No. 695,946. Patented Mar. 25, 1902.

H. N. POTTER.

HEATER WIRE SUPPORT FOR ELECTRIC LAMPS AND METHOD OF MAKING SAME.

(Application filed June 20, 1900.)

(No Model.)

Fig. 1.

Fig. 2.

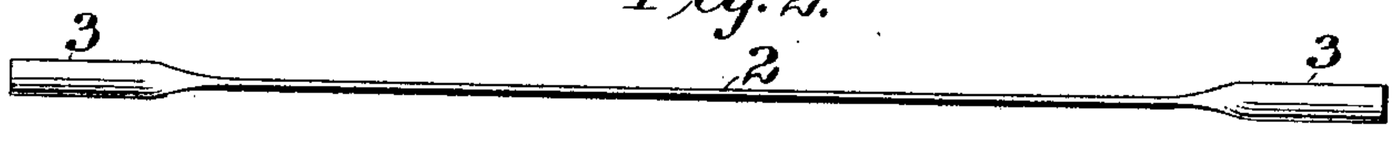


Fig. 3.

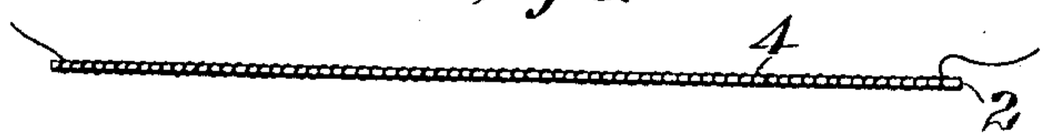


Fig. 4.

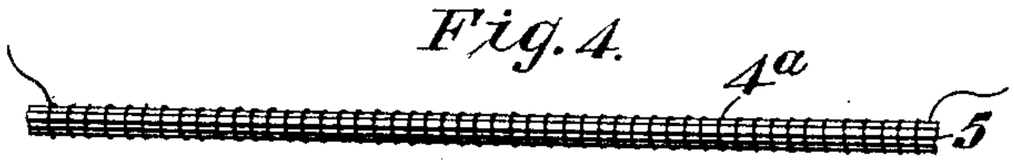


Fig. 5.

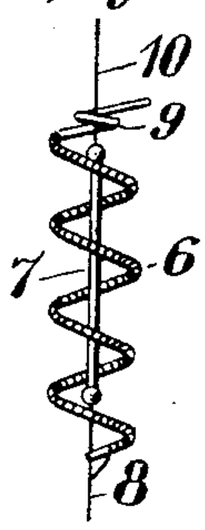


Fig. 6.

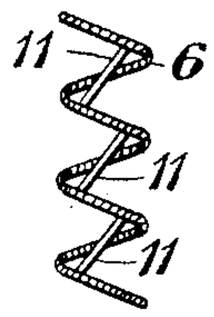


Fig. 7.

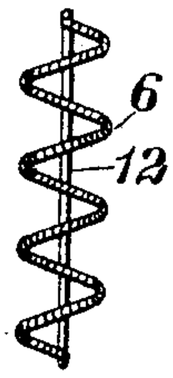


Fig. 8.

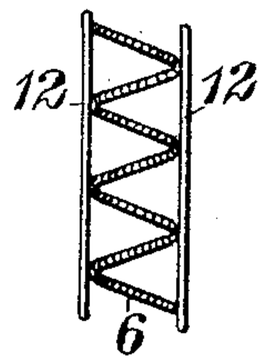
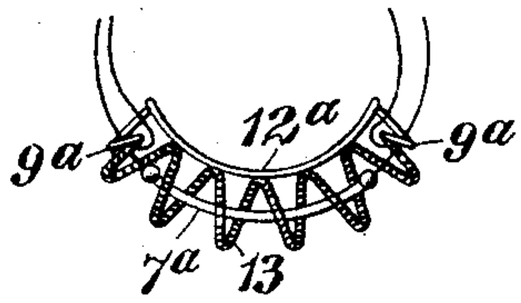


Fig. 9.



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HENRY NOEL POTTER, OF PITTSBURG, PENNSYLVANIA, ASSIGNOR TO GEORGE WESTINGHOUSE, OF PITTSBURG, PENNSYLVANIA.

HEATER-WIRE SUPPORT FOR ELECTRIC LAMPS AND METHOD OF MAKING SAME.

SPECIFICATION forming part of Letters Patent No. 695,946, dated March 25, 1902.

Application filed June 20, 1900. Serial No. 20,968. (No model.)

To all whom it may concern:

Be it known that I, HENRY NOEL POTTER, a citizen of the United States, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented new and useful Improvements in Heater-Wire Supports for Electric Lamps and Methods of Making the Same, of which the following is a specification.

My invention relates to electric lamps of the class in which the light-emitting element or glower is a non-conductor when cold and in which an electric heater is employed for raising the temperature of the glower to a conducting-point.

One of the objects of my invention is to provide a strong and durable support for the heater-wire and one which will obstruct a minimum amount of the light emitted by the glower.

A further object of my invention is to provide a simple and easily-practiced method for making a heater-wire support of the character above indicated.

The electric heaters heretofore employed for heating glowers of the character above indicated to conducting temperature have usually been made of platinum wire variously disposed upon suitable supports, and such supports have usually been formed of porcelain, talcite, or other refractory non-conducting material; but in every case, so far as I am aware, the support for the heater-wire has been opaque, and where it has been disposed around the glower it has therefore necessarily obstructed more or less of the light produced. The materials heretofore found to be generally best suited for this use have also been of such character that the support has been more or less fragile, and therefore such as required great care in use and in packing for transportation. As a result of discovery and experiment, I have found that quartz or pure crystalline silica, if ground fine and mixed with a suitable quantity of binding material, so as to form a plastic mass, to be formed into rods and subsequently baked at a high temperature, that such a rod may be heated for a portion of its length intermediate its ends by holding it in an electric arc or an oxyhydrogen flame and thus fused, and that by skilful manipulation the fused portion may be drawn out into a thread of very nearly uniform diameter and of considerable length. These small rods or threads may be used individually as supports for platinum heating-wires, the wires being coiled about them in the usual manner, or a plurality of rods may be assembled to form a bundle and the wire coiled about the bundle so formed. The single rod or bundle of rods wound with wire can thus be bent into any desired form by heating the wound rod or bundle in the hottest part of an ordinary-blast flame or in the cooler portions of an oxyhydrogen flame or by passing sufficient current through the helix to cause it to soften the rod or bundle. After bending the rod or bundle of rods and the wire wound thereon into the desired form, it may be supported and retained in any desired position by fusing supporting-wires directly to it and lead-wires may be attached mechanically in same way.

In the accompanying drawings, Figure 1 is a side elevation of a baked rod formed of ground quartz and binding material, and Fig. 2 is a similar view of an elongated rod or thread formed by heating and drawing the rod shown in Fig. 1. Fig. 3 is a corresponding view of a rod having a heating-wire wound thereon, and Fig. 4 is a similar view of a bundle of rods having wire wound thereon. Fig. 5 is a side elevation of a glower surrounded by a spiral heater made in accordance with my invention. Fig. 6 is a side elevation of a spiral heater provided with braces between adjacent turns of the spiral. Fig. 7 is a side elevation of a heater provided with a longitudinally-disposed brace-rod of the same material. Fig. 8 is a side elevation of a heater having two longitudinally-disposed brace-rods, and Fig. 9 is a side elevation of a curved glower and a heater having what I term a "wave-spiral" form and provided with a longitudinally-disposed brace-rod.

As has already been substantially stated, in practicing my invention I first mix powdered quartz and binding material—such, for example, as starch, dextrine, or tragacanth—in proper proportions, ten per cent. of the binder having been found suitable, and then form a rod of the plastic composition by forcing it through a die or opening by means of

a plunger or otherwise and bake the rod thus produced, the resulting article being indicated at 1 in Fig. 1. The ends of this rod may then be grasped and the middle portion heated in an electric arc or an oxyhydrogen flame until it becomes fused, and the fused part may be then drawn out into a small rod or thread 2. The ends 3 may then be broken off, and the part 2, or so much of it as may be desired for a given length of heater, may be wound with platinum wire 4, as indicated in Fig. 3. If desired, several of the rods 2 may be combined to form a bundle 5 and this bundle be wound with platinum wire 4ª, as indicated in Fig. 4. In case a heater of curved form is desired the rod 2 will be softened, either by passing sufficient current through the coil 4 or by heating the rod in a suitable flame, and the structure may then be bent upon a suitable mandrel or other form into the shape desired, as indicated, for example, at 6 in Fig. 5. If this shape of heater is produced, it will encircle or surround the glower 7, as indicated. One of the terminal wires 8 of the glower may be fused to the corresponding end of the heater-support, as indicated, and the other end of the heater-support may be bent, as indicated at 9, to form a loop or eye through which the other terminal wire 10 of the glower projects. This arrangement will serve to support the glower in proper relative position to the heater and at the same time permit free expansion of the one independently of the other. The heater and the support may be made to assume any other desired form and consequently the invention is not limited in this respect.

By reason of the fact that the support is transparent it not only permits the transmission through it of the light from the glower, but the material is such that it may be employed for bracing the portions of the support around which the wire is coiled.

In Fig. 6 I have shown braces 11 of the same material as that upon which the wire is wound, these braces being fused at their ends to adjacent turns of the spiral, so as to greatly strengthen the structure.

In Fig. 7 the longitudinally-disposed rod 12 of the same material as that constituting the support for the heater-wire is fused to the ends and to the several intermediate turns of the spiral, so as to strengthen the structure. In Fig. 8 two of such rods 12 are disposed at each side and are fused to the several turns of the spiral.

In Fig. 9 a wave-spiral 13 is disposed about a curved glower 7ª and is provided with loops 9ª at each end, through which the glower terminal wires project, and also with a curved brace-rod 12ª, fused to the ends and to the several turns of the heater-wire support.

I find in practice that when a spiral is formed of quartz, as above described, there is no tendency for it to crack by reason of the sudden application of current to the winding, but that it heats up gradually and is apparently less susceptible to damage than the materials heretofore employed. The softening temperature lies below the melting-point of platinum, but is above that at which heaters usually run, so that it is especially well adapted for this use. It is a great deal stronger than talcite or porcelain, and on account of its transparent character it may be made more substantial than would be possible with the opaque substances mentioned. I have tried transparent materials other than pure quartz and have found that there are certain varieties of glass that may be practically useful in some cases. Bohemian potash glass, for instance, is of such character that it may be utilized in certain types of lamps and for certain forms of heaters. I therefore desire it to be understood that my invention is not limited to the use of pure quartz or to any other specific material except in so far as limitations are imposed by the state of the art.

I claim as my invention—

1. The method of making heaters for electric lamps which consists in forming rods of powdered quartz and a binder, baking such rods, then fusing and drawing the baked rods and finally winding heating-conductors around the rods or threads thus formed.

2. A heater for electric lamps comprising a coil of wire, a curved support therefor and transparent braces for such support.

3. A heater for electric lamps comprising a heater-coil and support therefor one end of which is bent to form an eye or loop, as and for the purpose set forth.

4. A heater for electric lamps comprising a transparent, non-conducting body and a heating-coil disposed thereon, one end of said supporting-body being bent to form an eye or loop, substantially as described.

5. The method of making curved heaters for the glowers of electric lamps which consists in winding a conducting-wire about a rod or bundle of rods of transparent, vitreous material then rendering such rod or bundle of rods plastic by means of heat and bending the heated material into the desired form.

6. A heater for electric lamps comprising a bundle of rods or threads of transparent, refractory material and a coil of wire helically wound thereon.

7. A heater for electric lamps comprising a spiral, transparent rod bent at one end to form an eye or loop and a heater-wire coiled thereon, substantially as described.

8. A heater for electric lamps, comprising a helical rod of non-conducting, refractory material, a heating-coil wound around said rod and one or more braces of transparent material.

9. A heater for electric lamps, comprising a helical rod of transparent, refractory material, a heating-coil wound thereon and one or more braces of transparent material fastened to said rod.

10. The herein-described process of manufacturing heating-bodies for warming or pre-

heating electrical glowers, which consists in forming a hard rod or core of fireproof material winding the same with a conductor, thereupon bringing the said rod or core into a soft or pliable condition, forming the rod or core while in such condition into the desired shape, and finally causing the rod or core to harden.

11. The herein-described process of manufacturing heating-bodies for warming or preheating electrical glowers, which consists in forming a hard rod or core of fireproof material winding the same with a conductor, thereupon bringing the said rod or core into a soft or pliable condition by the application of heat, forming the rod or core while in such condition into the desired shape and finally causing the rod or core to harden.

In testimony whereof I have hereunto subscribed my name this 18th day of June, 1900.

HENRY NOEL POTTER.

Witnesses:

HUGH ANDREW CROOKS,

MURRAY C. BEEBE.