

No. 786,518.

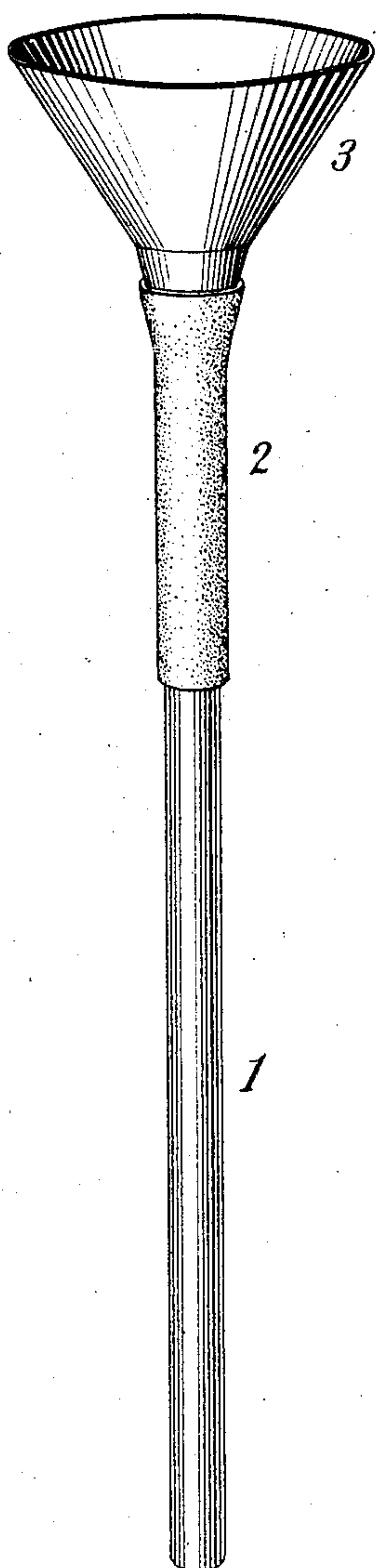
PATENTED APR. 4, 1905.

I. L. ROBERTS.

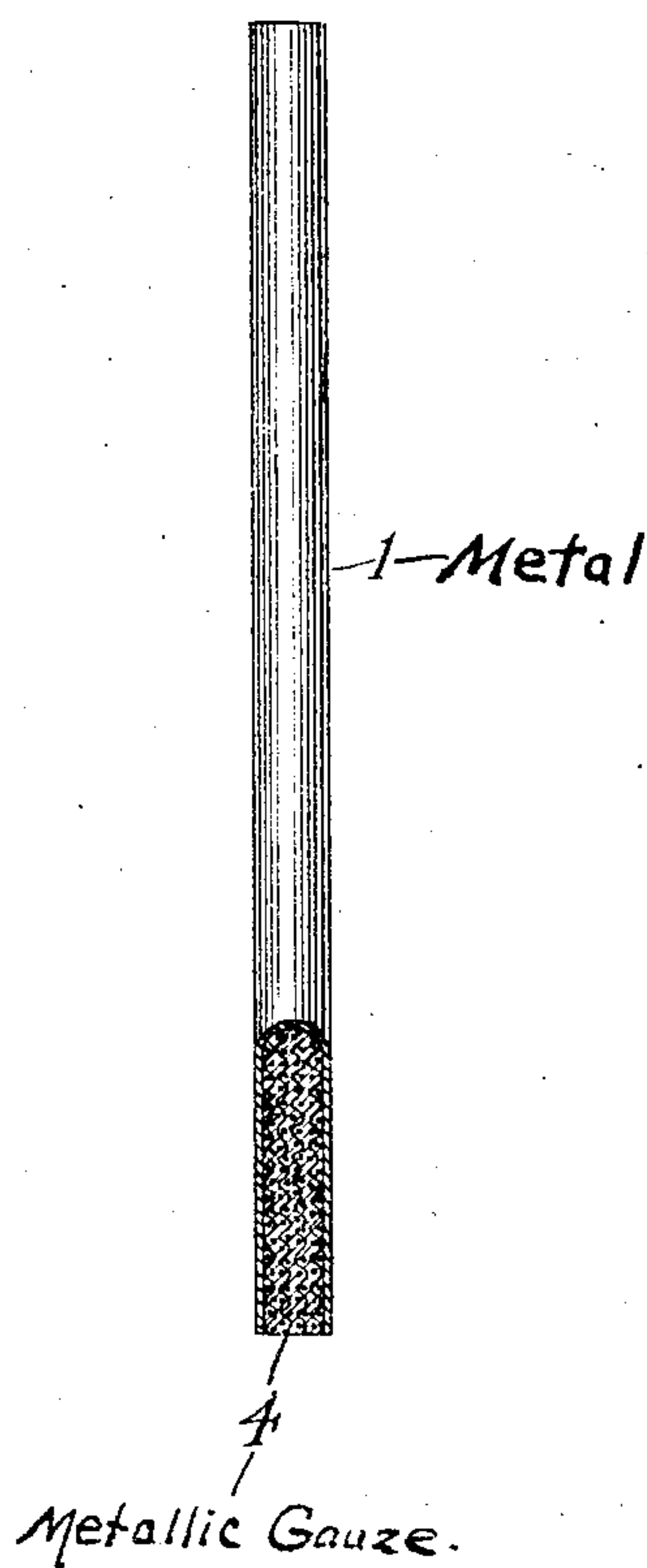
ELECTRODE FOR ARC LAMPS AND METHOD OF MAKING SAME.

APPLICATION FILED MAR. 25, 1903.

*Fig.1*



*Fig.2*



Witnesses:

*Rapphaël Vetter*  
*S. S. Dunham*

*Isaiah L. Roberts, Inventor,*

*by Kerr, Page & Cooper, Attys.*

## UNITED STATES PATENT OFFICE.

ISAIAH L. ROBERTS, OF NEW YORK, N. Y.

## ELECTRODE FOR ARC-LAMPS AND METHOD OF MAKING SAME.

SPECIFICATION forming part of Letters Patent No. 786,518, dated April 4, 1905.

Application filed March 25, 1903. Serial No. 149,462.

*To all whom it may concern:*

Be it known that I, ISAIAH L. ROBERTS, a citizen of the United States, residing at New York, county of Kings, and State of New York, have invented certain new and useful Improvements in Electrodes for Arc-Lamps and Methods of Making the Same, of which the following is a specification, reference being had to the drawings accompanying and forming part of the same.

In a prior patent, No. 460,595, granted to me October 6, 1891, I have shown and claimed an arc-lamp pencil consisting of a metallic tube filled with a refractory non-conducting material, which by fusion with the metal of the tube or holder forms a conducting slag or compound. I have found, however, that this pencil though possessing numerous advantages over the well-known carbon electrode nevertheless is not entirely satisfactory in use. The difficulty encountered in practical use is the fact that the light is not as steady as desirable, for the reason that the arc is liable to "lick" or run around the circumference of the end of the tube instead of being maintained steadily in the center of the end or some other one position. This seems to be due to the fact that the metal tube is of much higher conductivity than the substance with which it is filled.

In another patent, No. 460,596, granted to me at the same time as the first mentioned, I have described and claimed an electrode consisting of a tube or rod of wire fabric or gauze filled with carbonaceous or mineral substances made into a pasty or viscous condition by mixing therewith a solution of caustic soda and the whole then dried. A pencil so made has been found to give excellent results; but it presents one disadvantage in the fact that it is extremely difficult to make such pencils rigid and straight and of smooth surface. Such characteristics are of course necessary in practical use, as otherwise the electrodes will not feed properly.

The invention which forms the subject of the present application, however, overcomes the difficulties met in using the above-described devices and gives a pencil which maintains a steady arc, the pencil itself being

easily made rigid, straight, and smooth, as required. Simply by varying the diameters of the electrodes the size and candle-power of the arc is varied, approximately proportioned to the current used. A small steady arc can be made by the use of these electrodes with only one ampere of current, and the candle-power of the same can be increased practically to any desired degree by increasing their diameter.

The invention consists in the process and article herein described, and more particularly set forth in the claims.

The following is the method which I employ to make the electrodes, and I shall describe the same in detail, though it should be remembered that the method, broadly considered, as recited in the claims is capable of wide variation in details without departing from the proper scope of my invention.

I take a metal tube, preferably of tinned iron, with imperforate walls, and insert therein a rod or cylinder of metallic meshed fabric large enough to fit the tube tightly. Iron-wire gauze I have found gives good satisfaction for this purpose. I then take a funnel and connect it by a rubber hose to the upper end of the tube, which is held in vertical position with the lower end closed in any convenient manner. Pulverized material, such as potassium chromate or pulverized chrome-iron ore or any refractory substance capable of producing the proper fusion with the metal, is put into the funnel and the tube gently tapped, so that the powdered material will pass into the tube, the vibration causing the interstices of the wire-cloth to be completely filled. The tube and its contents are then immersed in a solution of caustic soda or potash, by which the air will be expelled from the interstices of the powder. The tube and its contents are now slowly heated until the whole or the greater part of the water is expelled as vapor, after which the hydrate formerly in solution will bind the particles of the pulverized matter and hold them firmly together, so that they will not fall out. The electrode is then in condition for use.

In place of a caustic alkali a carbonizable substance, such as sugar or powdered cannell-



coal, can be used as the binder. These can be intimately mixed with the refractory material and when heated will carbonize and bind the particles together. If desired, the sugar  
5 can be used in solution in the same manner as the alkali above described.

By including proper chemicals in the refractory filler a light of any desired color may be produced, as will be readily understood.

10 While I have mentioned only a cylinder or rod of wire-gauze as the metallic filler used in the pencil, it is clear that other foraminous metallic fillers may be successfully employed. It is essential, however, that the filler should  
15 be to a certain extent rigid, in the sense that it has a definite structure as distinguished from loose filings or otherwise finely-divided metal.

In the accompanying drawings, Figure 1  
20 shows the apparatus employed in making an electrode by my method or process, and Fig. 2 shows a completed pencil in detail.

The tube or holder is indicated by 1.

2 is the rubber hose, and 3 the funnel.

25 4 represents the filling of gauze and refractory material.

Having now described my invention, what I claim is—

1. As a new article of manufacture, an arc-  
30 lamp electrode consisting of a metallic tube, inside the same a rigid metallic filler having numerous interstices, and a refractory material filling the interstices, as set forth.

2. As a new article of manufacture, an arc-  
35 lamp electrode consisting of a metal tube, a rod of wire-gauze constituting a filler inside the same, and a refractory material filling the interstices of the gauze rod, as set forth.

3. As a new article of manufacture, an arc-lamp electrode consisting of a metal tube, a rod of wire-gauze constituting a filler inside the same, and a substance containing chromium filling the interstices of the rod, as set forth.

4. The method of making arc-lamp electrodes, which consists in inserting in a metallic tube a rigid metallic filler having numerous interstices, and filling the interstices with a pulverized refractory material.

5. The method of making arc-lamp electrodes, which consists in inserting in a metal tube a rod or cylinder of wire-gauze, filling the interstices of the gauze with a pulverized refractory material, and binding together the particles of the refractory material, as set forth.

6. The method of making arc-lamp electrodes, which consists in inserting in a metal tube a rod or cylinder of wire-gauze, filling the interstices of the gauze with a pulverized refractory material and a carbonizable substance, and causing the carbonizable substance to bind together the particles of the refractory material, as set forth.

7. The method of making arc-lamp electrodes, which consists in inserting in a metal tube a rod or cylinder of wire-gauze, filling the interstices of the gauze with a pulverized refractory material, wetting the contents of the tube with a solution of a substance capable of binding together the particles of the refractory material, and then drying the whole, as set forth.

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Witnesses:

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