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ELECTRIC INCANDESCENT HIGH PRESSURE GAS LAMP AND SIMILAR ARTICLE

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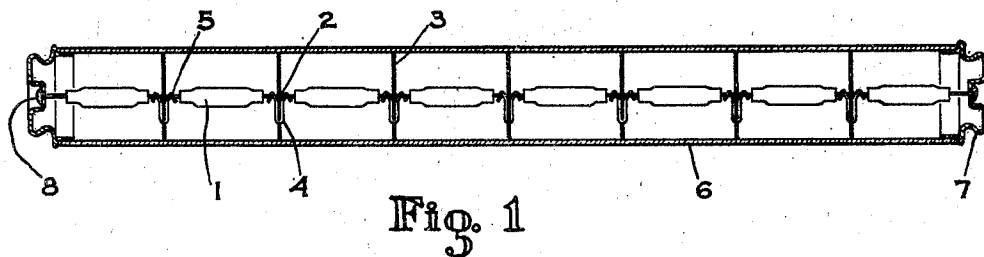
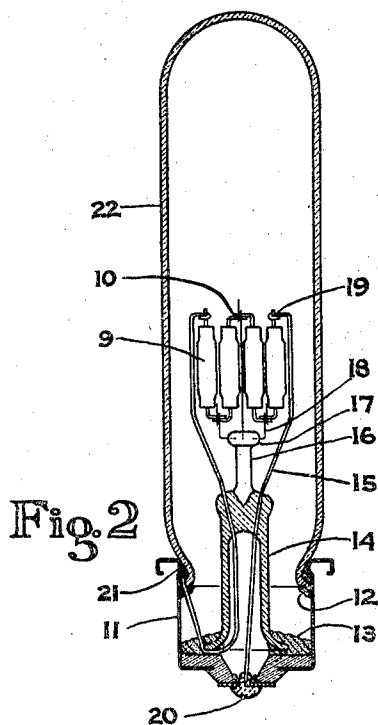
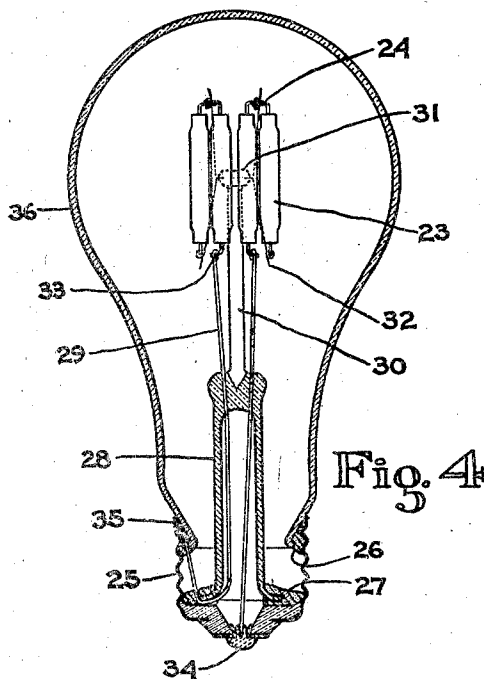


Fig. 3

Fig. 5



Witnesses:

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ELECTRIC INCANDESCENT HIGH PRESSURE
GAS LAMP AND SIMILAR ARTICLE

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15 Claims. (Cl. 176—16)

This invention relates to such improvements to increase the lighting efficiency of electric incandescent lamps and similar articles by using small electric incandescent high pressure gas lamps in place of the ordinary electric lamp filament.

The main object of this invention is to show that the improvements set forth in my application, Serial Number 744,598, filed Sept. 18, 1934, Patent No. 2,097,679, patented Nov. 2, 1937, are adaptable to many more electric incandescent lamps than those shown in the above mentioned application.

A further object is that this application is a continuation of my earlier filed application, Serial Number 744,598, filed Sept. 18, 1934, now a Patent Number 2,097,679, patented Nov. 2, 1937.

Other objects of this invention will appear more fully described and illustrated hereinafter.

While it is practical to adapt the improvements of my invention to nearly any of the present low pressure gas filled or vacuum type lamps Patent Office regulations at the present time permit me to claim only three types, which are illustrated in the accompanying drawing in which:

Fig. 1 is a cut away sectional view of a decorative type lamp;

Fig. 2 is a projection type lamp;

Fig. 3 is a plan view of the lamp cluster in Fig. 2;

Fig. 4 is a cut away sectional view of a general lighting type lamp;

Fig. 5 is a plan view of the lamp cluster in Fig. 4.

Referring to the decorative type lamp, Fig. 1; a string of several small electric incandescent high pressure gas lamps 1, are connected in series by soldering, clamping, or spot welding together at 2 in a line; a disk 3, made from a wire coil, sheet mica, metal, glass, moulded plastic, or any other suitable type of opaque or transparent material, is mounted on the lead-in wires between the small high pressure gas lamps by a wire clip 4, which is clamped or fastened to the lead-in wires at 5; the entire string of small lamps is then placed within a long glass tube 6, which was previously cut to a suitable length; lamp bases 7 of suitable design are cemented or fastened to the ends of the long glass tube and are soldered at 8 to the ends of the string of high pressure gas lamps; the remaining space within the long glass tube being air at atmospheric pressure.

Referring to the projection lamp, Fig. 2 and Fig. 3; a string of several small electric incandescent high pressure gas lamps 9, having a regu-

lar projection type lamp filament either a coil, coiled coil, or ribbon type filament mounted within them, are spot welded together in series at 10, in a column, the plan view being shown by Fig. 3; a standard outer shell pre-focus lamp base 11, is coated on the inside with a suitable basing cement at 12 and 13; a lamp stem flare 14, with embedded lead-in wires 15, is fused with a stem rod 16, having a button 17, with embedded support wires 18, on which is mounted the column of small electric incandescent high pressure gas lamps, being clamped or spot welded to the lead-in wires at 19, to form a stem mount or stem assembly; the stem assembly is positioned and mounted directly at the bottom of the pre-focus base and the lead-in wires are soldered or welded to the base at 20 and 21; the large bulb 22 is placed over the mount and cemented to the pre-focus lamp base; the remaining space within the large bulb being air at atmospheric pressure.

Referring to the general lighting type lamp, Fig. 4 and Fig. 5; a string of several small electric incandescent high pressure gas lamps 23, are connected in series by soldering, clamping, or spot welding together at 24, in a circular column, the plan view being shown by Fig. 5; a standard electric lamp screw base 25, is coated on the inside with a suitable basing cement at 26 and 27; a lamp stem flare 28, with embedded lead-in wires 29, is fused with a stem rod 30, having a button 31, with embedded support wires 32, on which are mounted the circular column of several small electric incandescent high pressure gas lamps, being clamped or spot welded to the lead-in wires at 33, to form a stem mount or stem assembly; the stem assembly is mounted directly at the bottom of the screw base and the lead-in wires are soldered to the screw base at 34 and 35; the large bulb 36 is placed over the mount and cemented to the screw base; the remaining space within the large bulb being air at atmospheric pressure.

While it is understood that the above illustrations show certain improvements and objects of this invention, many variations of these same lamps can be made; therefore the following, which describes a few variations of these lamps, are also intended to be improvements and further objects of this invention.

Again referring to Fig. 1, which shows a decorative type lamp. This lamp can be made with many new decorative arrangements. One of the arrangements which I have had particularly in mind, is what might be called a rainbow lamp.

This rainbow lamp is made up as shown in Fig. 1, with the long glass tube frosted on its inside wall; the small high pressure gas lamps 1, are each colored differently similar to Christmas tree lamps with the arrangement of colors the same as the sunshine spectrum or the rainbow; the disk 3, is made of opaque material to shield the colored light of each small lamp from passing into the adjoining colored lamp's compartment.

When this lamp is lighted, the light given off by each small colored lamp is dispersed by the inside frosted surface of the long glass tube with the results that it glows with light from one end to the other with the colors of the rainbow. While a lamp of this rainbow color arrangement might prove to be very ideal for some decorations, however other color arrangements would prove more satisfactory elsewhere, therefore the color arrangements of the small electric incandescent lamps can be made all one color or any combination of colors that may suit popular demand. I have had in mind the use of this rainbow lamp as a window decoration during Christmas holiday season. This type of decorative lamp can be made into a circle or a semi-circle as a wreath for window decoration if so desired. The long glass tube can be artistically colored on the inside or colored plain on the inside to suit novelty decorative demands. The decorative coating materials could also be applied to the outside of the long glass tube.

Again referring to Fig. 2, which shows a pre-focus projection type lamp. For convenience of illustration here I have shown the small electric incandescent high pressure gas lamps widely separated in the same plane; however in actual lamp construction, it is often more desirable to keep the light source area confined to as compact an area as is practical; to accomplish this, the small lamps can be staggered by setting each alternate small electric incandescent high pressure gas lamp forward or behind just enough to close up any area which does not give off light. When the small electric incandescent high pressure gas lamps are mounted in such a staggered fashion, the outer surface of the small bulbs reflects part of the light which strike it at small incidence angles and thus help to fill up the light source area. This type of pre-focus projection lamp can be pre-focused without the use of a double pre-focus base; the large bulb acts merely as a protector and a dust tight globe over the mount; the focusing being done by manipulating the mount parts until they are at the proper light source position in relation to the pre-focused lamp base, which is held rigid in a focusing fixture. The large bulb, during focusing operations, can be placed over the mount, rotated, or removed as often as desired before it is finally cemented into the pre-focus base; this being necessary sometimes because of the optical distorting effect produced by the large bulb. The mount can also be lighted up, to its full intensity if necessary, without the use of a dangerous hydrogen filled flashing bottle commonly used for this purpose at present. The cleaning of the filaments are done before the final sealing of the high pressure gas within the small bulbs, by flashing the filaments as a hydrogen flushing gas passes through the small bulbs, in and out simultaneously through the hollow metal wires. A mica disk can be placed in the neck of the bulb around the stem, in the event that the circulating warm air is objectionable down in the pre-focus lamp base; however the air will not be as warm

as the gas within the present low pressure gas lamps, because the air will not come in direct contact with the hot incandescent filament; therefore the large bulb can be made from a softer glass and also have a smaller volume without injurious effects.

Again referring to Fig. 4, which shows a general lighting type lamp. A present low pressure gas or vacuum type lamp can be salvaged and made up like this lamp. To do this, the base of the present lamp is heated just enough to soften the basing cement, the base is removed; then the stem is cut off from the bulb neck near the end of the stem flare; a string of several small high pressure gas lamps are mounted in place of the old filament, with the necessary spider support wires added and the lead-in wires are extended where necessary; the stem assembly is then cemented directly at the bottom of the lamp base, the lead-in wires being soldered to the base, the large bulb then merely acting as a dust tight protecting globe is re-cemented to the lamp base; the remaining space within the large bulb being air at atmospheric pressure. This lamp is then practically as serviceable as if made from all new parts. It is quite evident that all new parts or any of the old parts can be used or replaced with new parts to make this lamp.

In a general lighting type lamp, when the inside of the large bulb is etched or frosted to diffuse the lamp light, the outside of the small electric incandescent lamps can also be etched or frosted to give a double light dispersing action. This action has a tendency to make the whole lamp appear to be giving off light like an opal or milky glass bulb, instead of from just a spot within the large lamp bulb. This double light dispersing action naturally helps to make direct vision of the lamp easier on the eyes, without adding much light reducing properties to the lamp; also such a lamp would give off more polarized light which is naturally easier on the eyes, just like the reflected sun light from the northern sky.

In the drawings of each of the three lamps, I have shown that the large bulb is merely cemented to the lamp base; therefore some of the objects of this invention could not be properly shown with these illustrations, in lamps where it is desired to have the remaining space within the large lamp bulb be a vacuum or filled with any particular gas, the lamp stem flare can be sealed to the bulb neck and an exhaust tube added which will permit exhausting and filling of the large lamp bulb.

When the large lamp bulb is sealed to the stem flare for making the remaining space a vacuum or filled with gas around the small high pressure gas lamps, it is better to have an outlet for escaping high pressure gas, in the event that one or more of the small high pressure gas lamps develop a leak; therefore as a safety precaution a very thin glass disk, or a metal disk such as a thin copper disk is hermetically sealed around the edges to close an opening through the wall of the lamp, the opening could be preferably through the wall of the lamp stem, which would be a very effective safety valve by rupturing the thin disk in the event that an excess gas pressure builds up within the large lamp bulb.

Whenever the words "small electric incandescent high pressure gas lamps" or "small high pressure gas lamps" are used herein, they are intended to mean the small electric incandescent high pressure gas lamps that are described in my application, Serial Number 744,598, filed Sept.

18, 1934, Patent Number 2,097,679, patented Nov. 2, 1937, or the small electric incandescent high pressure gas metallic vapor lamps described and claimed in my copending application Serial Number 190,615.

Whenever the words "small electric incandescent lamps" or "small lamps" are used herein, they are intended to mean any small electric incandescent lamps that are similar in construction and purpose to the previously mentioned small high pressure gas lamps.

It is obvious that someone might try to manufacture electric incandescent lamps with improvements as illustrated and described herein except that their small lamps will be low pressure gas lamps, or vacuum lamps, in an attempt to avoid claims of this invention; therefore it is a further object of this invention to claim that one of improvements of this invention is the method whereby small electric incandescent lamps are used in place of a lamp filament within a large electric lamp, even though those small electric incandescent lamps are not filled with high pressure gas.

The following described variations and improvements for electric incandescent lamps, are also further objects of this invention.

During the gas filling operations of the small electric incandescent high pressure gas lamps having a hollow metal wire final seal, a compression type rubber connection can be used around the hollow metal wire to prevent gas leakage until the final seal is made tight enough to permit withdrawal of the lamp from the gas filling equipment: this compression type rubber connection allows the hollow metal wire to be easily inserted or withdrawn from the free rubber ring of the compression type rubber connection without kinking the hollow metal wire.

The remaining space within the large lamp bulb which encloses the small electric incandescent lamps, can be filled with gases which are normally harmful to filaments in the present low pressure gas lamps.

When two hollow metal wires are hermetically sealed through the wall of a small electric incandescent lamp, the gases can pass through the lamp in and out simultaneously through the hollow metal wires; the flushing gas drives out the air and the filling gas drives out the flushing gas, which makes it possible to manufacture these small electric incandescent lamps without actually exhausting the air and flushing gases with pumping vacuum equipment from within the small electric lamp bulbs.

The remaining space within the large lamp bulb which encloses the small electric incandescent lamps, can be filled with a mixture of gases or even impure gases.

The remaining space within the large lamp bulb which encloses the small electric incandescent lamps, can be filled with an ionizing gas, like a neon-argon gas mixture, to produce a lamp being both a glow gas lamp and an electric incandescent lamp: this type of lamp would find a very practical application for lamps connected in series; when the filament in one of the small electric incandescent lamps enclosed by the large lamp bulb would burn out, the ionizing gas would glow and show which one of the lamps in the series had burned out.

The aforesaid metal vapor lamp construction can be used to make the so called mercury arc sun lamps.

The large glass bulb which encloses the small

electric incandescent lamps can be spray coated or painted on the inside to produce frosted lamps or colored lamps with coating materials which are normally injurious to gaseous getters and filaments within the ordinary gas filled or vacuum type lamps.

The large glass bulb which encloses the small electric incandescent lamps can be coated on its inside surface with materials which are either luminescent, fluorescent, or phosphorescent to the rays emitted from the small electric incandescent lamps; some of the common materials of this type are marble dust, fluorite, willemite, alkali earth sulphides, zinc silicates, mixtures of thorium and cerium salts, and many others; each having luminescence properties without being incandescent. While these materials with luminescence properties are old in physics, yet it is new to apply them to an electric incandescent lamp having improvements of my invention, and I hereby make claim to the use of luminescence materials only as far as the improvements of my invention are used with them.

The large glass bulb which encloses the small electric incandescent lamps can be chemically etched by using fluoride compounds on the inside of the bulb or mechanically frosted by sand blasting the inside of the bulb to diffuse the light from the small lamps.

The large glass bulb which encloses the small electric incandescent lamps can be heated to fuse to the inside surface, small amber beads, glass beads, or ground glass particles to diffuse the light from the small lamps.

The large glass bulb which encloses the small electric incandescent lamps can be coated on the inside with lacquer, varnish, or any other sticky transparent coating and covered with a layer of small amber beads, glass beads, or ground glass particles to diffuse the light from the small lamps.

When the aforesaid large glass bulb is covered on the inside wall with small amber beads, glass beads, or ground glass particles, those beads or particles can be made of various colors and beautiful colored designs can be artistically worked upon the inside surface of the large glass bulb to make novelty or decorative lamps that can be used on Christmas trees, ornaments, decorations, displays, etc.

The small electric incandescent high pressure gas lamps can also be used as individual lamps for Christmas trees or other decorative purposes; the high pressure gas lamps are connected a foot or so apart with lamp cord to make a string of Christmas tree lamps with each lamp in the string colored to suit popular demand.

A string of small electric incandescent lamps can be substituted for the present long filament in a tubular show case lamp or in those lamps which are known in the electric lamp trade as lumiline lamps.

The large lamp bulb which encloses the small electric incandescent lamps can be cemented by its neck into the lamp base to act only as a globe.

The large glass bulb which encloses the small electric incandescent lamps can be made of smaller volume than is required for present low pressure gas or vacuum type lamps of equal wattage.

A wire screen bulb or a moulded plastic material bulb can be substituted for the large glass bulb when such bulb acts as a protecting globe to enclose the small electric incandescent lamps.

When the large glass bulb is cemented by its

neck into the lamp base to enclose the small electric incandescent lamps, it provides for a dust tight chamber around the small lamps even though that chamber is not air tight.

5 The small electric incandescent lamps enclosed by a large glass bulb, increases the safety measures of using a high temperature filament incandescent lamp in mines, especially those mines which have explosive gases present and now use
10 only carbon filament incandescent lamps. It is known that high temperature filaments within incandescent lamps do not always cool off quick enough to prevent the igniting of mine gases if the fragile glass bulb is accidentally broken, and as
15 a result, they sometimes are the cause of mine explosions; therefore some mine operators use only carbon filament incandescent lamps to overcome this danger. In a lamp having small electric incandescent lamps enclosed by a large glass
20 bulb, the lamp will continue to burn without danger even though the large glass bulb is broken, and the mechanical strength of the small lamp bulbs reduces their chance from breakage to almost a negligible amount of danger.

25 A varnish coating or other insulating material coating can be applied to all bare wires and connections within the large glass bulb which encloses the small electric incandescent lamps to prevent electric contact arcs caused by accidental
30 breakage of the large glass bulb when such lamp is used in a mine or a place where explosive gases or vapors are present.

The spider support wires which support the small electric incandescent lamps can be made
35 from heavy wire to hold the small lamps more rigid on the lamp stem.

The spider support wires which support the small electric incandescent lamps can be made from lower melting temperature wire because
40 such wires do not come in direct contact with the high temperature filaments like the spider wires in present lamps.

The filaments used in the present vacuum or low pressure gas type lamps can be cut into suitable short lengths and made up within small electric incandescent lamps which can then be connected together and mounted in place of the regular filament within those lamps.

45 By making a large electric incandescent lamp within which are small electric incandescent lamps that have short filaments, such large lamp can be given greater shocks, bumps, and vibrations without the filaments within the small lamps breaking.
50

55 The filaments within any small electric incandescent lamp can be given a cleaning flash in hydrogen gas by lighting up the small lamp as a hydrogen flushing gas passes in and out of the lamp simultaneously through the hollow metal
60 wires.

It is obvious from the preceding descriptions of the many electric incandescent lamp variations to which the improvements of this invention can be adapted, that many other electric incandescent
65 lamps can be made by using these improvements, and in anticipation of the manufacture of such lamps, it is a further object of this invention not to limit the improvements of this invention to the lamps described herein, but I desire to extend the claims of this invention to any electric incandescent lamp which uses the improvements described herein.
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I claim:

1. An electric incandescent lamp, comprising, a large elongated tubular glass bulb closed at each end, an electric contact for each end of said bulb, a series of small individual lamps linearly
5 arranged between said contacts, spaced supports within said bulb holding said small lamps in serial order.

2. The construction set out in claim 1, wherein each of the small enclosed lamps are filled with 10 high pressure gas.

3. The construction as in claim 1, wherein at least one of the small enclosed lamps has a thick wall glass bulb.

4. The construction as in claim 1, wherein at 15 least one of the small enclosed lamps has a thick wall glass bulb and is filled with high pressure gas.

5. The construction as in claim 1, wherein there is provided hollow metal wire electric leads 20 adapted to withstand high pressure gas closed air tight within each of said small enclosed lamps.

6. A mount for an electric incandescent lamp, comprising, a stem flare having embedded electric lead-in wires and fused together with an extended
25 glass stem rod, the end of said stem rod having embedded support wires, a series of small individual lamps connected together between said lead-in wires and mounted to said support wires.

7. The construction set out in claim 6, wherein 30 each of the small individual lamps is filled with high pressure gas.

8. The construction as in claim 6, wherein at least one of the small individual lamps has a thick wall glass bulb. 35

9. The construction as in claim 6, wherein at least one of the small individual lamps has a thick wall glass bulb and is filled with high pressure gas.

10. The construction as in claim 6, wherein there is provided hollow metal wire electric leads 40 adapted to withstand high pressure gas closed air tight within each of said small individual lamps.

11. An electric lamp, comprising, a mount having a stem flare with embedded electric lead-in wires and an extended glass stem with embedded support wires, small individual lamps connected together between said lead-in wires and joined to said support wires, a lamp base with said mount independently fastened therein, contacts in said
45 base electrically connected to said lead-in wires of said mount, a large lamp bulb independently fastened to said lamp base enclosing said small individual lamps interconnected on said mount. 50

12. The construction set out in claim 11, wherein each of the small individual lamps is filled with high pressure gas. 55

13. The construction set out in claim 11, wherein at least one of the small individual lamps has a thick wall glass bulb. 60

14. The construction set out in claim 11, wherein at least one of the small individual lamps has a thick wall glass bulb and is filled with high pressure gas.

15. The construction set out in claim 11, wherein there is provided hollow metal wire electric leads adapted to withstand high pressure gas closed air tight within each of said small individual lamps. 65

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