

July 7, 1931.

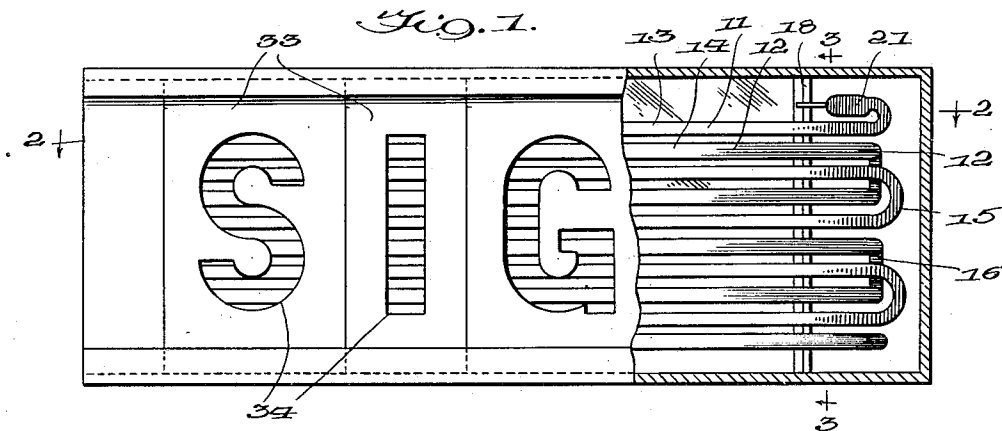
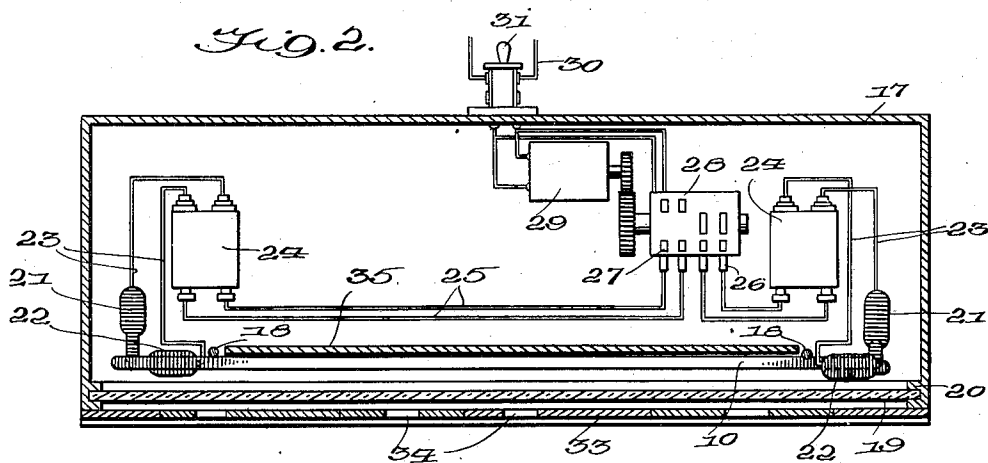
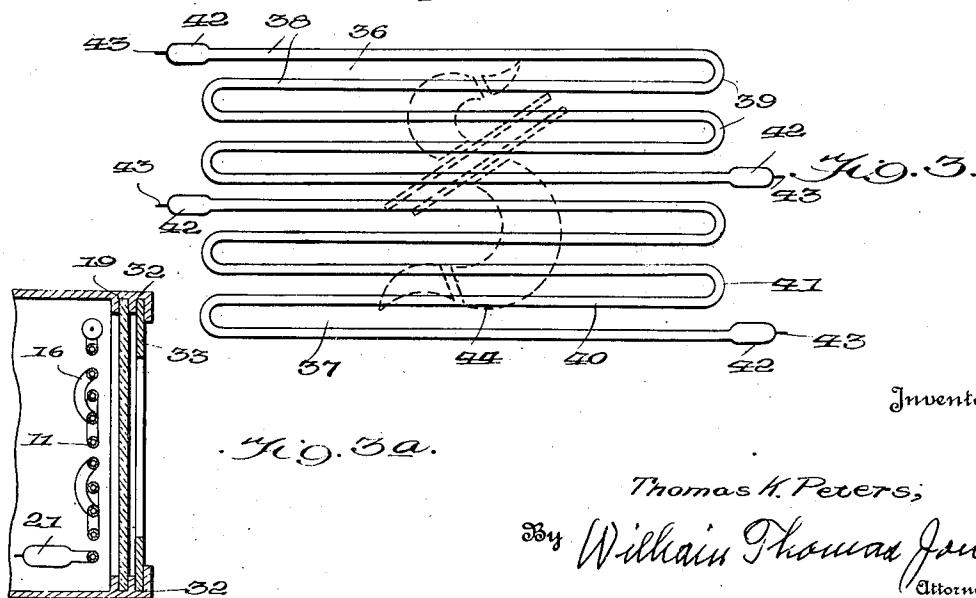
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1,813,759

LUMINOUS TUBE

Filed July 14, 1928

3 Sheets-Sheet 1



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July 7, 1931.

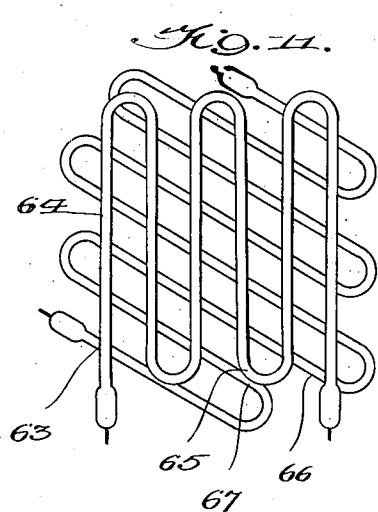
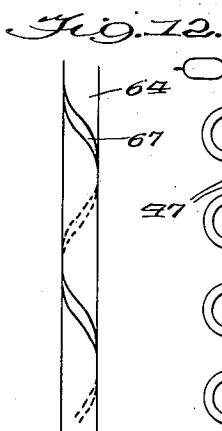
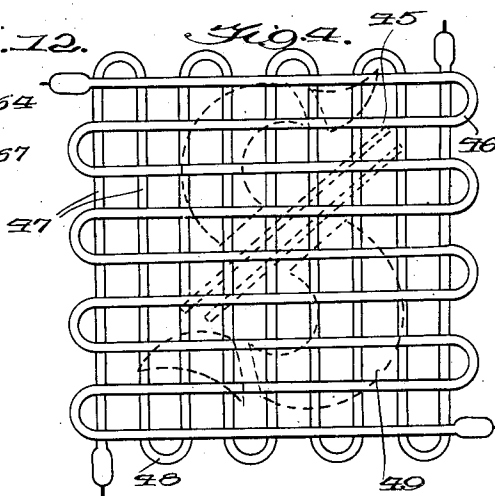
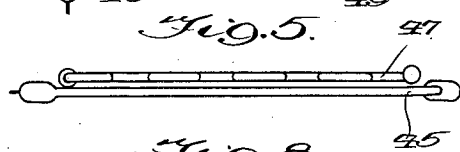
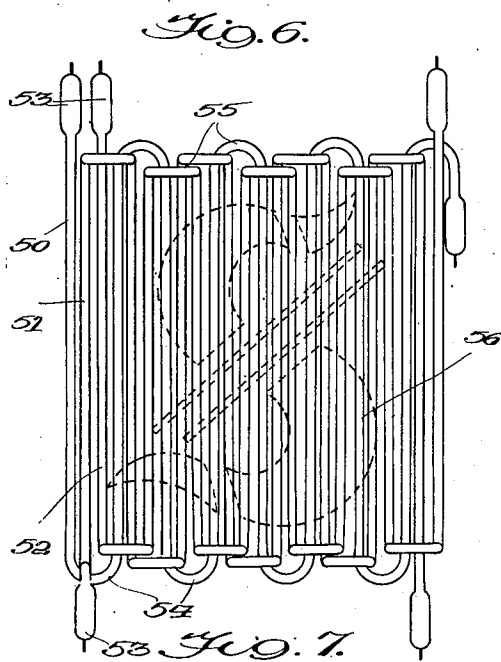
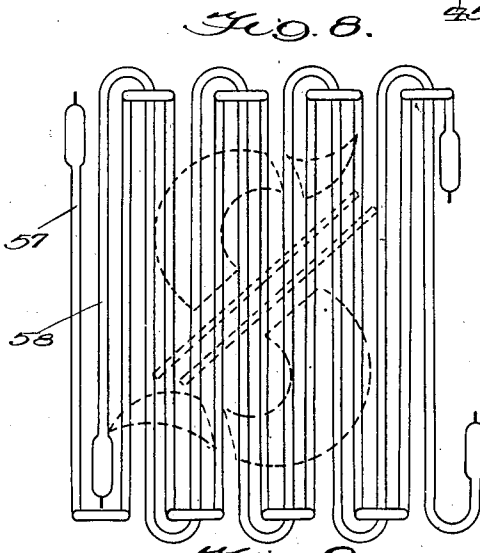
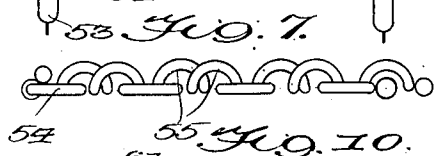
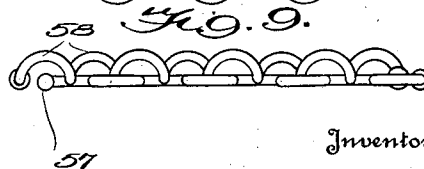
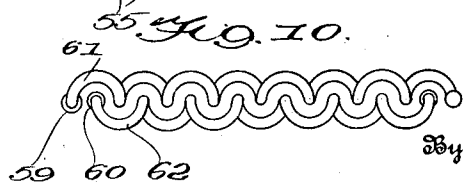
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LUMINOUS TUBE

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3 Sheets-Sheet 2



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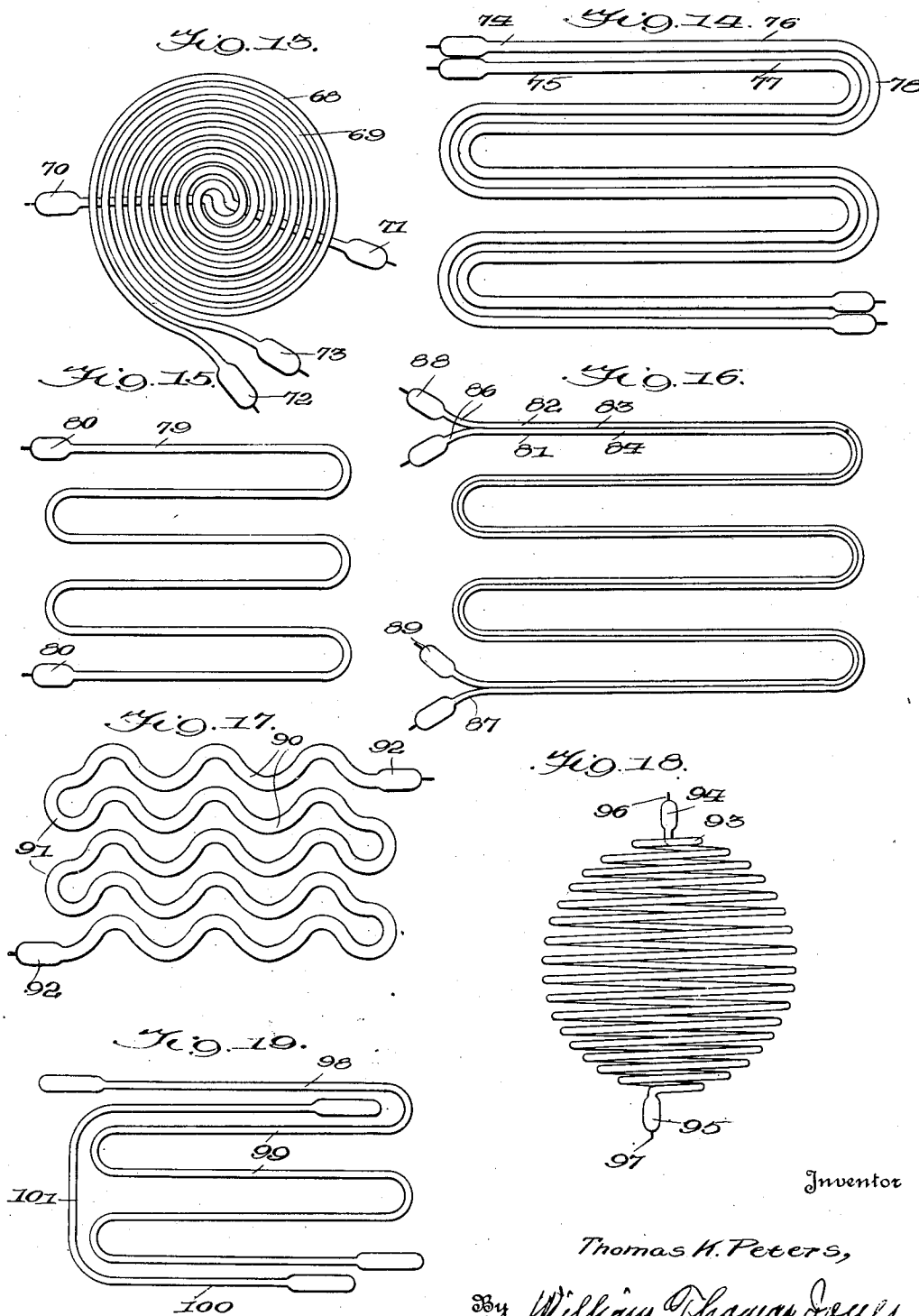
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LUMINOUS TUBE

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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

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LUMINOUS TUBE

Application filed July 14, 1928. Serial No. 292,671.

The present invention, which is a continuation in part of my co-pending application Serial No. 248,163, filed January 20, 1928, relates to improvements in luminous gas or vapor filled tubes that may be used for various display, decorative, scientific, or other illuminating purposes.

An essential object of the invention is to provide a new and improved arrangement of transparent tubing in the form of a luminous grid or grids, the main portions of which are closely interspaced to provide a relatively close banded illumination of the entire area of the grid.

Another object consists in the provision of a simple, efficient and economical luminous tubing in the form of non-communicating chambers or passages that are preferably filled with rarefied gases or vapors having different color characteristics, so that when the tubes are made luminous they will produce a variety of color effects of striking and pleasing appearance and a light of great brilliancy and beauty.

A further object is to provide a plurality of luminous gas filled tubes of different color characteristics in a single luminous grid or background whereby the different tubes, upon being selectively or simultaneously electrically energized, will produce a plurality of simple or blended color effects in the form of intense bands or stripes of light of the color characteristic of the particular gas or vapor contained in each of the tubes. Thus it will be seen that if two tubes are used, one of which emits blue and the other red luminosity, three color effects are obtained with these two tubes, namely the simple or primary colors red and blue, and the blended or complex color lilac. Instead of a plurality of tubes being employed, the same results might be accomplished by means of a single tube containing within itself a division or partition so as to form two separate passages each of which may be filled with different colored gases.

When different color effects are desired, they may be produced by the different color characteristics of different gases used in the respective tubes or by tinting the tubes

themselves, silvering them, impregnating the glass with various metallic elements or any other well known or suitable ways. The luminous tubes employed preferably have bulbous ends containing electrodes and are filled with any suitable rarefied gas such as neon or a vapor such as mercury. The electrodes may be in circuit with a high potential transformer so that when the gas is energized or ionized, the light produced will have the color characteristics of the particular gas. Obviously, other gases and vapors may be used, including active diatomic gases such as nitrogen, hydrogen and oxygen, etc., and other inert monatomic gases such as helium, argon, xenon and krypton.

Other advantages and objects of the invention will become apparent from the following description when taken in conjunction with the appended claims.

Referring to the drawings in which are disclosed a number of preferred embodiments that the invention may assume:

Figure 1 is a front elevation with the parts in section, of an illuminating appliance having one form of the invention associated therewith.

Figure 2 is a sectional view substantially along the line 2—2 of Figure 1.

Figure 3 is a front view of a modified tube arrangement.

Figure 3a is a sectional view taken substantially along the line 3—3 of Figure 1.

Figure 4 is a front view of another modification of tube construction.

Figure 5 is a plan view of Figure 4.

Figure 6 is a front view of a modified form of tubing.

Figure 7 is a plan view of Figure 6.

Figure 8 is a front view of another modification of tubing.

Figure 9 is a plan view of Figure 8.

Figure 10 is a plan view of a modification of the form of tubing shown in Figure 9.

Figure 11 is a front view of another tube arrangement.

Figure 12 is an end view of Figure 11 showing the effects produced when the tubes are made luminous.

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Figure 13 is a face view of a grid construction in which the tubing is arranged in the form of a convolute spiral.

Figure 14 is a side elevation of two closely spaced tubes filled with different gases.

Figure 15 is a side elevation of a single tube.

Figure 16 is a side elevation of a single tube having a partition therein for forming separate passages that may be filled with different gases.

Figure 17 is a side elevation of a sinuous tube arrangement.

Figure 18 is a side elevation of a spirally arranged luminescent tube.

Figure 19 is a side elevation of a further modification.

Referring to the drawings in which like numerals indicate like parts in the various views, there is shown in Figures 1, 2 and 3a, one of the many appliances or purposes to which the luminous tubes may be economically and efficiently employed.

As shown in these figures, the composite grid element or color background 10 is formed by the gas or vapor filled transparent tubes 11 and 12, each of which tubes preferably comprises closely interspaced main parallel portions 13 and 14 respectively, the main portions 13 being connected by end bends or bridges 15 in the same plane as the portions 13, while the main portions 14 are connected by the bends or bridge portions 16 that are offset substantially at right angles to the plane of the grid (Figure 3a) so as to pass over or bridge the intermediate portions of the tubes 11.

The grid which is composed of the tubes 11 and 12 is mounted within the casing 17 and is supported therein by the vertical racks 18 that are preferably positioned in close proximity to a transparent or translucent member 19 that acts as a closure for one side of the casing and is slidably connected thereto by the guides 20 (Figure 2).

The tubes 11 and 12 terminate in bulbous end portions 21 and 22, in each of which is arranged an electrode having an outside terminal 23 that is connected to the high potential transformers 24. Secondary leads 25 are connected at one end to the transformers 24 and have their opposite extremities terminating in brushes 26 which are in circuits with the contacts 27 of a rotary flasher 28, so that the tubes may be energized singly or simultaneously, depending upon the color effects desired. The flasher 28 is driven by a motor 29 which is supplied with current from any suitable source through the power line 30 that has a switch 31 that may be either manually or automatically controlled.

The open side or face of the casing 17 adjacent the transparent member 19 is provided along its upper and lower edges with

channels 32 that slidably receive the interchangeable sign sections or stencil screens 33 of any suitable sheet material and preferably relatively opaque. If the sign sections 33 are metal they are obviously completely opaque, while if they are formed of glass or analogous material, they may be rendered approximately or completely opaque by coating the entire area, or such portions thereof as may be desired, with paint or other material. Preferably each screen section includes a design area 34 which may be in the form of a letter or other character, or a part of a complete decorative design, this being provided, in the case of a sheet of opaque material, by cutting out the material to form a stencil opening, or in the case of material which is coated, by leaving the design area uncoated so that it is transparent or translucent, depending upon whether it is made of clear, opalescent, pebbled, or frosted glass. It is obvious that a design or legend of any suitable configuration may be formed on the member 33. When the design areas are transparent, the grid or background will be visible through such areas and will produce diffused bands or stripes of intense light and of colors characteristic of the particular gas contained in the tubes. When the design areas are not transparent but translucent, the light emitted by the separate tubes of the grid will be more or less blended and diffused, and in this way different color effects may be produced.

The grid may have in the rear thereof a light reflecting member 35 that preferably has its exposed face suitably treated or finished to produce in conjunction with the tubes, any desired colored pattern.

The luminous tubing which forms the grid or background, may be either a single tube, or a plurality of tubes to provide a multiplicity of grids arranged in various relations to one another so as to produce a variety of different color effects depending upon the particular character of the gas or vapor in the tubes and also upon whether means are provided for energizing the gases singly, simultaneously, or in sequential order.

As illustrating a number of preferred embodiments which the luminous tubes may assume, there is illustrated in Figure 3 one form which shows a vertically disposed grid that is composed of an upper section 36 and a lower section 37 which sections preferably lie in the same vertical or horizontal plane. The section 36 consists of a series of main horizontal portions 38 which are uniformly spaced from one another and are connected by the bent portions 39. The section 37 is similarly formed with main portions 40 that are joined by the bent portions 41. These sections terminate in the bulbous ends 42, 120

in each of which is mounted an electrode that is connected by the outside terminals 43 to any suitable source of electrical energy, not shown. Preferably, the section 36 of the luminous grid is filled with a different color gas than the section 37 so that when the tubes are energized, a display sign or the like, such as the letter 44, will be illuminated to produce a variety of color effects characteristic of the particular gas or vapor contained in each of the tube sections.

Figures 4 and 5 show a grid arrangement in which a lattice effect is produced by forming one of the tubes with main horizontal portions 45 that are uniformly spaced apart and connected by the bends 46 and the other tube with main uniformly spaced vertical portions 47 that are joined by the bridges 48. The tubes are arranged in close proximity to each other so as to provide a checker-board color effect of a very striking and attractive appearance.

In Figures 6 and 7, the grid is shown composed of three tubes, 50, 51, and 52, each of which is preferably filled with different colored gas or vapor and terminates in the bulbous ends 53 in each of which is mounted an electrode for energizing the gas therein. The main portions of the tube 50 are connected by the bends 54, while the main portions of the tubes 51 and 52 are connected by the laterally projecting bridges 55.

It will be seen that the gas in each of the tubes may be energized singly or in combination so as to give a total of seven color effects, which, when associated with a sign, such as 56, produces a pleasing and attractive blend of the component colors. Obviously, the main portions of the tubes may, if desired, be arranged horizontally instead of vertically.

Figures 8 and 9 show a grid arrangement substantially similar to Figures 1 to 3a except that the main portions of the tubes 57 and 58 are arranged vertically instead of horizontally.

Figure 10 is a plan view of a modified form of tubing shown in Figures 8 and 9 and has the straight portions 59 and 60 connected by bends or bridges 61 and 62 respectively, which are bent at right angles to the main portions and in opposite directions to one another.

Figures 11 and 12 show a grid arrangement in which the tubular member 63 is formed with the vertically disposed main portions 64 that are connected by the bends 65 and a tubular element 66 which has its main portions 67 arranged diagonally or at an inclination to the main portions of the tubing 64. The tubing 64 is preferably filled with mercury vapor, while the tubing 67 is filled with neon gas so that when the grid is made luminous the mercury will pro-

duce blue and the neon a red color, thus giving the effect as shown in Figure 12 in which the red bands appear to be spirally wound around a blue background. Obviously, the tubes may be arranged in various angular relation to each other or other tubes filled with different colored grids, added so as to produce patterns of various designs and configurations.

In Figure 13 the tubings 68 and 69 are employed, which are bent around each other so as to present a concentric or convolute spiral with their ends terminating in the upper electrodes 70 and 71 and the lower electrodes 72 and 73 respectively.

Figure 14 shows a grid in which two tubes 74 and 75 are arranged with their main portions 76 and 77 and their bent portions 78 lie in substantially the same vertical plane.

Figure 15 is substantially similar to Figure 14 with the exception that it only employs a single tube 79, the terminals of which are provided with the electrodes 80.

Figure 16 shows a single tube 81 which is provided with a partition 82 so as to form non-communicating gas filled passages 83 and 84 that may be filled with gases having different color characteristics. The ends of the tube 81 are suitably formed so as to terminate in the branches 86 and 87 in which are mounted the electrodes 88 and 89 for energizing the gas in the passages 83 and 84.

Figure 17 illustrates a single tube having a sinuous main portion 90 connected by the bridges 91. The tube 90 terminates in the bulbous ends 92 in which are mounted the electrodes for energizing the gas therein.

In Figure 18 a luminescent tubing 93 is formed of substantially spherical shape and is arranged to be filled with any rarefied gas or vapor. The diametrically opposite ends 94 and 95 of the tubing are provided with electrodes which in turn are connected with any suitable source of electrical energy by the wires 96 and 97.

Figure 19 exhibits a grid arrangement in which the tubing 98 is formed with a series of relatively close main portions 99 which are preferably positioned within the space formed between the main portions 100 of the tube 101.

It will be obvious that the term "grid" as employed to define the various configurations of the tubing is used in a generic sense and is intended to include any arrangement of the tubes which will produce the desired effect.

While I have shown grids composed of a single, double and triple arrangement of tubes, it will be apparent that the number of tubes may be increased and arranged in various forms so as to produce any desired pattern or color effect. Moreover, the tubes

may be filled with any rarefied gas such as neon, or the like, or diatomic gases or a monatomic gas that preferably have different color characteristics.

- 5 It is to be understood that the forms of the invention herewith shown and described are merely illustrative of preferred embodiments and that such changes may be made as fall within the purview of one skilled in the art without departing from the spirit of the invention and the scope of the appended claims.

What I claim is:

1. A luminous grid of the class described, comprising a plurality of non-communicating luminous tubes having electrodes, certain of said tubes having main portions connected by bridge portions, other of said tubes having portions interspaced between said main portions, means in said tubes for emitting luminous rays of different colors or tints, and means for causing illumination of the tubes separately for producing different color effects.

2. A luminous grid of the class described, comprising a plurality of non-communicating luminous tubes having electrodes, certain of said tubes having main portions connected by bridge portions, other of said tubes having portions interspaced between said main portions, means in said tubes for emitting luminous rays of different colors or tints, and means selectively illuminating the tubes.

- In testimony whereof I have hereunto set my hand.

THOMAS K. PETERS.

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