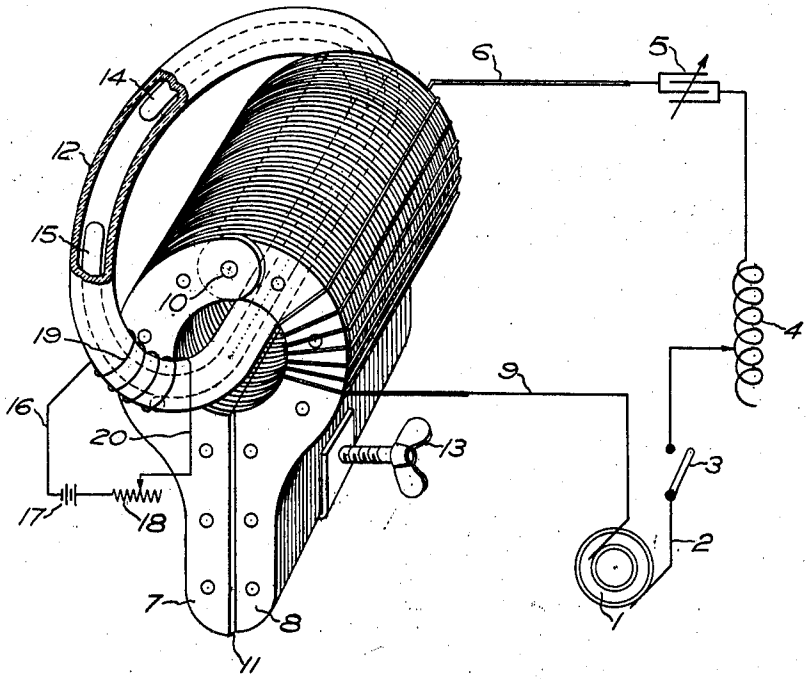
July 7, 1931. M. MORRISON 1,813,580

MERCURY VAPOR LAMP

Filed Feb. 11, 1929



Inventor:
Montford Morrison

Patented July 7, 1931

1,813,580

UNITED STATES PATENT OFFICE

MONTFORD MORRISON, OF CHICAGO, ILLINOIS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO WESTINGHOUSE LAMP COMPANY, A CORPORATION OF PENNSYLVANIA

MERCURY VAPOR LAMP

Application filed February 11, 1929. Serial No. 339,006.

The present invention relates to electric lamps in which the electric excitation for the medium producing the light is induced into that medium without the aid of electrical connections thereto. The medium may be gaseous, liquid or solid.

This invention further relates in particular to induction lamps where the frequency employed is of an order that permits of the advantageous use of iron in the magnetic circuit of the inducing field.

Among the objects of my invention are; to produce an electric lamp which operates without the use of sealed-in electrodes, to produce a gaseous conduction or vapor lamp which has no critical starting voltage; to produce an arc lamp in which the arc length may be varied at will and thereby vary the arc characteristics associated therewith; to produce an induction lamp in which the electric heating energy is confined to definite circuits, and to produce an induction lamp in which the heating circuit can be resonated with other associated circuits, thereby attaining a maximum of efficiency in operating conditions.

Other and further objects will be obvious and pointed out within the specifications, but the novel features of my invention are more particularly set forth in the claims.

In the accompanying drawing I have shown one embodiment of my invention in which the figure is in part a perspective and in part a diagrammatic view. In the figure, 1 is an alternating current generator which, by means of lead 2 and switch 3, is connected to variable inductive reactance 4, which in turn is connected in series with variable condensive reactance 5, which is connected to the primary winding 6 of transformer 7.

Current is conducted around a core 8 of transformer 7, and thence through conductor 9 to alternating current generator 1, completing the primary electric circuit. The preferred primary circuit to utilize the present invention to the best advantage, depends upon the characteristics of the generator 1 and the transformer 7, as will be more clearly hereinafter pointed out, though the circuit shown in the accompanying drawing is an operative one and serves as a simple illustration of one embodiment of my invention.

The obvious purpose of reactances 4 and 5 is for resonating or tuning the primary circuit in conjunction with the secondary circuit. Many different and more effective ways of tuning the primary circuit, as well as resonating its current flow with that of the transformer secondary, may be used in the employment of my invention. The method illustrated is shown for its simplicity and is merely illustrative of one embodiment of electrical tuning used in my induction lamp. This scheme of tuning is not a limitation of my invention and I not only reserve the right to use any method of tuning the circuit shown in the drawing, but the right to add circuits, electrically, electrostatically and/or magnetically associated with my lamp to produce tuning in the primary circuit and between the primary and secondary circuits.

The transformer 7 in the illustrated embodiment is a hinged core transformer, having its hinge at 10 with jaws at 11, which may be opened for inserting or withdrawing the closed tube 12. The jaws illustrated at 11 are held closed by clamp 13.

12 in the present embodiment is a closed tubing of translucent or partly translucent material being ordinarily formed by taking a piece of straight tubing, bending it into the desired shape, sealing it together in such a way that the internal wall of the tubing forms a continuous path.

The tubing 12 may be made of translucent material only where the light is emitted and may be sealed onto any other material that will fuse with the translucent material used.

In the manufacture of this part of my invention, a vapor, liquid or solid or any combination of these is inserted into the internal chamber of continuous tubing 12 in such a way that when the tubing is in its horizontal position, the conducting medium or media inserted into the tubing form a continuous conductor which provides, as will be appreciated, a short circuited turn of transformer 11.

It should be pointed out here in the specification that although in the figure only one

turn of tubing is illustrated, any number of turns may be employed, and in most cases in practice it may be desirable to construct part 12 with several turns instead of one.

As a matter of simplicity, to illustrate the operation of the present embodiment of my invention, I will describe the operation of my lamp with the use of mercury as a conducting medium which has been inserted into tube 12.

When the continuous tube 12 is held in a horizontal position, the mercury will form a continuous conductor, forming a secondary winding of transformer 7. By slightly tilting continuous tubing 12, the mercury will be separated, as illustrated in the figure, by the two ends 14 and 15, which represent the separated ends of the mercury. The space represented in between ends 14 and 15 represents the arcing space, the length of which depends upon the degree to which the tube 12 is tilted, and the amount of mercury contained in the tube. By tilting the tube 12 to different angles, the different arc lengths obtained provide means for varying the arc characteristics of my lamp.

In some cases I may use such a small amount of mercury that it will all vaporize and the lamp will operate after starting, on vapor entirely.

By means of inductive reactance 4 and condensive reactance 5, I can resonate my transformer circuits such as to not only obtain a maximum input into the primary of transformer 7, but also obtain a maximum input into the secondary side with a given set of conditions.

It will be appreciated that in most cases it is desirable to operate at frequencies of an order many times higher than commercial frequencies in the operation of my lamp, and, therefore, the effectiveness of tuning or resonating the circuit will then be of considerable importance.

In some cases I may desire to include a coil of heating wire 19 adjacent the tubing 12 and connected through leads 16 and 20 to a source of electromotive force 17 and a current adjustor 18. Quite obviously the source of electromotive force 17 may be derived from the transformer if and when desired.

With this heated coil 19 I can adjust the mean operating temperature of my tube 12 without the necessity of designing into the tubing 12, carefully predetermined cooling characteristics.

By means of coil 19 I can further adjust the vaporization and conductivity of the vapors within the tube, and thereby influence not only the electrical operating characteristics of the lamp but the spectrum of the light emitted. The dependence of the spectrum upon the temperature of the lamp being well understood in the art.

I have described one embodiment of my invention and, therefore, I claim:

1. In a luminous discharge device, a core of magnetic material comprising an integrally separable leg, a primary winding upon said core and electrically associated with a source of alternating potential, a hollow translucent hermetically sealed envelope containing a medium conductive to electric current, luminescent under excitation and surrounding one leg of said core, whereby the said tube may be removed from said one leg by integrally separating one leg from said core.

2. In a luminous discharge device, a hinged core of magnetic material having a separable air gap, a primary winding upon said core and electrically associated with a source of alternating potential, a hollow translucent hermetically sealed envelope containing a medium conductive to electric current, luminescent under excitation and surrounding one leg of said core, whereby the said tube may be removed from said one leg by increasing said air gap.

3. In a luminous discharge device, a core of magnetic material, a primary winding thereupon electrically associated with a source of alternating potential, a hollow translucent hermetically sealed envelope containing a medium conductive to electric current, luminescent under excitation and inductively associated with said core, and a source of heat adjacent said envelope, whereby the mean operating temperature of the said device is partly determined by the inductive association with said core and partly determined by the said source of heat.

4. In a luminous discharge device, a core of magnetic material, a hollow translucent hermetically sealed envelope containing a medium conductive to electric current, luminescent under excitation and inductively associated with said core, a source of alternating potential of a frequency in excess of 5000 cycles per second, a primary winding upon said core, said winding electrically associated with said source, and a condensive reactance electrically associated with said source and with said primary and having a value equal to the total inductive reactance of all the associated circuits combined.

Chicago, Illinois, February 8, 1929.

MONTFORD MORRISON.