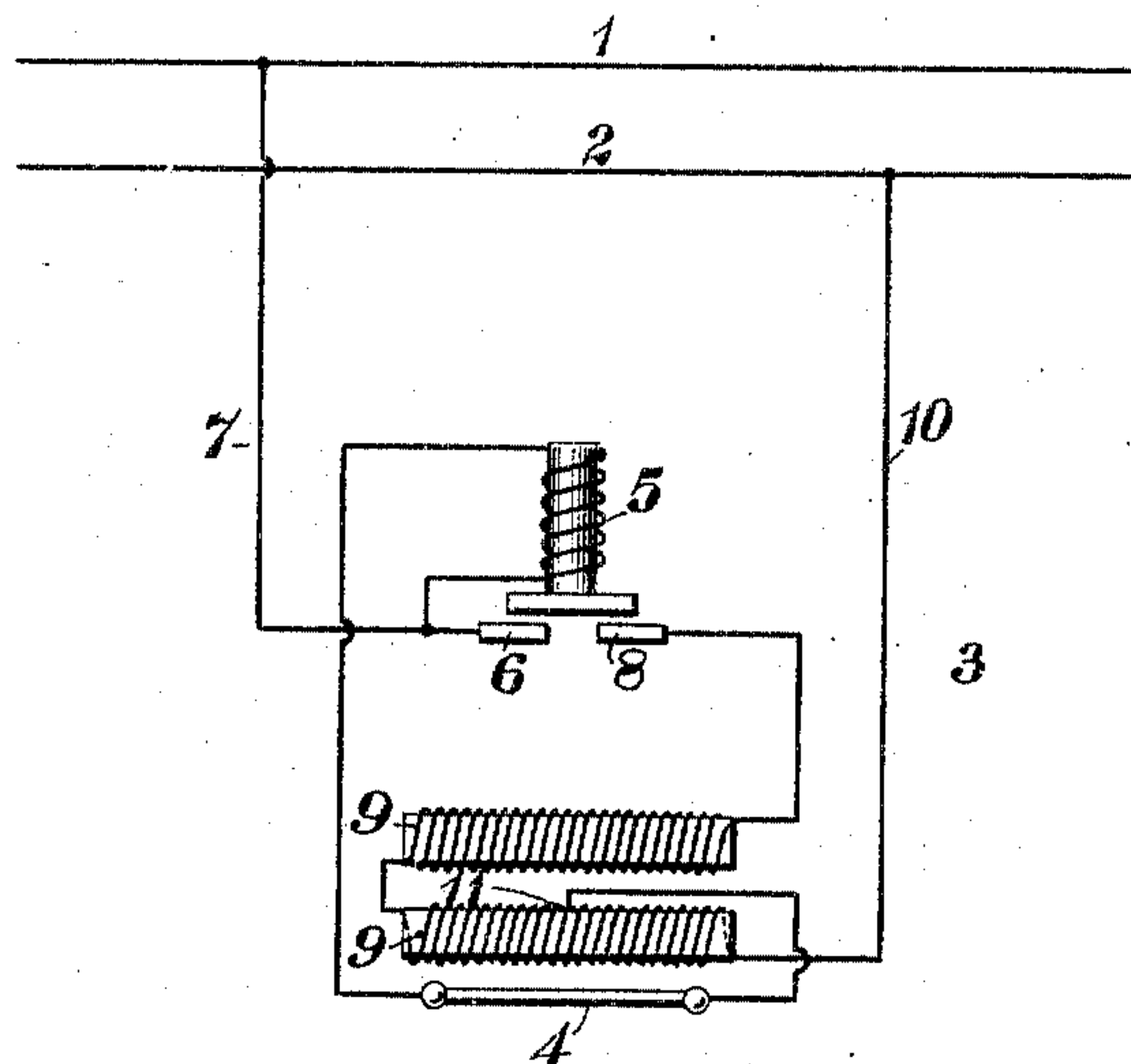


No. 780,065.

PATENTED JAN. 17, 1905.

E. R. ROBERTS.  
ELECTRIC LAMP.

APPLICATION FILED DEC. 15, 1900.



WITNESSES:

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# UNITED STATES PATENT OFFICE.

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## ELECTRIC LAMP.

SPECIFICATION forming part of Letters Patent No. 780,065, dated January 17, 1905.

Application filed December 15, 1900. Serial No. 40,042.

*To all whom it may concern:*

Be it known that I, ELIJAH ROY ROBERTS, a citizen of the United States, and a resident of Bellevue, in the county of Allegheny and State of Pennsylvania, have invented new and useful Improvements in Electric Lamps, of which the following is a specification.

My invention relates to electric lamps of the type in which the light-emitting body, or glower, is a non-conductor when cold, but becomes a conductor when heated to a proper temperature, and the resistance of which decreases as its temperature increases within certain limits, depending more or less upon the particular material of which the glower is composed.

The object of my invention is to provide a lamp of the type above indicated with an electric heater a portion of which acts as a ballast device to compensate for variations in the resistance of the glower under changes in temperature after the glower becomes conductive. It has been a usual practice heretofore in this branch of the electric-lighting art to employ both a heating-conductor for heating the glower to conducting temperature and an independent ballast resistance which is in series with the glower and serves to compensate for the variations in resistance of the glower under changes in temperature. In order to simplify the construction of lamps of this character and at the same time reduce the cost of manufacture, I propose to utilize a portion of the heating-conductor as a ballast for the glower and to effect the necessary change in circuits without the employment of any moving parts except those comprised in the usual heater cut-out device.

I have illustrated my invention in the accompanying drawing, in which—

1 and 2 are the mains from which the lamp 3 is supplied with electrical energy. The glower 4, which may be replaced by a plurality of glowers, if desired, has one terminal connected to one of the terminals of the heater cut-out coil 5, the other terminal of said coil being connected to the main 1 and also to a stationary contact-terminal 6 of the cut-out by means of a conductor 7. The

other stationary contact-terminal 8 of the cut-out is connected to one terminal of the heating coil or coils 9, and the other terminal of the heating coil or coils is connected to the main 2 by means of a conductor 10. The other terminal of the glower 4 is connected at such a point 11 between the terminals of the heating coil or coils 9 as will provide the necessary ballast resistance for the glower when it becomes conductive, and the portion of the heating-coil between the cut-out and the point 11 is removed from the circuit. The location of the point 11 in the length of the heating-coil will obviously depend upon the size of the heater-coil wire and the material of which it is made and also to a greater or less extent upon the character of the glower. This is a matter that can be easily determined, however, by any one skilled in the art.

The operation is as follows: When current is supplied to the lamp, the circuit will be from conductor 1, through wire 7, the terminals 6 and 8, and the bridge-piece of the cut-out, heating-coils 9 9, and wire 10, to the conductor 2. The current will follow this circuit until the heat that is imparted to the glower 4 from the coils 9 9 raises it to conducting temperature. Current will then be shunted through the coil 5 of the cut-out, the glower and the portion of the heating-conductor that is included between the point 11, and the wire 10. The circuit will thus be opened at the terminals 6 8 by the action of coil 5, and the entire current will then follow the new path.

If suitable material is selected for the heating-conductor and the size and length of that portion which is between the point 11 and the wire 10 are carefully determined, such portion will serve as the ballast resistance for the glower.

It will be readily understood from the foregoing description and the accompanying drawing that a heating-coil of the necessary length to provide the desired amount of heat for the glower may be employed without in any way interfering with the amount of ballast resistance and that the resistance which serves as the ballast will be raised to the proper cor



recting temperature during the heating of the glower, so as to be in condition for satisfactory operation as a ballast as soon as the glower becomes connected in series therewith.

5 While I have shown a construction and arrangement of circuits and apparatus in which only a relatively small portion of the heating-conductor is utilized as a ballast, I do not  
10 thereby intend to exclude from the scope of my invention the utilization of any length of heating-conductor as a ballast which will insure a difference of potential between the glower-terminals that is sufficient to effect the  
15 operation of the heater cut-out when the glower becomes conductive.

I claim as my invention—

1. In an electric lamp of the type described, the combination with a glower and a heater therefor, of means for cutting out a portion  
20 of the heater and leaving the remainder in series with the glower to serve as a ballast when the glower becomes conductive.

2. In an electric lamp of the type described, the combination with a glower and a heater  
25 therefor having an intermediate connection with one of the glower-terminals, of an automatic interrupter for the heater-circuit.

3. In an electric lamp of the type described, the combination with a heater-coil having its  
30 terminals connected to the supply-circuit and an electromagnetic cut-out, of a glower having one terminal connected to the cut-out coil and having its other terminal connected to a point in the heater-coil at such distance from  
35 its terminal remote from the cut-out as will provide the drop necessary for the proper ballast action.

4. In an electric lamp of the type described, the combination with a glower, of a length of  
40 heating-conductor connected in circuit to operate independently of the glower until the latter becomes conductive and then in series therewith to serve as a ballast.

5. In an electric lamp of the type described, the combination with a glower, of a heating-  
45 conductor located in proximity to the glower and connected in circuit to operate independently thereof until said glower becomes conductive and a portion of which is thereafter  
50 connected in series therewith to serve as a ballast.

6. In an electric lamp of the type described, the combination with a glower and a heating-  
conductor located in proximity thereto and connected in circuit to operate independently  
55 thereof during the heating operation, of means for breaking connection to one terminal of the heating-conductor and thereby serving to connect a portion of said heating-conductor in series with the glower to serve as a ballast when  
60 the glower becomes conductive.

7. In an electric lamp, the combination with a light-emitting member which is a non-conductor when cold, of a resistance member adjacent to said light-emitting member and having  
65 its end terminals connected to a supply-circuit and having an intermediate lead connected to one of the terminals of said light-emitting member, and means for interrupting one of the circuit connections of said resistance member when the light-emitting member  
70 becomes conductive.

8. In an electric lamp, the combination with a light-emitting member that is a non-conductor when cold, of an electric heater therefor a  
75 portion of which is adapted to serve as a ballast resistance when the light-emitting member is in operation.

In testimony whereof I have hereunto subscribed my name this 13th day of December, 80  
1900.

E. R. ROBERTS.

Witnesses:

HUGH A. CROOKS,  
D. M. GILLAN.