June 30, 1942. I. H. VAN HORN 2,288,499

ELECTRIC LAMP

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Fig. 1.

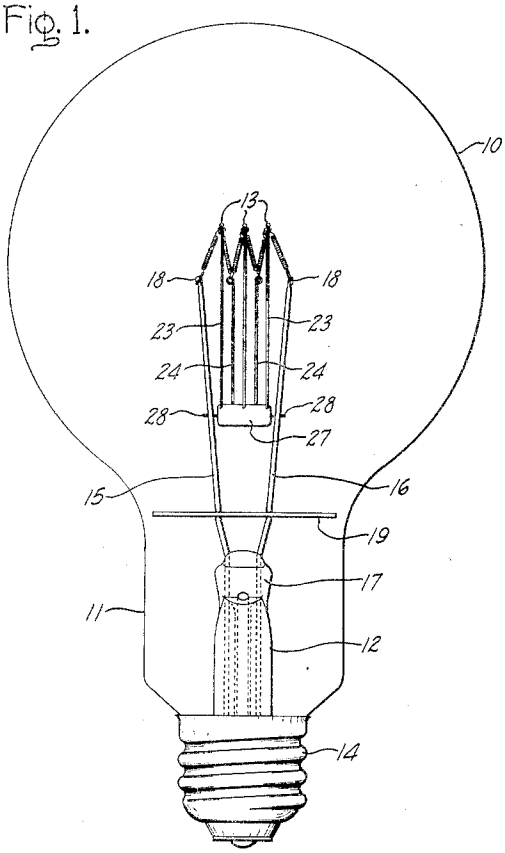


Fig. 2.

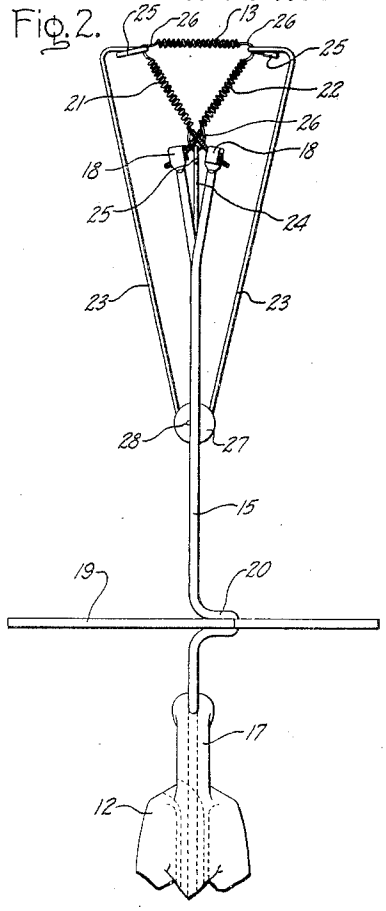


Fig. 3.

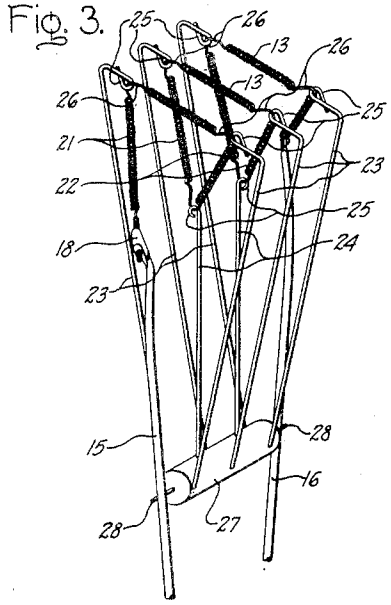
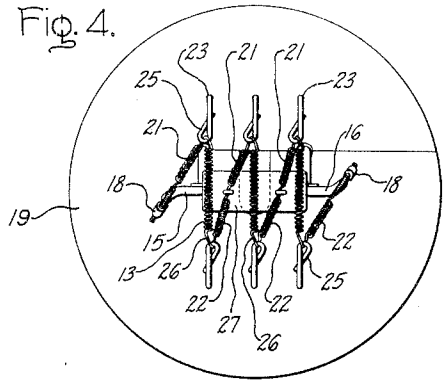


Fig. 4.



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Fig. 5.

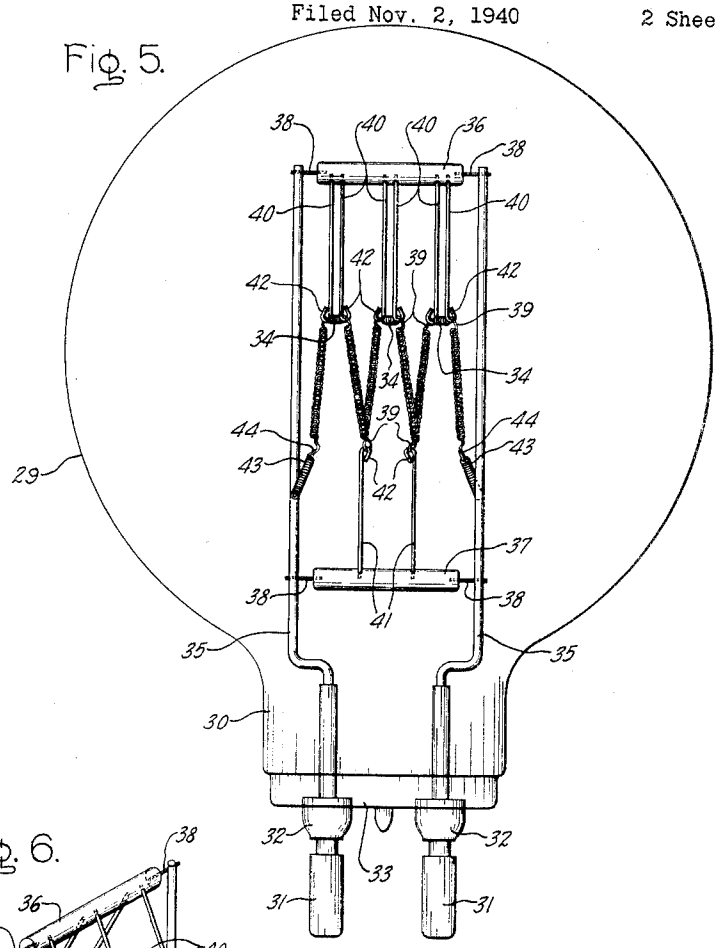


Fig. 6.

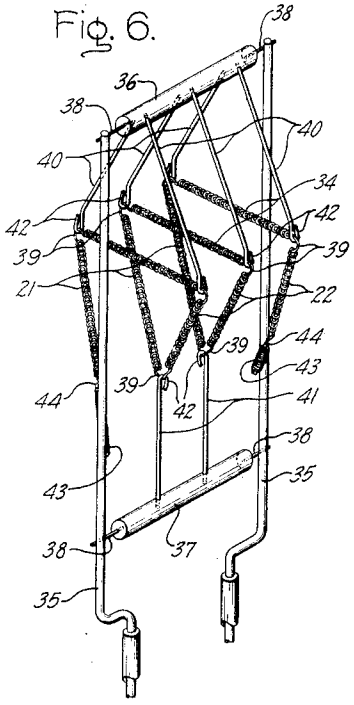


Fig 8

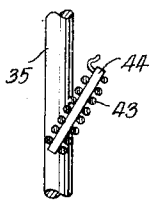
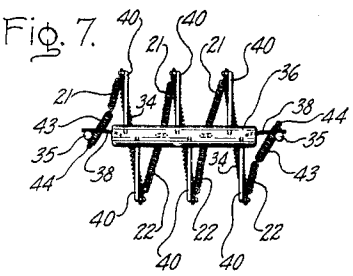


Fig. 7.



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UNITED STATES PATENT OFFICE

2,288,499

ELECTRIC LAMP

Irving H. Van Horn, East Cleveland, Ohio, assignor to General Electric Company, a corporation of New York

Application November 2, 1940, Serial No. 364,043

5 Claims. (Cl. 176—40)

My invention relates in general to electric incandescent lamps and more particularly to heat-radiating lamps such as are used for paint-drying and other drying purposes. Still more particularly, my invention relates to a filament and support arrangement for such lamps.

In the design of incandescent lamps for the radiation of heat at relatively high-wattage inputs, such as 250 watts to 1000 watts and above, a considerable amount of filament wire is required in order to provide the necessary surface area for radiating the energy input as infra-red or heat rays. Inasmuch as these heat-radiating lamps are customarily mounted in concentrating reflectors, the filament or heat source cannot be spread out or distributed to too great an extent, otherwise too much of the filament would be removed from the focal point of the reflector, resulting in inefficient control and utilization of the heat radiations from the lamp. Moreover, the filament preferably should be arranged so that the lamp can be burned in any position without danger of damage to the filament.

One object of my invention is to provide an electric incandescent lamp having a relatively large amount of filament wire arranged within the lamp in a concentrated manner and supported so as to permit burning of the lamp in any desired position.

Another object of my invention is to provide a simple and convenient support arrangement for the filament of high-wattage heat-radiating incandescent lamps which is of sufficient strength to maintain the filament in its originally disposed form or shape throughout the life of the lamp.

A feature of the invention is the disposition of the adjacent filament segments in the form of a series of oppositely disposed equilateral triangles with supports at the corners thereof, at least certain of the successive segments having a progressive pitch, the segments being so arranged that they define the three sides of an equilateral prism.

Further objects and advantages of my invention will appear from the following description of species thereof and from the accompanying drawings in which:

Fig. 1 is a front elevation of a high-wattage heat-radiating incandescent lamp comprising my invention; Fig. 2 is a side elevation on an enlarged scale of the filament mount structure of the lamp shown in Fig. 1; Fig. 3 is a fragmentary perspective view of the filament mount structure shown in Fig. 2; Fig. 4 is a top view of the filament mount structure shown in Fig. 2; Fig. 5 is a front elevation of a modified form of lamp construction comprising my invention; Figs. 6 and 7 are perspective and top views, respectively, of the filament mount structure of the lamp shown in Fig. 5; and Fig. 8 is an enlarged elevation, partly in section, showing the structure of the joint between the filament and lead-in conductor.

Referring to the drawings, Figs. 1–4 illustrate a lamp construction which I have found particularly desirable for heat radiating lamps operating at 250 to 500 watts or thereabouts. The lamp there shown comprises a glass bulb or envelope **10** of ordinary lime glass having a neck portion **11** formed with a re-entrant stem **12**, and containing a suitable gas filling. Hermetically sealed within the bulb **10** is a filament **13** having its ends connected to the terminals of a base **14** by means of suitable leading-in wires **15**, **16** extending longitudinally of the bulb through the stem **12** and sealed into the press portion **17** thereof. The said leading-in wires **15**, **16** are preferably disposed in a common plane and diverge upwardly from the stem press **17** so as to provide adequate space between the inner ends of the wires for the disposition of the filament **13** therebetween. The inner ends of the leading-in wires **15**, **16** are formed with hooks **18** in which the ends of the filament **13** are clamped. A heat deflecting disc **19** of suitable heat-resisting material, such as mica, is disposed transversely within the neck of the bulb above the stem **12** therein, the disc being supported in place by the leading-in wires **15**, **16** which are formed with offsets or bends **20** (Fig. 2) within which the disc is clamped.

The filament or electrical energy translation element **13** comprises a coiled wire of a refractory metal, preferably tungsten, divided into a plurality of segments or portions triangularly arranged so as to define, as viewed from the side of the lamp (Fig. 2), a series of side-by-side equilateral triangles which in turn define an equilateral prism extending transversely between the leading-in wires **15**, **16**. The corresponding segments of the triangles are substantially parallel, with the lower segments **21**, **22** of each triangle provided with a similar amount of pitch, as shown particularly in Fig. 4, so as to effect the desired spacing between the successive triangles, i. e., between the corresponding segments (or sides) of such triangles. For this reason, the triangles are not actually complete, but instead are open at their lowermost corners where the lower ends of the segments **21**, **22** are spaced apart because of the pitch of such segments. Because of the progressive pitch of the various filament segments, the filament may be said to be arranged in the form of a helix of triangular cross-section.

The filament **13** is supported in the above-described form or shape by means of a plurality of support wires **23**, **24** provided with hooks or loops **25** at their upper ends which engage and sup-

port the filament at the bights 26 between the various segments thereof, that is, at the corners of the triangles. The lower ends of the support wires 23, 24 are supported in a bridge or block member 27 of suitable insulating material, such as glass, which is mounted between the leading-in wires 15, 16 and is secured thereto by means of short fastening wires 28.

The modified construction shown in Figs. 5–7 has been found particularly suitable for heat radiating lamps operating at the higher wattages such as 1000 watts and above. The lamp comprises a glass bulb or envelope 29 made of suitable heat-resisting glass, such as that commercially known as Pyrex, and having a neck portion 30 provided with an end terminal or "bi-post" construction such as that described and claimed in United States Patent No. 2,098,080, D. K. Wright, issued November 2, 1937, and assigned to the assignee of the present invention. The said terminal construction comprises a pair of metal prongs or posts 31 extending through the end wall 33 of the bulb and having thin-walled skirt or cup portions 32 of suitable metal, such as that commercially known as "Fernico," the edges of which are embedded and fused into the thickness of the comparatively heavy end wall 33 of the bulb. The bulb contains a suitable gas filling, such as a mixture of nitrogen and argon at a pressure of around 200 mm. of mercury or thereabouts.

Hermetically sealed within the bulb 29 is a filament 34 comprising a coiled wire of a refractory metal, preferably tungsten, arranged in substantially the same triangular manner or shape as that of the filament 13 in the first form of the invention. The filament 34 is supported in place within the bulb by means of a framework comprising a pair of relatively heavy parallel leading-in wires 35 rigidly secured to the terminal posts 31, and upper and lower bridge or cross-bar members 36 and 37 respectively, of suitable insulating material such as glass, extending between the leading-in wires and secured thereto by short fastening wires 38. The filament 34 is supported, as before, at the corners of the triangles, i. e., at the bights 39 between the various filament segments, by means of support wires 40, 41 extending respectively from the upper and lower bridge members 36, 37 and formed at their free ends with loops or hooks 42 for engaging and supporting the filament. The opposite ends of the filament are wound with short coiled end segments 43 which are fastened to the leading-in wires 35 to thereby provide the electrical connection between the said wires and the filament. To provide a strong joint or connection between the end segments 43 and the leading-in wires 35, a conductive support or mandrel 44 is inserted within each end segment 43, the mandrel short-circuiting and reinforcing the coils of the end segments and being welded in place therein.

The drying lamps described hereinabove are designed to produce a maximum of infra-red radiation at the most effecting drying wavelength of infra-red consistent with economic lamp life. Inasmuch as the near infra-red, comprising the spectral band 7,000 to 14,000 Å., has been found most effective for drying purposes, the drying lamps according to the invention are designed to concentrate most of their emitted energy in such region.

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

1. An electric incandescent lamp comprising a bulb, a pair of leading-in wires extending into said bulb and supporting therebetween an insulating bridge member, a filament mounted within said bulb between said leading-in wires and electrically connected thereto, said filament comprising a continuous wire divided into a plurality of coiled portions, successive coiled portions being triangularly arranged so as to form a series of side-by-side triangles each open at corresponding corners, and a plurality of support wires extending from said bridge member and supporting said filament at the corners of said triangles.

2. An electric incandescent lamp comprising a bulb, a pair of leading-in wires extending into said bulb and supporting therebetween a pair of insulating bridge members, a filament mounted within said bulb between said leading-in wires and electrically connected thereto, said filament comprising a continuous wire divided into a plurality of coiled portions, successive coiled portions being triangularly arranged so as to form a series of side-by-side triangles each open at corresponding corners, and a plurality of support wires extending from each of said bridge members and supporting said filament at the corners of said triangles.

3. An electric incandescent lamp comprising a bulb, a pair of leading-in wires extending into said bulb and supporting therebetween an insulating bridge member, a filament mounted within said bulb between said leading-in wires and electrically connected thereto, said filament comprising a continuous wire divided into a plurality of coiled segments separated by bight portions, successive coiled segments being triangularly arranged so as to form a series of side-by-side triangles each open at corresponding corners, and a plurality of support wires extending from said bridge member and engaging the bight portions of said filament so as to support said filament at the corners of said triangles.

4. In an electric incandescent lamp, a mount structure comprising a filament in the form of a continuous coiled wire wound into a helix defining a triangular prism, insulating bridge means located outside of said prism, and a plurality of support wires secured to said bridge means and extending toward said filament with an end of each support wire engaging one of the corners of the triangularly arranged filament.

5. In an electric incandescent lamp, a mount structure comprising a filament in the form of a continuous coiled wire wound into a helix defining a triangular prism, insulating bridge means located outside of said prism and extending approximately parallel thereto, and a plurality of support wires spaced along and secured to said bridge means and extending toward said filament with an end of each support wire engaging one of the corners of the triangularly arranged filament.

IRVING H. VAN HORN.