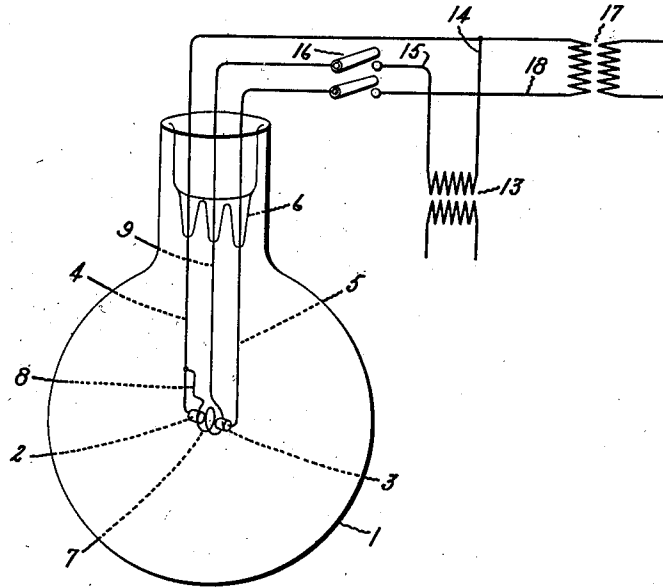


P. K. DEVERS, JR.,
INCANDESCENT ARC LAMP.
APPLICATION FILED MAR. 6, 1916.

1,290,930.

Patented Jan. 14, 1919.



Inventor:
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by *Wm. G. Davis*
His Attorney.

UNITED STATES PATENT OFFICE.

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INCANDESCENT ARC-LAMP.

1,290,930.

Specification of Letters Patent.

Patented Jan. 14, 1919.

Application filed March 6, 1916. Serial No. 82,377.

To all whom it may concern:

Be it known that I, PHILIP K. DEVERS, JR., a citizen of the United States, residing at Lynn, in the county of Essex, State of Massachusetts, have invented certain new and useful Improvements in Incandescent Arc-Lamps, of which the following is a specification.

The present invention relates to electric devices in which an arc is operated between electrodes of tungsten, or other suitable highly refractory material, in a gaseous medium of considerable pressure. It is the object of my invention to provide a convenient means for starting an arc between said electrodes at low potential while the electrodes are below a temperature at which appreciable electron emission occurs.

It has been suggested to start an arc between electrodes of refractory metal in a relatively dense gas by providing an auxiliary independently heatable electrode, and while this auxiliary electrode is at incandescence operating an arc between the auxiliary electrode and one of the main electrodes to heat this main electrode to incandescence and then to start the main arc with the incandescent electrode acting as cathode. This means for starting an arc although perfectly operative requires special switching mechanism.

In accordance with my present invention, I have provided an even simpler method of and apparatus for starting an arc between two juxtaposed electrodes namely, by subjecting the gas in the arcing space between the electrodes, and to some extent the electrodes, to radiation from a resistance heater located adjacent the arcing space, and impressing an arc supporting current upon the electrodes directly without the necessity of first operating an auxiliary arc to heat one of the main electrodes to a temperature at which the electron emission of the main electrode is sufficient to enable it to act as cathode.

The accompanying drawing illustrates somewhat diagrammatically a lamp embodying my invention.

The lamp shown in the drawing comprises a transparent globe, consisting of glass or the like, and containing electrodes 2, 3 consisting of refractory conducting material, such as tungsten, or the like, carried by conductors 4, 5 of small cross-section.

These conductors may also consist of tungsten and may be directly sealed into the stem 6 when the bulb consists of sodium-magnesium boro-silicate glass of proper expansion coefficient. For example, tungsten electrodes may be about 80 mils in diameter and 80 mils in length and may be separated by a gap of about 25 mils, the conductors 4, 5 also preferably consisting of tungsten and being proportioned to carry the arc-supporting current, without undue heating. The bulb contains a gas substantially inert chemically with respect to the electrodes when at incandescence and having a relatively low heat conductivity, for example, argon, krypton, neon or other rare gases, nitrogen, or mixtures of these gases. The pressure of the gas should be high enough to materially suppress disintegration, or sputtering, of the electrodes when at incandescence. Ordinarily the pressure of the gas is above about 380 millimeters of mercury when the lamp is cold so as to approximate atmospheric pressure when at the operating temperature.

Adjacent the arcing space and preferably extending very slightly over the opposing ends of the electrodes is a refractory heater wire 7, which preferably also consists of tungsten, and functionates to ionize the gas in the arcing space. The electrothermal ionizer 7 may have one of its supply conductors 8 connected to one of the arc electrode terminals, such as 4, the other conductor 9 being separately sealed into the stem 6. The ionizer has a substantial spread and preferably surrounds the arcing space. The size and length of the heater wire varies with the conditions. For example, I have used a 3/16" spiral of 20 mil wire requiring a heating current of about 15 amperes at 7 volts.

To start the arc a heating current is conducted through the spiral sufficient to raise the same to a temperature of about 2000° C. For the sake of simplicity this heating current is indicated as being derived from an entirely independent source, for example, a battery or a transformer as indicated at 13, which is connected to the conductors 14 and 15, the latter containing a switch 16. A current of suitable arc-sustaining voltage is impressed upon the arc electrodes, for example, about 110 volts in the case above indicated. This main arc-supporting current

is derived from a transformer 17 by the closure of the switch 16 in the conductor 18. When the arc starts the ionizer circuit may be opened in the example illustrated by means of the switch 16, and the arc will continue to operate.

The starting of the arc when the electrodes are below incandescence and electron emission therefrom is inappreciable, should not be confused with prior arc starting devices in which one of the electrodes is first heated to incandescence by an auxiliary electrode.

What I claim as new and desire to secure by Letters Patent of the United States, is:—

1. An electric arc device comprising the combination of an envelop, electrodes therein consisting of refractory material and separated by a gap, a filling of gas or vapor in said envelop at a pressure high enough to substantially suppress disintegration of said electrodes, a heater wire coiled about said arc gap for rendering the gas between

said electrodes conductive to current, and connections for impressing an arc sustaining voltage upon said electrodes while the same are at a temperature at which the electron emission is inappreciable.

2. An electric lamp comprising the combination of a sealed container, tungsten electrodes therein separated by a gap of about the same order of magnitude as the electrodes, a filling of gas in said envelop substantially inert with respect to tungsten at high temperatures having a pressure at the operating temperature approximating atmospheric pressure, and a coiled heater of refractory metal, the turns of which surround the gap between said electrodes, and are connected within the container to one of said electrodes.

In witness whereof I have hereunto set my hand this 3rd day of March, 1916.

PHILIP K. DEVERS, JR.