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F. SKAUPY ET AL

CLOSED ARC LAMP

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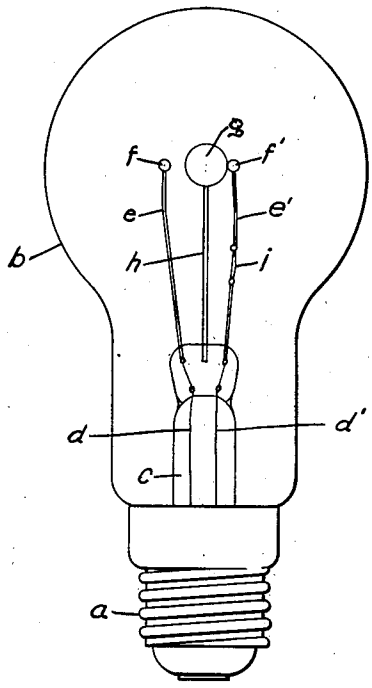

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UNITED STATES PATENT OFFICE.

FRANZ SKAUPY AND WILLY ZEBROWSKI, OF BERLIN, GERMANY, ASSIGNORS TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

CLOSED ARC LAMP.

Application filed April 19, 1924. Serial No. 707,722.

To all whom it may concern:

Be it known that we, FRANZ SKAUPY, a citizen of Austria, and WILLY ZEBROWSKI, a citizen of the Free State of Danzig, both residing at Berlin, Germany, have invented certain new and useful Improvements in Closed Arc Lamps, of which the following is a specification.

Our invention relates to closed arc lamps. More in particular, the invention relates to arcs of the tungsten type having provision for more than one arc.

Heretofore closed arc lamps, and in particular tungsten arc lamps, have been made sometimes with several pairs of electrodes and sometimes with one electrode surrounded by several cathodes. In these devices a number of current supply lines are required which render the manufacture and operation of the lamp difficult.

In the tungsten arc lamp forming the subject matter of the present invention, means are provided such that two arcs are produced in succession although only two current supply lines are used. The lamp is provided with three electrodes. Two of these electrodes are comparatively small in size and between them there is located a third electrode of larger diameter. The two outer electrodes are provided with suitable terminals outside of the lamp to which a single current supply line is connected. The larger or central electrode is not provided with any terminals outside of the lamp. The lamp is preferably filled with one of the rare gases. With this construction the central electrode forms a point from which two arcs may be developed. Furthermore, with the arrangement contemplated the central electrode in one respect acts as an anode and in another respect acts as a cathode. The result is that an increase in the voltage drop takes place double the usual amount. Therefore, the lamp can be operated with a smaller series resistance. Another result of this construction is that the central electrode is uniformly heated. Therefore it is possible with a smaller current to cause the central electrode, having a considerably larger diameter than the external electrodes, to be brought to a point of bright light radiation. This is of advantage especially when the lamp is used for projection purposes, as a larger central electrode is essentially operative in the optical apparatus. The rare gas filling insures a more simple and safe ignition, especially if there is inserted in the supporting stem of one of the several electrodes a bimetallic strip. With this arrangement, as soon as the first arc is automatically formed between two of the electrodes the bimetallic strip separates the third electrode thus forming a second arc.

In the drawing, the new tungsten arc lamp is shown in front view. This drawing illustrates one form of construction.

The lamp shown comprises a bulb b similar to that used for an incandescent lamp. The lamp is also provided with a base a and with a stem c in the interior through which the leading-in wires d and d' pass. The supporting stems e and e' of the two outer electrodes f and f' are connected to the terminals in the base a. Between the outer electrodes f and f' there is located a ball-like central electrode g having a diameter substantially larger than that of the outer electrode. This ball is supported by a stem h which is anchored in the foot c as shown. This stem h is not connected to any current line. In the supporting stem of the electrode f', which latter is adapted to rest against the central electrode g, there is inserted a bimetallic strip i. When the current is turned on there is first established an arc between the electrodes f and g and as a result of the heat action of the current, the bimetallic strip then bends over and draws the third electrode f' away from the central electrode g thereby forming a second arc. The central electrode therefore, when the lamp is burning, lies between two directly connected arcs. The central electrode thus operating both as an anode and as a cathode, and although not connected to any current supply line, is strongly heated by the action of the two arcs. The drop in voltage therefore is double that which usually takes place in lamps in which a single arc is maintained between two electrodes.

It will be understood that while we have shown and described our invention in connection with a specific embodiment we do not wish to be so limited, inasmuch as other modifications will readily suggest themselves to those versed in the art as a result of this disclosure without departing from the spirit and scope of our invention.

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

1. In a sealed envelope, a first electrode and a second electrode, a pair of terminals outside of the envelope one of which is electrically connected with the first and the other with the second of the said electrodes through the medium of a pair of stems, one stem supporting the first and the other stem supporting the second of said electrodes, a third electrode interposed between the first two electrodes, said second electrode being adapted to rest in contact with the interposed electrode whereby an arc may be formed between the central electrode and the first electrode, and means for separating the second and third electrodes after the first arc is formed whereby a second arc may be established between the second and third electrodes.

2. In a sealed envelope, a first electrode and a second electrode, a pair of terminals outside of the envelope, one of which is electrically connected with the first and the other with the second of the said electrodes through a medium of a pair of stems, one stem supporting the first and the other stem supporting the second of said electrodes, a third electrode interposed between the first two electrodes, said second electrode being adapted to rest in contact with the interposed electrode whereby an arc may be formed between the central electrode and the first electrode, and means for separating the second and third electrodes after the first arc is formed whereby a second arc may be established between the second and third electrodes, said means responsive to the current of the first arc.

3. In a sealed envelope, a first electrode and a second electrode, a pair of terminals outside of the envelope, one of which is electrically connected with the first and the other with the second of the said electrodes through a medium of a pair of stems, one stem supporting the first and the other stem supporting the second of said electrodes, a third electrode interposed between the first two electrodes, said second electrode being adapted to rest in contact with the interposed electrode whereby an arc may be formed between the central electrode and the first electrode, and means for separating the second and third electrodes, and a bimetallic element in the stem of the second electrode for separating the second and third electrodes after the first arc is formed whereby a second arc may be established between the second and third electrodes.

4. In a sealed envelope, a first electrode and a second electrode, a pair of terminals outside of the envelope, one of which is electrically connected with the first and the other with the second of the said electrodes through a medium of a pair of stems, one stem supporting the first and the other stem supporting the second of said electrodes, a third electrode interposed between the first two electrodes, said second electrode being adapted to rest in contact with the interposed electrode whereby an arc may be formed between the central electrode and the first electrode, and means for separating the second and third electrodes after the first arc is formed whereby a second arc may be established between the second and third electrodes, said electrodes consisting each of tungsten and said envelope being provided with a rare gas.

5. In an arc lamp, a first electrode, a second electrode and a third electrode interposed between the first two, said second electrode being adapted to rest in contact with the interposed electrode whereby an arc may be formed between the third and first electrodes, and means for separating the second and third electrodes after the first arc is established whereby a second arc may be formed between the second and third electrodes in series with the first arc.

6. In an arc lamp, a first electrode, a second electrode and a third electrode interposed between the first two, said second electrode being adapted to rest in contact with the interposed electrode whereby an arc may be formed between the third and first electrodes, and means for separating the second and third electrodes after the first arc is established whereby a second arc may be formed between the second and third electrodes in series with the first arc, said means comprising a thermally operated element.

7. In an arc lamp, a first electrode, a second electrode and a third electrode interposed between the first two, said second electrode being adapted to rest in contact with the interposed electrode whereby an arc may be formed between the third and first electrodes, and means for separating the second and third electrodes after the first arc is established whereby a second arc may be formed between the second and third electrodes in series with the first arc, said means comprising a thermally operated element, said element being responsive to the current of the first arc for drawing the second arc.

In witness whereof, we have hereunto set our hands this 3rd day of April 1924.

FRANZ SKAUPY.
WILLY ZEBROWSKI.