July 20, 1926. 1,593,381

F. BLAU

TUNGSTEN ARC LAMP

Original Filed April 14, 1921

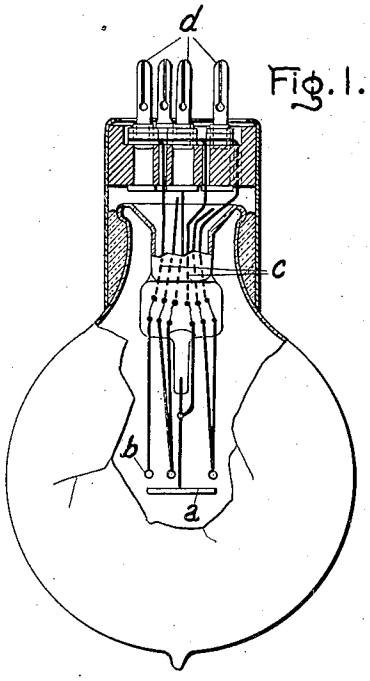


Fig. 1.

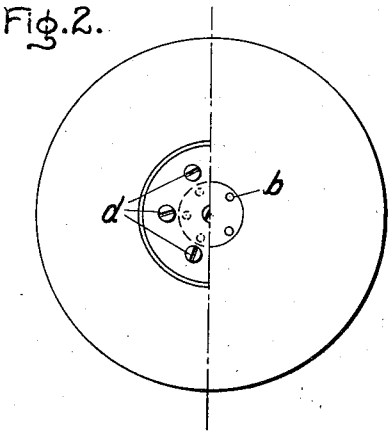


Fig. 2.

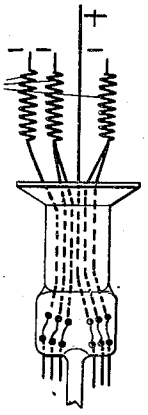


Fig. 3.

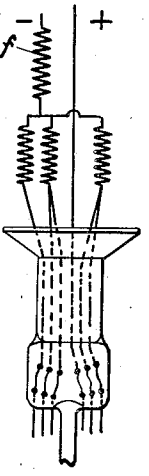


Fig. 4.

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Patented July 20, 1926. 1,593,381

UNITED STATES PATENT OFFICE.

FRITZ BLAU, OF BERLIN-CHARLOTTENBURG, GERMANY, ASSIGNOR, BY MESNE ASSIGNMENTS, TO GENERAL ELECTRIC COMPANY, OF SCHENECTADY, NEW YORK, A CORPORATION OF NEW YORK.

TUNGSTEN ARC LAMP.

Original application filed April 14, 1921, Serial No. 461,310, and in Germany April 28, 1920. Divided and this application filed September 22, 1924. Serial No. 733,997.

This invention relates to arc lamps of the kind in which the voltaic arc is formed between tungsten electrodes in nitrogen, argon, or the like gases or vapours which are practically indifferent to tungsten.

In the known types of those lamps only one cathode is associated with the anode. Although tungsten metal is a very good conductor of heat its thermal conductivity does not suffice to enable an approximately uniform temperature of the anode to be produced by the voltaic arc adjacent to it. Hence a part of its surface does not radiate the light in an economical manner.

Experiments have shown that by associating a plurality of cathodes with an anode, the uniformity of heat conduction in the anode increases rapidly so that by using an adequate number of cathodes an anode of greater extension can be brought to uniform incandescence. In such arrangements it is not possible to use a common series resistance for the various cathodes, because if this were done, an arc would not form or be maintained between each cathode and the anode. A separate series resistance has to be used for each cathode. A part of the series resistances may be common to the cathodes.

The invention offers special advantages in cases in which anodes are used which are practically flat. and which are of particular importance for the purposes of optical projection, because the radiation of light in directions in which it is not required is limited. Very favourable effects are obtained by placing the cathodes at one side of the anode, preferably near its edge, or by distributing them uniformly in the plane of the anode.

Two constructional forms of the invention are illustrated in the drawing:

Fig. 1 being a longitudinal section;

Fig. 2 representing one half of a plan view and one half of a cross section taken on the dash and dot line of Fig. 1;

Figs. 3 and 4 are circuit diagrams showing the manner of inserting the series resistances in the leads to the cathodes.

In accordance with Fig. 1, five cathodes *b* are arranged behind or above the flat anode *a* so that altogether there are six leads *c* leading to the six contact pins *d* of the plug.

According to Fig. 3 a series resistance *e* is inserted in each of the current leads of the five cathodes, whilst in Fig. 4 in addition to the single resistances a part *f* of the series resistance is common to all of the five cathodes.

It may be seen therefore that with the new construction and with the new combination of elements, which I have shown and described, I am enabled to operate a tungsten arc lamp and render the anode substantially uniformly luminous, which has not been done heretofore.

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

1. In an enclosed arc lamp, a series of small electrodes grouped about an axis within a circumscribed area, a comparatively large electrode covering the said area and located in proximity of the small electrodes, a terminal for the large electrode and a terminal for the small electrodes, said terminals adapted to be connected with a source of current whereby a series of arcs may be established between the small electrodes and the large electrode for heating the large electrode to incandescence whereby one side of the large electrode other than the arc side may be used as a light emitting surface, said large electrode serving as a shield to separate the light emitted by the said surface from the light emitted by said arcs.

2. In an enclosed tungsten arc, a plate tungsten electrode, a plurality of small electrodes adjacent one side of the plate whereby a series of arcs may be established between the small electrodes and the plate for heating the opposite side of the plate to incandescence whereby said opposite side may be used as a light emitting surface, said plate serving also to shield the arc and the small electrodes and confine both to the shadow of the plate with respect to the said opposite side.

3. In an enclosed arc lamp, a series of electrodes grouped about an axis within a circumscribed area, a comparatively large electrode covering the said area and located in proximity of the small electrodes, a terminal for the large electrode and a terminal for the small electrodes, said terminals adapted to be connected with a source of

current whereby a series of arcs may be established between the small electrodes and the large electrode for heating the large electrode to incandescence whereby one side of the large electrode other than the arc side may be used as a light emitting surface, said large electrode serving as a shield to separate the light from the arcs and the light from said surface, and a resistance individual to each small electrode interposed between the corresponding electrode and the terminal for the small electrodes and also a resistance interposed between the terminal of the small electrodes and the source of current.

In witness whereof, I have hereunto set my hand this 4th day of September, 1924.

FRITZ BLAU.