March 9, 1926. 1,575,701

H. G. MATTHEWS

ELECTRIC GAS DISCHARGE TUBE FOR PHOTOGRAPHIC SOUND RECORDING

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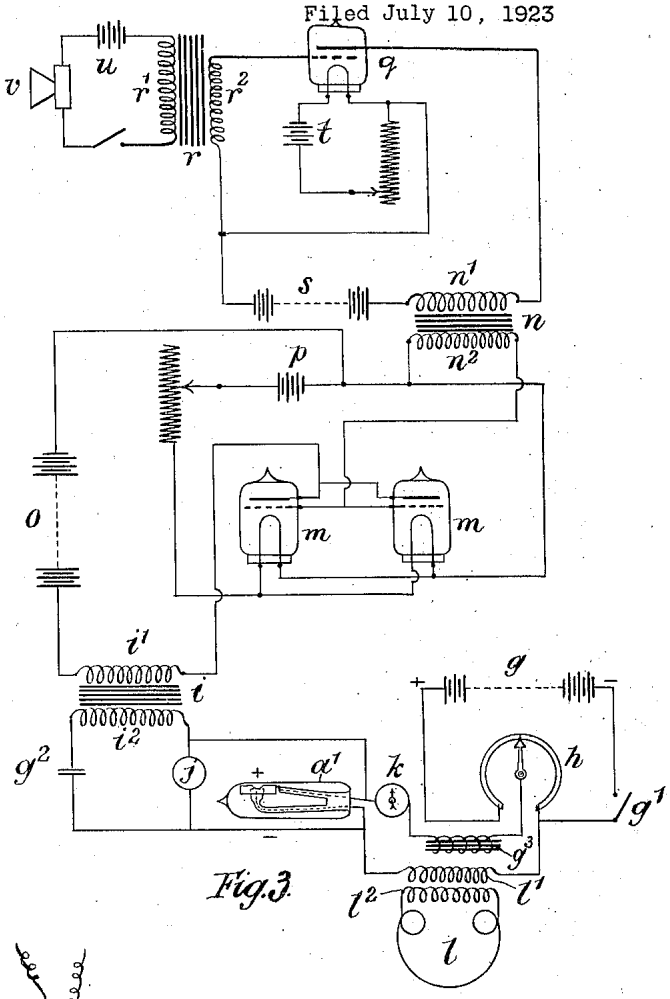

Fig. 3.

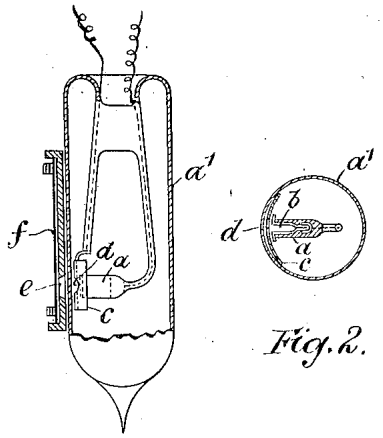

Fig. 1.

Fig. 2.

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ELECTRIC GAS-DISCHARGE TUBE FOR PHOTOGRAPHIC SOUND RECORDING.

Application filed July 10, 1923. Serial No. 650,590.

To all whom it may concern:

Be it known that HARRY GRINDELL MATTHEWS, subject of the King of Great Britain, residing at No. 2 Harewood Place, Hanover Square, London, W. 1, England, has invented new and useful Improvements Relating to Electric Gas-Discharge Tubes for Photographic Sound Recording, of which the following is a specification.

This invention relates to electric gas discharge tubes, to be employed more especially as a source of sound-varied light for use in effecting a record on a sensitive film or other light-sensitive surface, but capable of other applications.

For recording purposes, an electric gas discharge tube is employed as a source of actinic light, varied by the circuit of a microphone or other electrical sound receptor.

An advantage accruing from the use of a gas discharge tube as compared with other electrical sources of light, is the smallness of the sound-varied current sufficing to vary the light, thus avoiding any tendency for the microphone or the like to burn out.

The object of the present invention is to provide the light emitting electrode of a gas discharge tube employed as a varied source of light, with an elongated light-emitting surface of an area considerably greater than the sectional area of the beam of light emitted thereby, such that the superposed effect of points of light emission are concentrated in the beam.

For this purpose, according to the invention, the surface of the light emitting electrode (cathode) of the gas discharge tube is formed with a deep longitudinal groove. By a deep groove is meant one of which the depth is several times the width of the mouth of the groove.

With a suitably located anode and with a suitable pressure of gas in the tube, the glow of light will be located within the groove of the cathode.

The effect of the groove in the cathode is not only to concentrate the light emitting surface but results in an increased variation of the light when influenced by sound-varied currents. Such increased variation moreover being localized, is therefore constantly positioned for acting on a light-sensitive surface through a small slot.

An example of a gas discharge tube according to the invention and a representative diagram of the connections suitable for employing such a tube for photographically recording sound on a travelling sensitive film, are illustrated on the accompanying drawing, in which:—

Fig. 1 is a sectional plan of one form of gas discharge tube, and

Fig. 2 is a transverse section thereof.

Fig. 3 is a diagram of the electrical connections of the tube with a microphone.

Referring to Figs. 1 and 2, an electrode a of a gas discharge tube a^1 is formed with a deep longitudinal groove b, by the electrode a consisting of a sheet of metal folded about its middle and with outwardly turned borders, see Fig. 2.

The other electrode consists of a plate c with a hole d opposite the groove b of the first electrode a and adjacent to the outwardly turned borders thereof.

The electrode a is the cathode and the electrode c is the anode.

As shown in Fig. 1, the groove b of the electrode a is arranged opposite and parallel to a gate e behind which passes a travelling light-sensitive film f, so that variations in the light emitted from the electrode a, within the groove b, effect a varying photographic record on the film f.

In the illustrated example, the film f is assumed to be a kinematograph film, the portion of which not bearing the sound record being available for a correlated kinematograph record.

By virtue of a groove b being presented towards the film f, light from a surface of greater area than the area of the beam of light acts upon the film and therefore intensifies the photographic effect and exaggerates the variations thereof.

In the representative diagram of electrical connections shown in Fig. 3, the tube a^1 is connected to an energizing battery of 250–300 volts g through a graphite segment potentiometer h, with the secondary i^2 of a low frequency transformer i in parallel with the tube a^1. j is a voltameter in shunt across the terminals of the tube a^1 and k is a microammeter in series with the tube. l is a telephone in series with the secondary l^2 of an air core transformer, the primary l^1 of which is in series with the tube a^1, for enabling audible observation of the battery and tube circuit. The telephone l may, how-

ever, be directly connected in the battery and tube circuit. g^1 is the battery switch, g^2 is a fixed condenser for preventing discharge of the battery g through the primary winding i^2, and g^3 is a choking coil for preventing the pulsations from the transformer i passing through the battery circuit.

The primary i^1 of the transformer i is connected in series with the plate circuit of a pair of thermionic valves m in parallel, the grid circuit of which is connected in series with the secondary n^2 of a low frequency transformer n. o is the high tension battery and p the low tension filament battery of the valves m.

The primary n^1 of the transformer n is connected in series with the plate circuit of a thermionic valve q, the grid circuit of which is connected to the secondary r^2 of a low frequency transformer r. s is the high tension battery and t the low tension battery of the valve q.

The primary r^1 of the transformer r is in series with a battery u of about 4½ volts, in the circuit of which is a microphone v, or a plurality of microphones variously connected, i. e. in series, parallel or series-parallel.

I claim:

In an electric gas discharge tube, a light emitting cathode consisting of a sheet of metal folded about its middle with outwardly turned borders, and an anode consisting of a plate with a hole opposite said folded portion of said sheet and adjacent said outwardly turned borders thereof.

In testimony whereof I have signed my name to this specification.

HARRY GRINDELL MATTHEWS.