E. THOMSON.

INCANDESCENT LAMP.

APPLICATION FILED OCT. 12, 1908.

980,703. Patented Jan. 3, 1911.

2 SHEETS—SHEET 1.

Fig. 1.

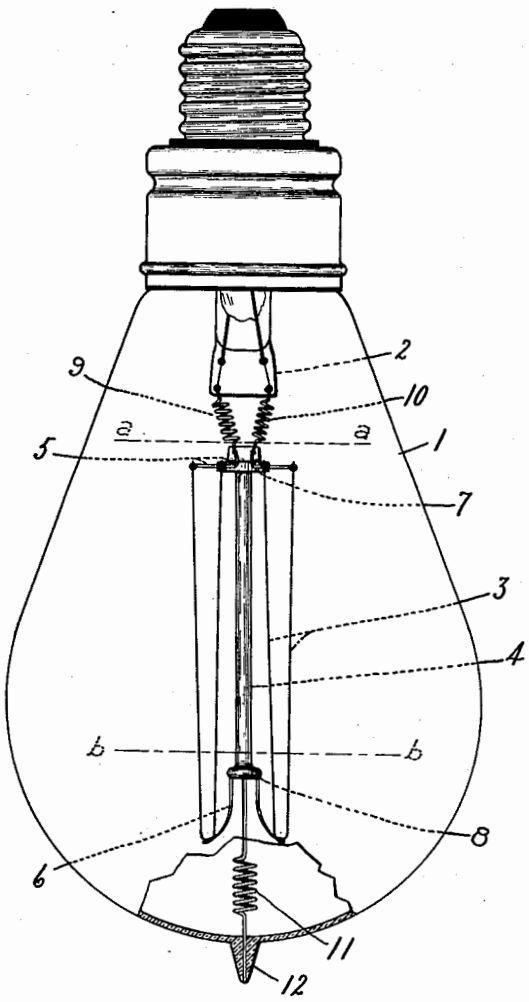


Fig. 2.

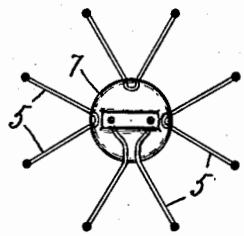
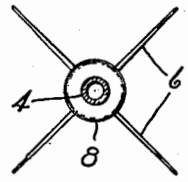


Fig. 3.



Witnesses:

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2 SHEETS—SHEET 2.

Fig. 5.

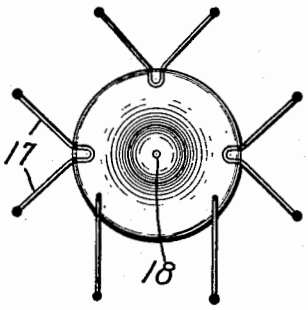


Fig. 6.

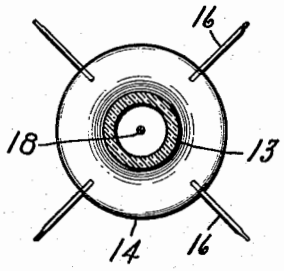
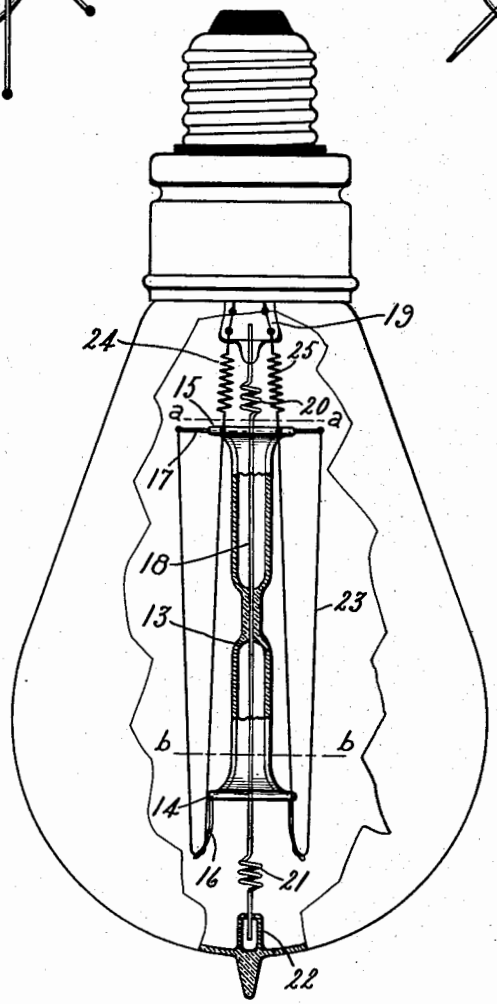


Fig. 4.



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UNITED STATES PATENT OFFICE.

ELIHU THOMSON, OF SWAMPSCOTT, MASSACHUSETTS, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

INCANDESCENT LAMP.

980,703. Specification of Letters Patent. Patented Jan. 3, 1911.

Application filed October 12, 1908. Serial No. 457,192.

To all whom it may concern:

Be it known that I, ELIHU THOMSON, a citizen of the United States, residing at Swampscott, county of Essex, State of Massachusetts, have invented certain new and useful Improvements in Incandescent Lamps, of which the following is a specification.

My present invention relates to incandescent lamps and more particularly to lamps having filaments which are fragile or brittle.

Many of the high efficiency incandescent lamps recently developed have filaments which are of small cross-section and relatively fragile; tungsten lamps are typical of this class. Furthermore, some of these high efficiency filaments are inherently brittle and easily cracked or broken when subjected to rough handling, as during transportation. If such a lamp be struck sharply the violent transverse vibration set up in the filament is liable to open up fissures near the ends of the filament legs where they are rigidly sealed to the supporting wires. In extreme cases, the filament will be torn in two.

According to my present invention, the fragile filaments of tungsten or other suitable material are mounted on a framework so arranged within the lamp bulb that it is free to oscillate or vibrate, and so moves with the filament and protects the latter from dangerous stresses. If such a lamp bulb be struck sharply on the side, the framework will oscillate back and forth within the bulb and the filament will not at any point be unduly bent or twisted.

Two embodiments of my invention are disclosed in the accompanying drawings, wherein—

Figure 1 shows the filament supporting framework carried on spiral current supply wires and anchored by a wire spring sealed to the lamp bulb; Fig. 2 is a section along the line *a a* of Fig. 1; Fig. 3 is a similar section along the line *b b*; Fig. 4 shows a modification wherein the filament supporting frame is mounted on a wire extending the entire length of the lamp bulb; Fig. 5 is a section along the line *a a* of Fig. 4; and Fig. 6 is a similar section along the line *b b*.

In Fig. 1 the lamp bulb 1 is of the usual type and provided with a stem 2 having wires through which current is delivered to the filaments 3 of tungsten or other suitable material. These filaments are arranged in a plurality of loops on a frame comprising a central pedestal 4 having at one end a plurality of radial current supply wires 5 to which the filaments are welded or otherwise suitably secured, and having at the other end a plurality of anchors 6 holding the filament loops in position, and, if desired, placing them under slight tension. This central pedestal 4 may be hollow as indicated in Fig. 3 and may be provided at its ends with hubs 7 and 8 into which the current supply wires 5 and resilient anchors 6 are respectively sealed. This entire filament supporting frame is carried at one end by coiled springs 9 and 10 which also serve as leads for conducting current to the filament loops 3. The frame is supported or anchored at its other end by a helically coiled metal spring 11 sealed into the hub 8 and also sealed into the tip 12 of the lamp bulb. By thus supporting the filament frame on the resilient wires 9, 10 and 11, the frame is free to vibrate with respect to the lamp bulb, and by its own movement prevent excessive vibration in the legs of the filament loops.

In the modification shown in Fig. 4, the central pedestal 13 of the filament supporting frame has its ends 14 and 15 flared outwardly to form rims into which the anchors 16 and current supply wires 17 are respectively sealed. In this modification, the support for the frame comprises a long wire 18 sealed into the lamp stem 19 and passing entirely through the hollow pedestal. Near the lamp stem 19 this wire is bent up into a spiral 20 to act as a spring, and a similar spiral 21 at the opposite end of the wire serves a like function. In this embodiment, the lower end of the wire 18 is not rigidly sealed into the tip of the lamp but passes loosely into a socket 22 formed on the inside of the lamp bulb. Current is supplied to the filaments 23 through flexible leads 24 and 25 but these leads are small enough and flexible enough not to interfere with the free movement of the filament-supporting frame, as provided for by springs 20 and 21.

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

1. In an incandescent lamp, the combination of a bulb, a filament supporting frame, and means for resiliently supporting said frame within said bulb.

2. The combination of a lamp bulb, a frame within said bulb, and springs attached to said frame and resiliently supporting it.

3. The combination of a fragile filament, a frame for supporting said filament, and wire springs connected to said frame and permitting movement thereof to protect said filament from shock.

4. The combination of fragile filament, a frame for supporting said filament, flexible current supply leads at one end of said frame, and resilient supporting means for the other end thereof.

5. The combination of a lamp bulb, a filament supporting frame having a pedestal, flexible current supply leads at one end of said pedestal, and a spring secured to said pedestal and resiliently supporting it from said bulb.

6. The combination of a lamp bulb, a filament supporting frame within said bulb, and springs at either end of said frame to permit movement of the frame with respect to the bulb.

7. The combination of a lamp bulb, a frame with a tubular pedestal, a wire passing through said pedestal and supporting it in position within said bulb, said wire having coiled portions to act as springs.

8. The combination of a lamp bulb having a stem, a filament supporting frame within said bulb, and coiled wires resiliently connecting said frame with said stem.

9. The combination of a lamp bulb having a stem, a frame within said bulb and carrying fragile filaments, coiled current supply leads leading from said stem to one end of said frame, and means for resiliently supporting the opposite end thereof.

10. The combination of a fragile filament, current supply wires rigidly attached to said filament, and means resiliently supporting said current supply wires.

11. The combination of a lamp bulb, a fragile filament therein, current supply wires attached to said filament, and a support for said wires movable with respect to said bulb.

12. In an electric filament lamp, an internal rigid filament carrier, a rigid filament holder supported thereby by an elastic supporting means and filaments carried by said filament holder and connected with the filament carrier by coiled conducting wires.

13. In an electric filament lamp, a rigid filament carrier, a spiral suspension spring secured to said carrier, an independent filament holder secured to said spring and a spring connecting the opposite end of said holder with an adjacent portion of the bulb.

14. In an electric filament lamp, a rigid filament carrier, an independent suspended filament holder having one end thereof secured to said carrier and the other end secured to an adjacent portion of the bulb by spiral springs substantially as described.

15. The combination with a lamp bulb, of a suitable frame, a filament loop carried on said frame, and means resiliently supporting said frame in said bulb.

16. The combination with a lamp stem, of a carrier, a plurality of filament loops mounted thereon, and means through which said carrier is resiliently supported from said stem.

17. The combination of a lamp stem, a carrier, means yielding in the longitudinal direction of the stem resiliently connecting them, and a filament loop having its ends secured to terminals on said carrier and its bend suitably supported by it.

18. The combination of a suitable carrier, a fragile filament mounted thereon, and resilient means connecting said carrier with a lamp stem.

In witness whereof, I have hereunto set my hand this fifth day of October, 1908.

ELIHU THOMSON.

Witnesses:
ALEX. F. MACDONALD,
JOHN A. MCMANUS, Jr.