

Dec. 15, 1925.

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E. L. HARRINGTON

ELECTRIC GAS LAMP

Filed Feb. 2, 1922

FIG. 1.

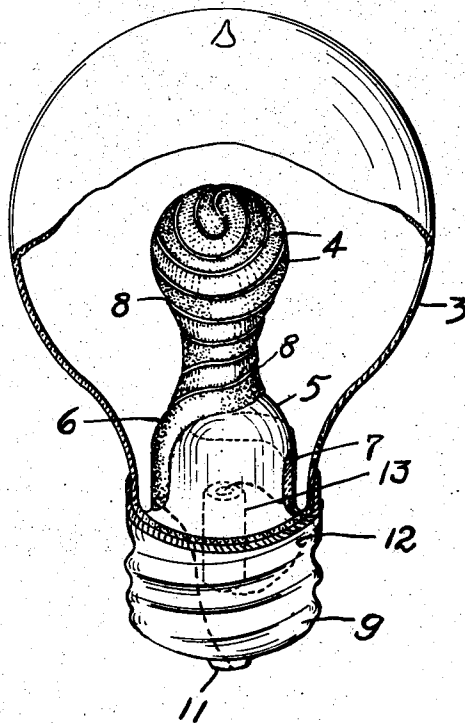
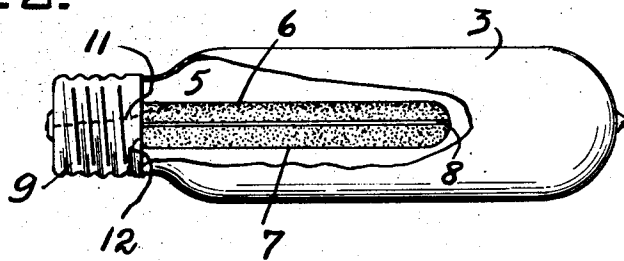


FIG. 2.



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UNITED STATES PATENT OFFICE.

ERTLE LESLIE HARRINGTON, OF SASKATOON, SASKATCHEWAN, CANADA, ASSIGNOR
TO WESTINGHOUSE LAMP COMPANY, A CORPORATION OF PENNSYLVANIA.

ELECTRIC GAS LAMP.

Application filed February 2, 1922. Serial No. 533,709.

To all whom it may concern:

Be it known that I, ERTLE LESLIE HARRINGTON, a citizen of the United States, and a resident of Saskatoon, Saskatchewan, Canada, have invented a new and useful Improvement in Electric Gas Lamps, of which the following is a specification.

My invention relates to electric lamps of the type in which gas enclosed in a transparent container is rendered luminous by the passage of an electrical current there-through.

An object of my invention is to provide an electric gas lamp in which the electrodes are in film form.

Another object of my invention is to provide, in a lamp of the character indicated above, an electrode or plurality of electrodes which are immovable with respect to each other.

A further object is to provide a lamp of the character indicated, in which the electrodes are very close together so that the lamp may be operated at low voltages throughout the life of the lamp.

A still further object is to provide an electric lamp containing gas, substantially all of which is rendered luminous when the lamp is in operation.

Other objects will be apparent from a reading of the following detailed description.

Various lamps of the same general character as that of my invention, have employed electrodes widely spaced apart, but lamps of this type require high voltages to start them. In order to secure a lamp which will operate at lower voltages, it has been proposed to bring the electrodes nearer to each other. One of the forms of electrodes in lamps operating at low voltages and considered fairly efficient, is that in which the electrodes are in the form of interlacing spirals near to each other. Others have proposed dome-shaped electrodes spaced but a short distance from each other. In manufacturing lamps with the electrodes thus arranged, considerable difficulty has arisen in securing uniformity in the spacing of the electrodes and of maintaining such spacing after the lamp is in operation. Furthermore, if lamps, having their electrodes closely adjacent to each other in order to adapt them for operation at low voltages, are subjected to shocks their electrodes may be vibrated

into contact, thus short-circuiting the lamp and rendering it useless.

Furthermore, in lamps of the character indicated, no attempt has been made, so far as I am aware, to so arrange the electrodes as to secure an electrical discharge which will render all of the surrounding gas luminous, instead of a portion of it as has been the result heretofore obtained.

I avoid the above disadvantages by my invention, which comprises an electric lamp, the bulb or container of which is filled with a suitable gas. The gas usually employed in lamps of the type contemplated by my invention is one of the monatomic gases, neon being preferred. The lamp is provided with two electrodes arranged closely adjacent to each other. The construction of the electrodes is such that they are incapable of being moved toward and from each other, thus obviating any danger of short-circuiting. Furthermore, the electrodes are distributed over a considerable area within the bulb, which obviously assists in rendering all the gas luminous when the lamp is in operation.

Referring to the drawings:

Fig. 1 is an elevation of my invention, a portion of the exterior bulb being broken away to show the arrangement of the electrodes; and,

Fig. 2 is a similar view of a modification of the lamp shown in Fig. 1, showing a different arrangement of the electrodes.

A lamp constructed in accordance with my invention comprises a bulb or container of transparent glass which may have any desired configuration. The bulb or container is filled at a suitable pressure with a monatomic gas, such, for example, as neon. This gas has the property of becoming luminous when an electric current is discharged there-through. This phenomenon occurs when either direct or alternating current is employed, and either type of current may be employed with my improved lamp.

To provide for the discharge of an electrical current so as to cause the gas to become luminous, I have devised a special form of electrode which may be readily manufactured with a degree of certainty in the uniformity of the product and without any considerable wastage through shrinkage.

The preferred form of electrode coming within the spirit of my invention comprises

a film or films 4 of any desirable conducting material capable of being satisfactorily shaped into that form. I find it convenient to use copper, aluminum, bronze, silver, or molybdenum; however, other equally satisfactory substances will suggest themselves.

I prefer to make the electrode material into film form for two reasons, one of which is that when thus constructed, a given quantity of the material may be spread or distributed over a greater area. This is important in a lamp of the character indicated for the reason that, instead of merely a portion of the enveloped gas being rendered luminous, as is the case with the type of electrode at present used, substantially all of the gas will be thus affected.

Obviously, when the electrode or electrodes are in the form of a film they would have no inherent resistance against distortion; therefore, in order to securely fix them in position within the lamp, I find it desirable to affix the film of conducting material to another body having the necessary rigidity. In the drawings, the film conductor or electrode 4 is shown as secured to a non-conducting body 5 comprising an inner support or bulb which may be of glass. The film may be secured to the body by any of the well known expedients, as, for instance, by deposition in a vacuum, electrolytic means, painting, dipping or spraying or dusting and then baking, etc. It will thus be seen that, by securing the film in the manner indicated, considerable rigidity is obtained.

The second reason why it is desirable to construct the electrode in film form is that, with certain arrangements, it is possible to more accurately and uniformly space the electrodes apart and maintain them at such spacing regardless of any disturbance of the lamp.

As indicated in Figure 1, the electrodes are in the form of two spiral bands or ribbons 6 and 7, which are uniformly spaced apart as at 8, throughout their lengths by the insulating body 5. These bands or ribbons are secured to the surface of the inner bulb 5, the latter being sealed to the outer envelope 3 in very much the manner of sealing-in a mount in the standard incandescent electric lamp. One of the bands 6 has an external contact, as indicated at 11, positioned in the center of the lower end of the base, while the other terminates at the side of the base, as shown at 12.

This construction provides for spacing the electrodes very close together without any danger of contact between them and a consequent short circuiting of the lamp, and is a decided advantage in that, by reducing the spacing to a minimum and having the gas filling within the lamp at a pressure rang-

ing from 1 to 30 mm. of mercury, the lamp may be operated at commercial voltages. Ordinarily, the spacing is a sixteenth of an inch; however, this distance may be varied within a considerable range since it is dependent on several factors, such as the pressure of the gas, etc. Furthermore, where both electrodes are firmly fixed to a substantially rigid body, by depositing the electrode material on the body, the relative positions of these electrodes will remain unaltered, and they will be immovable with respect to each other.

In the type of lamp illustrated in Fig. 2, the envelope or bulb 3 is given an elongated or tubular form, while the electrodes 6 and 7 are uniformly distributed on opposite sides of the body 5 to which they are secured. A gap or passageway 8 extends between the two electrodes to insulate them. This insulating gap may be no more than the surface of the non-conducting body, which at this point may be left uncoated for the purpose, but the invention is not limited to such an expedient. The customary base 9 is cemented to the outer container 3 and may be connected in the usual manner by the connections 11 and 12 to the electrodes 6 and 7 respectively.

In lamps which are to be burned on direct current circuits, it is not necessary to form both electrodes of the same size, as the glow occurs at the cathode. In such a lamp, the cathode is made of considerable size, and the anode rather small in comparison. Inasmuch as this construction is well known in the art, illustration thereof is thought unessential.

The lamp operates as follows: When current either alternating or direct, at a suitable commercial voltage, is transmitted to the electrodes 6 and 7 through the connections 11 and 12, an electric discharge will be started which will extend between the electrodes throughout their entire lengths. This discharge will have a spiral configuration if a lamp of the type illustrated in Fig. 1 is employed, or will have the design of a hairpin if the lamp of Fig. 2 is used. The luminous discharge thus set up extends well within the gas and, therefore, will cause substantially all of the contained gas to be rendered luminous.

In order to prevent the lamp from becoming overheated upon passage of excess currents, it may be desirable to provide a suitable ballast resistance 13 in the base of the lamp. It may be found preferable to place such resistance external to the lamp; but in either event, such resistance is placed in series with but one of the leading-in wires, suitable insulating material being provided to prevent short circuiting across the leading-in wires. The strength of the resistance will be governed by the amount

of current flowing and may be readily computed by any lamp engineer.

Many modifications of the arrangement and size of the parts of the lamp may be apparent to those skilled in the art, but such as fall within the scope of the appended claims are to be considered as falling within the scope of my invention.

What is claimed is:

10 1. In an electric gas lamp, a plurality of electrodes each consisting of a film of conducting metal adherent to a non-conducting surface in intertwined spiral relation.

15 2. In an electric gas lamp, a plurality of electrodes consisting of a number of intertwined strips of conducting metal immovably fixed with respect to each other throughout their lengths.

20 3. An electric gas lamp comprising inner and outer bulbs spaced apart, said inner bulb being sealed within said outer bulb, a gaseous filling within the space between said

bulbs adapted to become luminous upon passage of an electrical discharge therethrough, two intertwined spiral electrodes in film form affixed to the outer surface of said inner bulb and spaced apart and means connecting said films to the exterior of the lamp for making contact with a source of energy. 25

4. An electric gas lamp comprising inner and outer bulbs spaced apart and sealed together, a monatomic gaseous filling within the space between said bulbs, two electrodes affixed to the outer surface of said inner bulb having the form of intertwined conducting films spaced apart and electrical connections secured to said electrodes for conducting a current thereto from an outside source of energy. 30 35

In testimony whereof, I have hereunto subscribed my name this 17th day of January, 1922.

ERTLE LESLIE HARRINGTON.