No. 814,162. PATENTED MAR. 6, 1906.

W. J. PHELPS.

ELECTRIC INCANDESCENT LAMP.

APPLICATION FILED DEC. 22, 1902.

Fig. 2.

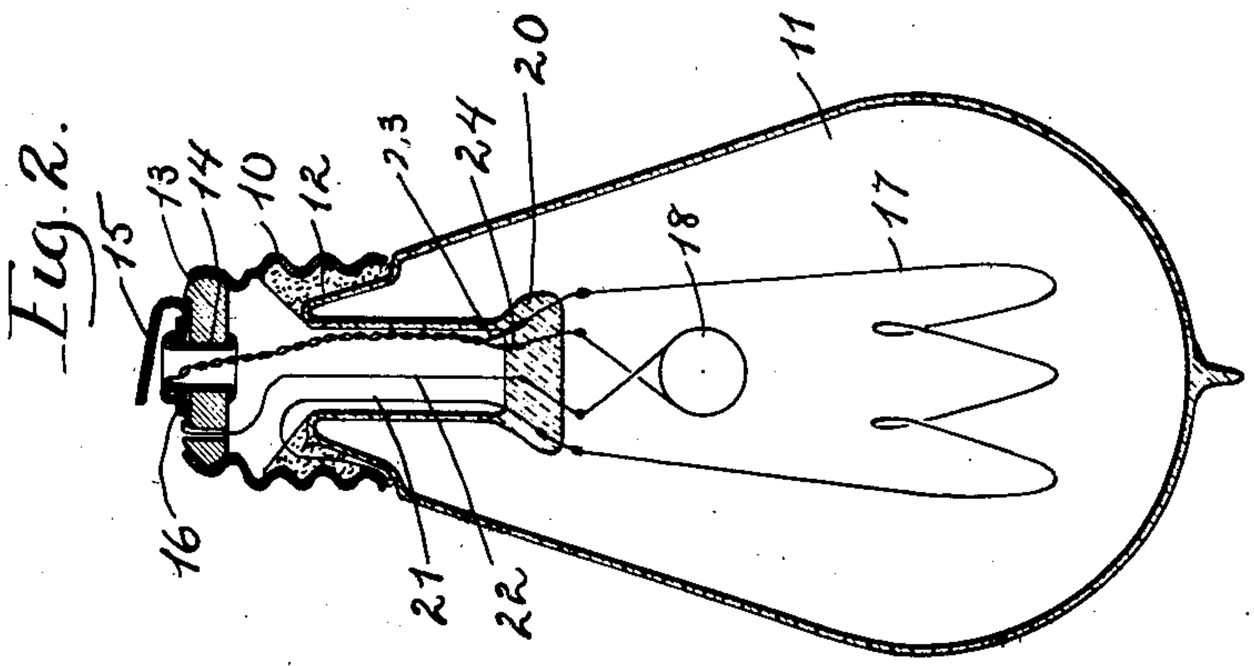
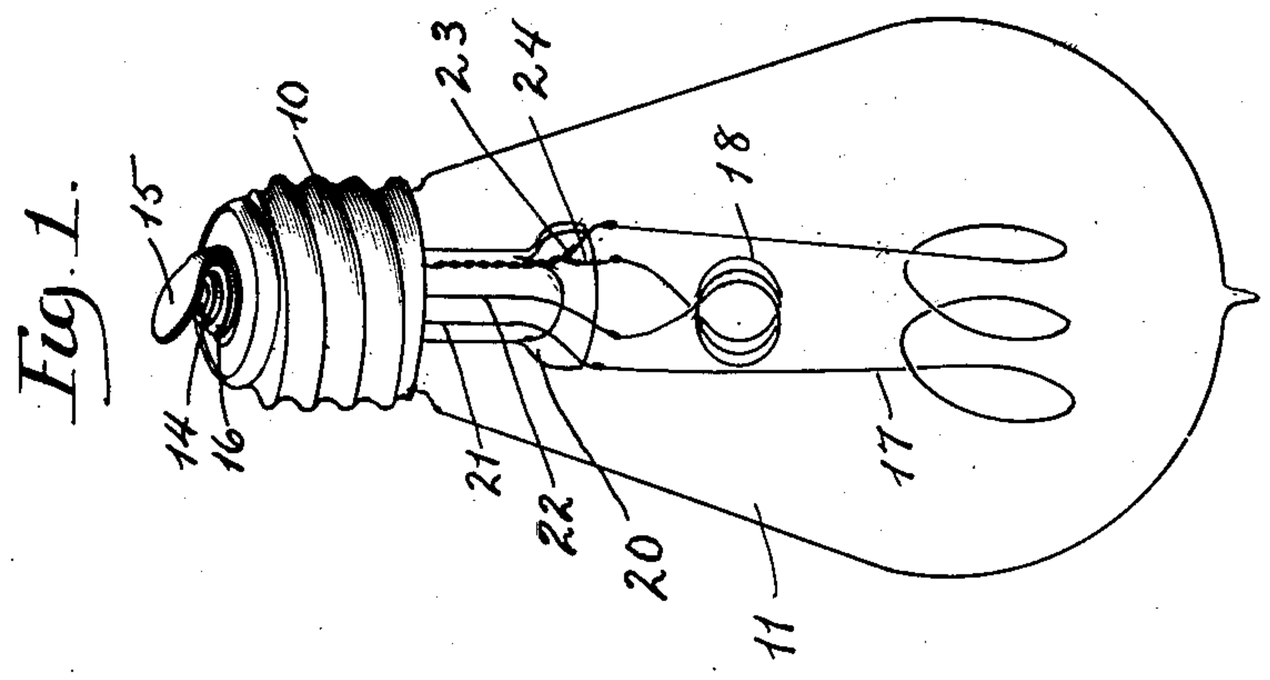


Fig. 1.



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WILLIAM J. PHELPS, OF DETROIT, MICHIGAN.

ELECTRIC INCANDESCENT LAMP.

No. 814,162. Specification of Letters Patent. Patented March 6, 1906.

Application filed December 22, 1902. Serial No. 136,160.

To all whom it may concern:

Be it known that I, WILLIAM J. PHELPS, a citizen of the United States, and a resident of the city of Detroit, county of Wayne, and State of Michigan, have invented certain new and useful Improvements in Electric Incandescent Lamps, of which the following is declared to be a full, clear, and exact description.

The invention relates to electric incandescent lamps having two or more incandescing filaments designed to emit light of varying intensity such as described in prior Letters Patent of the United States granted to me, No. 603,705, May 10, 1898.

The present improvement seeks to provide an effective arrangement of the separate filaments within the lamp which will prevent short-circuiting between them and which will allow the employment of filaments of high efficiency, but prevent them from drooping.

A further object is to improve the arrangement of the leading-in wires, which will facilitate the manufacture and, in particular, the "exhausting" of the lamp.

The invention consists in the features of construction and arrangement of parts set forth in the following description, illustrated in the accompanying drawings, and more particularly pointed out in the appended claims.

In the drawings, Figure 1 is a side elevation of the improved form of lamp. Fig. 2 is an elevation taken at an angle to the view shown in Fig. 1 and with the base of the lamp in section.

The base of the lamp may be of any well-known or desired type and adapted to be used with any suitable form of lamp-holder.

To illustrate the present improvement, the Edison type of lamp-base is shown, which comprises a screw-shell 10, which forms one of the lamp-terminals for the reception of current from the lamp-holder and which support within its outer end the glass vacuum-bulb 11, held in position by suitable composition filling 12. An insulating-disk 13, of porcelain or other suitable material, mounted within the inner end of screw-shell, carries a central contact in the form of a tubular unit 14, which passes through a central opening in the disk and is flanged at either end to hold it securely in position. A bent spring-metal piece 15 is clamped to the face of disk 13 by the upper flanged end of the tubular rivet 14, but is insulated from the latter by a suitable washer 16. The metal piece 15 forms the second terminal of the lamp and engages the central terminal of the lamp-holder for the reception of current therefrom. As shown, the upper end of the lamp-terminal 15 extends above and normally out of engagement with the contact 14, but may be depressed into engagement with such contact by any suitable means—as, for example, when the lamp is secured completely into its holder.

Preferably two filaments 17 and 18 of different candle-power are employed within the vacuum-bulb 11, the large or high-power filament being arranged below the small or low-power filament 18. The filaments are connected to lamp-terminal 15 by leading-in wire 22, while the joined ends of the filaments are connected to the contact 14. This latter connection is preferably formed of two leading-in wires 23 and 24, twisted together and connected, respectively, to the filaments 17 and 18 for the purpose hereinafter stated.

The lamp is designed for use with an electric lighting-current of constant or fairly constant potential, and preferably the large or high-power filament 17 is of lower resistance per unit of length than the small low-power filament 18. If the current is caused to flow from lamp-terminal 15 to lamp-terminal 10, as when the lamp is screwed partially to its holder, the current will flow through both filaments in series, and filament 18 will alone glow with, for example, one-candle power, while filament 17 will act as a relatively dark and dead resistance, cutting down the amount of current used. When, however, spring-terminal 15 is depressed into engagement with contact 14, as when the lamp is screwed completely into its holder, filament 18 will be short-circuited, and the current will flow through filament 17 alone, which will glow with the full candle-power of the lamp—for example, sixteen-candle power.

The parts thus far described may be widely varied without departure from the essentials of the present invention. The lamp base and terminals may be adapted to any suitable lamp-holder, and the modification of the flow of current to the separate filaments may be effected in any suitable manner. The electrical connections and arrangement of the filaments may also be varied.

In single-filament lamps an efficient length of thin filament is usually provided by em-

ploying a filament with a single coil and preventing its drooping by connecting the coil by an anchor with the mount; but with the double-filament lamp an anchor to the large filament 17 would interfere with the small filament 18 and would be likely to effect a short circuit. To obtain the desired length of filament in the present construction and still prevent drooping, filament 17 is provided with a double coil substantially helical, as shown most clearly in Fig. 2. Low-power filament 18, arranged above the high-power filament 17 in the elongated or pear-shaped bulb 11, is likewise provided with a double helical coil, as most clearly shown, to obtain the desired length of efficient thin filament and to prevent it drooping into engagement with the large filament.

In the manufacture of the lamps the stem or support 20, to which the filaments are attached, is provided in sealing the stem with a flattened end, as shown, so that the extreme ends of the filaments or the short platinum mounts therefor sealed in the end of the stem necessarily lie in the same plane. By thus flattening the end of the lamp for sealing this part may be conveniently manufactured by the machinery now employed for manufacturing ordinary lamps; but with a double-filament lamp the extreme ends of the filaments are necessarily brought into close relation near the flattened end of the stem. To give the maximum distance between the legs of the filaments and insure that the legs shall diverge to prevent short-circuiting between them, the central portions or coils of the filaments 17 and 18 are arranged at an angle to each other and in different planes, preferably at a right angle to each other, as shown in Figs. 1 and 2. This insures that the adjacent legs of the separate filaments shall diverge from one another outwardly from the end of the lamp-stem 20, so that there is no danger that they will come in contact. For the same purpose the coils of the separate filaments 17 and 18 are twisted in opposite directions—that is to say, one of the coils is twisted toward the right and the other to the left, as most clearly shown in Fig. 1. By such an arrangement the separate legs of the filaments diverge from the stem of the lamp in opposite directions.

The object of preventing short-circuiting by engagement between the legs of the filament may be attained either by arranging the coils of the separate filaments at an angle to each other or by twisting the coils in opposite directions, and while preferably both arrangements are employed either one only would fall within the scope of the present invention.

The above-described mechanical arrangement of the filaments has been found effective in use with lighting-currents as high as one hundred and twenty-five or one hundred and thirty volts and may of course be satisfactorily employed with currents of lower voltage.

By employing two leading-in wires 23 and 24, twisted together to connect the filaments, instead of a single connection to the joined end of the filament, as previously employed, the manufacture of the lamp-stems by machinery instead of by hand is greatly facilitated. Moreover, the wires 23 and 24 are not twisted together or connected to the lamp-base until after the lamp has been "pumped"—*i. e.*, until after the vacuum has been formed in the glass bulb 11. While pumping incandescent lamps the filament is heated to varying intensities, according to circumstances, by passing a current through it, which by reason of the so-called "Edison effect" a more perfect vacuum is formed. In pumping multifilament-lamps it has been found desirable in order that the Edison effect shall be undisturbed to pass the current separate through the filaments, first through one and then through the other. By providing each filament with two leading-in wires (four independent wires for the two filaments in the present instance) the current may be readily passed through the filaments separately and a more perfect vacuum found than when only three leading-in wires are provided for the two filaments, as in prior construction. After pumping, leading-in wires 23 and 24 are twisted together to connect the filaments and the proper connection made with the lamp-base.

Variations from the construction set forth may be readily made without departure from the essentials of the invention.

Having described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. An electric incandescent lamp comprising a single vacuum-bulb, a stem projecting within said bulb and having a flattened end and two incandescent filaments, the ends of which are attached to said stem in substantially the same plane, said filaments comprising leg portions which diverge from said stem and central portions arranged one above the other and at an angle to each other in different planes.

2. An electric incandescent lamp comprising a single vacuum-bulb, a stem projecting within said bulb and having a flattened end and two incandescent filaments, the ends of which are attached to said stem in substantially the same plane, said filaments comprising leg portions which diverge from said stem and central portions formed into coils arranged one above the other and in different planes.

3. An electric incandescent lamp comprising a single vacuum-bulb, two filaments supported within said bulb with the central portions of one supported above that of the

other, and a stem having a flattened end to which the ends of the filaments are attached in substantially the same plane, the central portions of said separate filaments being formed into coils twisted in opposite directions.

4. An electric incandescent lamp comprising a single vacuum-bulb, two filaments supported within said bulb with the central portions of one supported above that of the other, and a stem having a flattened end to which the ends of the filaments are attached in substantially the same plane, the central portions of said separate filaments being formed into coils twisted in opposite directions and arranged at angles to each other and in different planes.

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