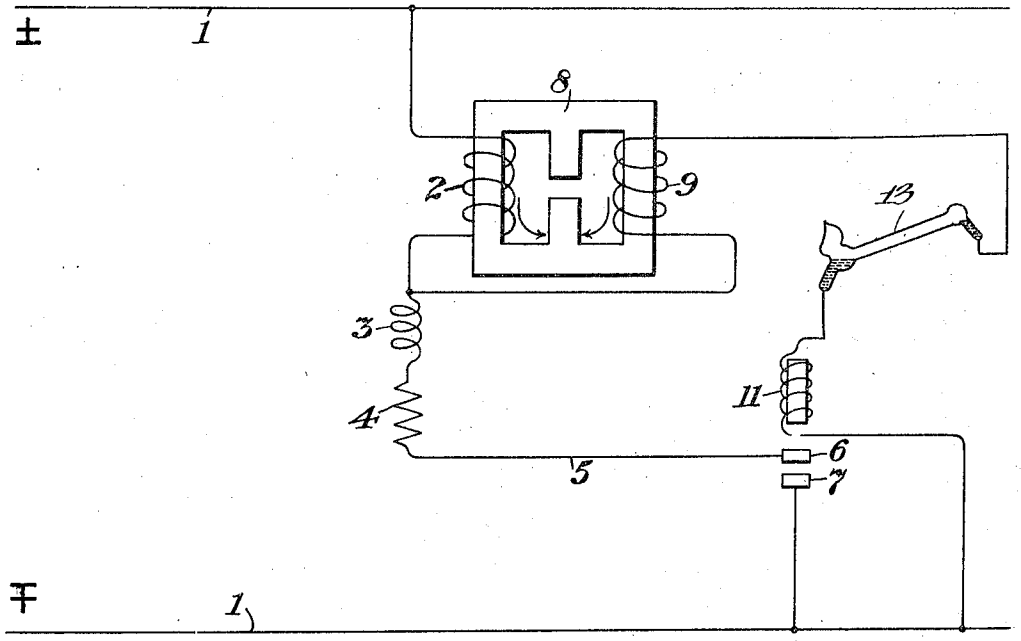
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MERCURY VAPOR APPARATUS.

APPLICATION FILED JULY 20, 1915.

1,235,741. Patented Aug. 7, 1917.



WITNESSES

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MERCURY-VAPOR APPARATUS.

1,235,741. Specification of Letters Patent. Patented Aug. 7, 1917.

Original application filed September 12, 1912, Serial No. 719,924. Divided and this application filed July 20, 1915. Serial No. 40,854.

To all whom it may concern:

Be it known that I, PERCY H. THOMAS, a citizen of the United States, and resident of Upper Montclair, county of Essex, State of New Jersey, have invented certain new and useful Improvements in Mercury-Vapor Apparatus, of which the following is a specification.

My invention relates to the operation of mercury vapor lamps and especially to such lamps when operated at relatively high pressures, from sources supplying alternating current. My invention further aims to provide means making it possible to operate such a lamp or other apparatus by passing current from the source in opposite directions between the same electrodes. When mercury vapor lamps are operated from alternating mains at relatively low pressures it is usually more convenient to provide an extra anode and pass the current alternately from the two anodes to the same cathode. However, by the method of operation here set forth it is possible to operate from an alternating supply directly with only two electrodes.

The mercury vapor lamp has a very high resistance to starting; but when the temperature of the electrodes, assuming these to be of mercury is raised sufficiently, this starting resistance is much lowered and a lamp that will not run on a certain voltage cold will operate satisfactorily on this voltage when its temperature is sufficiently high. I overcome the difficulty of getting the lamp heated to the point at which it will operate on normal alternating voltage by various methods, such as raising the alternating voltage at the start, shortening the vapor path at the start, or preheating the mercury before attempting to start the flow of current in the vapor; I do not, however, claim to be the first to preheat the mercury of a vapor lamp broadly. The application of these arrangements will be pointed out in more detail in connection with the various figures of the drawings.

It may be well to point out that the normal resistance to current flow in these mercury vapor devices depends as one factor upon the pressure of the vapor which in turn depends upon the temperature of the mercury in the container. The relation between the amount of heat generated in the mercury by the operation and the natural rate of heat dissipation of heat from the mercury is the factor determining the normal temperature of the mercury and the various parts and current strengths may be proportioned in conformity therewith.

It is furthermore well known that such apparatus operates most satisfactorily when there is some voltage absorbing device in series therewith or when it is fed by constant currents.

In the drawings I show a system of circuits adapted for any of the mercury vapor devices of the usual types.

This lamp is preferably constructed and exhausted as is usual for mercury vapor lamps, that is by exhausting all gases from the container and the walls of the chamber. However, it will be found advantageous in some cases to facilitate the initial starting by leaving in a certain amount of residual gases between the electrodes. The presence of such gas serves to lessen considerably the resistance of the device to the initiation of current flow. The container is hermetically sealed and when the gases have been eliminated as already described it is sealed from the pump.

When current is thrown on the constant potential main 1, the transformer primary 2 is energized through the inductance device 3, the resistance 4, the conductor 5 and the cut-out contacts 6—7. This energizes the transformer 8, which in turn produces the voltage in the secondary line 9, which may be given any desired ratio to that in the primary 2. When the lamp starts the coil 11 is energized by the flow of current which opens the cut-out 6—7, thus interrupting the current in conductor 5. The current is then forced through the device 13 by way of the primary 2 and the secondary 9 of the transformer, whose core 8 is provided with a shunt leakage path having an open magnetic circuit. These two coils operating together, produce in effect an inductance device in series with the circuit which operates as steadying means. Where desired, a very high potential can thus be impressed upon the device 15 during the starting period only, without maintaining such high potential during operation.

While I have described my invention with regard to the specific diagram and figure

illustrated, I do not wish to limit myself to the particular embodiment of my invention but consider any system utilizing the novel features of this disclosure to come within my invention.

The lamp structure shown may, if desired, be made of quartz or any of the other usual materials for these devices may be used over a wide range of pressure. Of course, in each case the pressure of the vapor, the dimensions of the tube, the voltage impressed and radiating power of the apparatus must be properly correlated to secure the results described.

Many of the lamps shown may be operated to advantage upon direct current, but in this application I have illustrated more particularly alternating current sources. Material other than mercury may be used in these tubes and when run at a high temperature any material, even material solid at the temperature appropriate to low pressure lamps may be used as the electrode material. I may mention tin, which has a very low vapor pressure; zinc and copper as materials that may become liquid at reasonable temperatures, each giving its own characteristic color; also lead, lithium; and cadmium.

This application is a division of my application Serial Number 719,924, filed September 12th, 1912.

I claim as my invention:

1. In a system of electrical distribution, the combination with alternating current constant potential mains, an apparatus requiring at high starting and a low operating voltage and voltage-absorbing steadying means, and a transformer having a separated primary and secondary, both in series with the lamp, and a shunt circuit energizing said primary winding across the mains during the starting period only.

2. The combination of alternating mains, a consumption device in series with a transformer winding across said mains, means for shunting said device and a part of said winding and means responsive to the starting of normal operation for interrupting said shunt.

3. The combination of alternating current mains, a consumption device, a transformer winding connected in series therewith across said mains, a shunt circuit across said mains including a portion of said transformer winding and current controlling means in said shunt.

4. The combination of alternating current mains, a consumption device, a transformer winding connected in series therewith across said mains, a shunt circuit across said mains including a portion of said transformer winding and current controlling means in said shunt and means responsive to current in said device for interrupting said shunt circuit.

5. In combination, a primary transformer winding, a secondary therefor, a connection between said primary and said secondary, a circuit including said primary and said secondary and separate means for supplying magnetizing current in said winding and means for interrupting such supply.

Signed at New York, in the county of New York and State of New York, this sixteenth day of July, A. D. 1915.

PERCY H. THOMAS.

Witnesses:

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