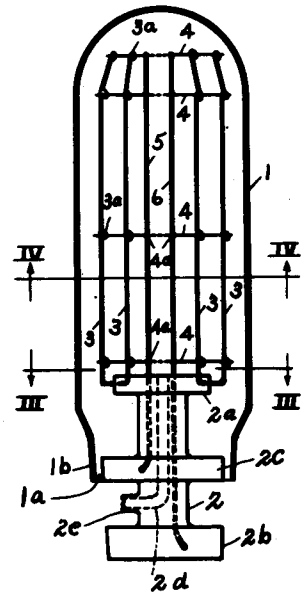
Oct. 22, 1935. H. F. TEICHMANN 2,018,330

ELECTRIC LAMP

Original Filed July 14, 1933

Fig. I



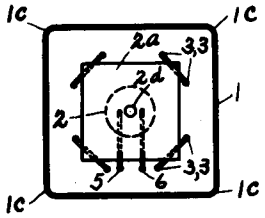


Fig. III

Fig. IV

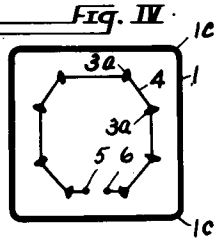
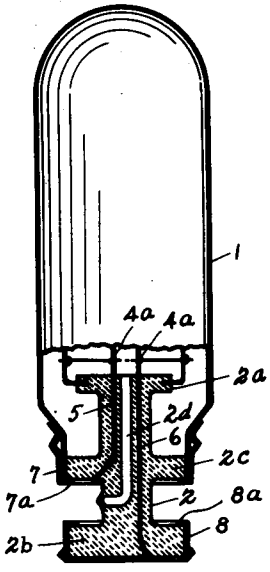


Fig. II



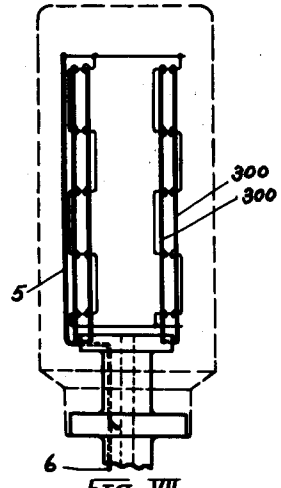
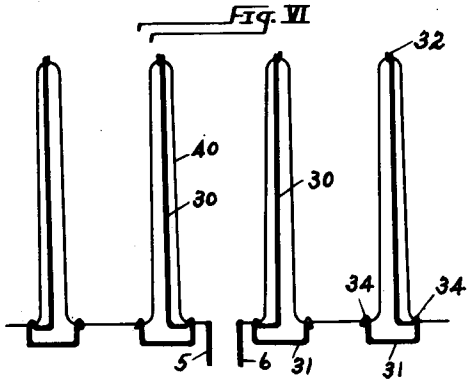


Fig. VII

Fig. VI



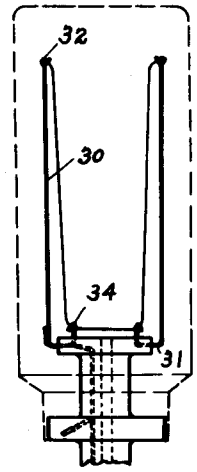


Fig. V

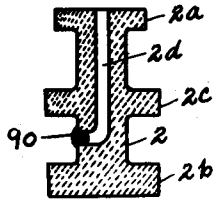
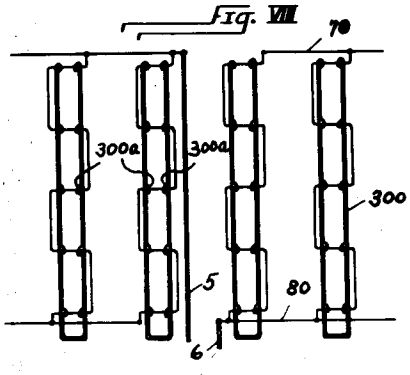


Fig. IX

Fig. VIII



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2,018,330

ELECTRIC LAMP

Henry F. Teichmann, Washington, Pa.

Application July 14, 1933, Serial No. 680,288
Renewed October 3, 1934

11 Claims. (Cl. 176—26)

The invention relates to electric lamps, and consists in a filament structure which is particularly adapted for service in a lamp whose glass body or bulb is of polygonal form, such for example as the polygonal lamp described in Letters Patent No. 1,972,541, granted to me September 4, 1934.

The present practice is to form lamp bulbs of "frosted" or opaque glass, inasmuch as such glass has the desirable characteristic of eliminating the glare and softening the light of the glowing filament within the lamp. While the usual lamp of any specified candle power efficiently produces the light required of it, one may observe that the appearance of the lighted bulb itself is not attractive to the eye, chiefly because its filament is more or less concentrated in a relatively small locality within the bulb and produces unequal distribution of light upon the exposed wall of the lamp. One region of the wall is brilliant and another dull. The object of my present invention is to provide a filament structure which is effective to illuminate uniformly the "frosted" or colored walls of an electric lamp.

My above-noted patent explains wherein a polygonal lamp, say a lamp whose body is square in cross-section, possesses advantages which are valuable in advertising displays and other installations. It is further my aim to provide a filament structure which in service, so far as is practical, is particularly effective in illuminating uniformly all exposed faces of a polygonal bulb, to the end that the lamps may be more effective, either severally or in group organization, and may be more pleasing in appearance.

The lamp of my invention includes other structural characteristics of value. Whereas according to usual construction the filament of an electric lamp is supported within the bulb by means of a glass stem constructed of two glass members (known as the "flare" and the exhaust or sealing-off tubing), which two members are independently formed and then assembled and united with the lead-in wires of the lamp, in my lamp the stem is a unitary thing which may be produced in a single glass-casting operation, the lead-in wires being introduced to the body of the stem during the casting process. Accordingly, my lamp may be more economically constructed. And whereas, in the ordinary lamp the bulb must be exhausted and its atmosphere determined before the basal members or contact pieces of the lamp are assembled upon and permanently integrated with the bulb, in my lamp the exhausting outlet of the lamp is accessible in the base of the finished lamp, and advantageously in the unitary, cast glass stem of the lamp. Thus, in my lamp the atmosphere within the lamp may be determined and adjusted after the lamp has been manufactured, and the lamp need not be discarded, as lamps of the usual structure are discarded, when factory tests show that the atmosphere surrounding the filament is not what it should be.

In the accompanying drawing Fig. I is a view in side elevation of the unit glass stem and filament structure of my invention, and illustrates in vertical section a polygonal bulb in position for assembly with the stem. Fig. II shows, partly in side elevation and partly in vertical section, a view of the completely assembled lamp. Figs. III and IV are views in cross-section, taken respectively on the planes III—III and IV—IV of Fig. I. Figs. V and VII are fragmentary views in side elevation, each illustrating a modification in the filament structure of the lamp. Figs. VI and VIII show the filament structures of Fig. V and VII, respectively, as they appear in development. And Fig. IX is a view in vertical section of the unit glass stem, and showing a modification in structure.

The lamp of my invention comprises a polygonal bulb 1 which is united with a glass stem 2. Four sets of supporting wires 3 are secured at their lower ends to the glass stem, and extend upward substantially throughout the length of the bulb and in parallelism with its longitudinal axis; the supporting wires carry filaments 4, and the terminals 4a of the filaments are connected to the lead-in wires 5 and 6; and the lead-in wires severally make contact with the two poles or contact pieces 7 and 8 which are secured in electric isolation from one another upon the assembled stem and bulb. As in the case of the usual electric lamp, when my lamp is installed in an electric socket, electric current flows through the filaments 4, causing them to glow and produce light. Although the particular form of the contact pieces 7 and 8 is not essential to the practice of this invention, I have shown them to be of the form illustrated and described in my above-noted patent—a form which adapts the lamp for installation in a push-type socket.

The integral, die-pressed stem 2 comprises a head portion 2a, a base portion 2b, and an intermediate body portion 2c. A passage 2d is provided in the body of the stem; the passage terminates at one end in an opening in the head 2a, and at its opposite end terminates in a sealing-off tube 2e, located on the side of the stem

between the body portion 2c and the base portion 2b. Each of the lead-in wires 5, 6 is embodied and sealed (for a portion of its length) in the stem 2; the lower end of lead-in wire 5 projects from the body portion 2c and in the assembled lamp makes contact with contact piece 7, while the lower tip of lead-in wire 6 projects from the base portion 2b and is electrically united with the contact piece 8. The upper ends of the lead-in wires 5, 6 project upward from the head portion of the stem and are electrically connected, in parallel, to the terminals of the filaments 4.

Advantageously, the several supporting wires 3 are each of elongate U-shape. The vertical legs of each U-shaped member are coiled at intervals, to provide loops 3a through which the filaments 4 are projected, and by means of which, in the group organization of U-shaped members 3, 3, the filaments 4 are supported. At the bend or bottom each U-shaped member is embodied or secured in the head portion 2a of the glass stem, so that a sturdy support is provided for the filaments, while manifestly providing for such expansion and contraction of the filaments as occurs when the lamp is in service.

As already mentioned, it is characteristic of the stem 2 that it may be integrally formed in a single glass-casting or pressing operation. In accordance with engineering practice an automatic machine may be provided to insert and hold the portions of wires 5, 6 and 3, 3, to be embodied in the stem, in place within a matrix of required shape; a gob or blank of glass is placed in the matrix and pressed to the form of stem 2; by means of a suitable core piece or piercer the passage 2d is provided during the casting operation, so that the glass stem may be fashioned, and its associated wires 5, 6 and 3, 3 may be embodied in it, in a single casting operation. The engineer will know how existing automatic glass machines may be modified for the production of my glass stem, and in describing the invention it is needless to dwell further upon the apparatus employed. Suffice to say that, whereas the glass stem of the usual lamp is constructed of two or more preformed glass members which are fused together and sealed upon the lead-in wires for the lamp filament, my stem 2 is in a single casting operation formed as a unitary thing which includes the lead-in wires and supporting wires for the lamp filaments, and embodies a passage for exhausting the lamp, when the bulb and stem have been united.

It will be understood that aside from departures noted in this specification, the lead-in wires 5, 6, the filaments 4, and the supporting wires 3 will be constructed and embodied in the lamp structure in accordance with usual practice. For example, the filaments may be constructed of tungsten, the supporting wires of nickel, and the lead-in wires may comprise copper and platinum portions, the platinum portions being included at and immediately below the points where the lead-in wires extend into the stem 2.

In assembly the stem 2 is hermetically sealed in the mouth 1a of the polygonal bulb. Pursuing methods akin to those now employed in the art, the thin lip 1b of the bulb and the edge or periphery of the laterally extending, central body portion 2c of the stem are heated to the point of fusing, and then are pressed into welded union as indicated in Fig. II. Next a band of sheet copper or brass is electrically united with the terminal of lead-in wire 5 and cemented in place over the region of union of the stem and bulb, to provide the contact piece 7, and a jacket of such material is united with the lead-in wire 6 and cemented upon the base portion 2b of the stem, to provide the contact piece 8. The assembly is made more secure by means of flanges 7a, 8a which are "spun" into the form and position illustrated in Fig. II. The lamp is now completely assembled ready to be exhausted of air, and, if desired, charged with an atmosphere of inert gas, such as nitrogen. Here again the apparatus and methods in practice to-day are employed; and it is sufficient to say that the air within the lamp is removed and inert gas introduced by way of the passage 2d formed in the stem 2. When proper atmospheric conditions have been established within the lamp, the tube 2e is heated and sealed-off (welded shut) in the usual manner. The lamp is now complete, and ready for service.

It will be perceived that the outlet of the exhaust passage 2d is located in the side wall of the glass stem, between body portion 2c and the base portion 2b; that is, in the completely assembled structure the outlet is located in an open interval between the contact pieces 7 and 8 of the lamp. Accordingly, the evacuating, charging, and sealing-off of the lamp may be done when the structure has been completely assembled. To be able to do this is of great practical value, inasmuch as the lamp may be inspected for mechanical imperfections during the various stages of its manufacture, and, if any imperfections are found, the lamp may be discarded before it is exhausted of air and charged with inert gas. Of course, the practice prevailing to-day is to provide the lamp with its ultimate atmosphere as soon as the bulb and stem are united, and thereafter to apply the basal portions and contact pieces to the lamp. Manifestly, if imperfections are then found in the assembled lamp, and indeed they often are, the loss is greater than it would be in the procedure made possible by my invention.

The structure of my invention makes it possible at any time to adjust or change the atmosphere within the lamp. Obviously, the sealed outlet of the passage 2d is accessible between the contact pieces 7 and 8, so that heat may be applied to the seal. Thereupon the glass may be softened and entrance made into the passage. Thus, the gaseous conditions within the lamp may be regulated and the mouth of the passage again sealed-off. The "sealing-off" provides a closure of welded glass over the mouth of the passage 2d, which closure is superior to any sealing which may be had by a valve, or by cement. Indeed, as evidenced by the lamps on the market, it is practically essential that the electric lamps for ordinary use be so sealed. However, in specialized cases it may be desirable to change the atmosphere within the lamp quite often, and in such cases the mouth of passage 2d need not be sealed-off, but may be plugged with a body 90 (Fig. IX) of sealing wax, lead or other suitable material which is impervious to gases and which may be hardened in the mouth of the passage.

While (upon referring to Fig. II) it will be understood that the glass stem, the filament structure, and the contact pieces may advantageously be embodied in lamps of round cross-section, my stem and filament structure per se is particularly adapted for lamps which are polygonal in cross-section. In exemplary way, Figs. I–III, I have shown the bulb 1 to be square in cross section. The head portion 2a of the stem is corresponding-

ly square in plan, and the U-shaped filament supports 3, 3 are so located and secured in the corner regions of the square head portion that the vertical legs of the U-shaped supports comprise companion supporting wires which lie opposite or adjacent to the respective edge portions 1c of the bulb. The filaments 4—in this case I show four filaments—are secured at intervals to the four U-shaped supports 3, 3; the filaments are distributed axially of the bulb and throughout its length; the two upper filaments are arranged closer together than the others, to insure that the end or top of the bulb will glow with the same light intensity as the remaining exposed wall portions of the bulb. As may be seen in Fig. IV, each filament 4 is a polygonal loop (an octagonal loop in this case), and the portions of the loop extending between the companion legs of the supports 3, 3 provide filament elements which are severally located opposite or adjacent to the edges 1c of the bulb, so that the edge regions of the bulb may be illuminated with the same light intensity as the remainder of the polygonal bulb.

Figs. V and VI illustrate a modification in the filament structure. In this case the filament supports are shown as comprising each a single length of wire 30 rising from a U-shaped base 31, which base is embedded in the head portion of the glass stem, in the manner already described in connection with the supports 3, 3. A loop 32 is coiled in the upper terminal of each support 30, and the opposite legs of each U-shaped base 31 are each formed to include hooks or catches 34. The filament 40, may, as it is shown in Fig. VI, comprise a single length of tungsten wire which is passed through the loops 32 in the four supports 30 and hooked beneath the catches 34. The terminals of the filaments are, of course, united with the lead-in wires 5, 6.

Still another modification is shown in Figs. VII and VIII. The filament supports 300 in this modification correspond in general with the structure described in Fig. I, and the chief distinction is found in the organization of the filaments carried by the supports. That is to say, the companion legs of the U-shaped supports 300 are provided with loops 300a, and a filament wire is wound zigzag through the loops of each support; that is, each filament is of angular serpentine form, as shown in Fig. VIII. The opposite ends of the zigzag filaments are united with collector wires 70 and 80, whence communication is established with the lead-in wires 5, 6. Indeed, the collector wires 70, 80 may themselves be filament elements.

It will be understood, therefore, that I have provided a structure having filament portions which are particularly effective upon the edge regions of a polygonal bulb, to the end that all wall portions of such a bulb may glow with substantially uniform light intensity. And I have provided a unitary glass stem which may be produced as a single casting, whereby advantages of the nature indicated are obtained in largest measure.

I claim as my invention:

1. An electric lamp comprising a polygonal bulb, a stem of glass sealed in the mouth of said bulb, a plurality of supporting wires secured to the head of said stem, filaments carried by said supporting wires, which filaments are distributed axially of the bulb and include portions that are located opposite and adjacent the edges of said bulb, whereby in service all exposed faces of the bulb are illuminated with substantially uniform intensity, two contact pieces secured in isolation from one another upon the assembled stem and bulb, and lead-in wires extending through the glass body of said stem, and severally connecting said contact pieces with the terminals of said filaments.

2. An electric lamp comprising a polygonal bulb, a unitary cast stem of glass including lead-in wires sealed in the mouth of said bulb, a passage in said stem terminating at one end within, and at the opposite end without said bulb, a plurality of supporting wires secured to the head of said stem, filaments carried by said supporting wires, which filaments are distributed axially of the bulb and include portions that are located opposite and adjacent the edges of said bulb, the inner ends of said lead-in wires being secured to said filaments, and two contact pieces secured in isolation from one another upon the assembled stem and bulb, which contact pieces are severally united with the outer terminals of said lead-in wires.

3. An electric lamp including a bulb, a stem sealed in the mouth of said bulb, and contact pieces secured upon the assembled stem and bulb, the combination of a filament structure comprising companion supporting wires secured at their lower ends to said stem and extending in parallelism with the axis of said bulb, a zigzag filament extending with and secured at intervals to said companion supporting wires, and lead-in wires connecting the terminals of said filament with said contact pieces.

4. A stem structure for an electric lamp including a bulb, a filament, filament-supporting means, and contact pieces, said stem comprising a unitary cast body of glass including lead-in wires, a head on said stem adapted to secure said filament-supporting means, a base on said stem for the reception of a metal contact piece, and a spaced body portion intermediate said head and base and adapted for welded union with the bulb of said lamp.

5. A stem structure for an electric lamp including a bulb, a filament, a filament support, lead-in wires, and contact pieces, said stem structure comprising an unitary body of glass cast and sealed upon said lead-in wires, means at the top of said body for securing said filament support, means at the opposite end of said body adapted to receive a contact piece, an intermediate body portion adapted for welded union with said bulb, and an exhausting passage formed in said cast body of glass, said passage terminating at one end above and at the opposite end below the intermediate portion of said stem body which is adapted for said welded union with the bulb.

6. A stem structure for an electric lamp including a bulb, a filament, a filament support, lead-in wires, and contact pieces, said stem structure comprising an unitary body of glass cast and sealed upon said lead-in wires, said cast body of glass also embodying a portion of said filament support and said support projecting from said body, said cast glass body comprising a body portion adapted for fused union with said bulb, and an exhausting passage formed in said cast body of glass, said passage terminating at one end above and at the opposite end below the body portion of said stem which is united with said bulb, and in assembly said bulb and stem supporting said contact pieces in electric isolation from one another and severally in union with said lead-in wires.

7. An electric lamp comprising a polygonal bulb, and a glass stem including lead-in wires sealed in the mouth of said bulb, a supporting wire located opposite and adjacent each edge of said bulb, which supporting wires are secured at their lower ends to said stem, filaments carried by said supporting wires and including portions particularly effective for the illumination of the edges of the bulb, and contact pieces secured in isolation from one another upon the assembled stem and bulb, which contact pieces are severally connected with the opposite terminals of said filaments by means of said lead-in wires.

8. An electric lamp comprising a polygonal bulb, a stem sealed in the mouth of said bulb, contact pieces secured in isolation from one another upon the assembled bulb and stem, and independent filament loops connected electrically in parallel and supported at intervals axially of the bulb, said loops being severally of relative great compass with respect to the axis of said bulb, and said loops including portions located adjacent the edges of said bulb, whereby the edges of said bulb are adapted to be illuminated with substantially the same light intensity as the remaining wall portions of the bulb, and the terminals of said loops being connected in parallel to the respective contact pieces.

9. A stem structure for an electric lamp, comprising a unitary cast body of glass, said body of glass including a head portion, a base portion, and an intermediate body portion spaced from said head portion and adapted for welded union with the bulb of said lamp, and an exhausting passage formed in said body of glass, said passage terminating at one end above and at the opposite end below the said intermediate body portion.

10. In an electric lamp including a bulb, a filament, a filament support, lead-in wires, and contact members, the combination of a unitary stem molded and sealed upon said lead-in wires, said stem including a spaced portion at one end for mounting said filament supports in said bulb, said stem including at its opposite end a spaced portion projecting from said bulb for the support of contact member, and said stem being secured in the mouth of said bulb by sealed engagement between the wall of the bulb and the body portion of the stem located intermediate said opposite ends, and an exhausting passage terminating at its one end above and at its opposite end below said intermediate body portion of the stem.

11. An electric lamp comprising the combination of a glass bulb having a relatively wide and thin-lipped mouth, a filament within the bulb, electric lead-in means for said filament, and a base, said base comprising an integral, unitary, die-pressed body of glass including a body portion for closing the mouth of said bulb, said body portion being of relatively great lateral extent with respect to the axis of said bulb and including an outer peripheral edge of relatively small thickness with respect to the lateral extent of such mouth-closing body portion, said outer peripheral edge of said body portion being secured in welded union with the thin lip of said mouth, said electric lead-in means projecting through and being hermetically sealed in said unitary, die-pressed base within or inwardly of the compass of said peripheral edge, a passage formed in said base, and a die-shaped sealing-off tube integrally formed with said base and being accessible below said mouth-closing body portion thereof, said passage communicating at its upper end with the interior of said bulb and terminating at its lower end in said sealing-off tube, whereby, upon providing desired atmospheric conditions within the bulb, said passage may be readily sealed.

HENRY F. TEICHMANN.