F. G. KEYES.

TERMINAL CONNECTION FOR ELECTRIC LAMPS.

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1,161,822.

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Fig. 1

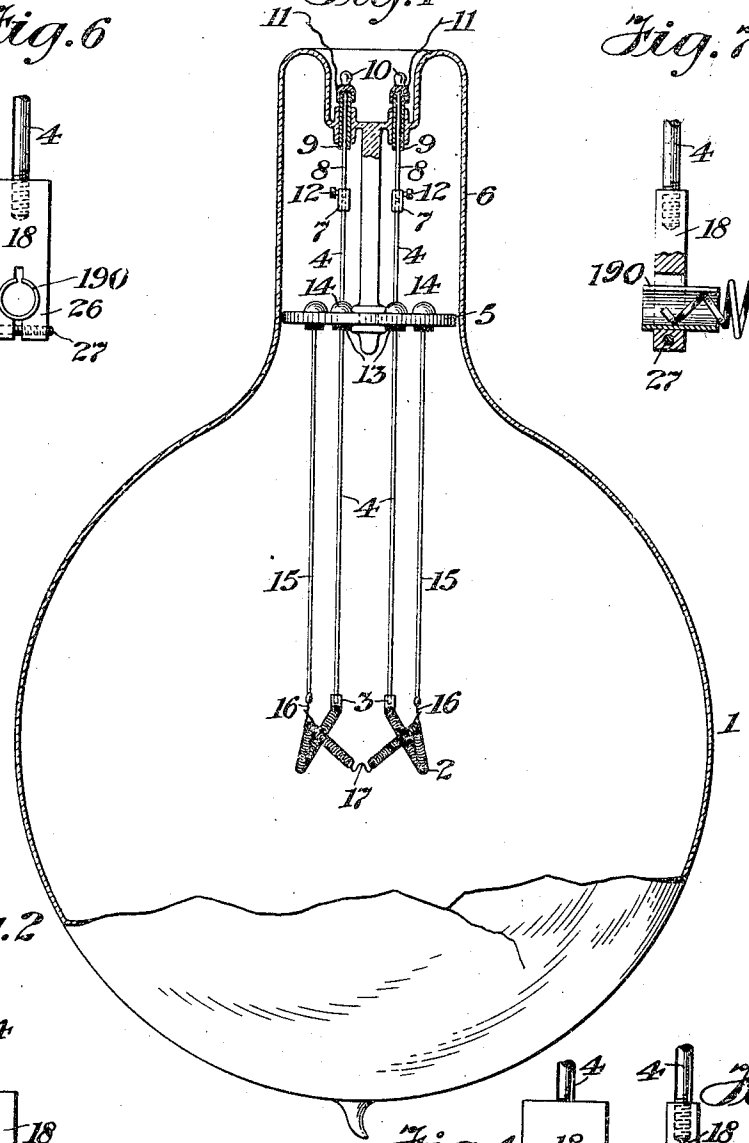


Fig. 6

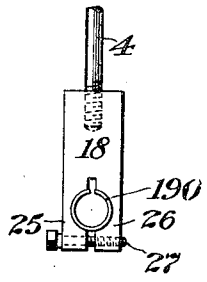


Fig. 7

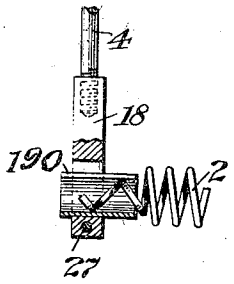


Fig. 2

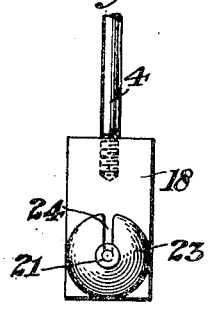


Fig. 4

Fig. 5

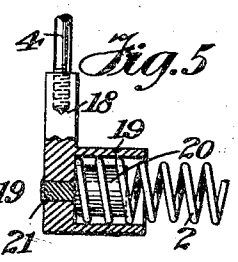
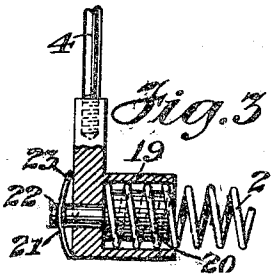


Fig. 3



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TERMINAL CONNECTION FOR ELECTRIC LAMPS.

1,161,822. Specification of Letters Patent. Patented Nov. 23, 1915.

Application filed February 11, 1914. Serial No. 818,004.

To all whom it may concern:

Be it known that I, FREDERICK G. KEYES, a citizen of the United States, and resident of East Orange, county of Essex, State of New Jersey, have invented certain new and useful Improvements in Terminal Connections for Electric Lamps, of which the following is a specification.

In my applications numbered 811,002 and 811,003 filed in the United States Patent Office on January 8th, 1914, I have shown and described tungsten electric lamps provided with large filaments capable of carrying 20 or 30 or more amperes of current and appearing in the form of spirals, the ends of which are attached to heavy metallic leads within the lamps. In the same application I have disclosed terminal connections of a certain character between the filaments and the lead wires. The terminal connections shown in the said applications are adapted to form permanent junctions between the parts named and have been found to serve the purpose adequately.

The connections shown in the present application may be substituted for the permanent junctions mentioned, although they are readily replaceable in case of need. The special adaptability, however, of the terminal connections herein described is to use as detachable junctions, as will presently be described.

In some instances it may happen that the filament is broken or far reduced in diameter from the spattering off of filament particles as to render its replacement necessary. To accomplish this without taking apart the lamp, the present special mode of connecting the filament to the leads has been devised and adopted. To this end, the lamp globe may be opened up at the bottom or some suitable part thereof and the method of connecting the filament and the leads may be used.

My invention is illustrated in the accompanying drawings in which—

Figure 1 is a vertical section through the main body of a tungsten electric lamp, the lower part of the globe being shown without section lines; Fig. 2 illustrates one form of terminal connection, in end view; Fig. 3 shows a section of the same connection in a view taken at right angles to that shown in Fig. 2; Figs. 4 and 5 are, respectively, front and side views of a second form of terminal connection; Fig. 6 is a side view of another form of connection and Fig. 7 is a sectional view of the same connection taken at right angles to the view in Fig. 6.

It will be understood that the filament itself, besides being supported by the terminal connections shown is also supported at different points in its length by anchor rods, as will be hereinafter described.

Referring to the drawings, 1 is a lamp globe within which is mounted a tungsten filament, 2, joined by terminal connections, 3, 3, to leads, 4, 4. The leads are carried up through a diaphragm, 5, which may be of porcelain or of aluminum, but is here shown as a metallic diaphragm, preferably aluminum. This diaphragm is supported near the mouth of a tubular portion, 6, of the globe, 1, the object being to shut off from the tubular extension and from the lamp seals near the top thereof all unnecessary heat. The leads, 4, 4, after passing up through the diaphragm, 5, are shown as being provided with sockets, 7, 7, suitably secured thereto and having any convenient depth. Into these sockets extend copper leads, 8, 8, which form mechanically a part of the seals of the lamp. The leads 8, 8 pass through platinum tubes, 9, 9, steadying the main conducting portion of the lamp seal. On the outer ends of the tubes 9, 9 are placed iron caps, 10, 10, which are welded to the tubes 9, 9 and the rods 8, 8 by means of an oxy-acetylene flame. The external leads may be copper wires, 11, 11, fused or soldered to the caps, 10, 10, as shown.

The seals are made within a reëntrant portion of the tubular extension, 6, whereby the danger of fracture from mechanical causes is reduced. The tubes 9, 9 are sealed within said reëntrant portion. The entire interior of the lamp is then sealed off from exposure to the external air and a thoroughly efficient mode of sealing is provided. To join the leads 4, 4 and the leads 8, 8, set screws, 12, 12, may be provided as one convenient means. The leads 4, 4, where they pass through openings in the diaphragm 5,

being surrounded by tubes, 13, 13, of quartz; and the entire inner space is then packed with a suitable cement, 14, such as might be formed by a mixture of ground silica and sodium silicate. This prevents the contact of the leads with the aluminum disk and this obviates the danger of short circuiting between said leads. By the same construction, anchor rods shown at 15, 15 are supported in the disk and insulated therefrom and from the leads 4, 4. The said anchor rods may be of iron, but are preferably provided with tips, 16, 16, of tungsten wire sealed to the iron rod and bent around at its outer end so as to surround completely or partially portions of the tungsten spiral 2.

I have found in practice that a long spiral of heavy tungsten wire has a tendency to sag and, for this reason, it is of advantage to spread the spiral at the points where the sagging is likely to take place as shown at 17. This prevents the coils of the spiral from coming into contact with each other at the sagging points. Similar spreading portions may be assumed at the lower part of every sagging portion shown in Fig. 1.

As indicated above, one element of the present invention is that of providing detachable end connections between the filament 2 and the leads 4, 4. The filament having been prepared and drawn or wound in the manner illustrated in Fig. 1, the detachable terminals may be selectively applied to the ends of the filament and the lower ends of the lead, as will now be described.

Referring to Figs. 2 and 3, the lower end of one of the leads 4 is represented as being screw threaded and secured to a block or plate 18 of metal provided with a tubular side portion, 19, preferably integral with the plate 18. Inside the tube 19 is a cylinder, 20, having a shank, 21, provided with an annular slot, 22. The cylinder may be conveniently held within the tube 19 by means of a disk, 23, which is preferably dished, as shown, and provided with a slot, 24, which may be caused to slide over the reduced portion of the shank 21 and press, at its outer edges, against the side of the plate 18. In this way a firm connection is made between the cylinder 20 and the plate 18. Before the cylinder is put in place within the tube 19, several turns of the spiral tungsten filament 2 are wound around it, making good electrical connection with it. Thus, the end of the filament is electrically connected to the plate 18 and to the lead 4 in a handy and convenient manner. As stated this may be a form of connection designed for use for all purposes; but it is found to be particularly useful in making terminal connections through the bottom of the lamp globe 1 when a new filament is to be put in the place of a broken or otherwise imperfect one, it being true that where heavy filament like that shown at 2 are made use of, the lamp globe is necessarily of considerable size, permitting an opening from below to be made and manipulations to take place therethrough for making the necessary connections.

The form of end connection shown in Figs. 4 and 5 differs from that already described mainly in the detail relating to the attachment of the shank 21 to the plate 18. Fig. 4 is a view taken from the right in Fig. 5 and showing in full lines the ends of the tube 19 and the cylinder 20. Here the shank is passed for a comparatively short distance through the plate 18 and is welded thereto by any suitable process. The result is much the same as in the case of the connections shown in Figs. 2 and 3.

A joint having certain advantages is illustrated in Figs. 6 and 7. The part, which in Figs. 2, 3, 4 and 5 is called a tube, is here also shown tubular in shape but provided with a longitudinal slot making it correspond somewhat to a split ring. I have identified this by the numeral 190. The end of the tungsten filament 2, in this instance, extends inside the ring 190, and the ring itself lies between legs or extensions, 25 and 26, formed on the lower part of the plate 18. The said legs or extensions are traversed by a screw bolt, 27, which may be tightened so as to close the open slot in the ring 190 and at the same time provide a good connection between the last named part and the end of the tungsten filament 2. The contrivance last shown may be easily manipulated or it may be used for the permanent junction between the leads and the ends of the tungsten spiral.

In Figs. 2, 3, 4 and 5 the cylinder may be smooth or may be threaded to correspond to the loops of the tungsten spiral which surrounds it. When the connection shown in Figs. 4 and 5 is used, the old broken or worn out filament may be detached by melting the outer portion of the shank 21 and withdrawing the filament and the plug. The restoring of the parts after the insertion of the new filament may be accomplished from the outside by introducing a small special oxy-acetylene torch to weld the supporting plate and the shank 21 together.

I claim as my invention:

1. In a metallic filament lamp, a spiral filament of tungsten, terminal junctions therefor, said junctions including a metallic plate and a tubular cylindrical portion integral therewith and at right angles thereto in combination with a cylinder within the tubular portion around which the end of the spiral is wound and a shank for the said cylinder provided with an annular groove, and a split disk within the said groove and bearing at its edge upon the side of the plate.

2. In a metallic filament lamp, a spiral

filament of tungsten, terminal junctions therefor, said junctions including a metallic plate and a tubular portion integral with said plate and at right angles thereto in combination with a cylinder within the tubular portion and a shank passing through the plate and a little beyond the same.

3. In a metallic filament lamp, a spiral filament of tungsten, terminal junctions therefor, said junctions including a metallic plate and a tubular cylindrical portion integral therewith and at an angle thereto in combination with a cylinder within the tubular portion around which the end of the spiral is wound and a shank for the said cylinder provided with an annular groove, and a split disk setting within the said groove and bearing at its edge upon the side of the plate.

4. In a metallic filament lamp, a spiral filament of tungsten, terminal junctions therefor, said junctions including a metallic plate and a tubular portion integral with said plate and at an angle thereto in combination with a cylinder within the tubular portion and a shank passing through the plate and a little beyond the same.

Signed at New York in the county of New York and State of New York this 10th day of February, A. D. 1914.

FREDERICK G. KEYES.

Witnesses:

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