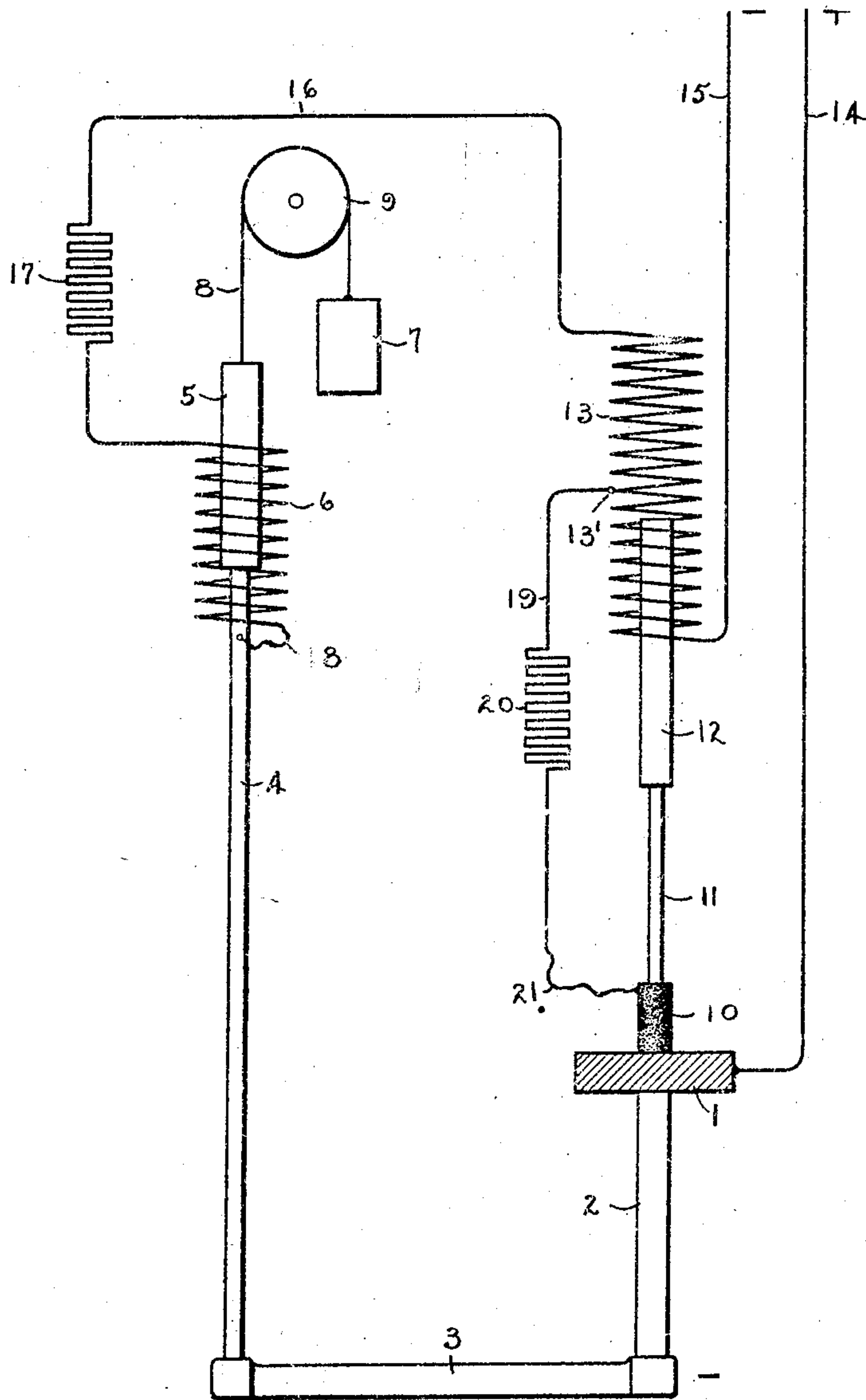


B. MONASCH.  
ELECTRIC ARC LAMP.  
APPLICATION FILED FEB. 20, 1908.

917,099.

Patented Apr. 6, 1909.



WITNESSES:

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INVENTOR

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ATTY.



# UNITED STATES PATENT OFFICE.

BERTHOLD MONASCH, OF BERLIN, GERMANY, ASSIGNOR TO GENERAL ELECTRIC COMPANY,  
A CORPORATION OF NEW YORK.

## ELECTRIC-ARC LAMP.

No. 917,099.

Specification of Letters Patent.

Patented April 6, 1909.

Application filed February 20, 1908. Serial No. 416,827.

*To all whom it may concern:*

Be it known that I, BERTHOLD MONASCH, a subject of the King of Prussia, residing at Berlin, Germany, have invented certain new and useful Improvements in Electric-Arc Lamps, of which the following is a specification.

This invention has reference to improvements in electric arc-lamps in which a positive electrode (anode) of copper or other material that is both a good conductor of heat and electricity, is used in conjunction with a negative electrode (cathode) whose arcing point is a conductor of the second class, that is to say a material that is a poor conductor of electricity in the cold state, but becomes a good conductor when heated.

The object of the invention is to provide means for starting the lamp by heating the arcing point of the cathode by an auxiliary arc until it becomes sufficiently conducting to allow a sufficient current to pass between it and the anode to strike and maintain an arc between them. A variety of arrangements have heretofore been suggested for the accomplishment of this purpose, but in all of them, so far as I am aware, the auxiliary arc heated the arcing point of the cathode by contact or close proximity thereto, and this resulted in the partial disfigurement or destruction of the cathode envelop at or near the arcing point. By my invention this, and other inconveniences of the devices and practices of the prior art is avoided, by causing the auxiliary arc to heat the arcing point of the cathode neither by direct contact nor by close proximity, but by conduction through the body of the anode.

One of the numerous constructions which may be employed in accordance with my invention is illustrated in the accompanying drawing, which is a diagrammatic representation of an arc lamp structure and its circuits.

The anode 1 is here shown as a rather wide and thick body; it is made of copper or other metal or substance that is a good conductor of heat and electricity; its general form is of no consequence,—it may be cylindrical or prismatic. This anode is a fixed element of the lamp, while the cathode 2, mounted in a holder 3, which is connected by a rod 4 with the core 5 of a solenoid 6, is movable toward and away from the anode. The core 5 is connected to a weight 7 by a cord or chain 8

which passes over a fixed pulley 9. The weight 7 is sufficiently heavy to raise the core within the solenoid, and with it the cathode, into contact with the underside of the anode when the solenoid is not energized or is not sufficiently energized. Any other means may be employed for holding the cathode in contact with the anode when no current passes between them and through the solenoid, or when the passing current is insufficient to energize the solenoid to actuate the core or to maintain an arc between the electrodes.

An auxiliary electrode 10, which may be and preferably is made of carbon, is connected by a rod 11 with the core 12 of the solenoid 13, and the combined weight of the core 12, rod 11 and auxiliary electrode 10 holds the latter in contact with the upper face of the anode 1, when the solenoid 13 is not energized, or is not sufficiently energized to lift the core 12.

The positive lead 14 is connected with the anode and the negative lead with one terminal (in the case shown, with the lower terminal) of solenoid 13. The other terminal of solenoid 13 is connected by a conductor 16 and resistance 17 with one terminal of solenoid 6, the other terminal of which is joined with rod 4 by a flexible conductor 18. The solenoid 13 is tapped at an appropriate point 13' by a conductor 19 which, through a resistance 20 and flexible connection 21, is joined to the auxiliary electrode 10.

The operation of a lamp thus constructed is obvious. When no current passes the solenoids do not act upon their cores, and these will assume the positions shown in the drawing, and both cathodes, the normal cathode 2 and the auxiliary cathode 10, will be in contact with the anode 1, but with opposite faces of the same. When current is started, and if at that moment the cold arcing point of the cathode is not conductive, or not sufficiently conductive, the current will first pass between the leads through the anode 1 and auxiliary electrode 10, by way of the connection 21, resistance 20, connection 19 and the lower part of solenoid 13. This current will sufficiently energize solenoid 13 to lift its core and thereby the auxiliary electrode to start an arc between the latter and the upper face of the anode. This auxiliary arc will quickly heat the copper or other metal anode, and the latter will



quickly and sufficiently heat the point of the cathode 2, to make it a comparatively good conductor. As soon as this happens, current will flow from the positive lead to the anode, cathode 2, arm 3, rod 4, flexible conductor 18, solenoid 6, resistance 17, conductor 16, the whole of solenoid 13, and the negative lead. Solenoid 6, being now energized, will actuate its core 5 against the pull of weight 7, and cathode 2 will thereby be withdrawn from contact with the anode, so that the main arc will be struck. At the same time, the magnetic center of solenoid 13 has been raised, so that the core 12 will be raised higher, and high enough to break the auxiliary arc. It will be seen that in this manner the auxiliary arc used for preheating the main cathode does not play about that cathode, so that the arcing point of the same or the sides of it near the arcing point are not disfigured or destroyed.

Instead of breaking the auxiliary arc by raising the auxiliary electrode beyond the arcing distance from the anode, it is practicable to break the auxiliary arc-circuit at any point of the connection between the auxiliary electrode and the point 13'; this may be effected by a switch actuated mechanically or electrically when the arcing point of the cathode has become sufficiently conductive by preheating.

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

1. In an arc lamp, the combination of an anode that is a good conductor of heat interposed between a cathode which is a conductor of the second class and an auxiliary cathode, means for maintaining contact between the anode and the cathodes when no current is passing through the lamp, means for separating the auxiliary cathode from the anode to establish an auxiliary arc and thereby heating the main cathode by conduction through the anode, and means for starting an

arc between the anode and the main cathode and further separating the auxiliary cathode from the anode for breaking the auxiliary arc.

2. In an arc lamp, the combination of a cathode that is a conductor of the second class, an auxiliary cathode, an anode that is a good conductor of heat interposed between the cathodes, means for maintaining contact between the anode and the two cathodes when no current is passing through the lamp, means for separating the auxiliary cathode from the anode to start an arc whereby the main cathode is heated to electric conductivity by heat conduction through the anode, and means for starting the main arc when the main cathode has become sufficiently conductive and further separating the auxiliary cathode to break the auxiliary arc.

3. In an arc lamp, the combination of a main cathode that is a poor conductor of electricity in the cold state, an auxiliary cathode that is a good conductor of electricity in the cold state, a fixed metal anode interposed between the two cathodes, means for establishing contact between each cathode and the anode when no current is passing through the lamp, means for separating the auxiliary cathode from the anode to establish an auxiliary arc when sufficient current is admitted to the lamp and thereby heating the main cathode by conduction of heat through the anode, and means for striking an arc between the main cathode and the anode when the former has been sufficiently heated to become conductive and thereafter further separating the auxiliary cathode from the anode to break the auxiliary arc.

In testimony whereof, I have hereunto set my hand this 31st day of January, 1908.

BERTHOLD MONASCH.

Witnesses:

JULIUS RUMLAND,  
ALFRED WOLF.