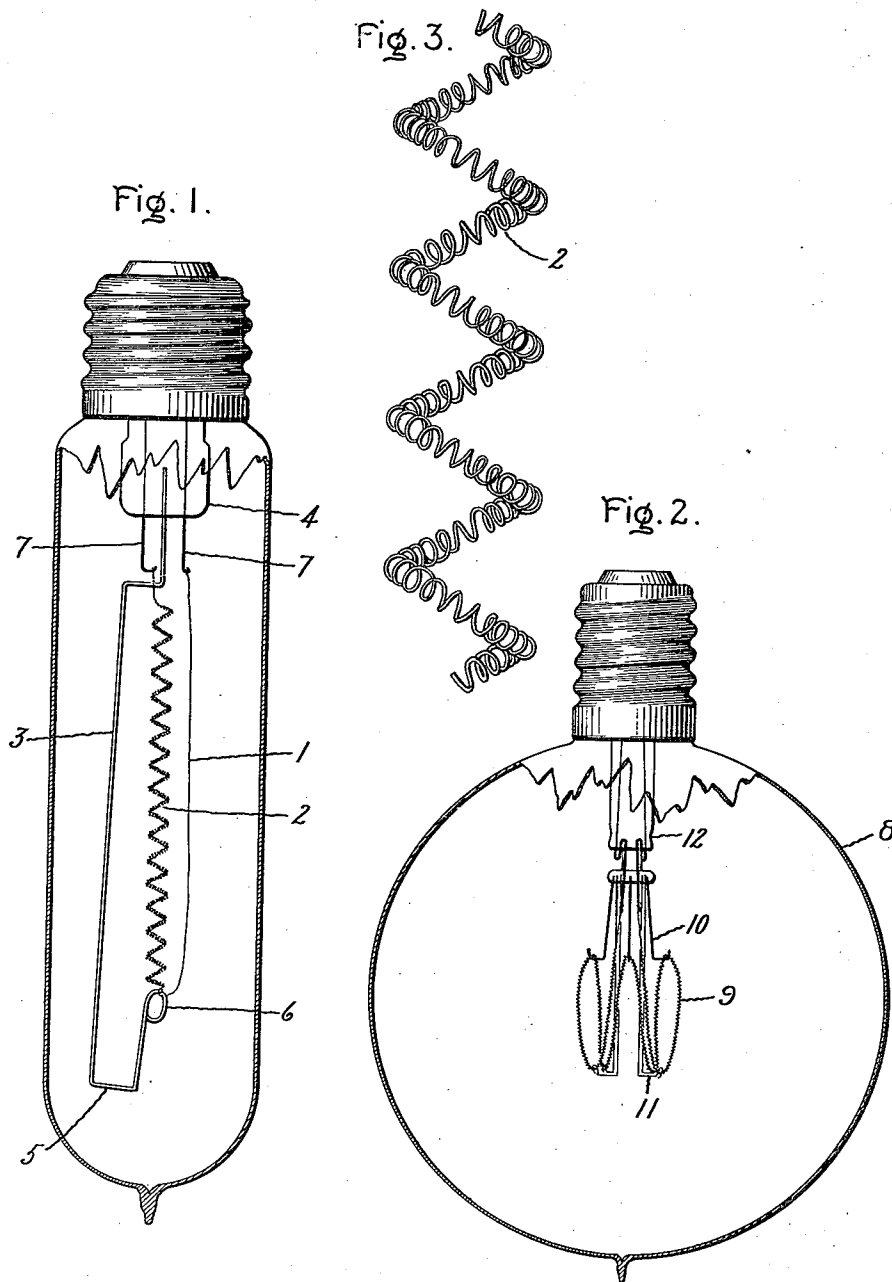


B. L. BENBOW.
FILAMENT.
APPLICATION FILED OCT. 4, 1913.

1,247,068.

Patented Nov. 20, 1917.



WITNESSES:

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FILAMENT.

1,247,068.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, BURNIE LEE BENBOW, a citizen of the United States, residing at Cleveland, county of Cuyahoga, State of Ohio, have invented certain new and useful Improvements in Filaments, of which the following is a specification.

My invention relates to filaments for incandescent lamps and more particularly to filaments of that character composed of metal such as tungsten. The object of my invention is to produce a filament of a highly concentrated form and of such consistency that it will require comparatively few supports in the lamp.

In producing my improved filament, I wind a straight fine filament wire of the proper diameter to produce the requisite light under voltage conditions of the circuit in which it is to be used, into a coil or helix of comparatively small diameter. The small diameter of the coil renders the difference in potential between successive turns when the filament is in use very small and the wire may be wound with the turns very close together without danger of the current jumping across between turns. The winding of this coil is preferably done on a mandrel of quite small diameter and the winding stress is such that the material is stressed beyond its elastic limit into a permanent helix. The filament thus produced is then wound into another helix, the winding stress also exceeding the elastic limit of the material. This may be done on the same mandrel upon which the first helix was wound. The result is what may be termed a double helix or a helix wound into a helix. In order that the turns of the second wound helix may be properly spaced from each other a spacing wire may be wound therewith and afterward removed.

In the drawing Figures 1 and 2 are views partially in section showing two forms of incandescent lamp each containing a filament embodying my invention, and Fig. 3 is a detail view on an enlarged scale of a portion of the said filament.

The lamp shown in Fig. 1 has a filament consisting of a straight portion 1 and a double helical portion 2. A support 3 composed of any metal commonly used for supports and of such size that it is comparatively rigid extends from the stem 4 into which it is sealed and is provided at the tip end

thereof with the supporting hook 5 having eyelet 6. The filament 1, 2 is twisted around the said eyelet and it extends from the same to the lead-in wires 7. It will be readily seen that by this construction a considerable length of filament may be concentrated in a comparatively small length of lamp. This affords a very useful construction especially where the lamp is to be used to illuminate show-cases and in other locations where it is desired to direct a very brilliant light over a comparatively extensive area.

In Fig. 2 is shown a filament embodying my invention mounted in a lamp having a spherical bulb 8. The filament 9 is concentrated around the center of the bulb and is draped between the supporting hooks 10 and 11 which are mounted in the glass stem 12. Owing to the compact structure of the filament only a very few supports are required. Such a lamp as that shown in Fig. 2 is especially adapted for use where it is desired to direct light by means of a reflector or reflectors to a comparatively small area. Lamps of this kind are especially adapted for use in connection with stereopticon apparatus, search lights, signal lights, and also for headlights for vehicles.

In Fig. 3 is shown on an enlarged scale a section of a filament embodying my invention. In mounting the filament it may be stretched somewhat. The process of winding, during which the wire is stressed beyond its elastic limit, seems to increase its strength. The completed filament is very elastic and may be handled very roughly without danger of breaking. After it is in use the filament sets and loses much of its elasticity. For this reason it is preferable not to stretch it in mounting; in other words, to wind it in substantially the shape in which it will be used in the lamp.

What I claim as new and desire to secure by Letters Patent of the United States, is:—

1. In an electric incandescent lamp, a plurality of supports and a metal light emitting filament having the shape of a helix, the turns of which are made up of helices, strung between the said supports, said filament possessing a permanent shape independent of said supports.

2. In an electric incandescent lamp, a light emitting filament having the shape of a helix, the turns of which are made up of helices, and means engaging only widely sep-

arated portions of the said filament for supporting the same.

3. In an electric incandescent lamp, a light emitting filament having the shape of a helix, the turns of which are made up of helices.

4. In an electric incandescent lamp, a light emitting filament having the shape of a helix, the turns of which are made up of helices, said filament wire being supported

at only a few points in its length and being otherwise free of contact with other materials.

In witness whereof, I have hereunto set my hand this first day of October, 1913.

BURNIE LEE BENBOW.

Witnesses:

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H. J. VOST.