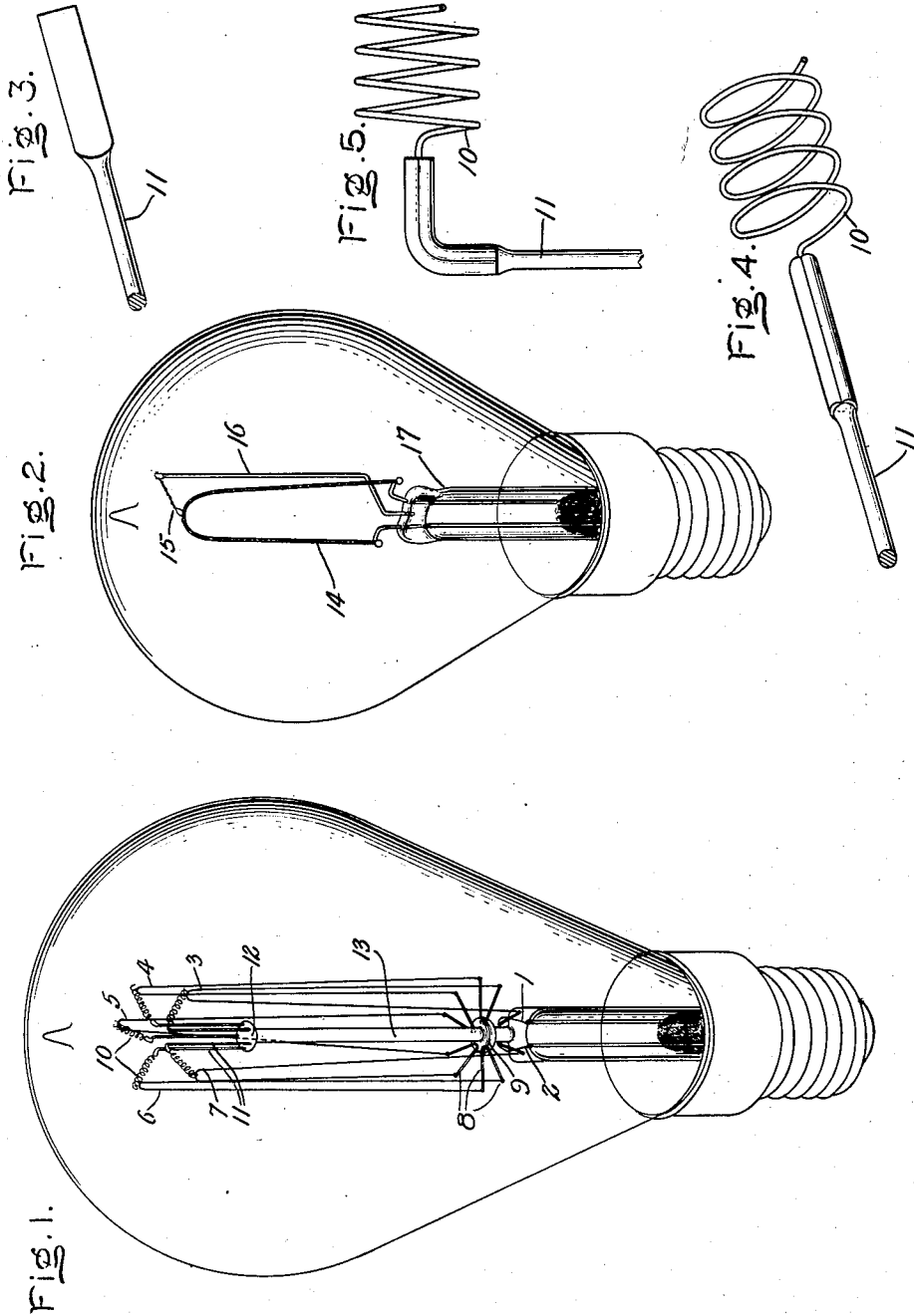


J. W. HOWELL.
 FILAMENT SUPPORT.
 APPLICATION FILED DEC. 17, 1906.

1,024,898.

Patented Apr. 30, 1912.



WITNESSES:

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UNITED STATES PATENT OFFICE.

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FILAMENT-SUPPORT.

1,024,898.

Specification of Letters Patent.

Patented Apr. 30, 1912.

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To all whom it may concern:

Be it known that I, JOHN W. HOWELL, a citizen of the United States, residing at Newark, county of Essex, State of New Jersey, have invented certain new and useful Improvements in Filament-Supports, of which the following is a specification.

This invention relates to an improvement in means for supporting filaments in incandescent lamps.

In the drawings accompanying and forming a part of this specification my invention is illustrated as applied to lamps having filaments of refractory metal. Tungsten filaments and other refractory metal filaments of the general class of which tungsten is typical, have a tendency to soften at the exceedingly high temperature of operation, and are also subject to a progressive change in length due possibly to some complex molecular change. My improved supporting means not only holds the filament in proper position when plastic or softened by heat, but it also permits this progressive change of the filament without subjecting it to undue strains. In addition to all this my improved supporting means is inert with respect to the filament and does not in any way introduce any impurity or volatile foreign material into the envelop of the lamp which might prove detrimental to the filament. One of the modifications shown in the accompanying drawing has the additional advantage of protecting the filament from lateral shocks or jars which might otherwise fracture the filament. When metal filaments are made of very small diameter they are fragile and subject to breakage during transportation. I find, however, that by the use of this shock resisting means the percentage of breakage is greatly reduced and the problem of transportation is much simplified.

In the drawings, Figure 1 is a perspective view of a metal filament lamp suitable for use on a constant potential source of commercial voltage; Fig. 2 is a similar view of a constant current lamp having a filament considerably stronger than that illustrated in Fig. 1 and supported according to a modification of my invention; Figs. 3, 4 and 5 are details.

The lamp shown in Fig. 1 is provided with the usual leading-in wires 1 and 2 supplying current to a filament made up of five

separate loops 3, 4, 5, 6 and 7 connected in series by means of metal conductors 8 radiating from a glass hub 9 mounted above the stem of the lamp. The filament may be connected with these radiating wires by welding, or in any suitable manner. Each of these five loops is supported at the top by a refractory metal helix or coiled spring 10 disposed at an angle to the plane of the filament in such a way that a progressive contraction of the filament will place the coiled spring under a stress transverse to the axis of the coil. As these springs are in contact with the intensely hot filament the advantages of making them of highly refractory material are apparent. I find that tantalum wire is well adapted for this purpose. It is not only refractory but is also elastic and resilient. Furthermore, it is relatively inert and does not combine even at high temperatures with the relatively active metal tungsten.

As a means for supporting the fixed ends of the tantalum springs I utilize metal standards 11, of copper or other ductile metal, fused in a glass knob 12 carried on a glass pedestal 13 supported by the lamp stem. These copper standards 11 are each provided with a clip at the upper end thereof, as shown in detail in Figs. 3, 4 and 5. This clip may be made by flattening out the end of the copper wire as shown in Fig. 3, and then drawing the flattened end through a die to roll it up into a tube into which the end of the tantalum spring or helix may be inserted, as shown in Fig. 4. This copper tube is then pinched over with a pair of pliers until it assumes the form shown in Fig. 5, and thereby grips firmly the end of the tantalum spring and holds that end of the spring rigidly against movement. The opposite end of the spring carrying the tungsten loop is free to move up and down through a relatively large arc and if the spring is arranged at substantially a right angle to the plane of the filament loop, as shown in Fig. 1, this movement through a large arc will not increase materially the tension on the supported filament. It should be noted that each filament in the lamp is independently supported and is free to shrink quite independently of the others and without in any way influencing the tension on the other loops.

If a loop of the type shown in Fig. 1 is

subjected to blows in a direction transverse to the filament loops, the coiled helical springs 10 take up the force of the jar or shock to which the filaments would otherwise be subjected, by direct compression of the springs, and thereby greatly reduce the danger of fracturing the filament.

The constant current or series lamp shown in Fig. 2 is provided with a relatively heavy tungsten filament 14 which, because of its size, is not liable to breakage during transportation. This filament is supported at the top by a loop 15 made by twisting a ductile tantalum wire on itself. This tantalum wire is pinched in the top of a metal standard or pedestal 16 supported by the lamp stem 17. This modification presents all the advantages of an inert supporting means arranged

at right angles to the plane of the filament and permitting permanent contraction thereof, and illustrates an embodiment of my invention quite suitable for refractory metal filaments of the larger cross-sections.

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

A supporting means for filaments comprising a metal wire standard with a flattened end portion having the form of a tube and a resilient member held in said tube.

In witness whereof, I have hereunto set my hand this fourteenth day of December, 1906.

JOHN W. HOWELL.

Witnesses:

S. N. WHITEHEAD,
J. HARRY ELKINS.