

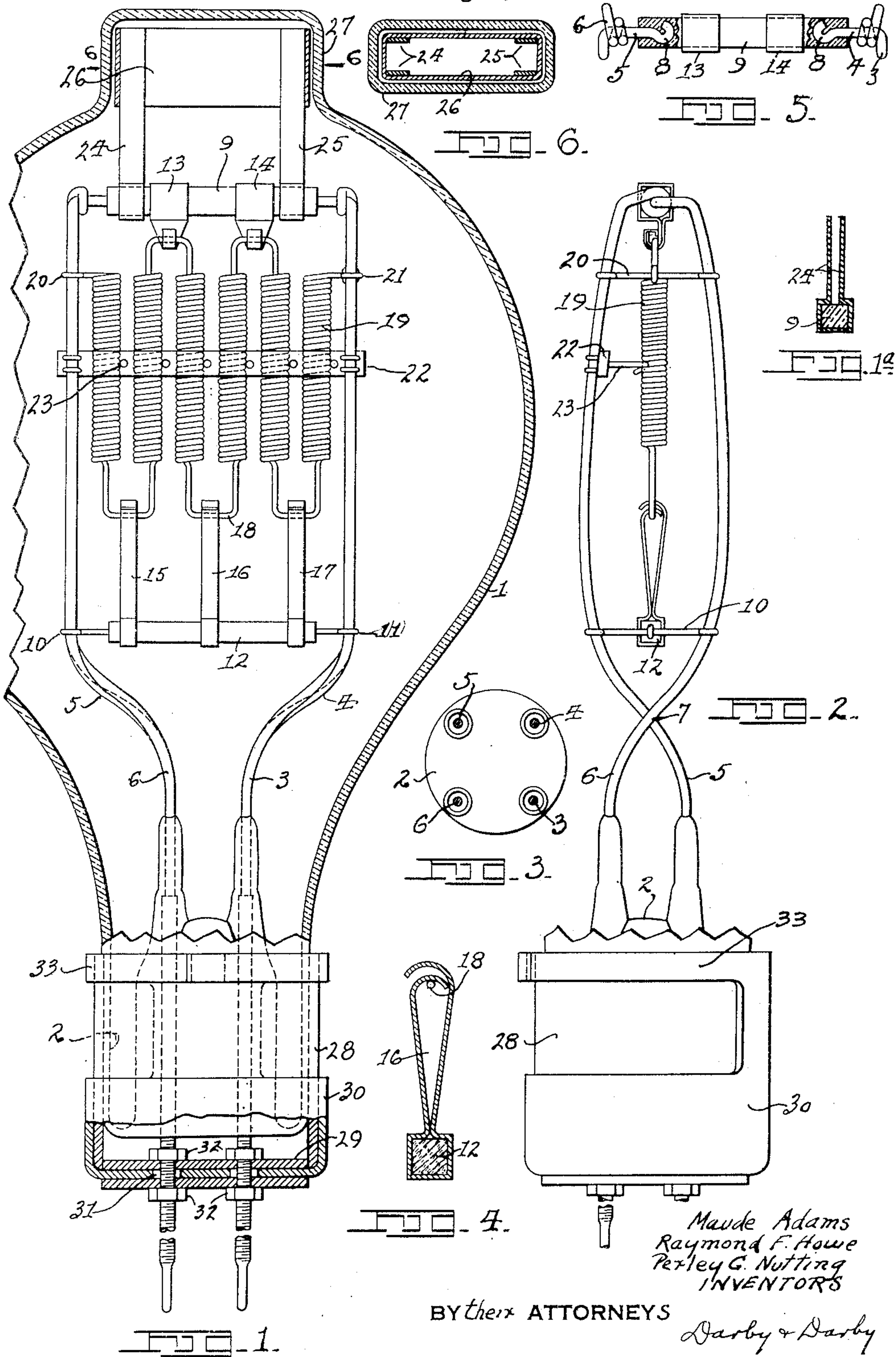
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ILLUMINATING DEVICE

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## UNITED STATES PATENT OFFICE

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## ILLUMINATING DEVICE

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This invention relates to lamp structures, and with particularity to lamps of the high-powered type.

An object of the invention is to provide a high-powered incandescent lamp which is efficient in use, and which is of rugged construction.

A feature of the invention resides in the methods and means for supporting the turns of a relatively heavy coiled filament against sagging, and also means for supporting the filament assembly as a whole.

A further feature of the invention relates to a high-powered lamp employing a long coiled filament, having means for supporting the filament at opposite ends and also at its central portion.

A still further feature relates to the details of construction which go to make up a commercially practicable high-powered lamp.

While the advantages of the invention find their greatest application in lamps of 10 or more kilowatts capacity, it will be understood that the invention is capable of embodiment in smaller size lamps.

Other features and advantages not specifically enumerated will be apparent after a consideration of the following detailed descriptions and the appended claims.

Referring to the drawing:

Fig. 1 shows a portion of a lamp according to the invention.

Fig. 2 is a detailed view showing one of the side supports for the filament.

Fig. 3 is a detailed view showing the arrangement of the lead-in wires.

Fig. 4 is a detailed view of one of the anchoring members for the lower portion of the filament.

Fig. 5 is a detailed view showing the manner of uniting the upper ends of the side supports.

Fig. 6 is a sectional view taken along the line 6—6 of Fig. 1.

Referring more particularly to Fig. 1 there is shown a high powered incandescent lamp of the type disclosed in the co-pending application of Raymond Howe Serial No. 362,977 filed May 14, 1929. This lamp comprises an evacuated envelope 1 which may be of any

desired shape preferably altho not necessarily cylindrical or spherical. The material of the envelope is preferably altho not necessarily, of high heat resistant material such as Pyrex glass or the like. The envelope 1 terminates at its lower end in a re-entrant portion 2 through which pass the four lead-in wires 3, 4, 5, 6. The wires or rods 5 and 6 converge towards each other and cross at the point 7 as indicated in Fig. 2. At this point the wires may be welded or otherwise fastened together in any suitable manner. After crossing each other the wires 5 and 6 continue upwardly and preferably, altho not necessarily, these wires are bowed outwardly from each other to provide a frame. Wires 5 and 6 again cross each other at their upper ends, and one of these wires for example the wire 6, is twisted around the wire 5 at which point the wires may again be welded or otherwise fastened together. The wire 5 however is bent at right angles to itself and its end is hooked as indicated by the numeral 8 Fig. 5. The other pair of wires 3 and 4 are bent in the same manner as the wires 5 and 6 and thus provide a frame support similar to the said wires 5, 6. The hooked ends 8 of the wires 4 and 5 are embedded in a block of insulation 9 such as zirconia or the like. The block 9 therefore forms a tie member for the upper ends of the frame members. Extending across the wires 5, 6, is a rod 10 which is of heat resistant metal such as tungsten molybdenum or the like, the rod 10 is preferably welded or otherwise fastened to the wires 5, 6. A similar rod 11 extends across the wires 3, 4.

Supported by the members 10, 11 is a block of insulation material 12 preferably, although not necessarily of zirconia or other heat resistant material. Supported by the insulation block 9 are two filament supporting hooks 13, 14. These hooks are preferably made out of strip metal such as tungsten or molybdenum and are wrapped around the block 9 as shown in the drawing (Fig. 1). Supported by the lower block 12 are three filament anchoring members 15, 16 and 17 which likewise may be made out of strip metal and surround the said block 12, as shown



clearly in Fig. 4. Each of the members 15, 16 and 17 may be made with the ends overlapped so as to enable the filament portion 18 to be expeditiously assembled and also to prevent the filament slipping out of the anchoring member. The filament proper is preferably in the form of a closely wound wire helix of tungsten or other similar metal, and comprises a series of similar sections preferably, altho not necessarily, connected in series. The free ends of the coiled filament are connected to the members 20 and 21 which latter members are similar to the members 10 and 11. Preferably also the ends of the filament are welded to the members 20 and 21 thus insuring adequate support for the end sections of the filament. The intermediate sections of the filament are supported mainly, altho not entirely by the members 13 and 14. Attached to the wires 3 and 6 is a block 22 of insulation such as zirconia or the like. This block carries a series of metal projections 23 which are adapted to be fastened to the respective sections of the coiled filament, it being understood that there is provided one of the projections 23 for each section of the filament. Preferably the members 23 are welded to the middle turn of each of the associated filament coils, thus insuring that the middle portion of the whole filament is adequately supported.

In many cases the lamp is required to be used in a non-vertical position and it has been found that unless special precautions are taken the filament assembly because of its weight, and also because of incidental jars or vibrations, many times becomes loose and breaks the portions of the envelope where the wires 3, 4, 5 and 6 are sealed in. For the purpose of preventing this happening the upper end of the filament assembly is supported from the upper end of the lamp envelope. As shown in the drawing the insulation block 9 carries a pair of uprights 24 and 25 which may be of tungsten, molybdenum or other similar metal. Each of the uprights may be in the form of a strip of metal wrapped around the block 9 as indicated in Fig. 1a. Fastened to the upper ends of the uprights 24 and 25 is a collar 26 also of heat resistant material such as tungsten, molybdenum or the like. Preferably the member 26 is welded to the uprights 24 and 25.

As will be seen from an inspection of Fig. 1, the lamp envelope 1 is provided with a rectangular constricted portion 27 to receive the member 26 and for this purpose the portion 27 is of slightly larger dimensions than the said member 26 to allow for the normal expansions and contractions thereof. However the member 26 through the intermediary of members 24, 25 and 9 effectually limits the extent to which the filament assembly as a whole may tilt. Consequently the lamp may be used in a horizontal position without there

being any danger of the filament and its assembly breaking the glass at the seal-in.

When the lamp is to be used with a plug in socket the lower constricted end of the envelope is provided with a suitable base 28 in the form of a metal cap or cup through which the wires 3, 4, 5 and 6 pass. The base 29 of the cap 28 is preferably of insulation so as to prevent short-circuiting.

If desired the base 28 may be made entirely out of insulating material such for example as is the common practice in the radio tube art. However in the case of high-powered lamps it is necessary to provide a base which has a certain amount of flexibility. For this purpose the base portion 28 may be further enclosed in a metal member 30 the lower portion of which is in the form of a cup surrounding the base 28. Of course the bottom of the member 30 is perforated to allow the wires 3, 4, 5 and 6 to pass therethrough. Preferably also the perforations in the bottom of member 30 are considerably larger than the diameter of the wire so as to preclude short-circuiting. In order that the wires may be held in place properly, the lower ends thereof may be threaded and fastened in place with suitable locknuts 32. The upper portion of the member 30 is in the form of two partially overlapping fingers 33 which surround the base 28, but allow the lamp as a whole to tilt slightly with respect to the base or receptacle into which the lamp is plugged.

For detailed descriptions of the separate features disclosed in the drawing reference may be made to the copending applications of Raymond Howe Serial No. 362,977 filed May 14, 1929; Raymond F. Howe Serial No. 543,034 filed June 9, 1931; Maude Adams-Raymond F. Howe-Perley G. Nutting, Serial No. 549,660 filed June 9, 1931. However it is understood that various modifications may be made without departing from the spirit and scope of the invention.

What is claimed is:

1. A high-powered lamp comprising an evacuated envelope, an incandescent member in the form of a coiled filament having a plurality of sections arranged in parallel rows, means for supporting all said sections from both ends of the envelope, and means for supporting each section intermediate its ends.

2. A lamp according to claim 1 in which the filament sections are in substantially the same plane, and the means for supporting the filament includes a pair of frame members arising from one end of the envelope, and a member adapted to engage the opposite end of the envelope to limit the tilting movement of said frame members.

3. A high-powered lamp having an evacuated envelope, a pair of frame members arising from one end of the envelope, a pair of insulation frame members extending across



5 said first-mentioned members, a filament in the form of a plurality of coil sections arranged in parallel rows, said filament being supported by said frame members, a projection from the upper one of said insulation members and adapted to engage the upper end of the envelope to limit the tilting movement of the filament as a whole, and means engaging each section of the filament intermediate its ends to prevent sagging within the filament.

10 4. A lamp according to claim 3 in which each of the first-mentioned frame members consists of a pair of crossed wires of heat resistant material.

15 5. A lamp according to claim 3 in which each of said insulation members is of zirconia.

20 6. A lamp according to claim 3 in which the upper end of the envelope is provided with a constricted portion to receive said projection.

25 7. A high-powered lamp comprising an evacuated envelope having a lower re-entrant portion and an upper constricted portion, a pair of uprights sealed into said re-entrant portion, a sectional coiled filament adapted to be supported by said uprights, the electrical ends of said filament being welded to said uprights, a pair of insulation tie members extending across said uprights, a pair of hooks carried by each tie member for engaging the filament at opposite ends to allow the filament to expand and contract and at the same time supporting the filament against  
30 collapsing, a third tie member of insulation extending across said uprights adjacent the center part of the filament, means for anchoring the central part of each filament section to said third tie member, and means  
35 carried by the uppermost one of said pair of tie members and adapted to engage the constricted end of the envelope to limit the tilting of the filament as a whole.

40 In testimony whereof I have hereunto set my hand on this 23rd day of July A. D., 1931.

MAUDE ADAMS.

RAYMOND F. HOWE.

45 In testimony whereof I have hereunto set my hand on this 1st day of August A. D.,  
50 1931.

PERLEY G. NUTTING.