No. 722,702. PATENTED MAR. 17, 1903.

M. W. HANKS.

METHOD OF MAKING ELECTRIC LAMP GLOWERS.

APPLICATION FILED OCT. 13, 1902.

NO MODEL.

Fig. 1.

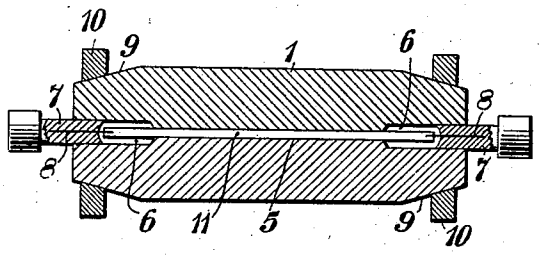


Fig. 2.

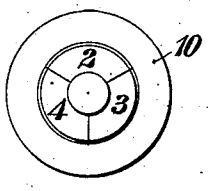


Fig. 3.

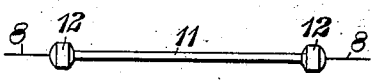


Fig. 4.

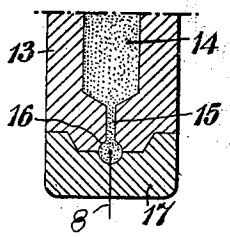


Fig. 5.

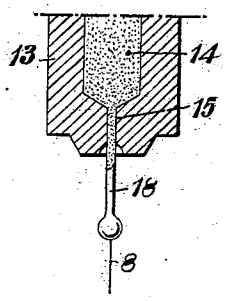


Fig. 6.



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METHOD OF MAKING ELECTRIC-LAMP GLOWERS.

SPECIFICATION forming part of Letters Patent No. 722,702, dated March 17, 1903.

Application filed October 13, 1902. Serial No. 127,146. (No model.)

To all whom it may concern:

Be it known that I, MARSHALL W. HANKS, a citizen of the United States, and a resident of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Methods of Making Electric-Lamp Glowers, (Case No. 1,094,) of which the following is a specification.

My invention relates to the manufacture of electric-lamp glowers which are non-conductors at ordinary temperatures and become conductors when heated to relatively high temperatures; and it has for its object to provide a simple, inexpensive, and easily-practiced method for forming such glowers and attaching terminal wires thereto.

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

Figure 1 is a longitudinal section of a piece of apparatus adapted for practicing one modification of my invention, and Fig. 2 is an end elevation of the apparatus shown in Fig. 1. Fig. 3 represents a completed glower which is formed or provided with terminal wires, as indicated in Figs. 1 and 2. Fig. 4 is a longitudinal sectional view of a portion of another form of apparatus for practicing my invention, and Fig. 5 is a similar view of a part of the apparatus shown in Fig. 4 and illustrating the method at a more advanced stage. Fig. 6 is a view which may be regarded as representing either an entire glower having one terminal completed or one-half of a glower adapted to be welded to a similar half to form a completed glower.

Referring first to Figs. 1 to 3, inclusive, 1 is a holder or mold which, as shown, is made in three parts 2, 3, and 4, but which may be made in two parts or in more than three, if desired. These parts are provided with registering grooves to form a recess at 5 of the proper size to receive a length of glower-string, which is placed in the recess when in a soft condition as it comes from the press. The recess 5 communicates at its ends with larger recesses 6, which are provided with movable plugs 7, each of which has a central recess or socket to receive a terminal wire 8. The ends of the mold 1 are more or less tapered, as indicated at 9, so as to receive clamping-rings 10. In using this apparatus to practice my method I place a suitable length of soft glower-string 11 in the groove of one of the parts 2 3 4, then place the other two of said parts in position, clamp them together by means of the rings 10, as indicated in Fig. 1, and, finally, press the plugs 7 inwardly to upset the ends of the string which project into the recesses 6 and compress the same around the ends of the terminal wires 8 in the form of terminal beads or heads 12. The rings 10 may be then removed, the parts 2, 3, and 4 separated, and the completed glower (shown in Fig. 3) be removed and dried and roasted in the usual manner.

Instead of forming the terminals and attaching the terminal wires, as above indicated, the formation of the string and one terminal may be effected at the same time, as indicated in Figs. 4, 5, and 6, in which a cylinder 13 is filled with glower material 14 in a plastic condition. The material is forced out through a passage or die-opening 15 into a cavity 16, formed partially in the end wall of the cylinder 13 and partially in a cap 17, which may be clamped in position by any suitable means. A terminal wire 8 projects through the cap into the cavity 16 and may have a small bead on its inner end to insure a better contact, if desired. When the cavity 16 is filled, the cap 17 may be removed and sufficient material forced out through the die to form the glower length desired, as indicated in Fig. 5. This length may be then cut off and the above-described operation repeated. The glower length 18 thus formed, which is shown in Fig. 6, may have its other terminal formed and its terminal wire affixed by the means and in the manner indicated in Figs. 1 and 2 or otherwise, and the completed glower may then be dried and roasted in the usual manner.

Instead of making the glower lengths 18 of proper dimensions for complete glowers they may be made one-half as long as the glowers desired and be dried and roasted in the form in which they are taken from the press. Two of these parts may then be welded together to form a complete glower by attaching their terminal wires to the terminals of a suitable

circuit, heating the parts to conducting temperature by a suitable means, touching the adjacent inner ends together, then separating them a short distance to form an arc, and finally moving the molten ends into contact, and thereby welding them together.

Variations may of course be made from what is here set forth as regards the apparatus employed and also as regards the specific steps of the method without departing from my invention, and I therefore desire it to be understood that no limitations are to be imposed except by the prior art.

I claim as my invention—

1. The method of attaching terminal wires to electric-lamp glowers which consists in forming a bead or enlargement around the terminal wire by compressing the glower end in a mold while in a plastic condition.

2. The method of attaching terminal wires to electric-lamp glowers which consists in compressing the glower end, while in a plastic condition, in a mold which contains one end of the terminal wire.

3. The method of making electric-lamp glowers which consists in forming half glower lengths in a suitable mold, drying and roasting said lengths and then welding corresponding ends together.

4. The method of making electric-lamp glowers which consists in forming half glower lengths and compressing one end of each around the end of a terminal wire while in a plastic condition, drying and roasting said lengths and then welding corresponding ends together.

In testimony whereof I have hereunto subscribed my name this 30th day of September, 1902.

MARSHALL W. HANKS.

Witnesses:
EDWARD BENNETT,
HUGH A. CROOKS.