent electric lamps operated by alternating current.

The object of this invention is an incandescent lamp in which the energy operating the lamp produces less variation in emitted light than is usual with previously known lamps. Under favorable conditions, the variation in the emitted light is so reduced that the light is practically constant.

It is well known that the luminosity and color of the light emitted by an incandescent solid varies with the temperature of the surface of the solid. In the commercial incandescent lamp operated on alternating current, the luminosity and color vary with the variation in the current but due to the persistence of vision, this variation is normally not noticed by the eye. On certain commercial systems, however, the frequency is sufficiently low that the variation in the light is objectionable.

Many light sensitive devices, such as the photoelectric cell, are sufficiently sensitive to detect the variation in luminosity of a commercial incandescent lamp when operated on alternating current. These devices are also usually sensitive to changes in the color of the light falling on the device. Thus, if an incandescent lamp operated on alternating current excites a photoelectric cell, the output current of the cell will have a component which varies with the variation in the light. When the cell is used for reproducing sound, this component will produce an undesirable tone in the sound.

This invention provides an incandescent lamp in which the variation of the energy operating the lamp produces a minimum variation in the light. Thus, when this lamp is used, for example, on alternating current circuits of low frequency the variation of the light is not perceptible to the eye. Also, the undesired component in the output circuit of a photoelectric cell excited by a lamp constructed in accordance with this invention will be so reduced that the tone produced is not objectionable.

A feature of this invention is the provision of a filament having a large heat storage capacity. The heat storage capacity of the filament may be made large by increasing the ratio of the mass of the filament to its surface. This invention contemplates the use of a short heavy filament having a large mass in proportion to its surface. The heat stored in the mass of the filament will be conducted to the surface during the time that the current is passing through its zero value and will aid in stabilizing the temperature of the surface.

Another feature of this invention resides in restricting the area of the surface from which luminous energy is utilized to a small part of the total area. Thus the energy utilized is a small fraction of the total energy emitted. The temperature of the surface does not need to lower as much to supply the energy drawn from this restricted area as if energy were drawn from the whole surface. The variation in the temperature of the surface is thus reduced.

Another feature of this invention resides in the provision of a reflecting shield or shields, partially enclosing the filament. A longitudinal slit in the reflector permits a portion of the radiation to pass the reflector and to be utilized. The remainder of the radiation is intercepted by the reflector and returned to the surface of the filament, aiding in maintaining the surface of the filament at a constant temperature. A plurality of co-axial, concentric shields may be used to more completely intercept and return the radiation.

The radiation falling on the reflector will tend to heat the reflector and a portion of this heat will be radiated to the filament, and a portion will be radiated from the surface of the reflector and lost. To avoid extracting energy from the surface of the filament to supply this heat loss, electric energy may be supplied to the reflector directly, either from a separate source, or by connecting the reflector in circuit with the filament.

Referring to the drawing

Fig. 1 shows an electrical incandescent lamp made in accordance with this invention;

Fig. 2 is a top view of the filament and reflector of the lamp shown in Fig. 1;

Fig. 3 is a top view of the filament and reflectors of an alternative form of the lamp shown in Fig. 1;

Fig. 4 is a schematic representation of a typical application of the lamp shown in Fig. 1.

Enclosed in the bulb 1, of any suitable shape, is a foot tube 2, supporting a filament 3. The filament 3 may be made of any suitable material, such as tungsten. The filament 3 is preferably short and of larger diameter than the filaments generally used in electrical incandescent lamps. The increased diameter will increase the ratio of the mass of the filament to its surface, and increase the ability of the filament to retain heat. The heat retained in the filament will be supplied to the surface during the time in which the energy supplied to the filament from the source 17 has fallen to a small value, and will aid in maintaining constant the temperature of the surface of the filament.

Partially surrounding the filament 3, is a reflector 4, of any suitable shape. For convenience of description the reflector 4 has been shown as a cylinder. The reflector 4 may be of any material capable of reflecting the radiant energy emitted by the filament 3 back on to the surface of the filament 3. In a preferred form of this invention, a metallic reflector 4 is used. The reflector 4 is divided longitudinally by the slit 5 through which radiant energy emitted by the filament 3 may pass. The radiant energy passing through the dihedral angle defined by the slit 5 has been termed the useful radiation in this specification. The unused radiation emitted by the filament 3 is intercepted by the reflector 4 and largely returned to the surface of the filament 3 and aids in maintaining constant the temperature of the surface of the filament 3.

The radiant energy falling on the reflector 4 will be partially absorbed and will raise the temperature of the reflector 4. The increased temperature of the reflector 4 will cause a portion of this energy to be radiated from the outside of the reflector 4 and lost. To lessen this loss of energy a second reflector 6 as shown in Fig. 3 may be placed outside the reflector 4. The reflector 6 has a slit 7 corresponding to the slit 5 in reflector 4 through which the useful radiation may pass.

Another method of lessening the energy drawn from the filament 3 to raise the temperature of the reflector 4, is to supply energy from an external source to heat the reflector 4 to the required temperature. Leading-out wires 8 and 9 may be attached to the reflector 4, and energy may be supplied through these wires 8 and 9 to the reflector 4. The energy may be supplied from a separate source 16, or the reflector 4 may be connected in the circuit which supplies energy to the filament 3. If more than one reflector be used, leading-out wires may be attached to each reflector. As shown in Fig. 3, energy may be supplied to the reflector 4 by means of leading-out wires 8 and 9, and to reflector 6 by means of leading-out wires 16 and 17.

A typical application of a lamp constructed in accordance with this invention is shown in Fig. 4. The useful radiation from the lamp 1 falls on the lens 10, producing an image of the light emitting slit 5 focussed on the slit 11 in the opaque plate 12. The light passing through the slit 11 falls on a lens 13, producing an image of the slit 11 focussed on a film sound record 14. The light passing through the film sound record 14 falls on the photoelectric cell 15 and causes a variation of the output current of the photoelectric cell 15 which is a reproduction of the variation of the film sound record 14.

What is claimed is:

1. In a lamp, a sealed envelope, a straight filament supported in said envelope, and a slitted electrically conductive reflector supported by electrically conductive leading-in wires in said envelope concentrically and coaxially with respect to said filament to limit the light from said filament to a small dihedral angle having its vertex parallel to the axis of the filament.

2. In a lamp, a sealed envelope, an incandescent body supported in said envelope, and a reflecting electrically conductive screen supported by electrically conductive leading-in wires in said envelope to partially surround said body.

3. In a lamp, a sealed envelope, an incandescent body supported in said envelope and a plurality of reflectors supported in said envelope concentrically and coaxially with respect to said body, each of said reflectors having a narrow light transmitting slit, said slits being radially aligned with the axis of said body.

4. In a lamp, a sealed envelope, an incandescent body supported in said envelope and a plurality of reflectors supported in said envelope each reflector partially surrounding said body and combining with said other reflectors to limit the light from said body to a small dihedral angle having its vertex parallel to the axis of the body.

5. In a lamp, a sealed envelope, an incandescent body supported in said envelope, a reflecting screen purposed to carry electrical currents and supported in said envelope to partially surround said body, and a second reflecting screen supported in said envelope to partially surround said body and said first screen.

6. In a lamp, a sealed envelope, a filament supported in said envelope and a plurality of reflectors supported in said envelope concentrically and coaxially with respect to said filament, each of said reflectors having a narrow light transmitting slit, said slits being

radially aligned with the axis of said filament.

7. In a lamp, a sealed envelope, a filament supported in said envelope, and a plurality of reflectors supported in said envelope, each reflector partially surrounding said filament and combining with said other reflectors to limit the light from said filament to a small dihedral angle having its vertex parallel to the axis of the filament.

8. In a lamp, a sealed envelope, a filament supported in said envelope, a reflecting screen purposed to carry electrical currents and supported in said envelope to partially surround said filament, and a second reflecting screen supported in said envelope to partially surround said filament and said first screen.

9. In a lamp, a sealed envelope, an incandescent body supported in said envelope and a plurality of electrically conductive reflectors supported by electrically conductive leading-in wires in said envelope concentrically and coaxially with respect to said body, each of said reflectors having a narrow light transmitting slit, said slits being radially aligned with an axis of said body.

10. In a lamp, a sealed envelope, an incandescent body supported in said envelope, a conductive reflector supported in said envelope concentrically and coaxially with respect to said body, leading-in wires affixed to said reflector for supplying electrical energy to said reflector, a second conductive reflector supported in said envelope to partially surround said first reflector, leading-in wires affixed to said second reflector for supplying electrical energy to said second reflector, each of said reflectors having a narrow light transmitting slit, said slits being radially aligned with an axis of said body.

In witness whereof, we hereunto subscribe our names this 6th day of August, 1929.

EDMUND R. MORTON.
HUGH M. STOLLER.