Oct. 22, 1935. S. DOBRUSSKIN 2.018,254

ILLUMINATING DEVICE

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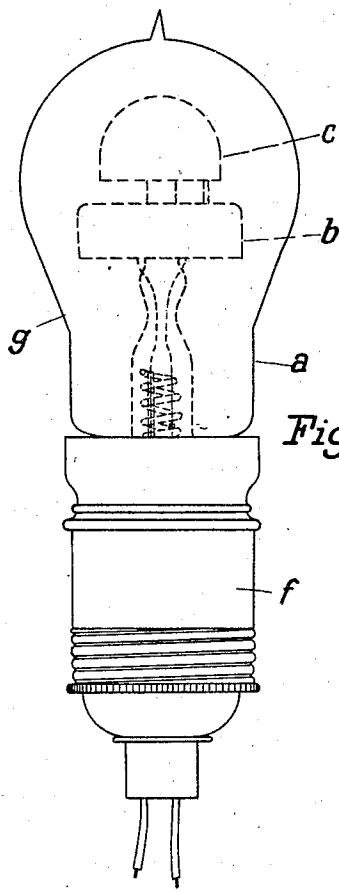

Fig. 1.

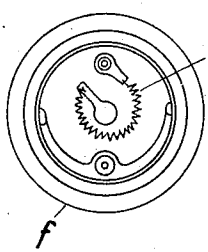

Fig. 2.

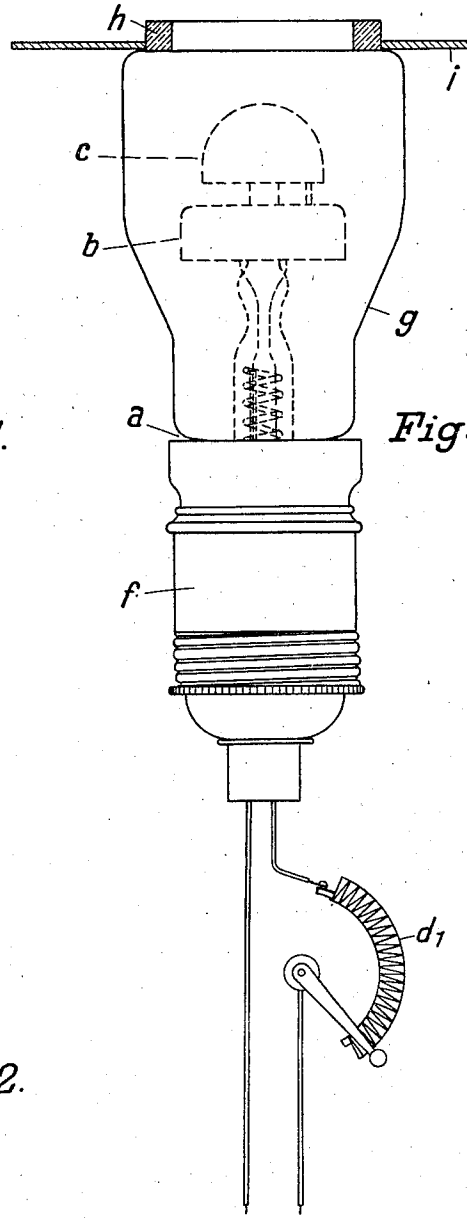

Fig. 3.

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Fig. 4.

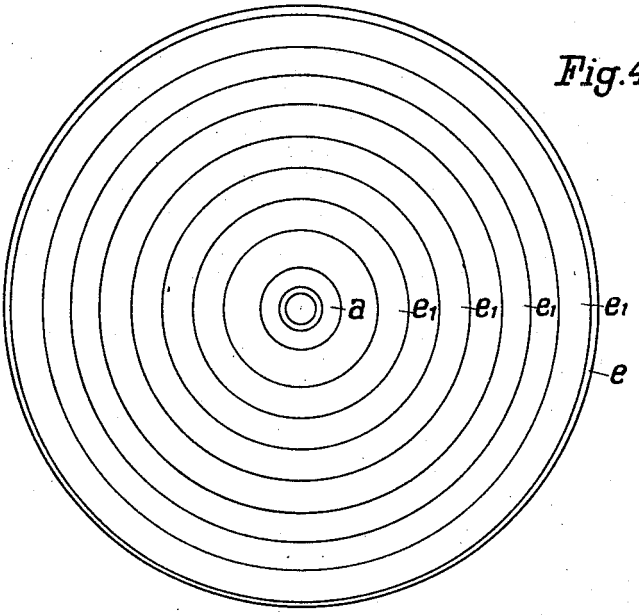

Fig. 5.

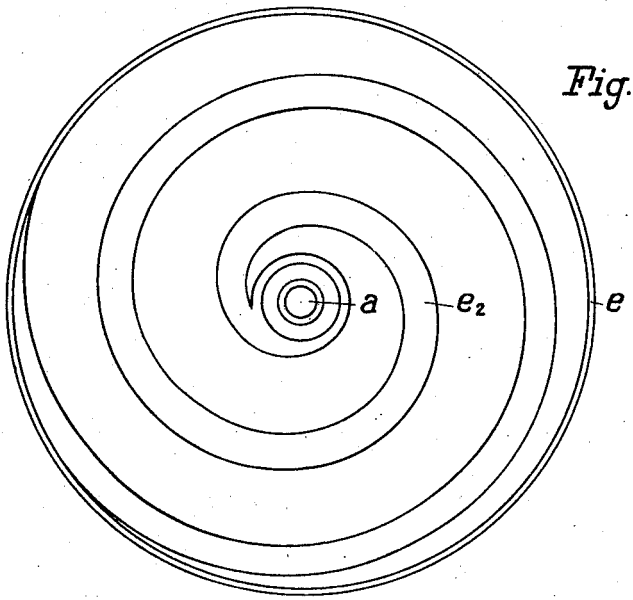

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Fig. 6.

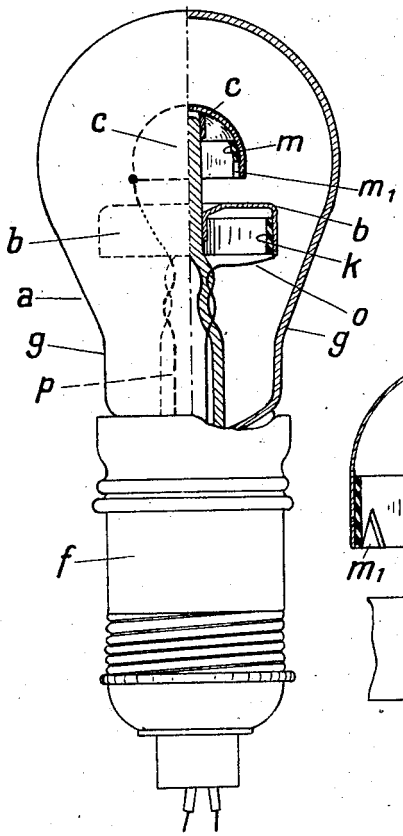
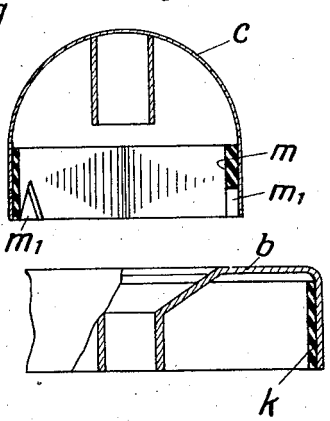


Fig. 7.



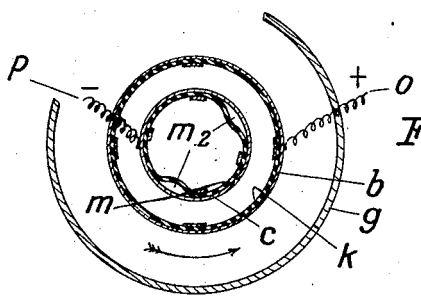


Fig. 8.

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UNITED STATES PATENT OFFICE

2,018,254

ILLUMINATING DEVICE

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Application June 14, 1929, Serial No. 371,004
In Germany February 6, 1929

11 Claims. (Cl. 176—124)

This invention relates to an illuminating device suited for a variety of purposes, intended, however, chiefly for advertising and for signalling purposes. The chief characteristic feature of this device is this, that it has at least one gaseous conduction lamp, the glowing haze of which is moving in a distinctly visible manner, preferably in a circle through which said haze is continually rotating.

The new effect is attained by arranging one of the two glow electrodes in series with a resistance, the size of which depends upon the manner in which the said movable haze is moving, viz. for instance regularly or irregularly, as well as the direction of rotation of the same if it is moving in a circle. It is suited to the purpose to use a regulable resistance. This latter may be provided at any desired place, for instance at the lamp itself or at its holder, or it may be combined with a rotary switch or the like.

It has been found that in order to attain regular movements of the glowing haze, especially in order to attain regular circulations thereof, the electrodes must be designed particularly uniformly especially at that place or those places between which the discharge takes place, and that the gap between them must have uniform width along its entire length.

It is, by causing vibrations of the gaseous conduction lamp, by means of a suitable device inserted into the circuit, possible to prevent the blue haze from stopping if during a comparatively long use of the lamp the conditions in it should change. The haze movement can be varied, if desired, for instance by reversing the polarity of a magnet introduced in the range of the lamp, but also a common bar of iron can act upon the lamp, for instance reverse the direction of rotation of the glow haze.

Illuminating devices designed according to this invention are excellently suited for advertising purposes, for instance in shop-windows and the like, also after the shop proper has been closed and only the window is open and illuminated. The illumination with gaseous conduction lamps attracts the eyes of the passers-by; besides, the costs are minimal as lamps of this kind consume exceedingly little current. The lamps may bear inscriptions or may be surrounded with such ones, consisting, for instance, of lighting words or numbers, etc.

The invention is illustrated diagrammatically and by way of example on the accompanying drawings on which Figure 1 is a side-view of a gaseous conduction lamp designed according to this invention; Figure 2 is a plan only of the holder of the lamp with its resistance; Figure 3 is a view similar to Fig. 1, showing a modification, the resistance being inserted into one of the current-supplying wires of the lamp; Figures 4 and 5 are two front views of reflectors for use in connection with gaseous conduction lamps of the type in question, these figures being drawn to a considerably reduced scale relatively to the other figures; Figure 6 is partly a side-view of a gaseous conduction lamp and partly on axial section therethrough, this lamp being another modification; Figure 7 shows the two electrodes of the lamp in Fig. 6 nearly wholly in axial section and drawn to an enlarged scale; and Figure 8 is a horizontal section through the electrodes of another constructional form of a gaseous conduction lamp, all as fully described hereinafter.

In the lamp shown in Fig. 1 the series resistance d (Fig. 2) is arranged inside the holder f. In the modification shown in Fig. 3 the series resistance d^1 is located in one of the current-supplying wires. The bulb g of the lamp a has a flat top and supports thereon a disk or plate i bearing advertisements or the like, that disk or plate being secured in its place upon the bulb by a rubber ring h. The top of the lamp may form a sort of neck upon which the disk or plate i is shown; this disk or plate is preferably transparent. The lamp top may, however, be actually flat, and the rubber ring h may be used for applying the bulb, or the lamp respectively, to the window pane, that is to say, for holding it fast thereat in known manner by atmospheric pressure.

The effect of the device can be considerably increased by arranging the gaseous conduction lamp in a reflector e (Fig. 2) having concentric steps e^1 or having a helical step e^2 as in Fig. 5 in which a denotes the lamp. There may be two or more such steps which, being helical, produce surprising effects when the glow haze is rotating. The steps may be of different breadth and may also show different colors, for instance when being combined with transparent colored disks. A plurality of such or similar illuminating appliances can be connected with one another so as to form a correspondingly large and therefore, still more striking and effective device.

Bringing about, and maintaining, the continual movement of the glow glaze, especially the regular circulation thereof, between the electrodes which are preferably shaped like basins or the like can be effected by choosing suitably the dimensions and the shapes of the electrodes, as well as the gap between them and their electrical

conditions with respect to the service conditions, especially the net voltage. It is possible in certain favorable cases to dispense with the series resistance. One of the means to this purpose is, for instance, this that the lower electrode which may have panlike shape is made with so large a diameter that at a certain service voltage the glow haze is interrupted at least at one spot of that electrode prior to the commencement of the rotary movement of the glow haze.

Furthermore, the gap between the electrodes may advantageously be increased to beyond the usual size, care being taken that the central rod between the two electrodes is enclosed by the glow haze while the lamp is inserted into the circuit. In order to attain this reliably it is particularly suited to give the contact resistance between the electrodes and along said central rod a certain definite value. This may be effected, for instance, by providing a deposit or layer upon the portion concerned of said rod; this deposit or layer may be produced, for instance, in the manner known with high-ohmic resistances by electric atomization of a suitable metal, preferably the same as used for the electrodes of the lamp.

Another means for initiating the movement of the glow-glaze, especially for initiating the circulation of the same, also to maintain it reliably, consists in providing the interior lining of the electrodes or at least of one of them which is made of an insulating material for instance mica, with recesses interrupting said lining at the respective places. The rotatory movement of the glow haze then takes place from said recesses and to them, these latter are preferably provided in that electrode which is located near the free end of the bulb.

In the constructional form shown in Figs. 6 and 7 the basin-shaped electrodes *b* and *c* are provided with the interior linings *k* and *m* and are conductively connected with the conducting wires *o* and *p* of the lamp. The lower rim of the lining *m* is provided with recesses m^1, the purpose of which has been stated in the preceding paragraph.

In Fig. 8 the recesses of Fig. 7 are replaced by inwardly bent portions m^2 of the lining *m* so that also in this way the insulating action of the lining is broken. There are in Fig. 8 two such interruptions m^2 located nearly diametrically opposite to one another. If continuous current is used, one of said interruptions (m^2, Fig. 8, as well as m^1, Fig. 7) is preferably arranged in the proximity of the positive pole constituted by the wire *o* in which case the circulation of the glow haze commences at said place and proceeds in the direction indicated by the arrow.

I claim:

1. An illuminating device, comprising, in combination, a gaseous conduction lamp having adjacent co-axial electrodes forming a substantially annular discharge path therebetween annular insulating means with peripheral recesses adjacent said electrode.

2. An illuminating device, comprising, in combination, a gaseous conduction lamp having adjacent co-axial electrodes forming a substantially annular discharge path therebetween, and in one of said electrodes an insulating lining having inwardly bent portions constituting interruptions of the insulation and being adapted to influence the motion of the haze.

3. The method of operating a negative glow discharge lamp, the electrodes of which form a substantially annular discharge path therebetween, which comprises limiting the current through the lamp so that the glow does not occupy the entire annular path.

4. The method of operating a negative glow discharge device, having a pair of electrodes spaced of uniform distance and forming a discharge path therebetween, which comprises limiting the current to the lamp so that the discharge at a fixed operating voltage does not occupy the entire discharge path and moves along the electrodes.

5. The method of operating a negative glow discharge lamp, having a pair of electrodes spaced at uniform distance forming a discharge path therebetween which comprises producing a fractional discharge relative to the entire discharge path and maintaining a fixed operating voltage across said electrodes to move the discharge along the path.

6. In a gaseous discharge tube, a first electrode; a second electrode, said electrodes forming a uniform annular discharge path therebetween; a lining on said second electrode consisting of insulating material having an interruption at a predetermined position for initiating and maintaining a movement of a fractional discharge along the electrodes.

7. In an illuminating device, a vessel containing a gaseous atmosphere; a positive electrode within said vessel having a substantially annular surface; a cup-shaped negative electrode being disposed coaxially to and at uniform distance from said positive electrode to produce an annular discharge path therebetween; lead-in means for applying an electric voltage across to said electrodes, the dimensions of said electrodes, the pressure of said atmosphere and the electric voltage applied across said electrodes being such that the glow does not occupy the entire annular path and rotates along the electrode surface.

8. In combination with an illuminating device as described in claim 7, means for modifying the discharge impedance at one place between the electrodes for readily starting and maintaining the movement of the fractional discharge between the electrodes.

9. The method of operating a negative glow discharge device having uniformly spaced discharge electrodes one of said electrodes being closed upon itself to form a closed discharge path which comprises producing a discharge over only a portion of the surface of the electrodes.

10. In combination, a gas discharge device comprising a vessel, an attenuated atmosphere therein; a positive electrode therein having a substantially annular surface; a negative electrode being disposed coaxially to and at uniform distance from said positive electrode to produce an annular discharge path therebetween; lead-in means for applying an electric voltage across said electrodes, the relative dimensions of said electrodes, the pressure of said atmosphere, and the electric voltage applied being such that the glow does not occupy the entire annular path and a resistance in series with one of said lead-in means to adjust the voltage applied across the electrodes.

11. The method of operating a negative glow discharge lamp having a pair of electrodes spaced at uniform distance and forming a discharge path therebetween which comprises producing a partial discharge relative to the entire discharge path, and maintaining a fixed operating voltage across said electrodes to move the discharge along said path.

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