

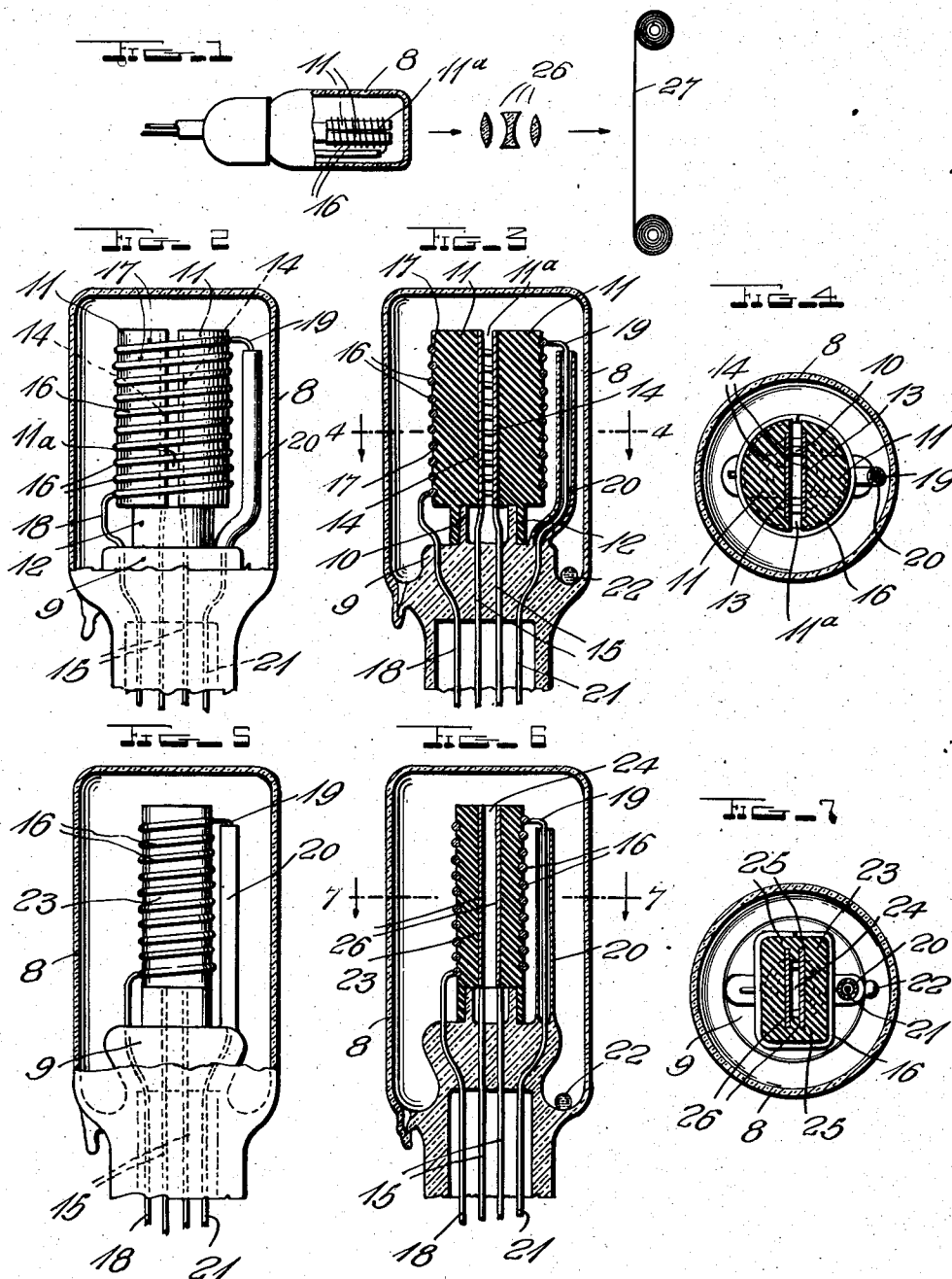
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LIGHT SOURCE FOR RECORDING SOUND ON FILM

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LIGHT SOURCE FOR RECORDING SOUND
ON FILM

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21 Claims. (Cl. 176—122)

This invention relates to new and useful improvements in the art of recording sound on film and more particularly to a high-frequency gaseous conduction lamp to produce the desired result, this application being a continuation in part of my copending application, Serial Number 507,220, filed January 27, 1931.

An object of the invention is to produce a recording lamp of high photographic value.

A further object of the invention is to provide a lamp whose light source is of appropriate size, shape, and brilliancy for the optical reduction in recording sound on film.

Another object of the invention is to provide a recording lamp of long life and of rigid construction.

Still another object of the invention is to provide a recording lamp which can be modulated by a magnetic field.

With these and other objects in view, my invention consists in the novel features of construction, combination, and arrangement of parts as will be hereinafter referred to and more particularly pointed out in the specification and claims.

In the accompanying drawing forming a part of this application:

Figure 1 is a diagrammatic view showing my improved lamp, partly in section, in operative relation to a lens and film;

Figure 2 is a side elevation of a lamp constructed in accordance with my invention, parts being shown in section;

Figure 3 is a central vertical section therethrough;

Figure 4 is a horizontal section as seen on the line 4—4 of Figure 3;

Figure 5 is a side elevation, partly in section, of a slightly modified form of lamp;

Figure 6 is a vertical section therethrough; and

Figure 7 is a horizontal section on the line 7—7 of Figure 6.

In the process of recording sound on film by the modulated glow-discharge lamp method definite advantages may result from the use of high-frequency current as the activating lamp means.

By reason of the selection and arrangement of the associated recording apparatus generating and utilizing such high frequency current, I have found it often desirable to separately control the high-frequency current activating the recording lamp with respect to the audible sound frequencies to be recorded, or conversely, to

separately control the audible sound frequencies in relation to the high frequency current.

Under other recording conditions, it may be desirable to activate the recording lamp by separately controlled current means and modulate the recording lamp so activated by a modulated high-frequency current separately controlled.

Another arrangement of associated recording apparatus may require variations in the area of the light source corresponding with variations in the sound frequencies and intensities to be recorded, or such associated apparatus may require variations in both area and intensity of the light source, corresponding with the sound variations.

In the present invention, a recording lamp is provided by means of which all the above described conditions may be fulfilled.

Referring more particularly to the drawing, Figures 2 to 4 inclusive set forth a form of my invention wherein 8 is a transparent envelope of glass or other suitable material into which is sealed a mounting stem 9. The stem 9 carries an upstanding tubular projection 10 as shown clearly in Figure 3. A cylindrical insulating member 11 of refractory material is provided which carries a tubular downwardly extending projection 12, said projection snugly engaging the upstanding projection 10 and serving to support the insulating member 11 in an upright position. The insulator 11 is provided with a longitudinal slot 11a intersecting the upper and lower peripheral faces thereof and extending across the full diameter of said insulator, as clearly shown in Figures 3 and 4. The inner opposed faces of the segments of the insulator 11 formed by the slot 11a are recessed at 13 to receive the rectangular flat electrodes 14, said electrodes having lead-wires 15 connected thereto which extend downwardly through the stem 9. These electrodes are arranged parallel and of substantially of the same size, shape, and area. A helically formed inductance coil designated by the numeral 16 is provided, the convolutions of which are wound on the peripheral surface of the insulator 11 and held in fixed position by the spiral groove 17 provided on the surface of said insulator as clearly shown in Figure 3 of the drawing.

The lowermost convolution of the helical inductance coil 16 is connected to the lead-wire 18 which extends downwardly through the stem 9. The uppermost convolution extends laterally outward, is bent downwardly as at 19 passing through the tubular protective member 20, and is connected with the lead-wire 21 which passes

downwardly through the stem 9. A drop of mercury 22 is provided to produce the mercury vapor necessary to the operation of the lamp. The lamp is evacuated in the usual manner and an inert gas such as argon admitted to a pressure of approximately ten millimeters of mercury.

Figures 5 to 7, inclusive, illustrate another modification of my invention. In this adaptation, the insulator 23 is rectangular in cross section, and is provided with a centrally disposed longitudinal slot extending the full length of the insulator, designated by the numeral 24. The end walls of the slot 24 are provided with spacing grooves 25 to receive and hold the electrodes 26 in abutting relation to the side walls of said slot as clearly shown in Figure 7.

In other respects, the structure of this modification is generally similar to that of the lamp heretofore described. In Figure 1, I have illustrated a lamp, constructed in accordance with the first described form of my invention showing its operative relation to lens elements 26 and a film 27.

Lamps constructed in accordance with my present invention possess great versatility in their applications to sound recording by high-frequency means. A substantially steady high frequency current may be impressed across the electrodes shown at 14 and the steady light produced as a result may be modulated by passing current at audible frequencies through the inductance coil 16. It will be noted at this point that the construction of the insulator prevents undesirable discharges from occurring between the lead wires of the electrodes and the lead wires of the inductance coil, and confines the glow between the electrodes forming the desired light source as regards shape. This careful shielding is essential to the construction of a gaseous discharge lamp utilizing high frequency energy. Since the two electrical circuits are entirely distinct from each other, the relations one to the other as manifested by the light output of the lamp may be easily studied, controlled and adjusted.

In the case where the sound modulated high frequency current is used directly on the lamp electrodes such control cannot be directly achieved but must be accomplished through the media of the various amplification and modulation circuits wherein it is usually difficult to determine the exact effect of one variable upon another.

If it is desired, a steady direct current may be used to activate the lamp and sound modulated high frequency current passed through the inductance coil. As a result of the separate circuits means for automatically controlling the value of the activating current with relation to the modulating current may be introduced.

Again, it may be desired to use high-frequency modulated current in the inductance coil and activate the inner electrodes with high-frequency current of a different wave length in order to produce a heterodyne frequency for monitoring processes associated with the apparatus or to concurrently control other separate apparatus.

It will be noted that a control or modulating current impressed upon the inductance coil establishes a magnetic field which includes the inner electrodes. A glow discharge occurring between the two inner electrodes is effected by this magnetic field and may be controlled by it. This result, brought about by the novel constructional features of my invention, may be used to per-

form a valuable function as hereinafter described. Such a magnetic field as described above exerts a force at right angles to the electric field established by the potential across the inner electrodes, and the glow discharge is expanded and contracted in proportion to the strength of the magnetic field, the intensity of the glow discharge being simultaneously increased and decreased. With appropriate optical means the light from such a fluctuating discharge can be utilized to produce "a variable area—variable density" sound record on the film. Inherent defects in the photographic properties of the film emulsion may be compensated for by providing a sound record of this type.

Due to the fact that the steady current activating the recording lamp and the modulating current are supplied from separate circuits no distortion can result from faulty impedance matching between lamp and amplifier output.

While I have shown and described preferable adaptations of my invention, I do not wish to be limited thereto, it being understood that various changes in form, proportion, and minor details of construction may be resorted to, within the scope of the appended claims.

Having thus described the invention, what I claim is:

1. In a gaseous conduction lamp for recording sound on film, a pair of parallel electrodes of substantially equal areas, and magnetic field-generating means surrounding the same.
2. In a gaseous conduction lamp for recording sound on film, a pair of electrodes, an insulator therefor, and magnetic field generating means mounted on said insulator.
3. In a gaseous conduction lamp for recording sound on film, a pair of electrodes, an insulator therefor, and magnetic field generating means mounted on said insulator and surrounding said electrodes.
4. In a gaseous conduction lamp for recording sound on film, a pair of electrodes, an insulator substantially enclosing the same, and magnetic field generating means surrounding said electrodes.
5. In a gaseous conduction lamp for recording sound on film, a pair of electrodes, an insulator substantially enclosing the same, and a magnetic field-generating means mounted on said insulator and surrounding said electrodes.
6. In a gaseous conduction lamp for recording sound on film, a pair of electrodes, an insulator substantially enclosing the same, and a magnetic field-generating means mounted on said insulator and surrounding both the insulator and said electrodes.
7. In a gaseous conduction lamp for recording sound on film, a pair of plane parallel electrodes of equal areas, an insulator substantially enclosing the same, and a magnetic field-generating means mounted on said insulator and surrounding both the insulator and said electrodes.
8. In a gaseous conduction lamp for recording sound on film, a pair of electrodes, an insulator slotted to receive said electrodes therein, and means generating a magnetic field mounted on said insulator and surrounding the same.
9. In a gaseous conduction lamp for recording sound on film, a pair of electrodes, an insulator substantially enclosing the same, and a helical inductance coil surrounding said insulator.
10. In a gaseous conduction lamp for recording sound on film, a pair of electrodes, an insu-

lator substantially enclosing said electrodes provided externally with a helical groove, and an inductance coil having turns conforming to and fitting within said helical groove.

11. In a gaseous conduction lamp for recording sound on film, a pair of plane parallel electrodes of equal areas, an insulator substantially enclosing the same provided with an external helical groove, and an inductance coil having turns conforming to and fitting within said helical groove.

12. In a gaseous conduction lamp including a glass envelope, a stem therein, a projection on said stem, a pair of electrodes, lead wires thereto, an insulator slotted to receive said electrodes and mounted on said projection, and means generating a magnetic field mounted on said insulator and surrounding same.

13. In a gaseous conduction lamp, a transparent envelope, an anode and a cathode centrally disposed in said envelope, an inductance coil within said envelope surrounding said anode and said cathode, and common means for supporting said anode, said cathode and said inductance coil, said means being inside said inductance coil and surrounding said anode and said cathode.

14. In a gaseous conduction lamp, an envelope, a pair of substantially parallel plane electrodes disposed in said envelope, and a helical inductance coil disposed in said envelope with its axis substantially parallel with the faces of said electrodes.

15. In a gaseous conduction lamp, an envelope, an insulating member disposed in said envelope and being slotted across its diameter throughout its entire length, a pair of electrodes respectively disposed on the faces of said insulating member formed by said slotting, and an inductive winding disposed inside said envelope and being wound on said insulating member and surrounding said electrodes.

16. In a gaseous conduction lamp, an envelope, an insulating member disposed in said envelope and being internally apertured to provide a channel having two substantially parallel faces and extending substantially the length of said insulating member but not occupying its entire cross section, a pair of electrodes respectively disposed on said internal parallel faces of said insulating member, and an inductive winding disposed inside said envelope and being wound on said in-

ulating member and surrounding said electrodes.

17. In a gaseous conduction lamp, a transparent envelope, an anode and a cathode disposed in said envelope adjacent each other to form a principal determined electron path therebetween, and a helical inductance coil within said envelope surrounding said anode and said cathode and having its axis substantially perpendicular to said principal electron path.

18. In a gaseous conduction lamp, a transparent envelope, an anode and a cathode disposed in said envelope adjacent each other to form a principal determined electron path therebetween, and means within said envelope surrounding said cathode and said anode for generating an electromagnetic field substantially perpendicular to said principal determined electron path.

19. In a gaseous conduction lamp, a transparent envelope, an anode and a cathode disposed in said envelope symmetrically with reference to a plane of symmetry positioned between said anode and said cathode, and an inductance coil within said envelope surrounding said anode and said cathode and generating an electromagnetic field whose line of direction lies in said plane of symmetry.

20. In a gaseous conduction lamp, a transparent envelope, an anode and a cathode disposed in said envelope adjacent each other to form a principal determined electron path therebetween, means within said envelope surrounding said cathode and said anode for generating an electromagnetic field substantially perpendicular to said principal determined electron path, and a pair of control leads extending through said envelope and connected to the terminals of said means.

21. In a gaseous conduction lamp, a transparent envelope, an anode and a cathode centrally disposed in said envelope, an inductance coil within said envelope surrounding said anode and said cathode, a pair of control leads extending through said envelope and connected to the terminals of said inductance coil, and common means for supporting said anode, said cathode, and said inductance coil, said means being inside said inductance coil and surrounding said anode and said cathode.

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