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GLOW LAMP

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Fig. 1

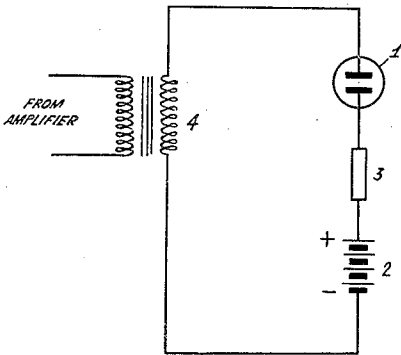


Fig. 2

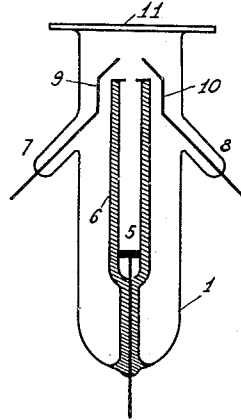
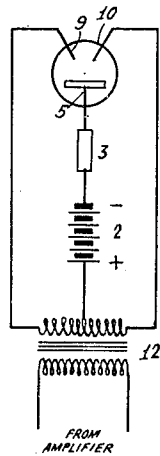


Fig. 3



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GLOW LAMP

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The present invention relates to glow-discharge lamps as adapted to the photographic or visible recording of current variations, particularly for the purposes of optical telegraphy, picture telegraphy, television, producing sound records on moving picture films, and similar purposes. It is useful both in connection with glow-discharge lamps operating with a relatively cold cathode and a correspondingly high cathode fall as well as with lamps wherein the cathode fall is diminished by the use of thermal emission, as in glow-discharge lamps furnished with a heated cathode.

According to the prior art, glow-discharge lamps of this kind were equipped with an anode and a cathode, but the A. C. passing therethrough was used only in one direction, irrespective of whether the cathode glow or the positive luminous column served as the electrically controlled light source.

The invention has been illustrated by the accompanying drawings, wherein:

Fig. 1 shows one of the circuit arrangements adapted to this purpose and to the operation of such lamps, the latter being operated mostly in connection with an amplifier;

Fig. 2 shows a preferred form of glow lamp construction; and,

Fig. 3 shows a circuit arrangement for utilizing the lamp shown by Fig. 2.

Now, referring to Fig. 1 of the drawings, the glow-discharge lamp 1 is inserted in the circuit of a D. C. source, say, a battery 2, the current being adjusted to a definite value by the aid of resistance 3. By means of transformer 4, the D. C. potential derived from 2 has superposed thereon a controlling A. C. potential whose amplitude and frequency is indicated or recorded by the light variations. Transformer 4, for instance, is contained in the plate circuit of the last tube of an amplifier which amplifies telegraphically received picture signals. Inasmuch as a D. C. potential exists between the electrodes of the glow lamp 1 upon which the controlling A. C. potential of 4 having comparatively low amplitude is superposed, it will be seen that one half wave of the A. C. potential which is of

the same direction as the D. C. potential will cause a larger flow of current and consequently will increase the luminous radiation of the lamp, while the other half wave of the A. C. potential will counteract the D. C. potential so that the discharge current and the luminous intensity of the lamp are correspondingly diminished. Inasmuch as the value of the current which flows in 4 when the A. C. potential is of zero value is usually set to such low amounts that it is not capable of producing practically any photographic action upon the film or not capable of resulting in a luminous impression or perception in television, it will be seen that the second half of the wave of A. C. potential, since it undergoes a reduction both in the value of the current and luminous radiation, is lost so far as the recording or visual impression is concerned. Another aggravating fact present under certain circumstances is that the minimum potential difference or minimum current required for maintaining the discharge is not attained, with the result that the circuit may be broken, and that the operation of the outfit becomes unstable.

Now, according to the present invention, a glow-discharge lamp of the kind before described, as shown in Fig. 2, is furnished with three electrodes, that is to say, either with two distinct anodes and a joint cathode, or else with two cathodes and a common anode. Which form of construction should preferably be chosen depends upon whether it is the negative glow layer at the cathode that is used as the luminous source, or whether other parts of the discharge, such as the positive column is employed. In what follows, a lamp is described by reference to Fig. 2 with a cold cathode and the utilization of a primary or secondary cathode glow layer. Axially secured inside the lamp bulb 1 is a tubular hollow cathode 5 of well-known type, the latter being safeguarded and specially insulated by a non-conducting sheath 6 made from glass, quartz, or the like, with the end in view to prevent the starting of a glow layer upon the outer surface thereof. Opposite the said cathode are mounted two filamentary anodes 9 and 10, the latter, if de-

sired, being sealed by fusion in separate tubular appendages 7 and 8. The shape of such anodes and seals does not fall inside the scope of this invention, and this holds true also of constructional details, the provision of distinct diaphragms, screens, or the like, as used in connection with the different uses and applications of the lamp. When the discharge passes through the gas filling which, for instance, in the case of photography consists of a markedly actinic mixture of argon and nitrogen, or in the case of television of a mixture of neon and helium exhibiting great brightness inside the visible spectral range, the interior of cathode 5 is filled with a glow light, while at the constricted outlet opening thereof, a secondary glow light of great intensity is produced which is radiated off across a window 11 made from glass, quartz, or other transparent material cemented thereon.

The arrangement hereinbefore described is capable of a great number of modifications as regards the nature of the cathode and the utilized portion of the discharge, especially in cases where a common anode and two distinct cathodes are employed.

Now, a lamp of this kind allows of the utilization of both halves of the controlling A. C., and it thus insures a higher efficiency; in other words, at the same amplifier power double photographic blackening or double luminosity.

A circuit arrangement useful for operating the scheme is shown by way of example in Fig. 3, though the same is capable of various modifications. The D. C. potential source 2 is again connected in series with a resistance 3 and cathode 5, opposite which there are mounted the two anodes 9 and 10, similarly as in Fig. 2, the latter being united with the two ends of the secondary winding of a transformer 12 to the middle of which the other pole of the D. C. source 2 is connected. The primary winding of 12 is again connected in the output circuit of an amplifier. As will be readily understood, the two half-waves of the controlling A. C. potential are so superimposed upon the discharge D. C. that an amplified or intensified current passes over to the cathode 5 alternately from the anode 9 and from the anode 10. As a result, both half-waves cause an intensified luminosity.

Other changes and modifications will at once suggest themselves to those skilled in the art to which the invention relates, and I, therefore, believe myself to be entitled to make and use all modifications of this invention such as fall fairly within the spirit and scope of the hereinafter appended claims.

Having now described my invention, I claim:—

1. In a glow lamp construction, a cathode member, a plurality of anode members co-

operating with said cathode member and spaced apart therefrom, and a tubular member surrounding said cathode member and extending outwardly therefrom toward said anode members.

2. A glow lamp construction adapted to produce luminous rays from both halves of supplied alternating currents comprising a pair of anode members arranged substantially adjacent each other, a cathode member remotely spaced and equi-distant from each of said anode members, and a tubular insulating member surrounding said cathode and extending for substantially the distance separating the said anode members from said cathode members for shielding said cathode member and confining the glow produced within said lamp to a predetermined area.

3. In a glow lamp construction, a cathode member, a tubular insulating member surrounding said cathode member and extending outwardly therefrom, said tubular member being open at the end thereof remote from said cathode, a pair of anode members separated from said cathode member and arranged adjacent the open end of said tubular member opposite said cathode, and an enclosing envelope surrounding all of said electrodes.

4. In a glow lamp construction, a cathode member, a tubular insulating member surrounding said cathode member and extending outwardly therefrom, a pair of anode members separated from said cathode member and arranged at the end of said tubular member opposite said cathode, and an enclosing envelope surrounding all of said electrodes.

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