

No. 672,451.

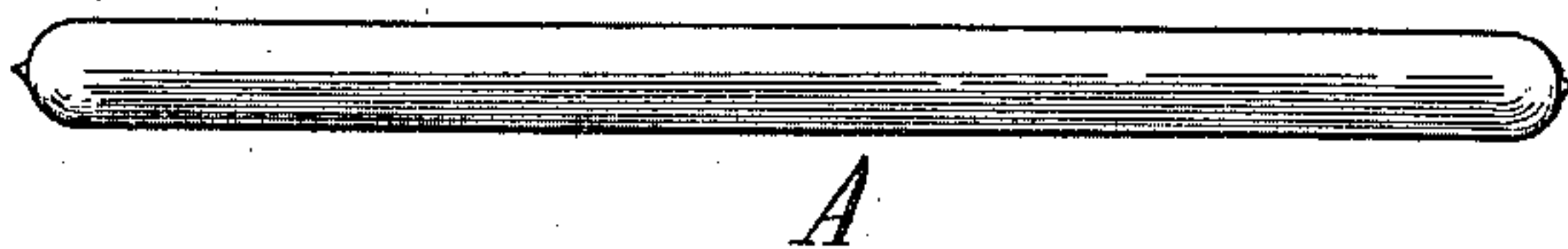
Patented Apr. 23, 1901.

D. McF. MOORE.  
ELECTRIC LIGHT VACUUM TUBE.

(Application filed Mar. 26, 1898.)

(No Model.)

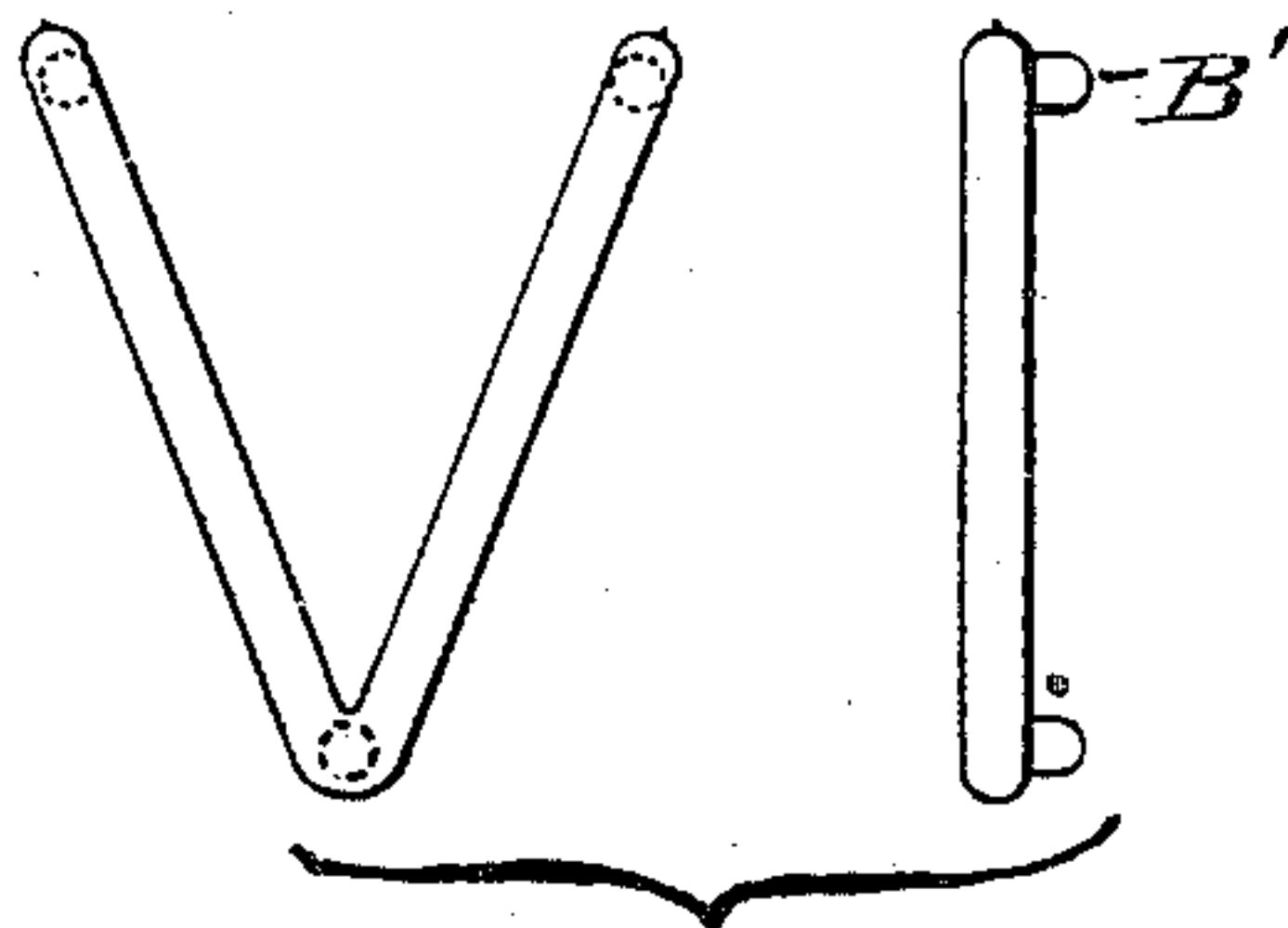
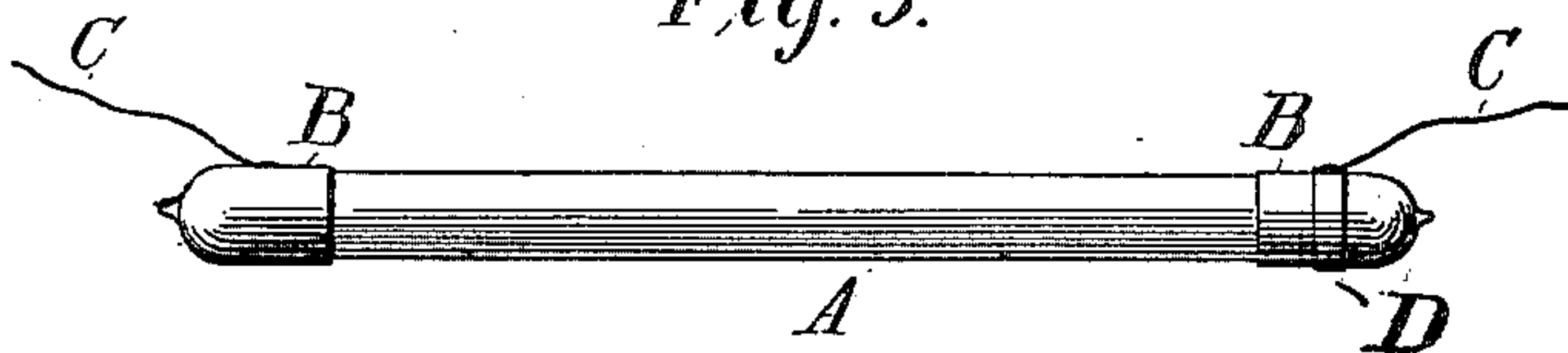
*Fig. 1.*



*Fig. 2.*



*Fig. 3.*



*Fig. 4.*

Witnesses:

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# UNITED STATES PATENT OFFICE.

DANIEL MCFARLAN MOORE, OF NEWARK, NEW JERSEY, ASSIGNOR TO THE  
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## ELECTRIC-LIGHT VACUUM-TUBE.

SPECIFICATION forming part of Letters Patent No. 672,451, dated April 23, 1901.

Application filed March 26, 1898. Serial No. 676,205. (No model.)

*To all whom it may concern:*

Be it known that I, DANIEL MCFARLAN MOORE, a citizen of the United States, and a resident of Newark, in the county of Essex and State of New Jersey, have invented a certain new and useful Electric-Light Vacuum-Tube, of which the following is a specification.

This invention relates to the construction of vacuum-tubes or other devices to be used as lamps or sources of light when excited by electric vibrations, oscillations, or disturbances generated in any desired way—as, for instance, by interruptions of a circuit of induction produced in any desired manner—as, for instance, by the means described in my Patent No. 548,127.

In the manufacture of vacuum light-tubes considerable difficulty is experienced in constructing and mounting terminals or electrodes thereon in such a manner as to produce the best luminous effects and to prevent a certain crackling, spitting, or hissing noise while the current is passing through the tube.

The object of this invention is the elimination of these difficulties; and to that end the invention consists in the construction hereinafter fully described, and set forth in the claim.

In the accompanying drawings, which form a part of this specification, Figure 1 represents a vacuum light-tube as it comes from the air-pump. Fig. 2 represents it with roughened ends. Fig. 3 shows the finished tube ready for insertion in a circuit; and Fig. 4 represents a tube in the form of a letter, as in Patent No. 602,953, granted April 26, 1898.

A represents the vacuum-tube, which may be made from any suitable kind of transparent or translucent material, but preferably from glass.

B represents the terminals or electrodes, and C suitable conductors connected to the terminals. These conductors may be the ends of the circuit in which the lamp is located, or they may be short pieces of wire soldered or otherwise secured to the terminals and by means of which the tube may be connected into the circuit.

The most satisfactory way of adding terminals to the tubes is by electroplating, and the best mode of effecting this is by first roughening the parts of the tube where the terminals are to be placed and then mechanically fixing thereto some conducting material, as by dipping the tubes into a bath of nitrate of silver or like substance, after which they may be submitted to the plating-bath.

The places on the tubes for the electrodes may be roughened in any suitable way—as by treating with an acid, such as hydrofluoric acid—but the best results have been produced by mechanically roughening the parts to receive the terminals, as by means of the emery-wheel or sand-blast. This mode of roughening has the effect of producing sharp-edged pits, grooves, ridges, and projections, which give the electrodeposited terminal a more intimate contact with the substance of the tube than has yet been effected in any other way.

Vacuum light-tubes provided with electrodeposited terminals will be silent, and aside from this they have other advantages over terminals consisting of tin-foil or metallic paint which have heretofore been used in that they may be made of greater thickness, so that they will not be easily scraped off or torn, and the circuit-conductors may be readily soldered thereto instead of having to be simply wrapped around them. It is preferable, however, to make these terminals as thin as possible to prevent reverberation, and when too thin for soldering conductors thereto a band of metal may be wrapped about them and the conductor soldered thereto, as indicated at D, Fig. 3.

The electroplating process is especially adapted to the application of terminals to vacuum-tube letters or other characters, because of the more or less conical or spherical shape of the projections to which the terminals must be applied, (see B', Fig. 4.) It is by these laterally-projecting terminals that the tubular letters or characters are held in place, as well as supplied with current, as fully set forth in the latter patent above referred to.

What I claim as my invention is—

5 As an article of manufacture, a vacuum-tube lamp consisting of an exhausted hermetically-sealed tube of glass or like material devoid of interior electrodes and having its extremities roughened and electroplated with a conducting material.

Signed at New York, in the county of New York and State of New York, this 11th day of March, A. D. 1898.

DANIEL MCFARLAN MOORE.

Witnesses:

WM. H. CAPEL,  
C. L. BELCHER.