

No. 684,222.

Patented Oct. 8, 1901.

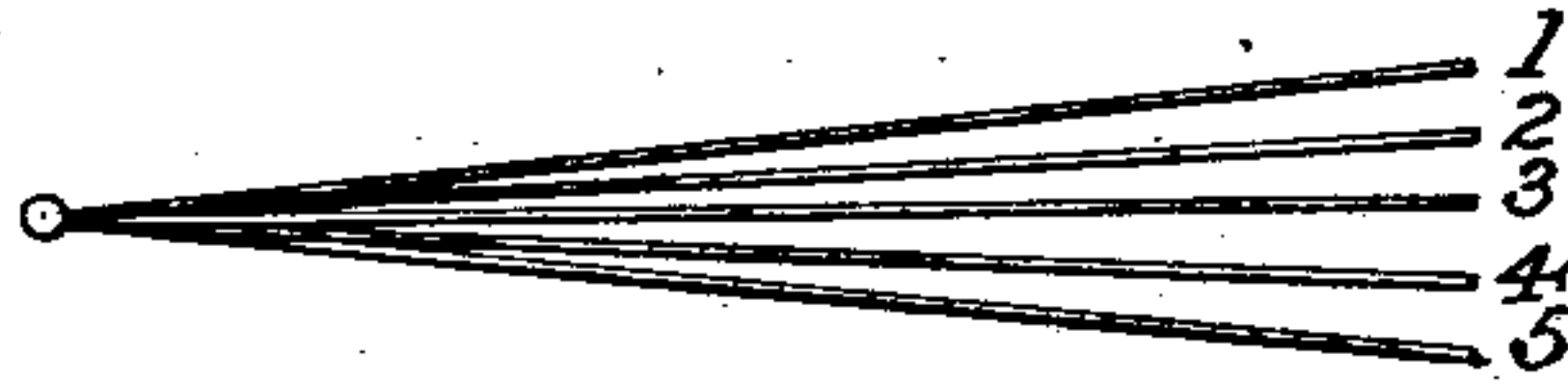
F. M. GODDARD.

TERMINAL FOR ELECTRIC LAMP GLOWERS.

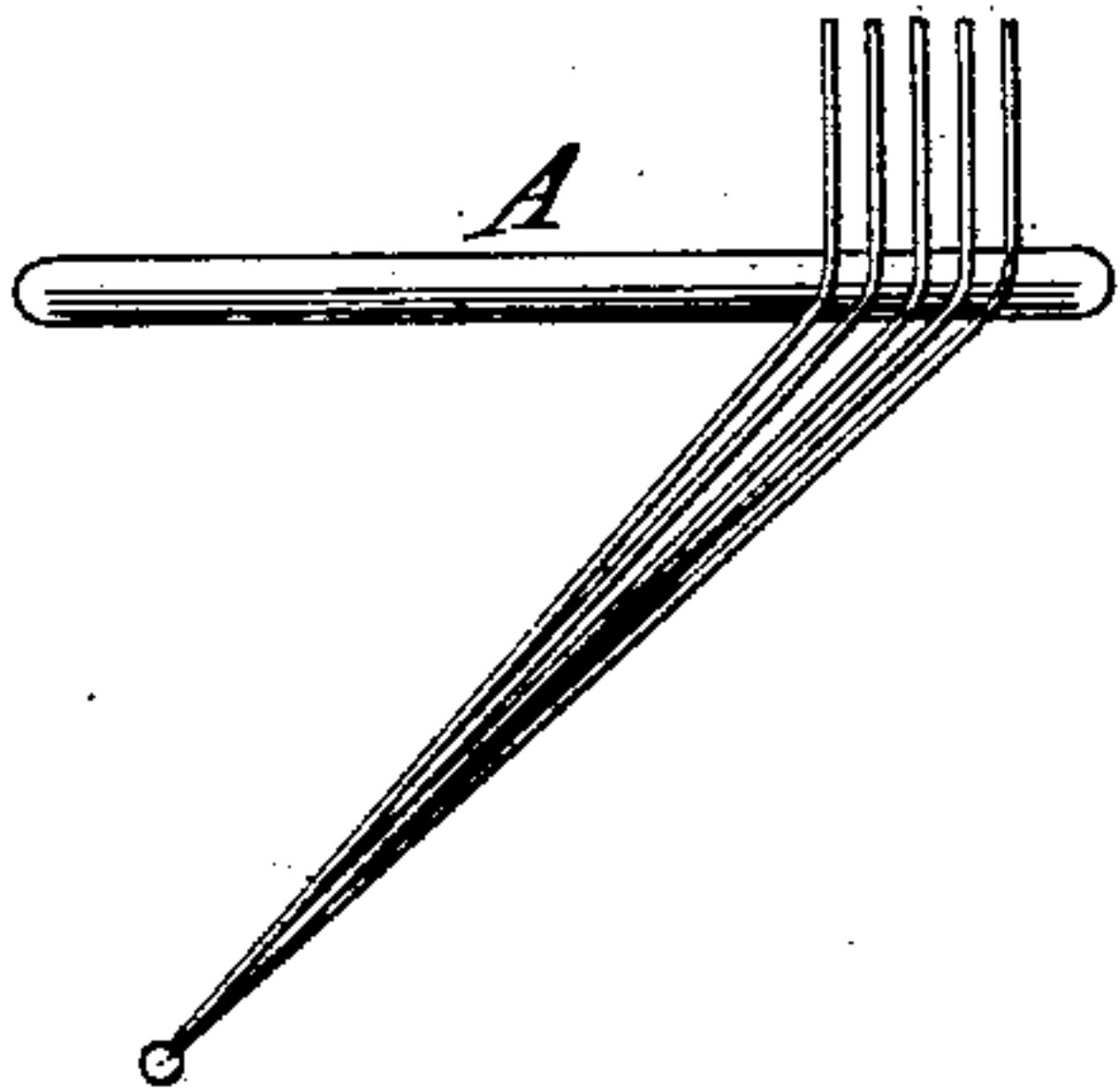
(Application filed July 20, 1899.)

(No Model.)

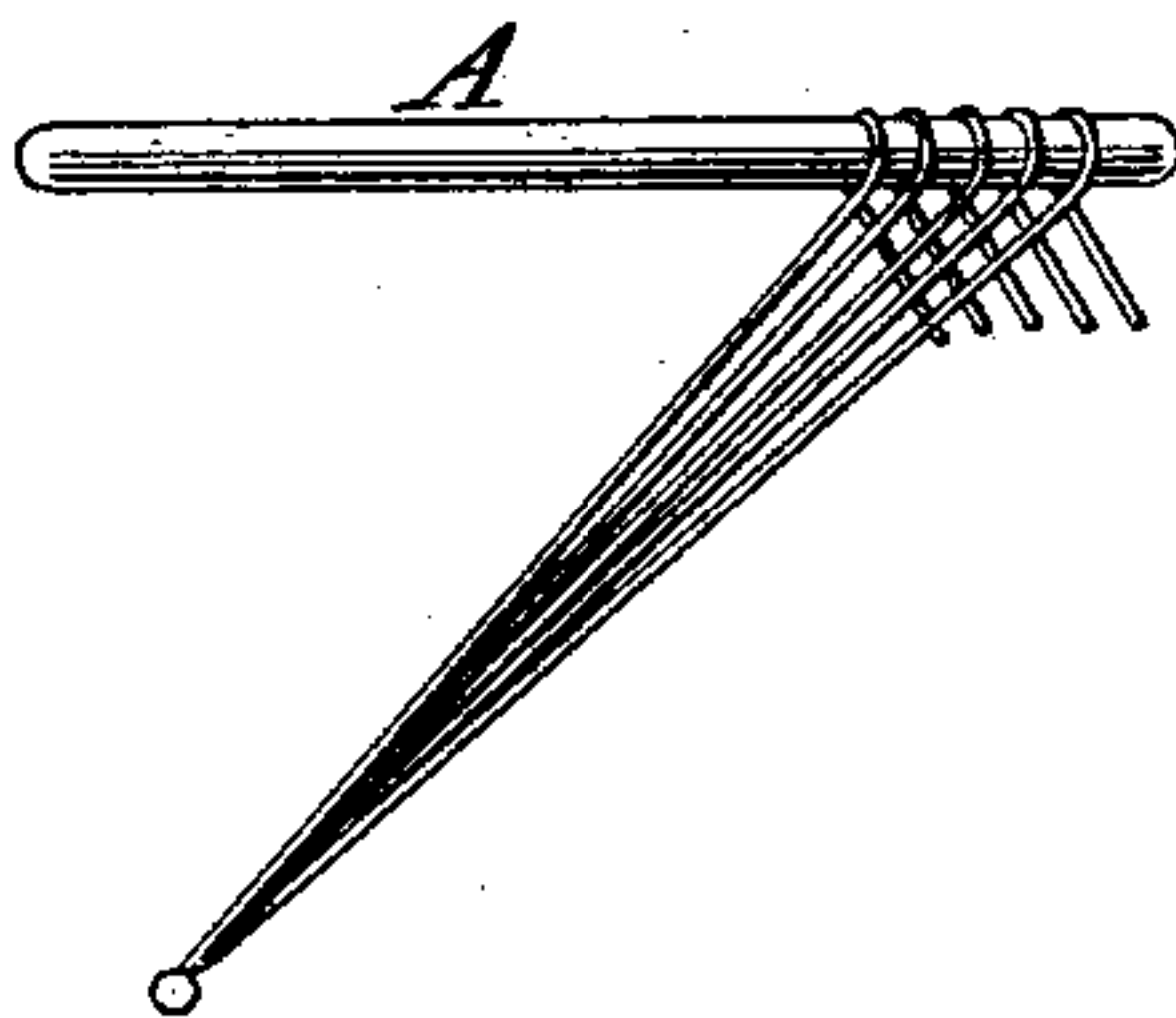
*Fig. 1*



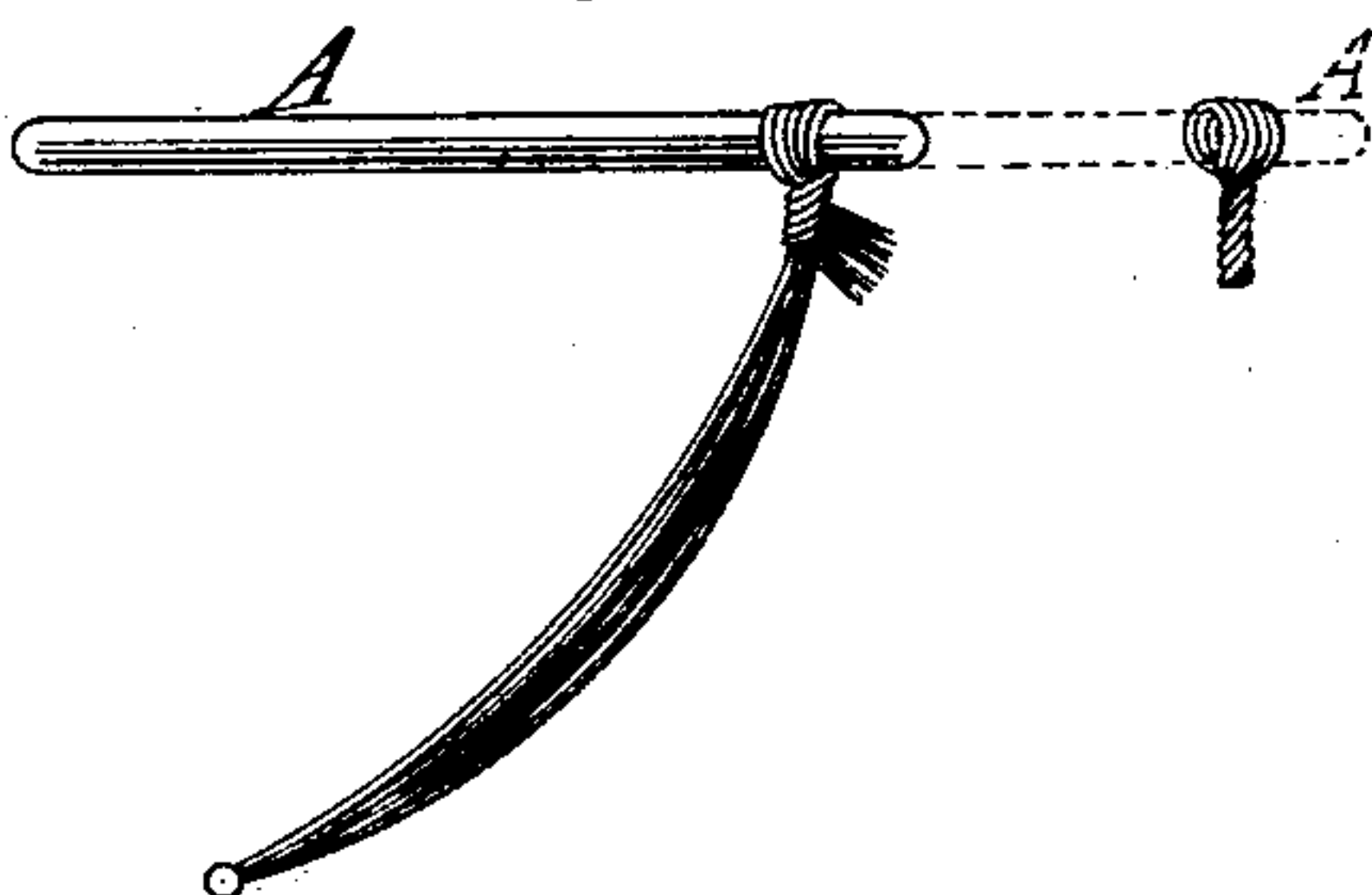
*Fig. 2*



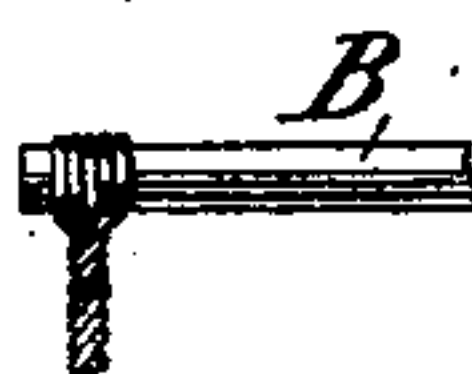
*Fig. 3*



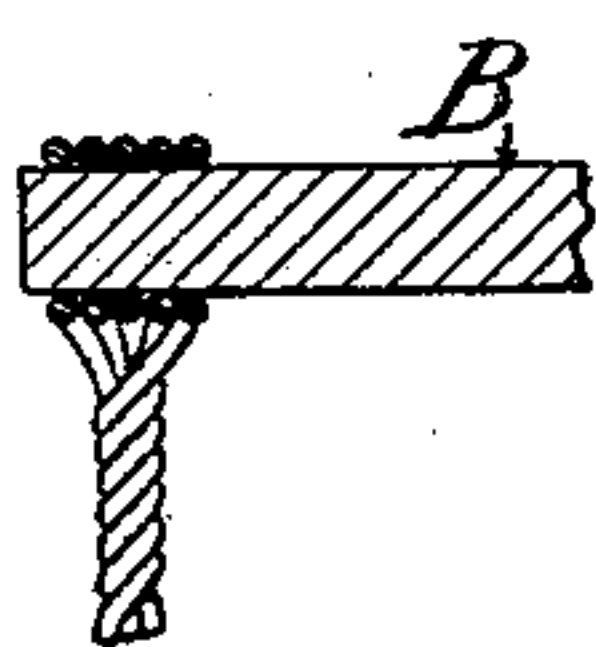
*Fig. 4*



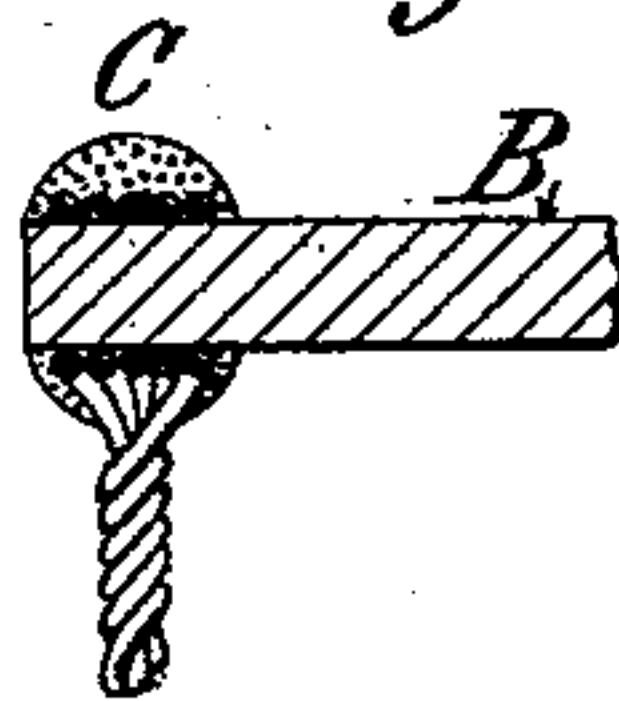
*Fig. 5*



*Fig. 6*



*Fig. 7*



Witnesses:  
*Raphael Heller*  
*J. H. Jones*

*Inventor*  
*Frederick M. Goddard*  
*by Charles A. Terry, Att'y*

# UNITED STATES PATENT OFFICE.

FREDERICK M. GODDARD, OF PITTSBURG, PENNSYLVANIA, ASSIGNOR TO  
GEORGE WESTINGHOUSE, OF SAME PLACE.

## TERMINAL FOR ELECTRIC-LAMP GLOWERS.

SPECIFICATION forming part of Letters Patent No. 684,222, dated October 8, 1901.

Application filed July 20, 1899. Serial No. 724,452. (No model.)

*To all whom it may concern:*

Be it known that I, FREDERICK M. GODDARD, a citizen of the United States of America, and a resident of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Terminals for Electric-Lamp Glow-ers, of which the following is a specification.

One of the difficulties connected with the employment of electric lights in which the glowers or incandescent bodies are made of rare earths has been the obtaining of a good connection between the terminals of the said glowers and the lead-wires of the circuit.

This difficulty has been partly caused by the fact that the glowers are somewhat fragile and liable to be broken during the process of fixing the terminal wires thereto. Among the terminal connections which have been employed for glowers of this class is one which is made by winding a small wire or several small wires around the end of the glower and leaving enough of the said wire or wires projecting to form a means for connection with the circuit-wires. It has, however, been found that it is difficult to wind the terminal wires around the ends of the glower without breaking the glower in the process.

I have invented a method of making the connection between a single wire or several wires and the end of a glower practically without danger of injuring the glower if the process be carried out with ordinary care. The method which I pursue in order to accomplish the result described is first to wind the wire or wires around a form slightly larger than the end of the glower to which the wire or wires are afterward to be applied. While the wires are on the form I twist the loose ends tightly around the strand. Thus all the force necessary to form the wires into a good terminal connection is applied at a time when the said wires are supported on a rigid form and not when they are supported upon the glower. I then remove the terminal wires from the form and having inserted the end of the glower within the said wires twist the wires just enough to make them bind upon the glower and then apply outside the wires a paste of the same or similar material as the glower itself. The paste having been hardened by heat it will be found that an

excellent mechanical and electrical connection exists between the terminal wires and the glower.

In the drawings, Figures 1, 2, 3, 4, 5, 6, and 7 illustrate separate stages in the process of attaching a terminal to a glower.

Referring to the drawings, 1 2 3 4 5 are wires intended to be wound upon the end of a glower and fixed there to serve as a terminal connection for the glower. In Fig. 2 the said wires appear in connection with a rigid form A, made of metal or other strong material, this form being slightly larger than the glower for which the wires 1 2 3 4 5 are to constitute the terminal connection. In the said Fig. 2 I show the beginning of the operation of winding the wires upon the form A. Fig. 3 illustrates a further step in the process, the loose ends of the wires having in this instance been wound entirely around the form. In Fig. 4 the said loose ends have been wound around the main body of the wires and left long enough to constitute a terminal, after which the main wires are cut off at a sufficient distance from the form A. Of course the loose ends may be wound around the form as many times as may be found necessary or desirable. While the wires are upon the form A the various wires are so adjusted that those which will be in contact with the surface of the glower lie evenly on the form and also in planes as nearly as possible perpendicular to its axis. At the right in Fig. 4 I show the looped wires slipped off the end of the form A and ready to be put upon the end of a glower. In Fig. 5 I show the wires on the end of a glower B, and in Fig. 6 a section of such a glower and of the wires appears, showing the said wires after a slight twist has been given to the terminal connection, so as to make the wires bind upon the end of the glower. The final step in the process is illustrated in Fig. 7, wherein a bead C is formed by molding a paste of rare earths closely over the end of the glower B and the wires 1 2 3 4 5 and afterward hardening the same by heat. Manifestly there may be as many wires in the strand as may be found convenient, or a single wire may be wound about the form, if that should for any reason be preferable.

I claim as my invention—



1. The hereinbefore-described method of attaching terminal wires to the ends of electric-lamp glowers, which consists in forming a loop of the said wire or wires independently  
5 of the said glower, passing the loop over the glower end, and binding the same by twisting one projecting end or set of projecting ends around the other end or set of ends and then applying outside the said loop a coating  
10 of pasty material having substantially the same composition as the glower.

2. The hereinbefore-described method of providing an electric glower with a convenient wire terminal which consists in forming  
15 a loop from a wire or wires independently of the said glower, severing the strand at a convenient distance, passing the loop over the end of the glower, mechanically binding the said loop to the glower end by twisting the  
20 shorter end or ends around the longer end or ends, and completing the attachment of the terminal by applying outside the loop a paste of substantially the same material as the  
25 glower itself.

3. The herein-described improvement in

the method of making electric lamps of the type described which consists in forming a plurality of strands of wire into a cylindrical loop from which project a set of short ends and a set of long ends, inserting one end of a  
30 glower in said loop, twisting the short ends about the long ends to bring the glower and the loop into close engagement and finally cementing said parts together.

4. The herein-described improvement in  
35 the method of making electric lamps of the type described which consists in forming one or more strands of wire into a cylindrical loop having projecting free ends, inserting the end of a glower into said loop, twisting the  
40 projecting ends together to bring the glower and the loop into close engagement, and finally cementing said parts together.

Signed by me at New York city, New York,  
this 26th day of June, 1899.

FREDERICK M. GODDARD.

Witnesses:

J. H. JONES,  
L. C. CARUANA.