

C. P. STEINMETZ.
INCANDESCENT LAMP.
APPLICATION FILED SEPT. 8, 1908.

1,062,305.

Patented May 20, 1913.

Fig. 1.

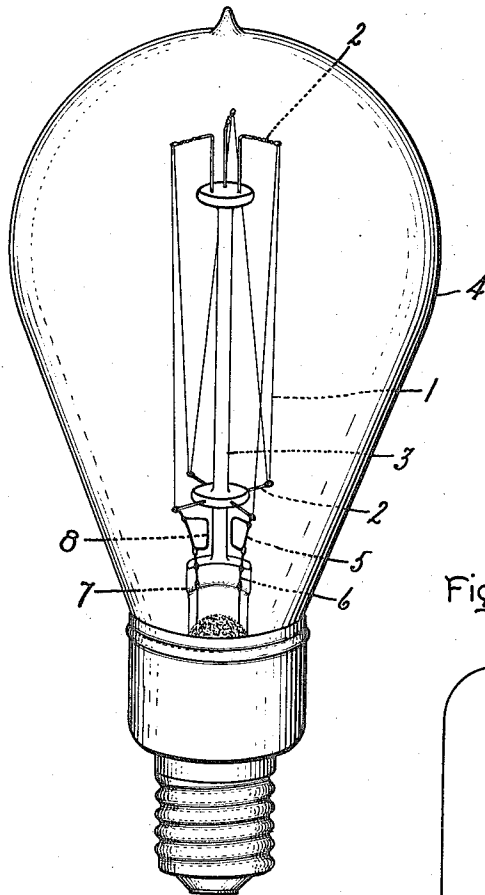


Fig. 2.

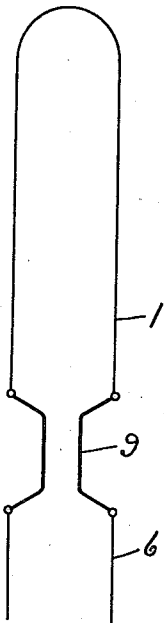


Fig. 3.

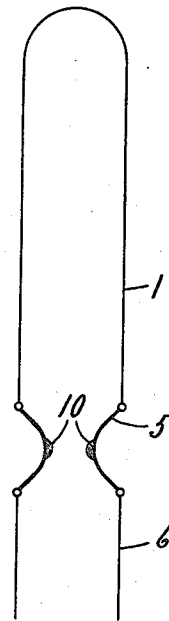
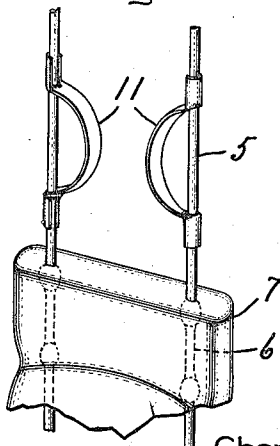


Fig. 4.



Witnesses:

George W. Tilden
J. Ellis Elen,

Inventor:

Charles P. Steinmetz,

by *Allen H. Davis*
Att'y.

UNITED STATES PATENT OFFICE.

CHARLES P. STEINMETZ, OF SCHENECTADY, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

INCANDESCENT LAMP.

1,062,305.

Specification of Letters Patent.

Patented May 20, 1913.

Application filed September 8, 1908. Serial No. 452,057.

To all whom it may concern:

Be it known that I, CHARLES P. STEINMETZ, a citizen of the United States, residing at Schenectady, county of Schenectady, State of New York, have invented certain new and useful Improvements in Incandescent Lamps, of which the following is a specification.

My invention relates to the suppression of that class of phenomena known as "Edison effect", which occur in electrical apparatus such as incandescent lamps. These phenomena are in the nature of electrical discharges taking place across the leading-in wires or parts of lamp filaments across which a difference of potential exists. The discharge in some cases is invisible and may harm the filament only very slowly, or it may be visible, continuing visible for a short time and then ceasing. In the latter case, of course, the filament is damaged more rapidly. The discharge seems more likely to take place when the vacuum in the lamp has deteriorated, because of the liberation of gases occluded by the filament or condensed upon the inside walls of the lamp bulb.

According to my invention I dispose a wire strip or globule of metallic magnesium, calcium or lithium, or, alloys containing these metals, near the leading-in wires of the lamp in a manner hereinafter described, so that the electrical discharge takes place across these wires or strips in preference to taking place between adjacent parts of the filament, or filaments. The discharge seems to have the effect of vaporizing a small amount of these metals. I find that this apparently has the effect of completely absorbing or abstracting the gases which may have accumulated in the globe, and in this way the high vacuum is automatically restored and maintained.

My invention is illustrated in the accompanying drawings, and will be more clearly understood by reference to the following description taken in connection therewith.

Figure 1 shows an incandescent lamp in which the filament is arranged in several loops, and illustrates one way of attaching the magnesium or calcium wires; Figs. 2, 3 illustrate diagrammatically alternative ways of attaching the vaporizable metals; Fig. 4 is an enlarged view showing how the mag-

nesium wires may be attached without welding.

In Fig. 1 a lamp is shown of the type now commonly used in connection with metallic filaments. The filament loops 1 are supported by wires 2 attached to the standard 3, and are arranged in the usual manner within the glass bulb 4. Current is supplied to the filaments 1 by intermediate leading-in wires 5, which may be copper, nickel or platinum, but which in either case are attached to a short piece of platinum wire 6, passing through the glass stem 7. Wires 8 consisting of one of the metals mentioned, say magnesium, are attached to the leading-in wires 5, as by welding or attaching them as is illustrated in Fig. 4 to which reference will again be made. The magnesium wires 8 are so arranged as to approach one another more closely than do the leading-in wires or the adjacent legs of the filament to which the leading-in wires are attached, so that the discharge will take place across the space between the magnesium wires 6 and not at other points. As above explained, a small amount of metallic magnesium will be vaporized by the discharge, and this apparently has the effect of absorbing the liberated gases and producing a practically perfect vacuum. As to the exact cause to which this effect is due, I am not at present prepared to state.

In Fig. 2 the magnesium or calcium wires are represented as applied to a single loop of filament; but, of course, they may be applied in the same way with a multi-loop lamp. In this figure the leading-in wires 6, magnesium wires 9 and the filament 1 are all in series, the magnesium wires 9 serving to carry current from the platinum leading-in wires 6 to the filament 1. The magnesium wires are here shown as being welded to the filament 1 at one end and to the leading-in wires 6 at the other end. The wires 9 are bent toward each other as is clearly shown so that the electrical discharge will be sure to take place between the magnesium wires instead of between the opposite legs of the filament or between the leading-in wires. The wires 9 must be made heavy enough to carry away the heat conducted thereto by the incandescent filament with sufficient rapidity to prevent their melting.

Fig. 3 is a view showing the filament 1

attached to intermediate leading-in wires 5 which are bent toward each other and are connected in turn to the platinum leading-in wires 6 in the usual manner. A small globule of lithium 10 is attached to the leading-in wires 5 at points where the distance between these wires is least. The lithium will adhere readily to these wires because of its small bulk and when the electrical discharge takes place it will vaporize a small amount of the lithium which, as has been stated, will absorb gases.

Fig. 4 is an enlarged fragmental view of the stem of the lamp. The intermediate leading-in wires 5 are shown, each connected at one end by a weld to the platinum wire 6 passing through the glass stem 7 in Fig. 1. The filament loops 1 are not shown in this figure but of course are to be understood as attached to the other ends of the wires 5. Magnesium ribbons 11 are attached to the wires 5 by piercing a hole through the ribbons at either end, slipping the wires 5 through these holes, and then pinching the ends of the ribbons 11 around the leading-in wires 5 as is clearly shown in the figure, the magnesium ribbons being bowed toward each other, so that if an electrical discharge takes place it will be sure to take place between the magnesium ribbon and not between the leading-in wires or the legs of the filaments.

What I claim as new and desire to secure by Letters Patent of the United States, is—

1. The combination of an evacuated envelop, an incandescing conductor disposed therein, means for supplying the same with current, and means for furnishing gas-absorbing material during operation of the lamp by the disintegrating action of an electrical discharge taking place across a portion of the evacuated space.

2. The combination of an evacuated envelop, a filament disposed therein, and a conductor containing metal whose vapors have great affinity for gases connected with

said filament so as to form a terminal for the easiest path for electrical discharges across the filament during operation of the lamp.

3. The combination of an evacuated envelop, filaments disposed therein, leading-in wires supplying current to said filaments and conductors consisting of metals having great affinity for gases when vaporized electrically connected to said leading-in wires; the distance at some point between said conductors being less than that between the leading-in wires, said conductors forming at said point terminals for the easiest path for electrical discharges across the filament circuit and being adapted to vaporize by such discharges upon a deterioration of the vacuum in the envelop during operation of the lamp.

4. The combination in an incandescent lamp of an evacuated envelop, filaments disposed therein, means for supplying said filaments with current, and means made operative by a deterioration of the vacuum in said envelop during the life of the lamp for producing therein a metal vapor having a great affinity for gases and thereby automatically acting to restore the vacuum during operation of the lamp.

5. The combination in an incandescent lamp of an evacuated envelop, filaments disposed therein, means for supplying said filaments with current, and means made operative by the electrical discharge occurring upon a deterioration of the vacuum in said envelop for producing therein a metal vapor having a great affinity for gases and thereby automatically acting to restore the vacuum during operation of the lamp.

In witness whereof, I have hereunto set my hand this 5th day of September, 1908.

CHARLES P. STEINMETZ.

Witnesses:

BENJAMIN B. HULL,
MARGARET A. DELEHANTE.