O. KRAUSE.

ARRANGEMENT OF INCANDESCENT FILAMENTS IN ELECTRIC METAL FILAMENT LAMPS.

APPLICATION FILED JAN. 10, 1910.

1,069,707.

Patented Aug. 12, 1913.

2 SHEETS—SHEET 1.

Fig. 1.

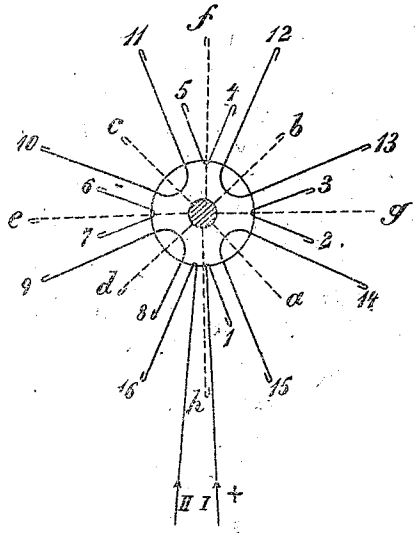
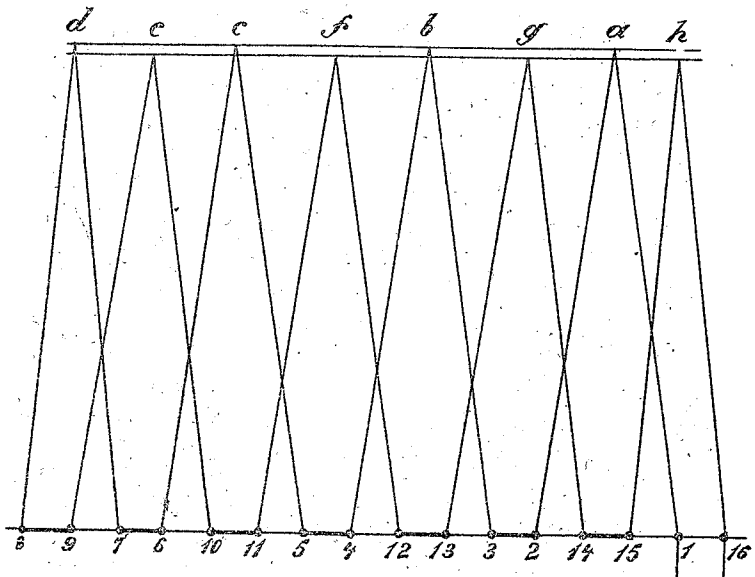


Fig. 2.



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2 SHEETS—SHEET 2.

Fig. 3.

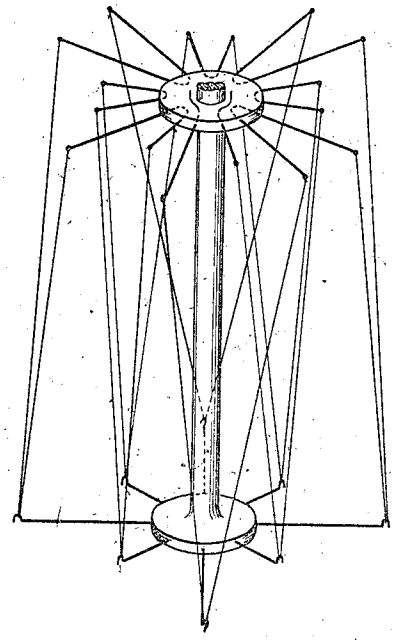
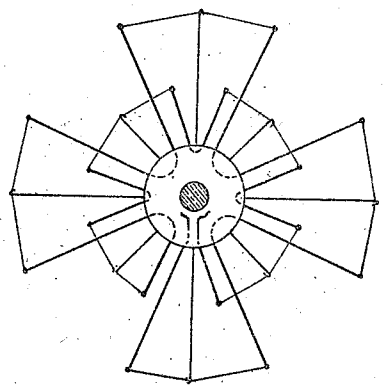


Fig. 4.



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OTTO KRAUSE, OF BERLIN, GERMANY, ASSIGNOR TO DEUTSCHE GASGLÜHLICHT A. G. (AUERGESELLSCHAFT), OF BERLIN, GERMANY, A CORPORATION OF GERMANY.

ARRANGEMENT OF INCANDESCENT FILAMENTS IN ELECTRIC METAL-FILAMENT LAMPS.

1,069,707. Specification of Letters Patent. Patented Aug. 12, 1913.

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To all whom it may concern:

Be it known that I, OTTO KRAUSE, a subject of the German Emperor, and a resident of Hohenlohestrasse 9, Berlin, Germany, have invented a certain new and useful Improvement in the Arrangement of Incandescent Filaments in Electric Metal-Filament Lamps, and do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawing, and to letters of reference marked thereon, which form a part of this specification.

My invention relates to the arrangement of incandescent filaments in electric lamps in such a manner that great lengths of filament can be satisfactorily put in a small space, and lamps for high voltage thus made very compact, that the risk of short circuits may be greatly reduced, that the lamp may be made capable of operating with the above advantages in any position and adapted for service in which it is subject to vibration and shocks, and that various other advantages may be secured.

I have hereinafter specifically described and illustrated my invention as embodied and applied in a lamp having a plurality of separate hair-pin filament loops connected together by current leads, the lamp being of the type in which a number of portions of incandescent filament, each forming, as it were, a single luminous line (a filament loop of course comprises two such portions of filament), extend between suitably separated sets of supporting devices carried by a supporting member about which they are grouped in proximity to one another.

It has been found necessary in the manufacture of metal filament lamps to use a large number of filaments in order to produce lamps suitable for high voltages. If now these lamps are used in an oblique position there is a risk of the filaments bending and coming in contact with one another, and the more filaments there are the greater is this risk. The contacting of the filaments produces a short circuit and destroys the lamp. According to the present invention, in order to avoid this inconvenience, the filaments are not arranged side by side as heretofore, but in two rows one behind the other, so that the shanks of the filaments are disposed so as to give a considerably wider space between the filaments than heretofore, and so avoid contact. This result is obtained by making the current leads in the inner row shorter than the leads forming what may be called the outer row.

The arrangement is illustrated diagrammatically in Figure 1. The lamp is shown in elevation in Fig. 2, unrolled as it were. Fig. 3 shows a perspective view of the filament holder formed by the member and supporting devices above referred to, with the filament strung in place, and Fig. 4 a top view thereof.

In the drawing the current enters and leaves at I and II respectively or vice versa. One shank of the first filament for the inner row is secured to the hook 1, and the other end to the hook 2, the second filament to hooks 3 and 4, the third to hooks 5 and 6, the fourth to hooks 7 and 8, the fifth to hooks 9 and 10, the sixth to hooks 11 and 12, the seventh to hooks 13 and 14 and the eighth to hooks 15 and 16. It will be seen, therefore, that the shank portions of the filaments form two concentrically arranged circular or tubular illuminating surfaces

What I claim as my invention is:

1. An incandescent electric lamp containing two concentrically arranged substantially circular illuminating surfaces composed respectively of filaments, the filaments of the outer circle being connected in series along the line of said circle and the filaments of the inner circle being connected in series along the line of said inner circle, the two circles of filaments being connected in series.

2. An incandescent electric lamp containing a central support, a series of arms projecting therefrom of approximately equal length, filamentary illuminating bodies carried by said arms and thus arranged in an approximately circular form, a second series of arms projecting from said support also of approximately equal length but differing in length from the first named series and filamentary illuminating bodies carried by said arms and thus also arranged in an approximately circular form of a diameter different from that of the first named circle.

3. In an electric lamp a series of arms having filament engaging portions, said portions being located at approximately equal

distances from the center of the lamp and all lying in approximately the same plane, a second series of such arms located in a different plane, filamentary bodies sustained by the said filament engaging portions and connected with the upper and lower series of said arms respectively and thus forming a substantially tubular illuminating surface; a third and fourth series of arms substantially like those of the first and second series and similarly located but having different lengths than the arms of the first and second series and filamentary bodies connecting said last named arms in the same manner as described with reference to the first and second series of arms, whereby a second substantially tubular illuminating surface is formed.

4. An incandescent electric lamp containing two approximately concentric filament rows, the portions of filament in each row being in series as regards passage of current through them, and the portions of filament in the path of the current as it traverses circumferentially successive portions of filament in each row all lying in that row.

5. An incandescent electric lamp containing two approximately concentric filament rows, the portions of filament in each row being connected in series and each filamentary portion of each row lying wholly within the circumferential lines of the respective concentrics.

6. An incandescent electric lamp containing a plurality of filaments, two sets of filament leads the ends of the leads in said sets lying respectively in circumferences of circles of different diameters, a portion of said filaments being connected by both ends to the leads of one of said sets and the remaining portion of said filaments being connected by both ends to the leads of the second set.

7. An incandescent electric lamp containing a plurality of substantially circular filament rows one within the other, the portions of filament in each row being in series as regards passage of current through them in their circumferential order of succession in the row, and the several filament rows being traversed by current successively.

8. An incandescent electric lamp containing a plurality of filament rows arranged one within the other about a supporting member which carries suitably separated sets of supporting devices between which the portions of filament in said rows extend, the portions of filament in each row being in series as regards passage of current through them in their circumferential order of succession in the row and constituting the entire length of filament in the path of the current as it traverses the row.

9. An incandescent electric lamp comprising filaments, and, supporting said filaments, a plurality of filament leads a certain number of said leads being shorter than the rest and connected in series with each other, the remaining longer leads being also connected in series with each other.

10. An incandescent electric lamp comprising a central support, a set of arms of equal length projecting therefrom, a second set of arms of equal length projecting therefrom, the arms of each set being electrically connected in series and the sets being electrically connected in series, filament loops forming part of said electrical connections, the ends of certain of said filament loops being connected with the extremities of adjacent arms of the first set and the ends of the remaining filament loops being connected with the extremities of adjacent arms of the second set and a plurality of filament holders extending from said support and engaging at their extremities with the filaments at a distance from the ends thereof.

In testimony whereof I affix my signature in presence of two witnesses.

OTTO KRAUSE.

Witnesses:
WOLDEMAR HAUPT,
HENRY HASPER.