

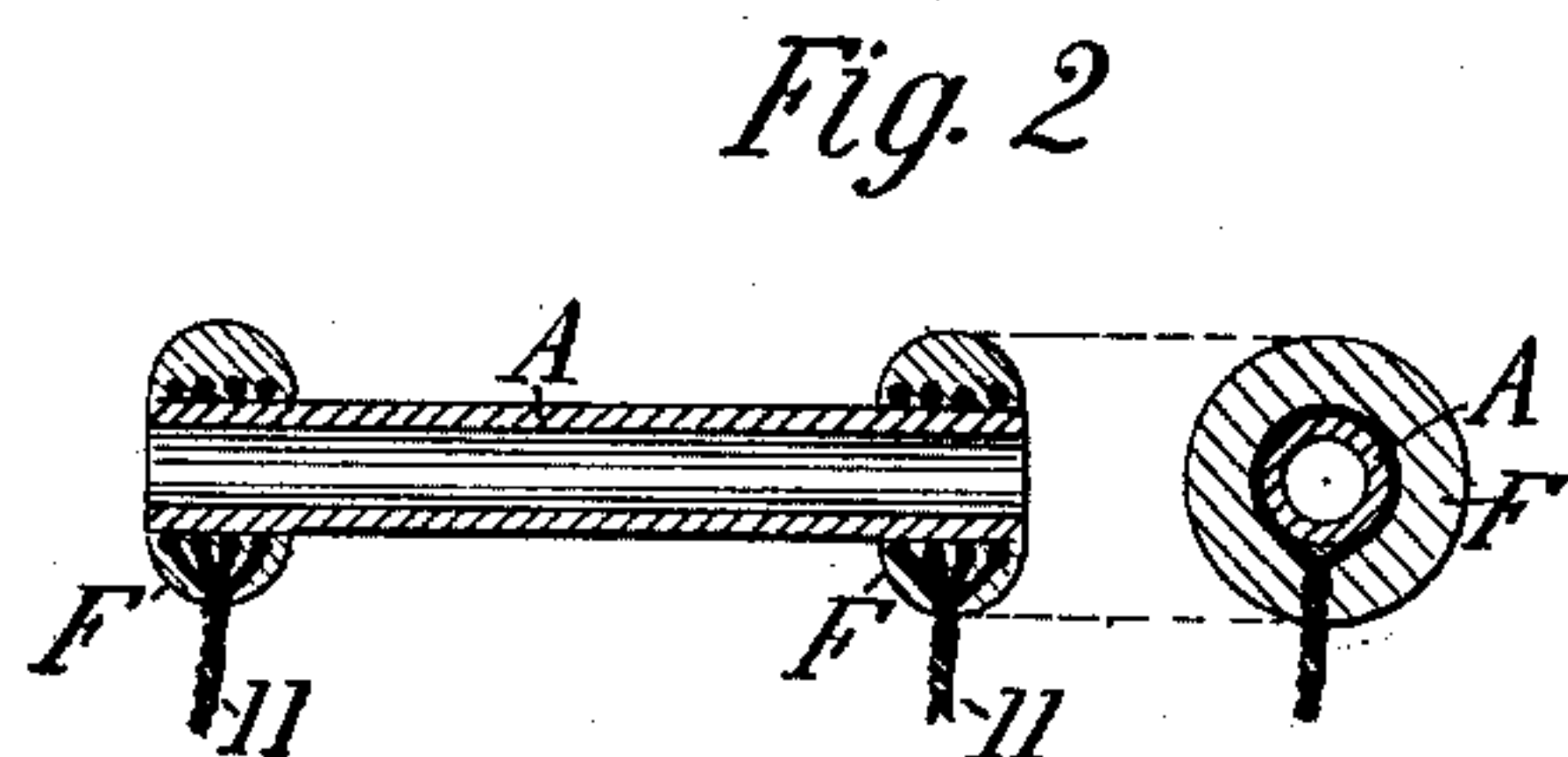
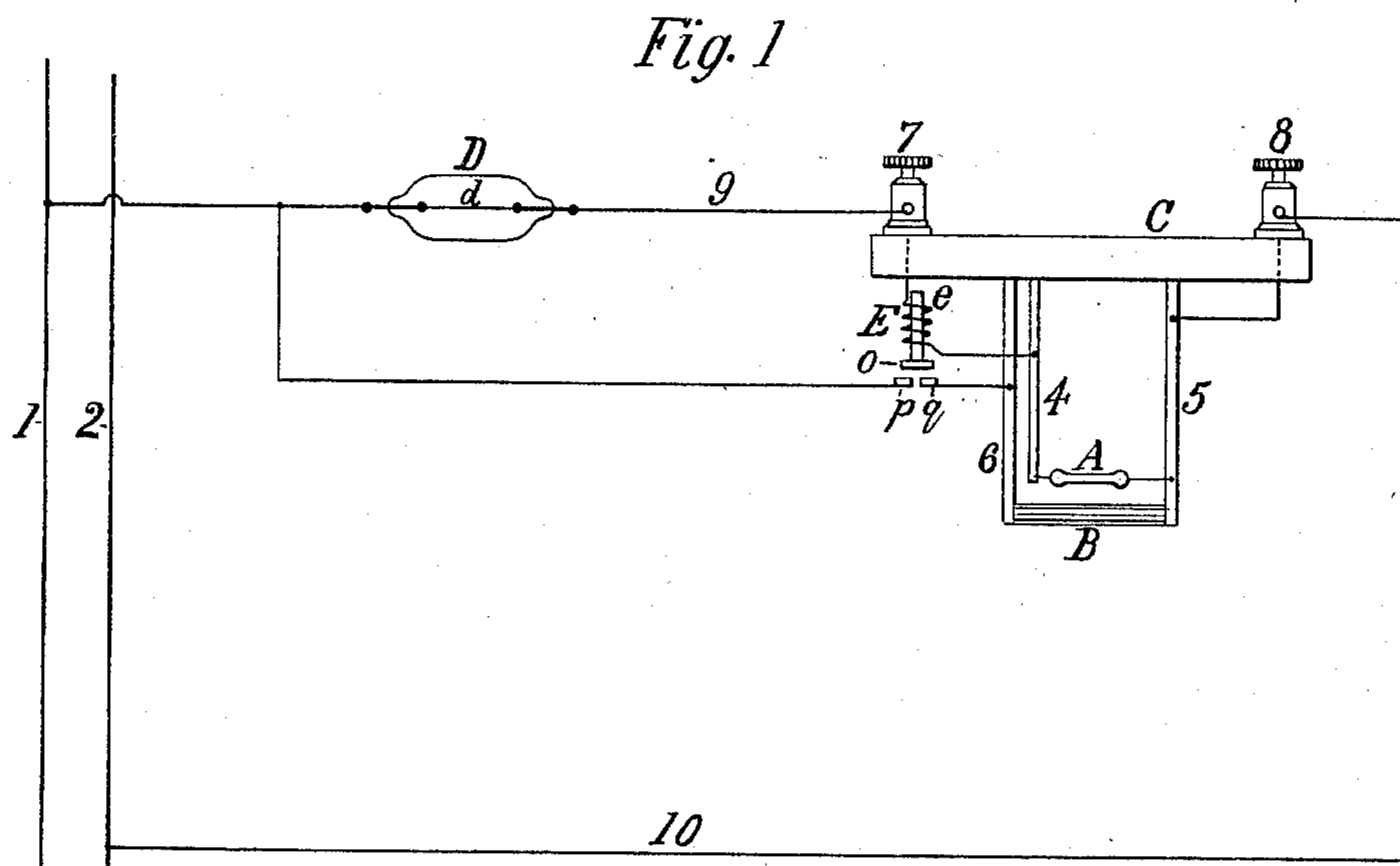
No. 717,022.

Patented Dec. 30, 1902.

H. N. POTTER & W. NERNST.  
GLOWER FOR ELECTRIC LAMPS.

(Application filed Sept. 29, 1899.)

(No Model.)



Witnesses:  
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# UNITED STATES PATENT OFFICE.

HENRY NOEL POTTER, OF BERLIN, AND WALTHER NERNST, OF GÖTTINGEN, GERMANY, ASSIGNORS TO GEORGE WESTINGHOUSE, OF PITTSBURG, PENNSYLVANIA.

## GLOWER FOR ELECTRIC LAMPS.

SPECIFICATION forming part of Letters Patent No. 717,022, dated December 30, 1902.

Application filed September 29, 1899. Serial No. 732,046. (No model.)

*To all whom it may concern:*

Be it known that we, HENRY NOEL POTTER, a citizen of the United States of America, residing in Berlin-Halensee, and WALTHER NERNST, a subject of the German Emperor, residing at Göttingen, Germany, have invented certain new and useful Improvements in Glow-ers for Electric Lamps, of which the following is a specification.

Those who are familiar with the art of lighting by means of glow-ers formed from refractory materials, such as the rare earths or mixtures thereof, have from the first seen in such glow-ers a possible means for producing lamps of very high candle-power. When, however, the attempt was made to realize the apparent possibilities of these glow-ers, it was found that solid glow-ers made of this class of conductors would break down under currents of considerable volume by reason of the fact that the central portion of the glow-ers would become fused or melted by the heat produced by the current. We have succeeded in overcoming the difficulty referred to and in producing lamps of very high candle-power by making hollow or tubular glow-ers with very thin walls. With such glow-ers it is possible to employ much heavier currents without danger of breaking down the glow-ers, and as a consequence it is possible to obtain from a single glower a far greater candle-power than could be obtained from a solid glower.

Our present invention relates to the use of tubular glow-ers in electric lamps which employ conductors of the second class as the incandescing bodies. We have illustrated such a glower in the accompanying drawings, in which—

Figure 1 is a diagram of a lighting device or lamp, and Fig. 2 is an enlarged longitudinal section of a glower such as we have invented.

In the drawings, A is a glower, and B a heating device therefor, both being suitably supported by a disk or plate C, of porcelain or other good insulating material. The said glower is made of material, such as a rare earth or a mixture of rare earths, and pos-

sesses the quality of becoming a good conductor of electricity when sufficiently heated. 50

In series with the glower A, I show a ballast D and a solenoid E. The core *e* of the said solenoid is provided with a contact terminal *o* on its lower end, which terminal coöperates with stationary terminals *p q* to open or close the circuits of the heater B. 55

The ballast device shown at D consists of an iron wire *d*, inclosed in a sealed chamber, of glass, containing an inert gas. The said ballast-conductor *d* is joined at its end to wires of nickel or platinum, which are sealed into the ends of the glass holder in the manner well known in the art of incandescent lamps. 60

Any suitable form of ballast may be substituted for that shown at D, this particular form being shown merely for the purpose of illustrating a ballast in series with the glower. 65

The operation is, as usual, that the heater-circuit, which is connected with the mains 1 and 2, leading from any suitable source of heat, first becomes energized, the core *e* of the solenoid being at such time in its lowermost position, wherein the contact-piece *o* is in contact with the terminals *p q*. The heater B is made operative, and the glower is thus heated and made conductive. Then the glower-circuit, including the ballast device D, the solenoid E, and the glower A, is energized and the glower becomes incandescent and gives forth light. The current passing through the solenoid E lifts the core *e* and automatically breaks the heater-circuit. 70 75 80

It will be seen that the glower A is supported on metallic posts 4 and 5 and that the heater B is supported upon metallic posts 5 and 6. The posts are electrical conductors and form part of the heater and the glower-circuits. The insulating-piece C is supplied with binding-posts 7 and 8 for connecting up the branch wires 9 and 10, leading from the main conductors 1 and 2. 85 90

The glower A is shown to be hollow and of a tubular cross-section. To the ends of the said tubes terminal connections are secured, which in the present instance consist of loops 95



11 11, of fine wires, having their ends made long enough to twist into good connecting devices for the circuit in which the glower is to be included. Outside the loops, on the ends  
5 of the glower, are secured bodies F F, formed by applying pasty material similar to that which enters into the composition of the glower to the outside of the said glowers, molding or pressing them thereupon and af-  
10 terward hardening them by heat.

The cross-section of the glower A will generally be the section of a true cylinder. We do not wish, however, to limit ourselves to the employment of a glower having such a  
15 cross-section; but we desire in the present application to claim glowers which are hollow irrespective of the exact cross-section, claiming also especially glowers of true cylindrical form.

20 We claim as our invention—

1. A hollow glower for electric lamps composed of one or more refractory oxids and having terminal wires cemented to its ends.

2. A hollow, cylindrical glower for electric

lamps composed of one or more refractory 25 oxids and having terminal wires cemented to its ends.

3. In an electric lamp, a hollow glower composed of one or more refractory oxids and having terminal wires cemented to its ends, 30 in combination with means for heating said glower to conducting temperature.

4. In an electric lamp, a tubular glower composed of one or more refractory oxids and having terminal wires cemented to its ends, 35 in combination with an electric heater located in proximity thereto, and an automatic cut-out for the said heater, the said cut-out being operated from the glower-circuit.

In witness whereof we have hereunto signed 40 our names this 13th day of September, 1899, in the presence of two subscribing witnesses.

HENRY NOEL POTTER.  
WALTHER NERNST.

Witnesses:

WOLDEMAR HAUPT,  
DEAN B. MASON.