No. 860,601. PATENTED JULY 16, 1907.

C. GLOGAU.

ARRANGEMENT OF THE FILAMENT FOR HIGH VOLTAGE INCANDESCENT ELECTRIC LAMPS OF HIGH EFFICIENCY.

APPLICATION FILED MAY 17, 1907.

4 SHEETS—SHEET 1.

Fig. 1.

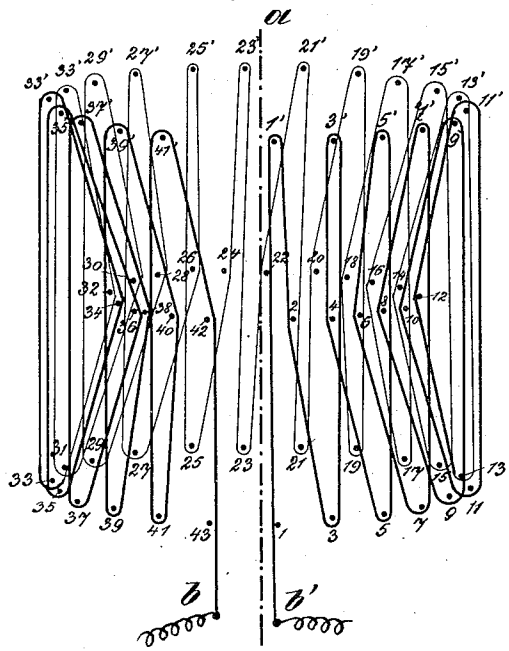


Fig. 3.

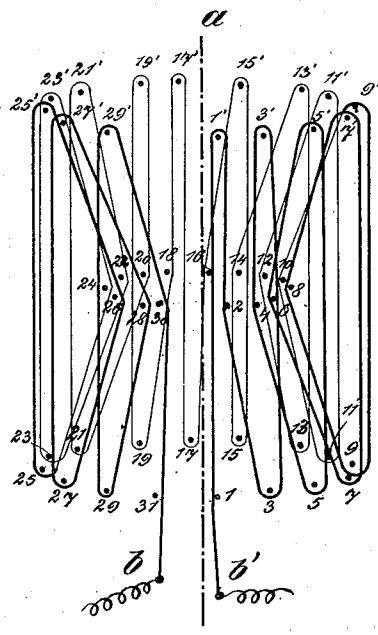


Fig. 2.

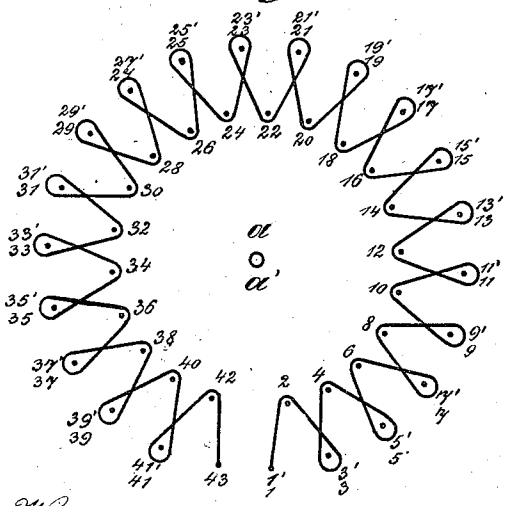
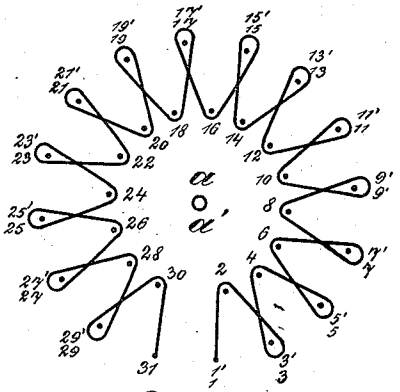


Fig. 4.



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4 SHEETS—SHEET 2.

Fig. 5.

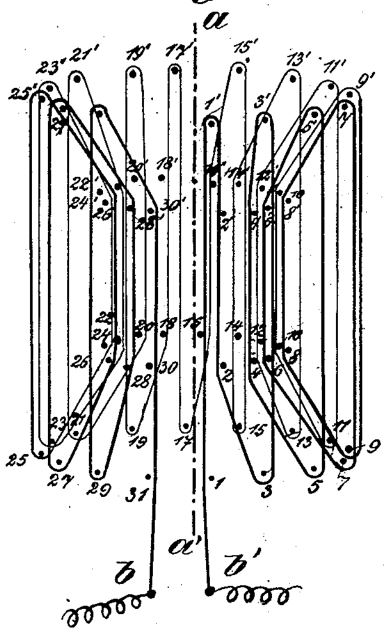
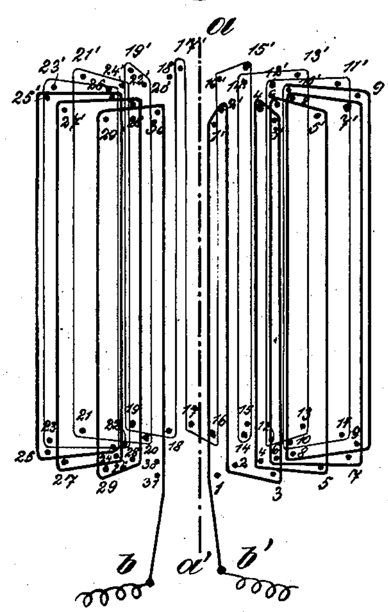


Fig. 7.



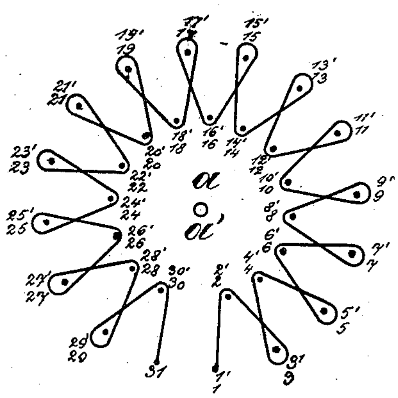


Fig. 6.

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4 SHEETS—SHEET 3.

Fig. 8.

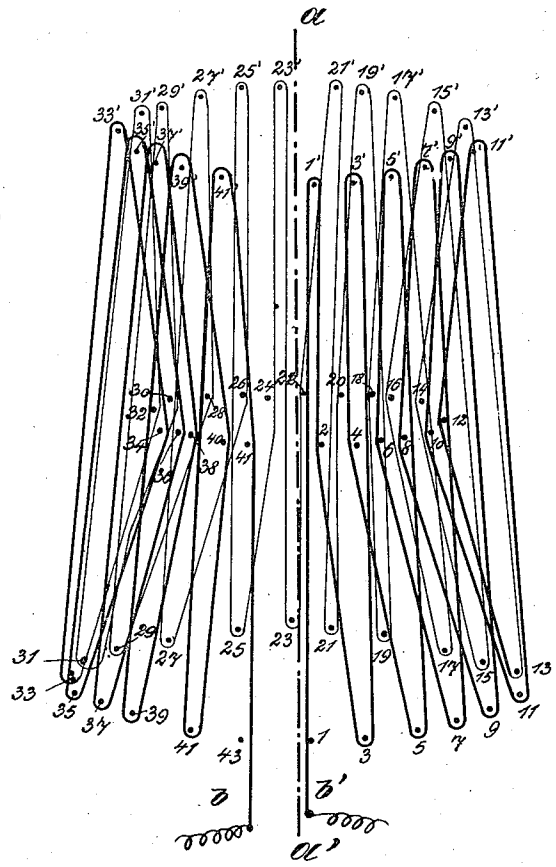
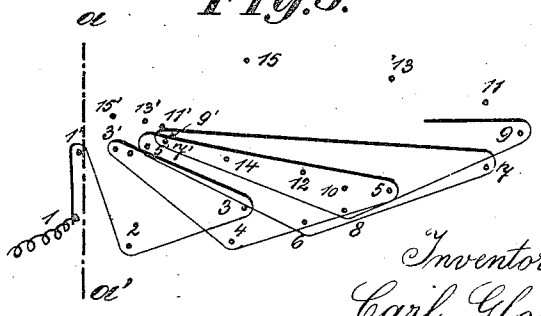


Fig. 9.



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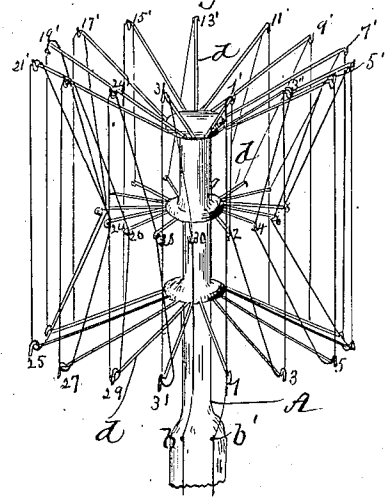
4 SHEETS—SHEET 4.

Fig. 10



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ARRANGEMENT OF THE FILAMENT FOR HIGH-VOLTAGE INCANDESCENT ELECTRIC LAMPS OF HIGH EFFICIENCY.

No. 860,601. Specification of Letters Patent. Patented July 16, 1907.

Application filed May 17, 1907. Serial No. 374,188.

To all whom it may concern:

Be it known that I, CARL GLOGAU, a citizen of Germany, residing at Stuttgart, Seyfferstrasse 59, in the Kingdom of Würtemberg and Empire of Germany, have invented certain new and useful Improvements in the Arrangement of the Filament for High-Voltage Incandescent Electric Lamps of High Efficiency, of which the following is a full, clear, and exact description.

The incandescent electric lamps of high efficiency introduced into commerce hitherto are associated with the drawback that they cannot be manufactured for sufficiently high voltages so as to be applicable for single insertions in electric installations up to 300 volts, and yet retain the usual dimensions of the well-known pear shaped globe. On account of this drawback the sphere of application for high efficiency lamps is a limited one, and particularly in electric installations with high lighting voltage. This disadvantage is removed by the present invention. In the tantalum lamps, the filament is wound to and fro in a well know manner between two circular series of points of attachment and with higher voltages necessitates a greater length of filament. The neighboring filament parts in such cases approach very near to one another and on account of the shortening of the filament occurring during the burning, such pointed angles form at the points of support, that in time neighboring filament parts can easily touch one another. The present invention permits a far greater length of filament to be used without the filament parts approaching nearer to one another during the burning at the point of support as is the case with the above mentioned tantalum lamps up to 120 volts.

This invention consists of an improved arrangement of the filament and of the points of support for the filament of an incandescent electric lamp, in which the supports are arranged in circular series of different diameter and the filament wound spirally and continuously upon or over the supports from terminal to terminal, the points of support of the series of larger diameter alternating with those of smaller diameter whereby the filament strands are separated such distance as to avoid contact with each other when the filament varies in length.

When the supporting points are located in circles assumed and shown as at the base and summit of imagined conical figures the distance of the supporting points, or summits of the conical figures from the base may be infinitely great, or infinitely small.

The drawing represents different arrangements or modifications of the incandescent filament all within the scope of the invention.

Figure 1 illustrates in perspective a filament with points indicating three circular groups of supports two of said groups being of equal diameter, and the third of smaller diameter. Fig. 3 is a perspective view of a filament similar to that shown in Fig. 1 but of less length. Figs. 2 and 4 are plan views respectively of the filaments shown in Figs. 1 and 2. Fig. 5 is a perspective view of a filament in which the supporting points are arranged in two smaller and two larger circles, the smaller circles being in different horizontal planes from the larger. Fig. 6 is a plan of the filament shown in Fig. 5. Fig. 7 is a perspective view of a filament in which the supporting points are in two larger and two smaller circles, the latter being in the same horizontal plane with the adjacent larger circle. Fig. 8 is a perspective view in which the filament is arranged to form a frustum of cone. Fig. 9 is a plan view of a filament arranged in a horizontal plane. Fig. 10 is a perspective view of a filament with its three groups of supports, corresponding to the arrangement shown in Fig. 2, the supports being shown as projecting radially from a central stem.

In Fig. 1 the points of support 1, 1′, 3, 3′, 5, 5′, 7, 7′, etc., are arranged in circular series of the same diameter, while the second series of supports 2, 4, 6, 8, 10, etc., are in a circle of less diameter than the others. In order to obtain greater angles in passing the filament over from one circle of supports to another, two smaller circular groups of points of support can be provided as shown in Fig. 5 and when right angles are desired each smaller circle may fall in one horizontal plane with a group or circle of supports of larger diameter as shown in Fig. 7.

In Fig. 1 an example of the invention is shown in which a length of filament of 1260 millimeters is used. The incandescent filament starts on one current leading point or terminal *b′*, runs then to a point of support of the lower, larger circular series, from here to an upper point of support denoted in the example shown at 1′, of the upper larger circular series, and is then led towards the smaller circle of supports, in this case to the point of support 2 and so forth over 3, 3′, 4, 5, 5′, etc., until the filament has reached another current leading point or terminal *b*. It can be seen from the plan of this lamp given by way of example in Fig. 2, that, firstly, the parts of the filament in the outer surface of the skeleton cylinder formed by the filament do not approach nearer to one another than the distance between two neighboring filament parts of the previously mentioned tantalum lamps for 120 volts. Secondly, that in the inner surface, forming the skeleton of two truncated cones placed summit to summit, the filament parts approach one another most nearly at the points

of support, and diverge towards the outer skeleton cylinder.

Fig. 3 of the drawing represents as a further example a form of construction with a filament of 650 millimeters length in which arrangement contrary to the existing tantalum lamp the compact arrangement of the filament winding is remarkably conspicuous, although as is obvious from the plan shown in Fig. 4 the neighboring filament parts are no further from one another than in Fig. 2.

It is to be understood that the lamp is similar to the tantalum or tungsten lamp, except as to the structure and arrangement of the filament supports, and the described arrangement of the filament winding. The filament may be either made of tantalum, tungsten or other well known material and the supports *d* made of suitable material attached to a glass stem A, in the base of which is embedded the leading wires.

I claim:

In a high voltage incandescent electric lamp having a plurality of series of supporting points arranged in several circles of larger and smaller diameter, a filament wound continuously and spirally over the supporting points of the several series, and forming two series of circularly disposed strands one within the other, the inner strands alone engaging the supporting points of the circle of smaller diameter.

In witness whereof, I subscribe my signature, in presence of two witnesses.

CARL GLOGAU.

Witnesses:
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HENRY H. MORGAN.