

No. 886,821.

PATENTED MAY 5, 1908.

H. KUZEL.
ELECTRIC INCANDESCENT LAMP.

APPLICATION FILED JULY 16, 1907.

2 SHEETS—SHEET 1.

Fig. 1.

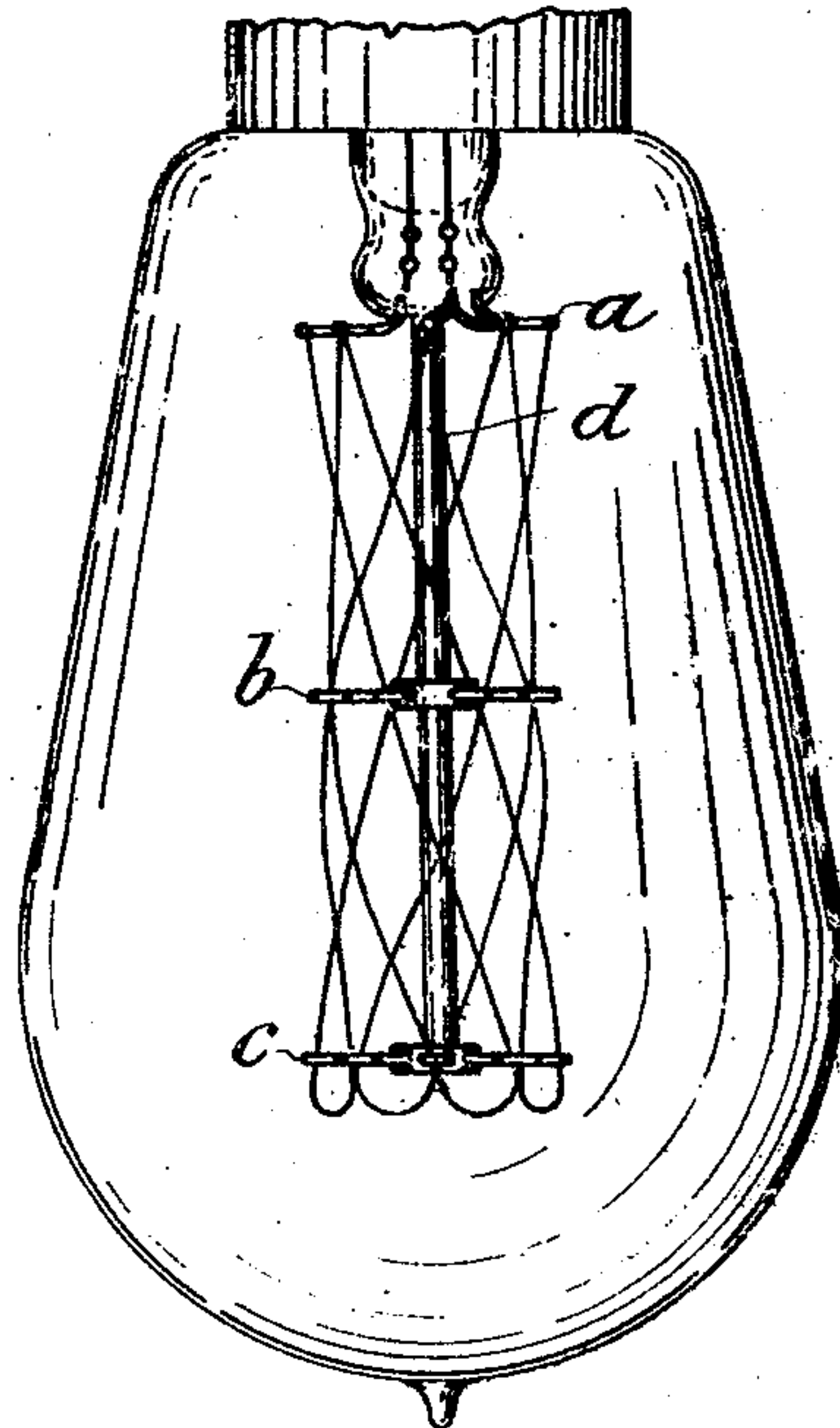
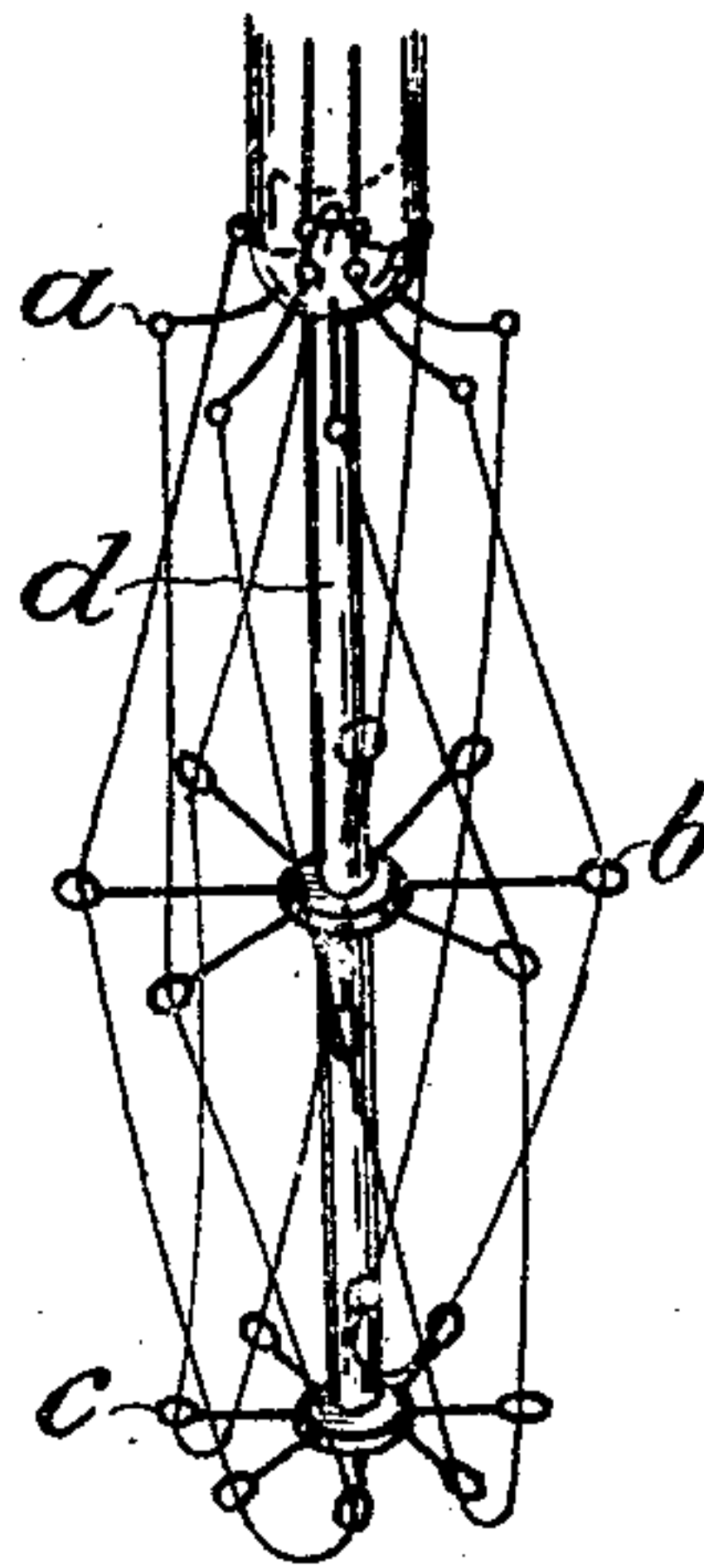


Fig. 2.



WITNESSES

Walter Abbe
L. H. Grote

INVENTOR

Kaus Kuzel
BY

Hanson and Hanson

ATTORNEYS

No 886,821.

PATENTED MAY 5, 1908.

H. KUZEL.
ELECTRIC INCANDESCENT LAMP.
APPLICATION FILED JULY 16, 1907.

2 SHEETS—SHEET 2

Fig. 3.

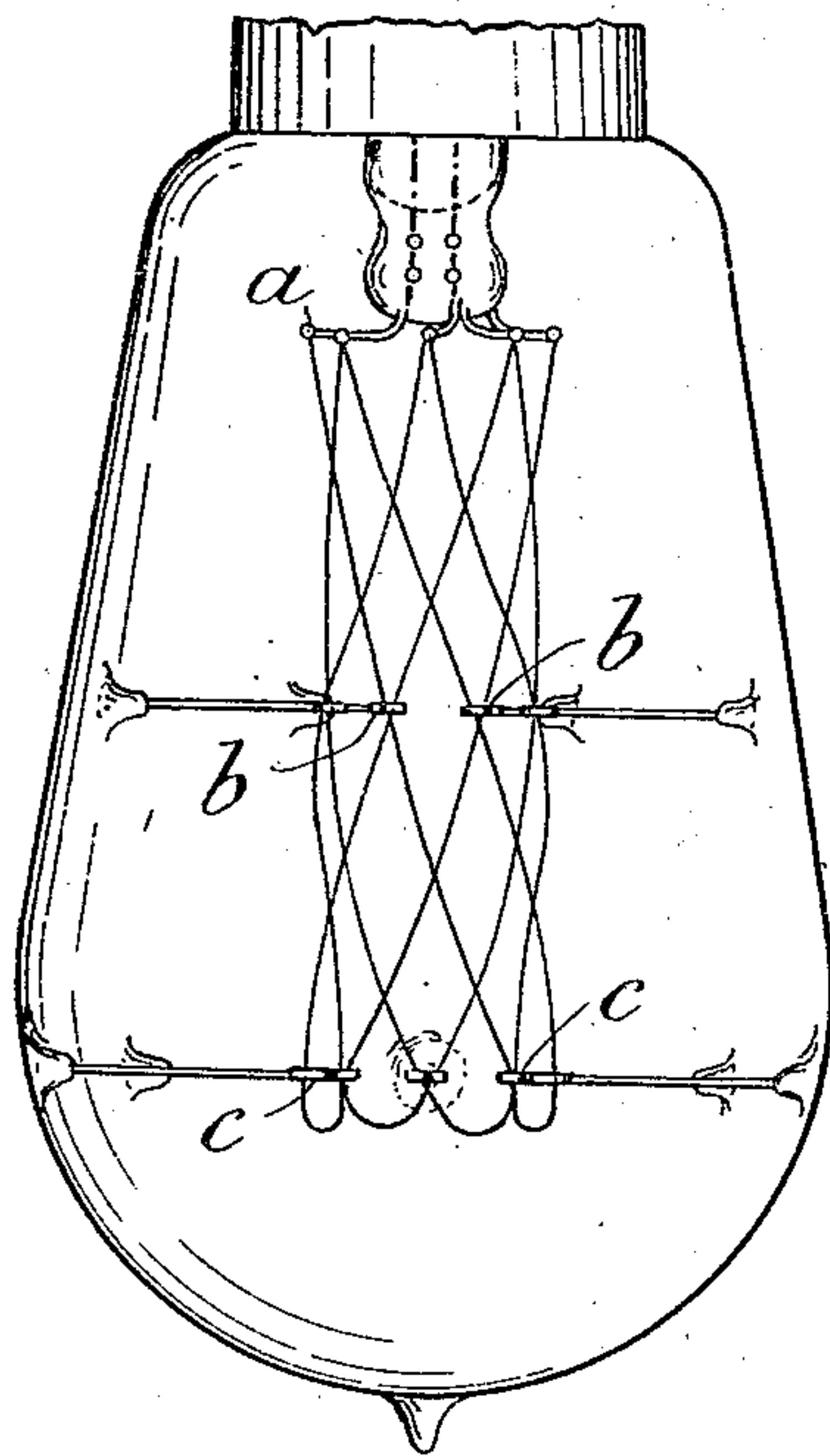
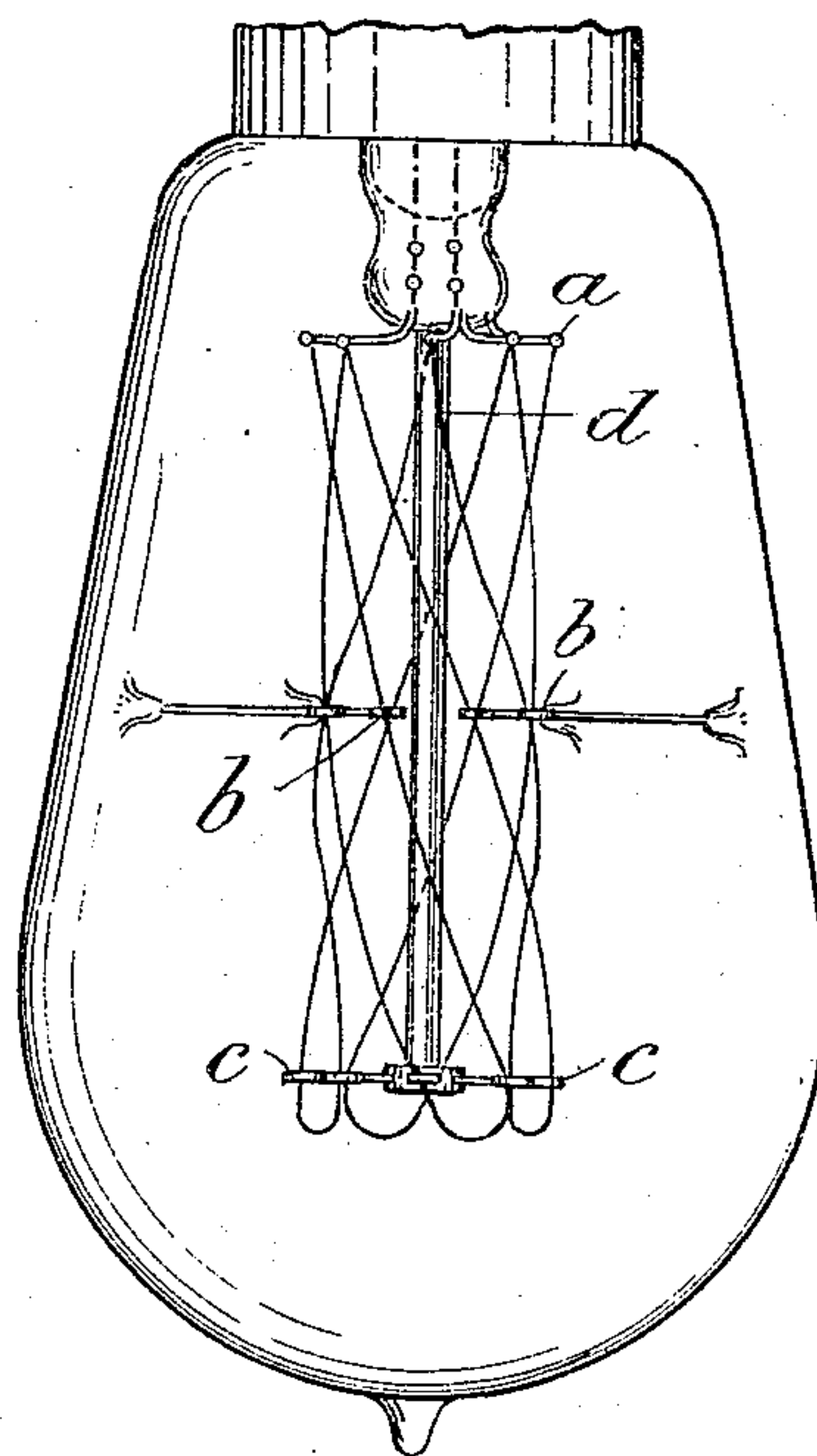


Fig. 4.



WITNESSES

L. H. Grote
M. E. Keir

INVENTOR

Hans Kuzel
BY

Horsman and Horsman

ATTORNEYS

UNITED STATES PATENT OFFICE.

HANS KUZEL, OF BADEN, NEAR VIENNA, AUSTRIA-HUNGARY.

ELECTRIC INCANDESCENT LAMP.

No. 886,821.

Specification of Letters Patent.

Patented May 5, 1908.

Application filed July 16, 1907. Serial No. 383,955.

To all whom it may concern:

Be it known that I, HANS KUZEL, a subject of the Emperor of Germany, and a resident of Baden, near Vienna, Empire of Austria-Hungary, have invented a certain new and useful Electric Incandescent Lamp, of which the following is a specification.

My invention relates to electric incandescent lamps having metal filaments of horseshoe shape, that is, U-shaped or V-shaped, or the like, with the free ends of the legs of the horseshoe connected to the leading-in wires.

The object of my invention is to construct the filaments and so support them in their bulbs as to prevent liability to breakage of the filaments in use and to prevent also such deformations of the loops of the filaments when burning as to cause short circuits.

The object I attain by mounting and holding or supporting the horseshoe filaments loosely with a limited freedom in a bent, or twisted state in which their free movement is beforehand impeded to a certain degree by their position and friction in the holding devices. For this purpose they are supported from a central support or the wall of the bulb by hooks, eyelets, or mere small rods which are so arranged that an imaginary line connecting the successive bearing points of each filament leg is inclined to planes passing through the longitudinal axis of the lamp, and by preference helically or similarly wound.

In the accompanying drawings Figure 1 is a side view of a lamp containing filaments in accordance with my invention; Fig. 2 is a perspective view of filaments with modified arrangement of holding means; Figs. 3 and 4 are illustrations of modifications.

In Fig. 1 the simplest case is assumed that the holding devices *a*, *b*, *c*, for horseshoe filaments are carried by a central support *d* and the filaments are arranged on an imaginary cylindrical surface with their legs in approximately regular helical lines.

The two legs of each filament run approximately parallel the one to the other, and owing to the elasticity inherent in them, they are in contact with their holding devices whereby their free movement is impeded.

On burning the lamp in any desired oblique or upright position it will be seen that the curvatures and distortions due to the impeded free movement of the legs of the fila-

ments are always such that contact between adjacent parts of the filaments is practically prevented.

Instead of having the helically bent horseshoe filaments arranged to describe a cylinder about the axis of the lamp, they may be arranged in the barrel-like form shown in Fig. 2. Again, instead of guiding and supporting the loops of the horseshoe filaments from a central support, they may be guided and supported from the wall of the glass bulb, as by hooks or guide-eyes *b*, *c*, sealed into the wall of the bulb, as shown in Fig. 3. Or there may be a combination of the two ways of supporting the filaments, as indicated for example in Fig. 4, where there is shown a central support carrying guide eyes *c* for the parts of the horseshoes near their bends, while the intermediate eyes *b* are sealed into the wall of the bulb.

After burning a lamp of the construction described, for a short time, in a given position, for instance in the horizontal or the vertical or in any desired inclined position the various parts of the filaments assume between any two supporting points, (as to which the soldering or cementing beads have to be considered) under the action of gravity upon the metal softened by the heat, the form of downwardly directed arcs. If now owing to cooling down on throwing the lamp out of circuit a contraction of the filament takes place, such arcs will compensate for the same being flattened and thereby will prevent the breaking of the filaments. This way of supporting, therefore, on burning the lamp, causes the filaments to assume such positions that simultaneously both of the inconveniences above referred to (breaking of the filaments and short circuiting of the same), are practically avoided, so that the lamps when burned in any desired position show a normal length of life. This is a result of the inclining of the legs of the horseshoe filaments to planes passing through the longitudinal axis of the lamp, so that the yoke-shaped filaments can never hang perfectly, but so that they bear at all times on one point of each holding device whatever may be the position of the lamp. In this way a moderate frictional resistance will result from the weight of the filaments, which prevents the legs of the filaments from moving freely on throwing the lamp into circuit, but owing

to the dilatation due to heating the filaments to incandescence, arcs or beads in the filaments are produced.

Gravity tends to make the legs of the filaments parallel, and thus counteracts any tendency to come into contact with each other in the arrangement set forth. Further, it causes the formation of arc-shaped parts in the filaments which act to compensate and prevent the filaments from breaking on throwing the lamp out of circuit again.

The spiral arrangement of the filament also produces a figure of light pleasant to the eye. Compared with lamps having stretched filaments the advantage is obtained that the longitudinal axis of the bulb may be shorter.

I claim as my invention:—

1. In an electric incandescent lamp, the combination of a horseshoe shaped metal filament having the free ends of its legs fastened to leading-in wires, and a plurality of holding devices within the bulb of the lamp adapted to loosely guide each of said legs longitudinally at a plurality of points, the lines connecting successive holding devices of each filament leg being inclined to planes passing through the longitudinal axis of the lamp and the centers of such holding devices substantially as and for the purpose described.

2. In an electric incandescent lamp, the combination of a horseshoe shaped metal filament having the free ends of its legs fastened to leading-in wires and a plurality of holding devices within the bulb of the lamp adapted to loosely guide each of said legs longitudinally at a plurality of points, the line connect-

ing the centers of successive holding devices of each leg being a helical line, substantially as and for the purpose described.

3. In an electric incandescent lamp, the combination of a horseshoe shaped metal filament having the free ends of its legs fastened to leading-in wires, a central support within the bulb of the lamp and a plurality of holding devices attached to such central support and adapted to loosely guide each of said legs longitudinally at a plurality of points, the lines connecting successive holding devices of each filament leg being inclined to the planes passing through the longitudinal axis of the lamp and the centers of such holding devices, substantially as and for the purpose described.

4. In an electric incandescent lamp, the combination of a horseshoe shaped metal filament having the free ends of its legs fastened to leading-in wires, a central support within the bulb of the lamp and a plurality of holding devices attached to such central support and adapted to loosely guide each of said legs longitudinally at a plurality of points, the line connecting the centers of successive holding devices of each leg being a helical line, substantially as and for the purpose described.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses.

HANS KUZEL.

Witnesses:

JOHN GEORGE HARDY,
ROBT. W. HEINGARTNER.