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PATENTED JUNE 5, 1906.

M. W. HANKS.

METHOD OF APPLYING TERMINALS TO THE GLOWERS OF ELECTRIC LAMPS.

APPLICATION FILED MAR. 23, 1901.

Fig. 1.

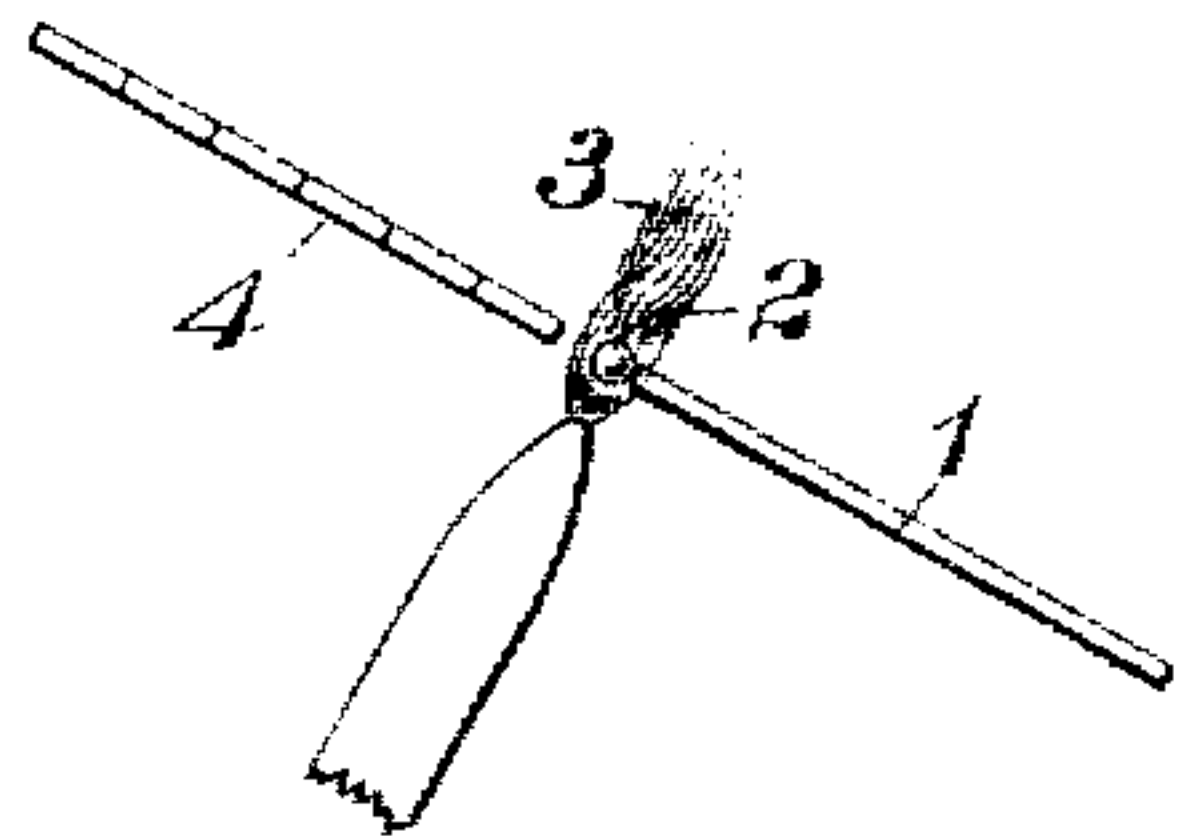


Fig. 2.

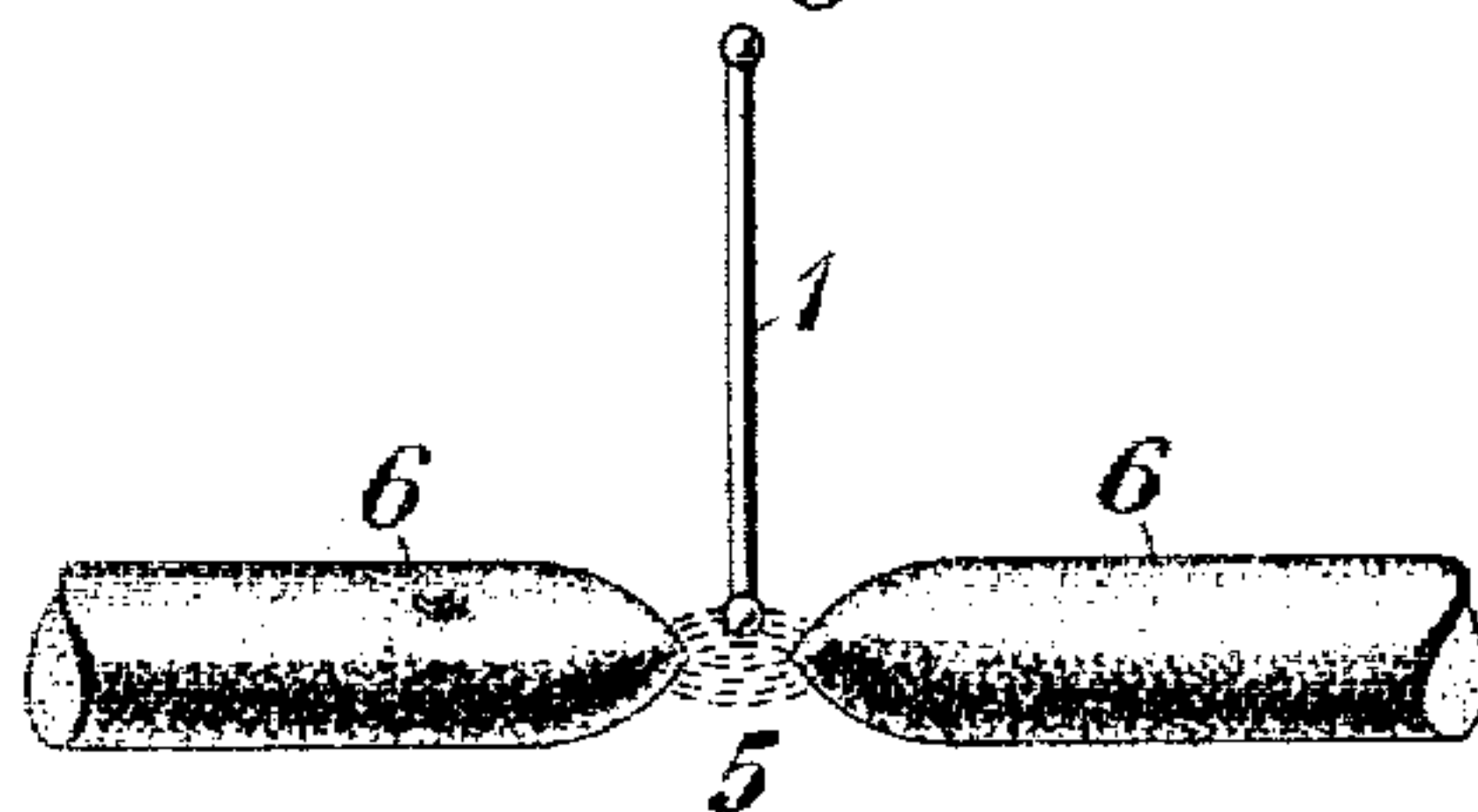


Fig. 3.



Fig. 4.

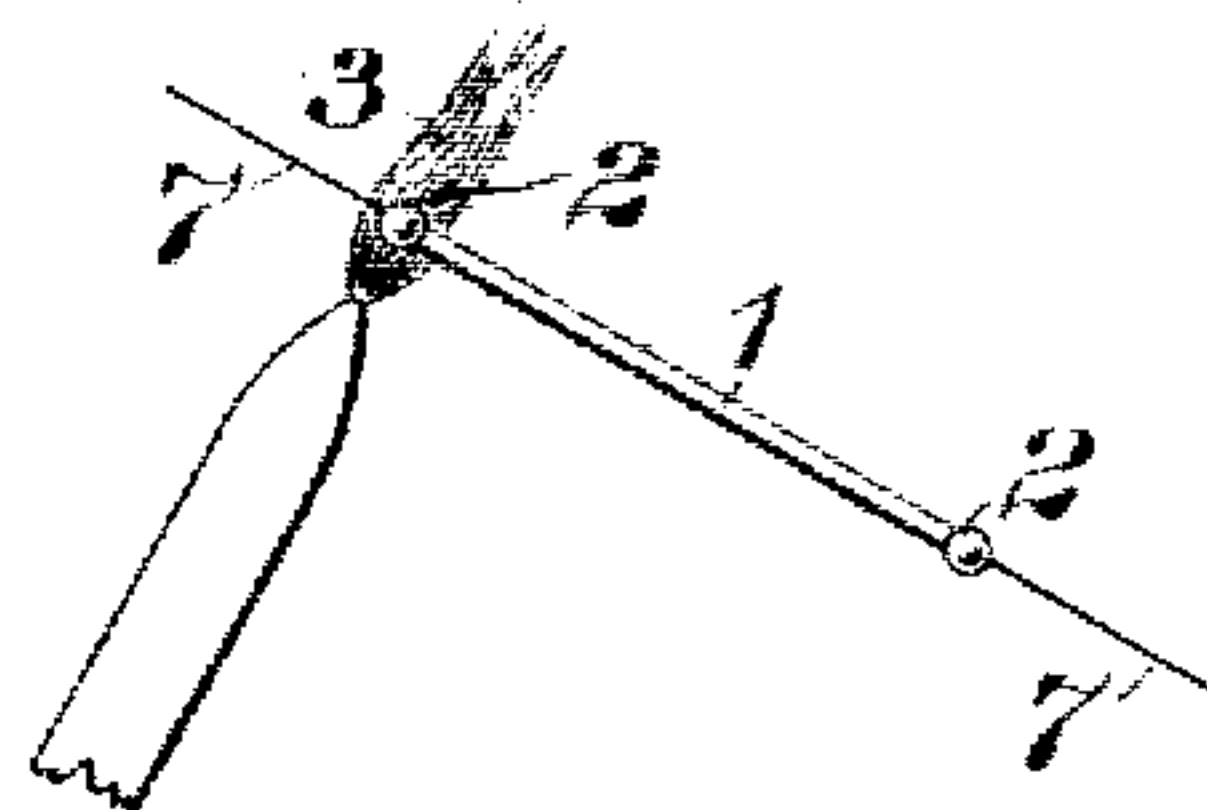


Fig. 5.

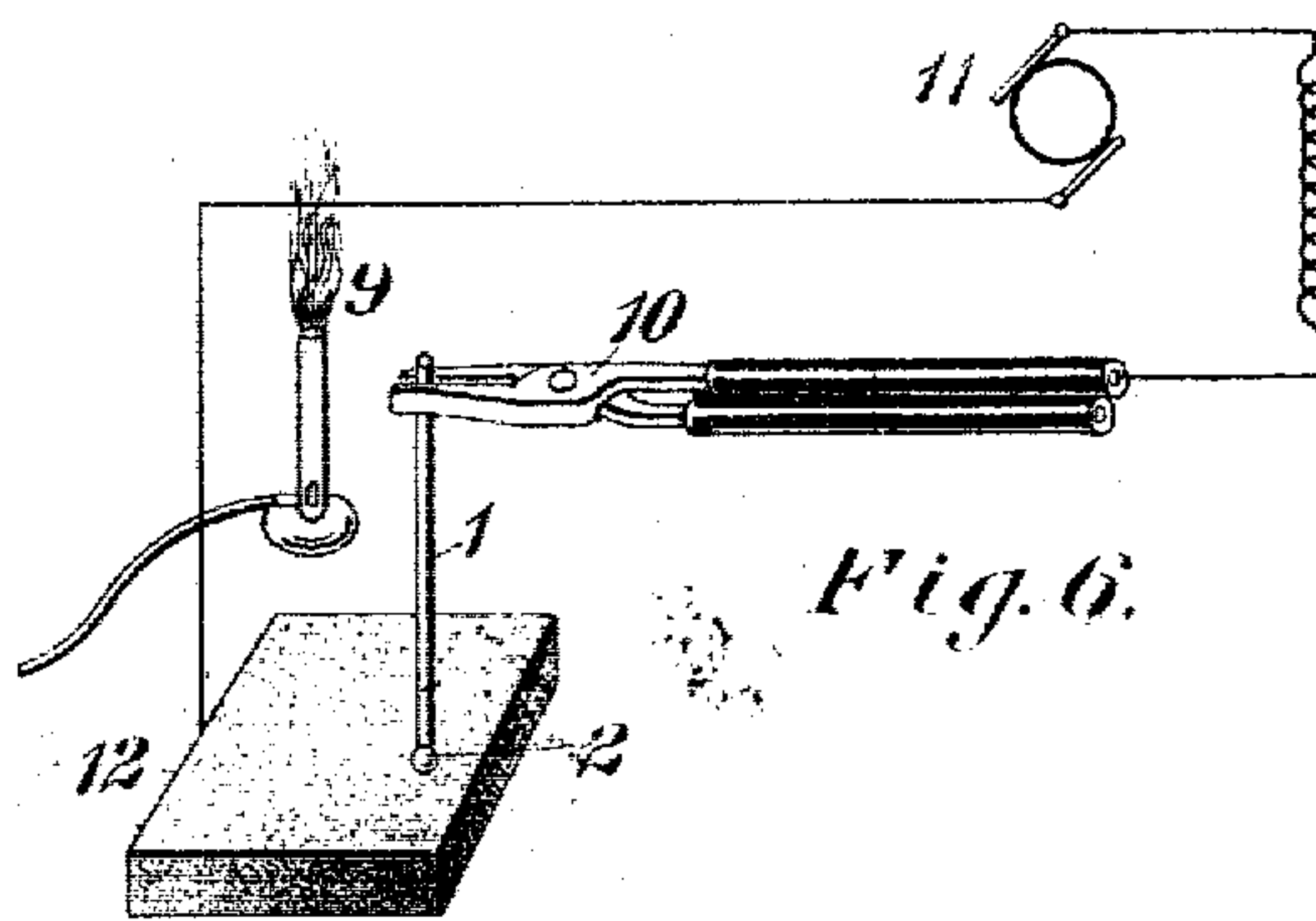
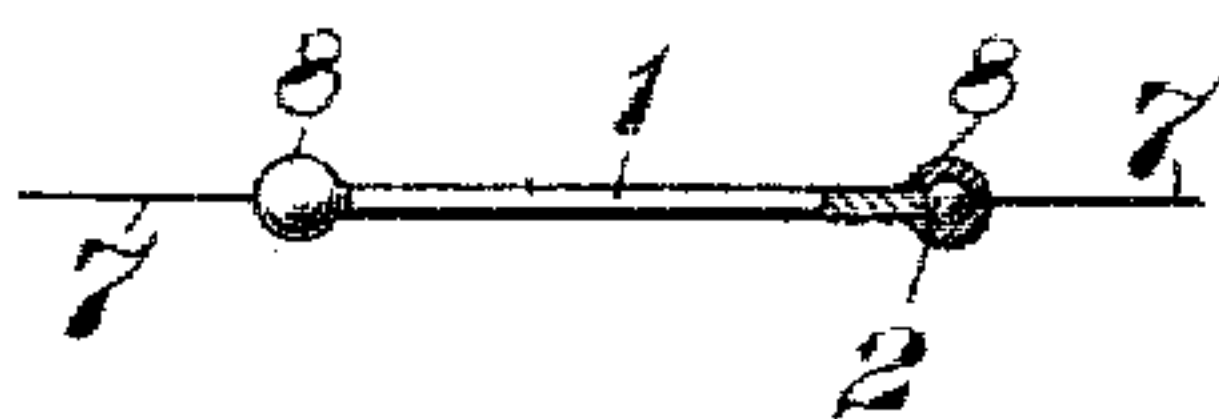


Fig. 7.

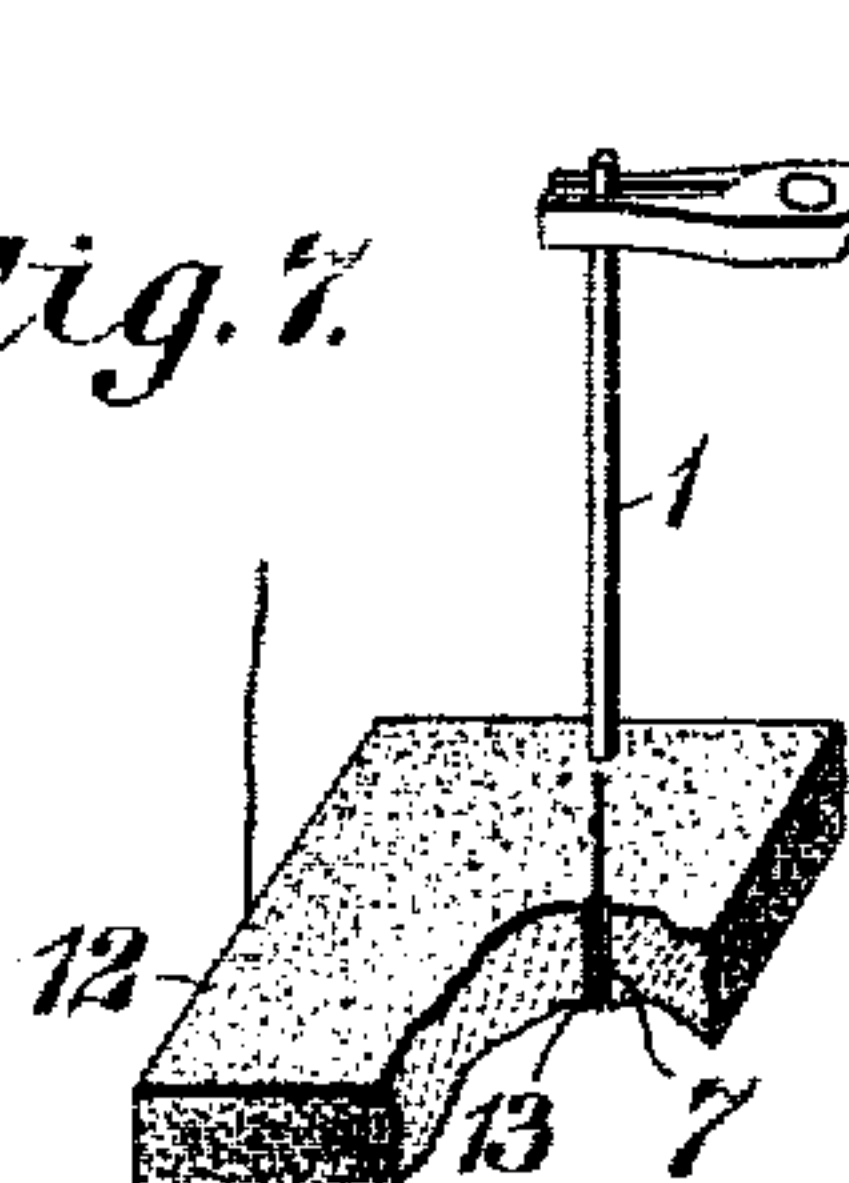
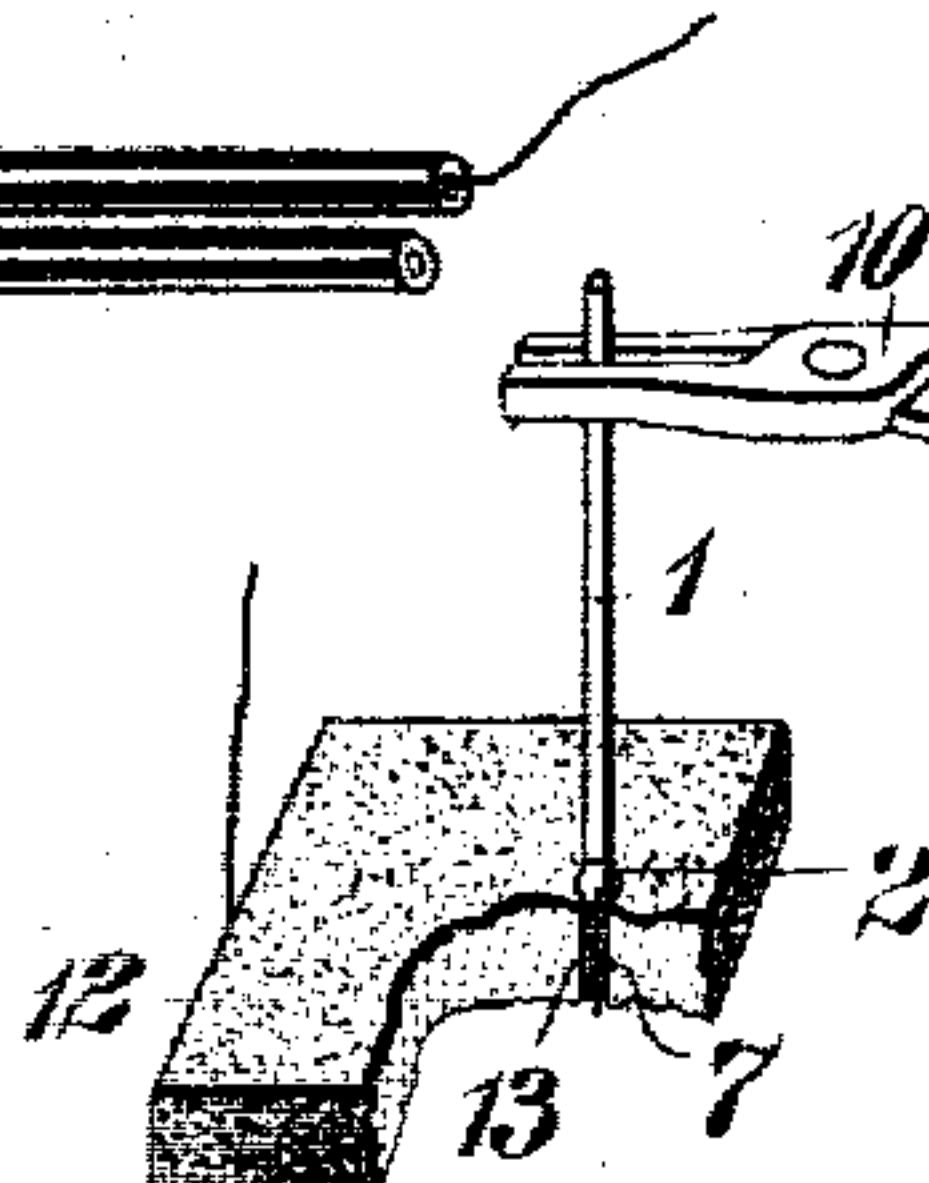


Fig. 8.



WITNESSES:

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# UNITED STATES PATENT OFFICE.

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METHOD OF APPLYING TERMINALS TO THE GLOWERS OF ELECTRIC LAMPS.

No. 822,365.

Specification of Letters Patent.

Patented June 5, 1906.

Application filed March 23, 1901. Serial No. 52,649.

*To all whom it may concern:*

Be it known that I, MARSHALL W. HANKS, a citizen of the United States, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in the Method of Applying Terminals to the Glow-ers of Electric Lamps, of which the following is a specification.

My invention relates to electric lamps of the type in which the light-emitting member or glower is a non-conductor when cold and becomes a conductor when heated to a relatively high temperature by heat from an outside source.

The object of my invention is to provide simple and durable glower-terminals and an easily-practiced method for attaching such terminals and suitable leading-in wires to the ends of glowers in such manner that the terminals shall be firmly secured in position and shall successfully resist tendency to deterioration by reason of the action of the current thereon when the glower is in use.

My invention is illustrated in the accompanying drawings, in which—

Figure 1 illustrates the first step in my method, and Fig. 2 the second step. Fig. 3 illustrates a glower provided with terminal beads applied thereto in the manner indicated in Figs. 1 and 2. Fig. 4 illustrates the step of attaching a terminal wire to the terminal bead at the end of the glower. Fig. 5 illustrates, partially in plan and partially in section, a completed glower constructed in accordance with my invention. Fig. 6 illustrates means for practicing a modified method embodying my invention, and Figs. 7 and 8 illustrate successive steps of a further modification.

In the manufacture of glowers for electric lamps of the class above indicated considerable difficulty has been experienced in securely attaching the leading-in or terminal wires to the ends of the glowers, so that the glowers will operate for a satisfactory length of time without deterioration or serious deterioration of the terminal connections. This is particularly true with reference to lamps operated from direct-current circuits. I have found by practical experience that the method herein set forth is productive of a terminal that is particularly well adapted for use in both alternating and direct current circuits

and which possesses great mechanical strength as well as substantial immunity from deterioration through the action of heat in use.

In practicing my present method I first cut the rod or string from which the glowers are to be made into the lengths necessary for the desired voltage, and to each end of each blank 1 so produced I attach a small platinum globule 2 by the action of a suitable source of heat, such as an oxyhydrogen blow-pipe flame 3, acting upon the end of a platinum wire 4, that has been partially separated into lengths suitable for the formation of globules of the size desired, as indicated.

After the globule is attached to the end of the blank 1 it is inserted into the arc formed between two carbon pencils 6 and held there until the globule is melted and securely fused to the end of the blank. The resulting glower 1, having the beads 2 fused to its ends, is shown in Fig. 3. The beads are then successively subjected to an oxyhydrogen flame 3 until the bead is melted, when the end of the leading-in wire 7 is plunged into the molten bead. The beads are then provided with a coating 8 of like or similar material to that of which the body of the glower is composed. The whole structure is dried slowly and finally baked at a bright cherry-red heat for a few moments.

Other means than those indicated may be employed for attaching the leading-in wires to the ends of the glowers. For example, instead of using the oxyhydrogen flame for attaching the globules to the ends of the glower-blank the blank may be first raised to conducting temperature by subjecting it to a suitable degree of heat—such, for example, as that of a Bunsen burner 9, (indicated in Fig. 6,) while one end of the blank is held in a suitable clamping device, such as metal tweezers 10, which are connected to one terminal of a source 11 of electric current, the other terminal of the said source being connected to a carbon block 12. If a globule 2 of platinum be placed upon the carbon block 12 and the free end of the blank 1 be brought into close proximity to the carbon block after having been raised to conducting temperature, an arc will be formed between such end and the block. If the free end of the blank is then brought close to the platinum globule, the latter will be melted by the arc and when melted the end of the rod may be placed in



contact with it to quench the arc and fasten the globule securely in position. Either direct or alternating currents may be used in this operation; but if direct current is used it will generally be found advisable to make the carbon block and the platinum globule supported thereby the positive terminal. I desire it to be understood, however, that the reverse arrangement is within the scope of my invention.

A more expeditious method may be practiced, as indicated in Figs. 7 and 8, in which the carbon block 12 is provided with a small hole 13, through which a platinum leading-in wire projects sufficiently to provide above the upper surface enough wire 7 to form a globule of the required dimensions for the terminal. The rod 1 is now heated to conducting temperature, as described in connection with Fig. 6, and its free end is then brought into close proximity to the projecting platinum wire, thus producing an arc which melts the platinum. When all of the projecting platinum is melted, the rod will be pressed against the molten globule and the current cut off, the result being that the platinum bead and the leading-in wire, constituting an integral extension thereof, will be securely fastened to the end of the blank.

After each end of the glower has been treated in this manner the coating 8 may be applied by means of a brush or other suitable device or pressed thereon by suitable mechanism and the glower then dried and baked, as hereinbefore described.

Other means for practicing the method might obviously be devised; but those shown have been found to be satisfactorily operative in practice and are believed to be sufficient to enable any one skilled in the art to practice my invention.

I desire it to be understood that my invention is not limited to the employment of any specific source of heat in forming and apply-

ing the terminals or to specific materials except in so far as limitations may be imposed by the prior art or by the demands of practical service.

I claim as my invention—

1. The method of applying a metal terminal to an electric-lamp glower which consists in producing an arc between the adjacent ends of a wire and a glower by an electric current traversing the path formed by said members until the end of the wire is fused into a molten globule and then bringing said globule and the adjacent glower end into engagement.

2. The method of providing an electric-lamp glower with terminals which consists in fusing metal globules and attached leading-in wires to the ends of the glower, coating such globules with material like or similar to that constituting the body of the glower and then drying and baking the coating.

3. An electric-lamp glower composed of one or more dry electrolytes and having metal terminals in the form of globules or beads fused directly and externally to the extreme ends of the glower-body.

4. An electric-lamp glower composed of one or more dry electrolytes and having metal terminals in the form of globules or beads fused directly and externally to the extreme ends of the glower-body and leading-in wires fused to said globules or beads.

5. A cylindrical glower for electric lamps composed of one or more dry electrolytes and having metal terminals in the form of globules or beads fused directly and externally to the circular, flat ends of the glower-body.

In testimony whereof I have hereunto subscribed my name this 20th day of March, 1901.

MARSHALL W. HANKS.

Witnesses:

H. A. CROOKS,  
A. J. WORTH.