United States Patent [19]

Vivari

[11] **3,833,828**

[45] **Sept. 3, 1974**

[54] **ILLUMINATION ARRAY STRUCTURE**

[76] Inventor: **Joseph Vivari,** 5015 Fort Summer Dr., Montgomery, Md. 20016

[22] Filed: **Aug. 16, 1972**

[21] Appl. No.: **281,006**

[52] **U.S. Cl.**..... **313/111,** 240/51.12, 313/114, 313/220

[51] **Int. Cl.**..... **H01j 61/32**

[58] **Field of Search**..... 313/220, 114, 111; 240/51.12, 11.4 N

[56] **References Cited**

UNITED STATES PATENTS

1,774,842	9/1930	Peters	240/51.12
2,304,594	12/1942	Pennybacker	240/51.12
2,399,222	4/1946	Germeshausen	240/51.12
2,799,791	7/1957	Honing et al.	313/114
3,535,653	10/1970	Zarowin	313/220 X
D113,652	3/1939	Bilofsky	240/51.12 X

FOREIGN PATENTS OR APPLICATIONS

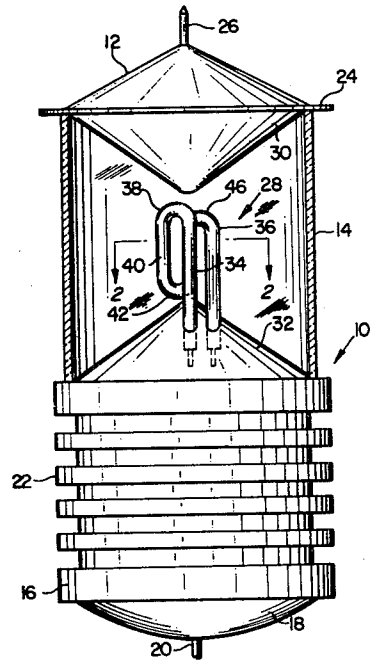
453,014	9/1936	Great Britain	240/11.4 N
727,428	3/1932	France	240/11.4 N

Primary Examiner—Palmer C. Demeo
Attorney, Agent, or Firm—Jesse C. Bowyer

[57] **ABSTRACT**

A lighting element for illumination preferably having a single elongated envelope containing a gaseous medium emitting white or colored, continuous or intermittent, light upon excitation by electrical current. The envelope is formed in a tortuous configuration and, preferably includes within a single envelope all of the poles of the array. The said poles each have a substantially parallel, preferably vertical axis and are at least four in number with one of this number being substantially centrally located relative to the remaining poles of the array. The array is so constructed that at least 75 percent of the surface areas of the exterior facing poles thereof are viewable on any vertical plane substantially parallel to the vertical axis of the array from any point on any such vertical plane spaced a distance at least equal to the closest spacing between the exterior surfaces of the most proximate viewable pole and the nearest pole thereto. Preferably the point of viewing is many multiples of such distance. In preferred embodiments, the amount of light viewable from any of said points on any of said planes is substantially equal. In further preferred embodiments, the exterior poles, excluding the central pole, are cylindrically disposed, as if they were positioned on the outer wall of a cylinder substantially parallel to the poles and to the vertical axis of the array. The poles are so disposed as to achieve maximum effective viewable illumination per unit of light lumens and per unit of wattage. The described embodiments eliminate, or reduce to a minimum, any flicker observable by a viewer as the viewer moves relative to the lighting element.

17 Claims, 8 Drawing Figures



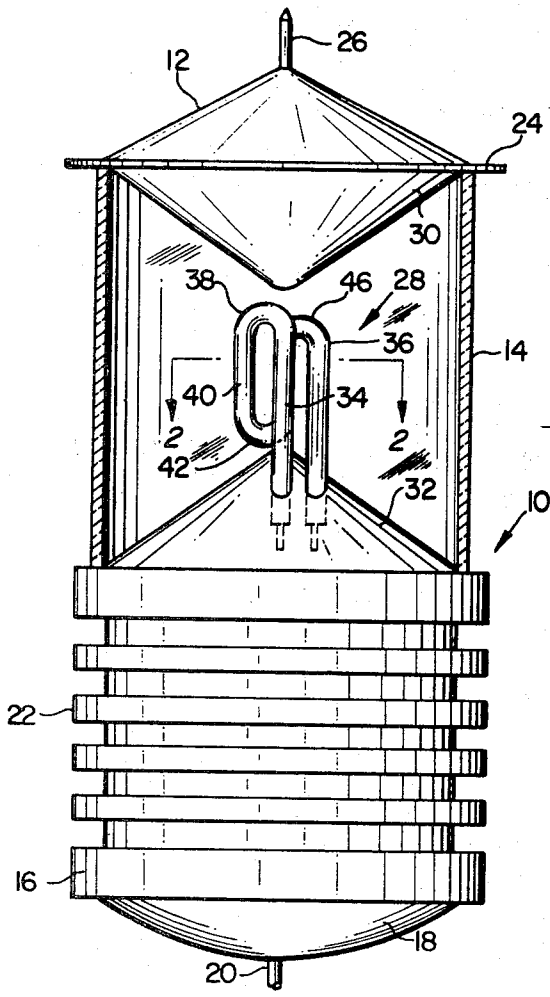


FIG. 1

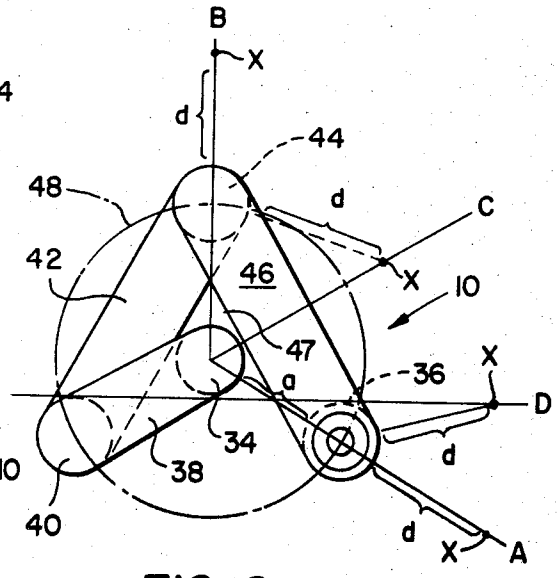


FIG. 2

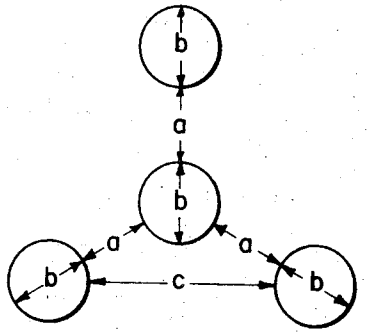


FIG. 3

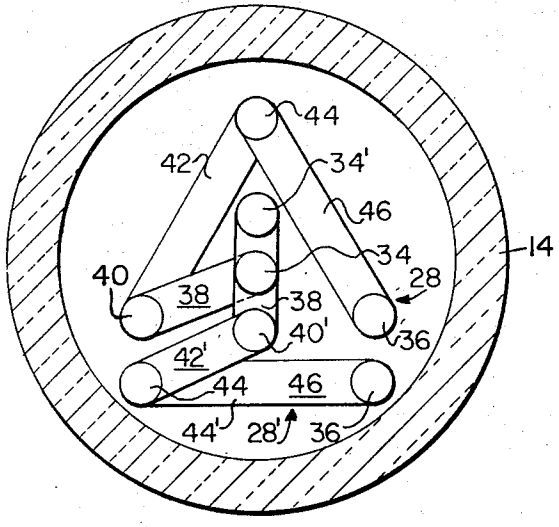


FIG. 4

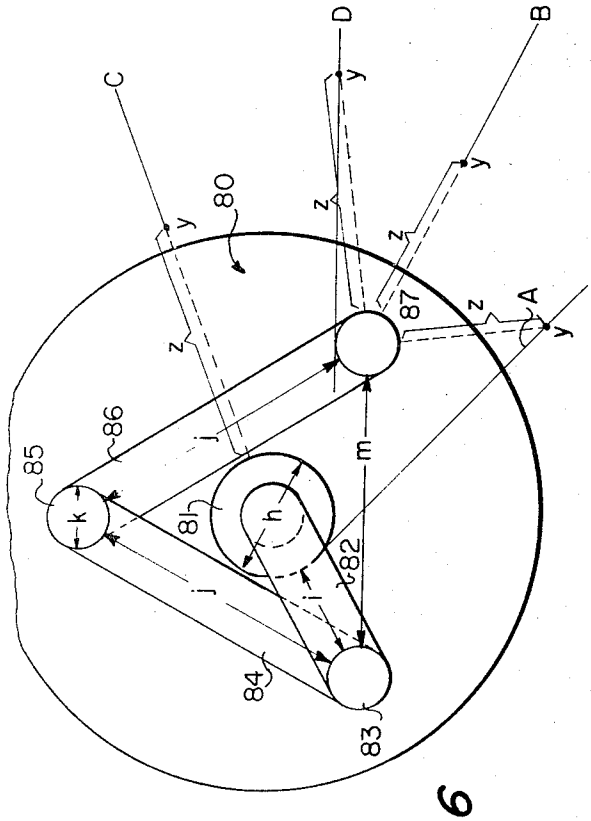


FIG. 6

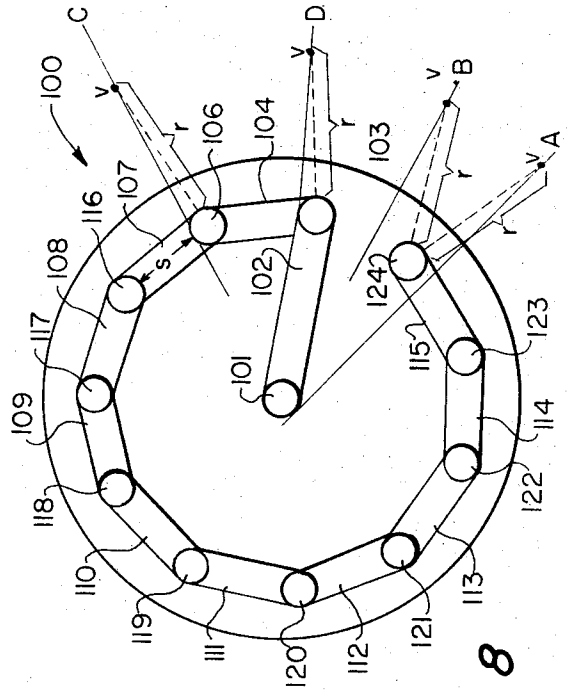


FIG. 8

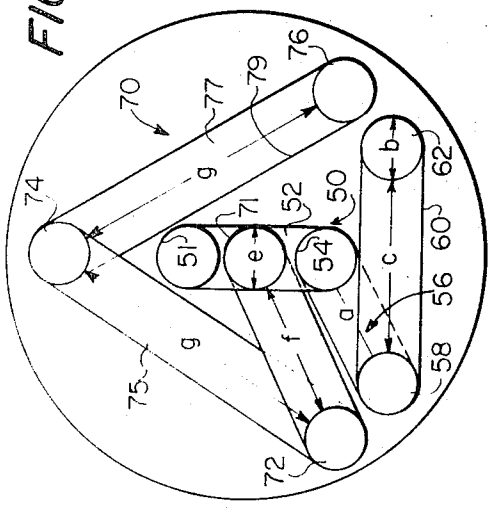


FIG. 5

FIG. 7

ILLUMINATION ARRAY STRUCTURE

BACKGROUND OF THE INVENTION

It is old in the art to use luminous tubes, such as neon tubes, as a source of illumination in which the tubes or tubing is formed as a helix or as a plurality of tubes arranged adjacent to each other. However, the defects of the prior art constructions have been that the configurations utilized therein have caused the blocking out of a significant number of individual tubes by others of the tubes at any given point of sight around the periphery of the source of illumination. In consequence, such devices have generally had very low efficiency and have required the use of a large number of lengthy tubes or tubing.

In the art it has been found suitable to provide illuminating elements of the type described in the form of elongated tubes filled with a gaseous medium. Such elements provide high intensity illumination and low current consumption. When such envelopes are formed in a tortuous path such that successive sections are close to one another, a more concentrated source of light emission is achieved which does not have the characteristics of a point source of light as in incandescent filaments or a line source of light as to straight line elements.

Prior art elements of the type described suffer the disadvantages that, although point or line sources of light are somewhat reduced, multiple concentrated zones of light are created which, as the eye moves with respect to a lighting element, causes a flickering effect which is not only distracting but fatiguing. Such prior art devices do not achieve maximum viewable efficiency per lumen or per watt. As illustrative of such prior art, reference is made to the following patents: Henninger et al. No. 2,217,315 and No. 2,273,520, Uyterhoeven et al. No. 2,200,940, Byrnes No. 1,898,615 and British Pat. No. 453,014.

SUMMARY OF THE INVENTION

This invention provides a lighting element of the type described in which the disadvantages of the prior art are avoided by furnishing an elongated light emitting envelope including plural parallel, preferably vertical poles arranged such that concentrated zones of light are avoided, the poles and array having a generally unidirectional axis.

The invention also furnishes a low, medium or high intensity lighting element having a substantially constant level of illumination around the periphery thereof by providing an element having plural light-emitting, parallel, preferably vertical poles disposed in an array such that the presented exterior facing surface area of the element viewable from points on any plane perpendicular and substantially beyond the periphery of the array is substantially constant.

In a most preferred embodiment, the invention provides a lighting element having an elongated envelope containing a gaseous medium emitting light upon excitation by electric current; the envelope being formed in a tortuous configuration including plural vertical poles on a substantially common cylindrical plane and spaced from one another a distance at least equal to the width of the poles such that at least about 75 percent of the total exterior facing surface area of the poles is viewable from points on any plane perpendicular to the cylindrical plane.

Various alternative embodiments are described and illustrated wherein the spacing and the widths of the poles are of differing form, these other embodiments also accomplishing the desired results of the invention.

These and other objects and advantages of this invention will become better understood to those skilled in the art by reference to the following detailed description, when viewed in light of the accompanying drawings, wherein like numerals indicate like components throughout the figures thereof.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is an elevational view of an illuminating device incorporating an element in accordance with this invention;

FIG. **2** is an enlarged plan view of the most preferred embodiment of the invention taken along the line **2—2** of FIG. **1**;

FIG. **3** is a plan view showing the distance relationship of the width and spacing of the poles in this embodiment;

FIG. **4** is an enlarged plan view of this form of the device with a duplicate or back-up horizontally displaced array;

FIG. **5** is an enlarged plan view of an alternative form of the device having a back-up array having different spacing than the primary array;

FIG. **6** is a view similar to FIG. **2** showing the centrally disposed pole having a width substantially greater than the remaining poles;

FIG. **7** is a view similar to FIG. **6** wherein one of the exteriorly disposed poles is positioned a greater distance from the center pole than the remaining exterior poles; and

FIG. **8** is an enlarged plan view similar to FIG. **2** utilizing **12** poles instead of the four poles shown in FIG. **2.**

DESCRIPTION OF THE PREFERRED EMBODIMENTS

In FIG. **1,** an illuminating device, shown generally at **10,** comprises a cap **12,** a cylindrical lens **14,** which may be glass or a suitable transparent or colored plastic material as is known in the art, a power unit **16** and a supporting base **18** through which conductors **20** connect the device to a source of electrical current (not shown). Fresnel or other type lenses can be utilized instead of the plain lens shown if so desired.

The power unit **16** may be provided with cooling fins **22** to dissipate heat generated therein. The cap **12** may be provided with a lens protecting overhang **24** and a bird-deterrent device **26.** The cap and lens may be combined in one piece, particularly if vertical light emission is desired. The power unit **16** may be remotely located if so desired.

The lighting element, shown generally at **28,** is disposed within the lens **14,** and may be between upper and lower conical reflectors **30** and **32.** The cone angle of the reflector is dictated by the desired angle of reflected light, e.g., a 45° cone for reflection of light at 90°. Either or both reflectors may be eliminated if cost or operational requirements so dictate. The element **28** is formed of adjacent, substantially parallel light poles, preferably connected into an elongated evacuated en-

velope having a center input leg **34** and a parallel, generally coextensive output leg **36** connected through the reflector **32** to the power unit **16** by means of a standard socket (not shown) or the like and may be secured to the base by a spring clip or other means. The envelope and/or the individual poles, if these do not form a single tortuous envelope, are filled with a gaseous medium, preferably one or more of the monatomic gases such as neon, helium, argon, krypton, and xenon, and mercury vapor, which emits light when excited by the passage of electric current between electrodes (not shown) or when externally excited, as is known in the art. The color of light emitted can be varied by selection of the medium (i.e., xenon for white, neon for red, etc.) or by colored coating of the envelope element or by using a coated or colored lens.

With reference to a preferred array embodiment shown in FIG. **2,** the center input or output leg **34** is connected by means of a first upper crossover **38** to a first intermediate vertical leg **40** which is parallel to the input or output legs and communicates, where a single tortuous envelope is used, with a lower crossover leg **42.** The lower crossover leg communicates with a second intermediate vertical leg **44** which extends generally parallel and coextensive with the first intermediate leg **40** and connects interiorly with a second upper crossover leg **46** which communicates with the top of the input or output leg **36,** it being understood that the above terminology is intended to imply that either of the designated legs **34** or **36** may be used as the input, in which case the other of the designated legs is utilized as the output. This array and single envelope thereof thereby is formed in a tortuous path including the plural vertical poles (legs **34, 36, 40** and **44**). All but one of these legs are substantially cylindrically disposed perpendicularly to the outer wall of a plane section of a cylinder **48,** while the remaining leg (preferably input or output leg **34**) is disposed substantially coaxial to the center of the plane. The location and choice of which legs are selected and connected and their orientation for forming the input and output legs may be other than as specifically shown in FIG. **2**; however, it is preferred that the socket ends of these legs **34** and **36** be oriented in the same direction to simplify the wiring of the device, the securing of the envelope to the base, and the installation and/or replacement of the envelope. It will be understood that the crossover legs need not be formed at exact right angles to the vertical poles but that, instead, these may have a rounded or arched configuration, especially at the connecting points or corners between the crossovers and the poles, since this facilitates the manufacture of the tubing.

As best seen in FIG. **3,** in this embodiment the vertical poles, which may be of any desired length and which have a width *b*, the poles all being contained within the housing or lens **14,** are disposed such that the distance *a* between the nearest wall point of any pole and the most proximate pole adjacent thereto is approximately equal, but preferably slightly less than the diameter or width *b* of the poles, each of the poles having a substantially equal width *b*. The resulting array of cylindrically disposed exterior poles therefore forms a pole array disposed in a substantially equilateral triangle on the outer edge of plane **48,** equal distances between pole walls being designated as *c*.

In operation, with the element **28** energized, each pole emits light and is partially opaque to transmission of light from the other pole sources. Each pole therefore "shades" some of the light from the poles, which may be disposed therebehind, when viewed from any particular sight line around the perimeter of the cylinder **14.** Since the total illumination observed from a point on any radial plane intersecting the plane **48** (e.g., A) is a function of the total surface area of the array elements visible at that point, the total illumination given off by the element **28** in that direction (towards A) is partially reduced by an amount proportional to the surface area of leg **34** which is shaded or eclipsed by leg **36** as seen in FIG. **2.**

In FIG. **2** there are shown four of the illustrative vertical planes which are substantially parallel to the axis of the vertical poles described above, these being designated by the lines A, B, C and D, and being shown as extended substantially beyond the array. On each of these lines a viewing point *x* is designated, which point *x* is spaced from the exterior facing viewable surface of the most proximate pole to said point a distance designated *d*, which is at least equal to the spacing (in this case distance *a*) between the exterior surface of the most proximate viewable pole and the nearest pole thereto (in this case, such pole being the centrally located pole **34**).

An examination of FIGS. **2** and **3,** the latter illustrating an embodiment in which the widths of the vertical poles are equal to the spacing between the exterior poles and the centrally located pole, will show that the total reduction of illumination from any of the points *x*, or from any point radially outwardly therefrom, can be no more than 25 percent irrespective of the pole or portions of poles, in summation, which are obscured. Thus, from point *x* a viewer will, in plane A, or in any similar plane, be able to view all of the exterior facing surfaces of poles **36, 40** and **44,** the exterior viewable surface of center pole **34** being totally shaded by pole **36.**

In plane B, leg **34** is totally shaded by leg **44** so that visible illumination is again reduced by no more than 25 percent. In plane C, leg **40** is totally eclipsed by leg **34,** thereby again reducing the illumination by no more than 25 percent. In plane D most of pole **40** will be eclipsed by pole **36.** It will be seen by similar placement of planes at any point through the periphery of an array of tubes such as that of element **28** that the total area eclipsed in any plane is approximately no more or less than 25 percent, assuming total eclipse, thereby providing an element having a constant visible illumination of 75 percent and, thereby not only eliminating "flicker", but providing a maximum possible amount of illumination without flicker.

If the envelopes of the vertical poles do have some transmissivity for the light emanating from the vertical pole directly eclipsed thereby, then the total illumination will be increased above 75 percent by this added amount of light. However, since this factor is constant for the entire area when viewed from any point, there will still be maximum illumination without flicker.

It should also be understood that one or more duplicate or standby or back-up arrays **28'**, similar to array **28** and having similar elements **34', 36', 38', 40', 42', 44'** and **46'**, can be situated within the lens area of the device with its poles circumferentially, angularly spaced from the poles of the first array and be wired to be energized at the same time, or upon failure of the primary element. In such an arrangement, as shown in

FIG. 4, the presence of the unenergized legs on a standby array would not decrease light transmitted therethrough by a substantially constant factor greater than 5 percent, which would not noticeably affect the visible character of the illumination.

It will be understood that in the dual configuration shown in FIG. 4, the pole 34 has a height which is sufficiently lower than the crossover between poles 40' and 34' so as to avoid physical contact therebetween. In like fashion where any plurality of arrays are utilized which require crossovers, the height of the vertical legs is so chosen as to avoid contact between these legs and the crossovers of the other array or arrays.

The structure shown in FIG. 5, contains a primary array 50 which comprises a first vertical pole 51, a crossover leg 52 connecting this vertical pole to a generally centrally located pole 54, a second crossover leg 56 connecting said centrally disposed pole 54 to a second exteriorly, or radially outwardly disposed, vertical pole 58, and a crossover leg 60 connecting outwardly disposed vertical pole 58 with vertically disposed pole 62.

The second array shown in FIG. 5 is designated generally by the numeral 70 and is preferably used as a back-up array, and has the distance *g* between the exterior poles thereof substantially double to the spacing of the distance between the exterior poles of the first array 50. There is shown a first generally centrally located vertical pole 71 having a width designated as *e* spaced from and connected to a vertical pole 72 by a crossover leg 73, the spacing between the said two poles being designated as *f*. Pole 72 is connected to vertically disposed pole 74 by means of a second crossover leg 75 and the distance from poles 72 and 74 is designated as *g*. Vertical pole 74 is connected by a crossover leg 77 to vertical pole 76, the spacing between poles 74 and 76 also having a distance designated as *g*.

It will be seen that the widths of the poles of the first array 50 have their diameters e substantially equal to that of *b*, as described above, and that the spacings *a* and *c* between vertical poles have the same generic relationship as described above with regard to the embodiment illustrated in FIGS. 2 and 3.

However, the distance *f* is substantially twice the distance *a* and the distance *g* is substantially twice the distance *c*. An examination of this second or back-up array reveals that by taking a vertical plane parallel to the vertical axis of the array, such as planes A, B, C or D of FIG. 2, and viewing the array from any point on such a plane, at least equal to the distance *f*, substantially 75 percent of the exterior facing viewable surface of the second array 70 is visible from any such point on any such plane.

In FIG. 6 there is shown an array 80 having a generally centrally located vertical pole 81 having a width *h* and being connected by crossover leg 82 to a radially outwardly disposed vertical pole 80 and spaced therefrom a distance *i*. Vertical pole 83 is connected by crossover leg 84 to a second outwardly disposed vertical pole 85 and is spaced therefrom a distance *i*. Crossover leg 86 connects vertical pole 85 with outwardly disposed vertical pole 87, poles 85 and 87 also being spaced apart a distance *i*. Each of the poles 83, 85 and 87 has a width *k*.

It will be noted that the width *h* of the centrally located vertical pole is substantially double the width *k* of the remaining outwardly disposed vertical poles 83, 85 and 87. Here again there are shown vertical illustrative viewing planes A, B, C and D generally parallel to the array axis. It will be seen that from any point on any of these planes, designated as *y* and spaced from the viewable surface of the most proximate pole a distance *z*, which distance is at least equal to the spacing between the exterior surfaces of the most proximate viewable pole and the nearest pole thereto gives a constant maximum viewing area to the observer. In this case, the portion of the exterior facing viewable surfaces of the poles which can be seen by the observer at any of these points is approximately 80 percent.

FIG. 7 is a view similar to FIG. 6, with all of the elements thereof being positioned as described with regard to the embodiment shown in FIG. 6, except that the pole 85 is displaced outwardly from the generally centrally located pole 81 a distance *n* which is greater than the distance *i* illustrated in FIG. 6. In consequence, the distance *m* remains the same as in the embodiment described with regard to FIG. 6, but the distances *p* between pole 85 and poles 83 and 87 is greater than the similar distance *m* between poles 83 and 87, the distance *n* between pole 81 and pole 85 being greater than the distance *q* between pole 81 and poles 83 and 87. Here again, illustrative points on radial planes A, B, C and D are shown, and correspond to points *y* of FIG. 6, and these points are designated as *y'*. It will be observed that any point *y'* on any of these planes or any point radially outwardly disposed therefrom will result in the viewer being able to observe about 80 percent of the exterior facing viewable surface of all of the poles of the array.

In FIG. 8 there is shown an alternative embodiment of the invention utilizing 12 poles. The array is designated in its entirety by the numeral 100 and includes a center pole 101 being connected by a crossover 102 to a vertically disposed pole 103 which is connected by crossover leg 104 to vertical pole 106. In like fashion, crossover legs 107, 108, 109, 110, 111, 112, 113, 114 and 115 connect vertically disposed poles 116, 117, 118, 119, 120, 121, 122, 123 and 124. Planes A, B, C and D correspond to previously described vertical planes A, B, C and D, and are substantially parallel to the vertical axis of the poles and array. Here again, it will be seen that any point, designated *v* positioned on any of these planes a distance *r* at least equal to the spacing *s* between the exterior surfaces of the most proximate viewable pole and the exterior surface of the nearest pole thereto will give the viewer an unobscured view of at least about 75 percent or greater of the viewable exterior facing sufaces of all of the poles. In this particular case, the percentage of the exterior facing surfaces viewed is approximately 83%.

In order to better understand the invention, it is further explained in the following alternative approach, reference being made to the above described drawing. It is to be emphasized that the herebelow given explanation constitutes, and includes, differences relating only to pragmatic approach, and no differences as to structure or relationship of elements, this portion of the specification simply forming a further explanation embodying somewhat different terminology.

The lighting array, and the various embodiments thereof described heretofore, may be alternatively so described as follows.

The centrally located pole, spaced substantially equal distances from the remaining poles, has an exterior surface, as illustrated in all of its embodiments.

Each of the remaining poles has an exterior wall, also, which wall has a radially, most inwardly positioned portion, i.e. in the direction of the center of the substantially circular plane. Each of the said remaining poles is so positioned that any line drawn on its radially, most inwardly positioned portion, or any portion closely adjacent thereto, and connected with, any similar point on each of its most proximate poles, has every point along such a line, or lines, positioned radially outwardly from the exterior surface, or any portion thereof, of the centrally located pole, so as not to touch the same.

Furthermore, each of such inwardly positioned wall portions of the remaining poles has a point thereon radially nearest to the exterior wall of the center pole, and these points are spaced from the center pole exterior wall a fixed distance, or substantially equal distances. Furthermore, each of said inwardly positioned wall portions of said remaining poles has a point thereon nearest to the exterior wall of its most proximate pole which points are spaced therefrom a second fixed distance, which second fixed distance is at least twice as great as said first distance.

Referring to the FIGS. of the drawing, it will be seen that the lines **47, 79, 88** and **88'**, as representative of the stated pole-to-pole lines, do not touch the exterior walls of center poles **34, 71** and **81.** The first fixed distance between the point of the outer poles and the inner pole is shown as *a, f, i, q.* The second fixed distance is shown as *c, g, j* and *p.*

While the points of observation have been described as quite close to the light array of the invention, it is understood that this has been done to define the minimum points of observation with relation to the arrays of the invention.

In normal use of the invention the observer is positioned relatively distant from the light array, the distance between the observer and the light array being many multiples of the distances between the poles of the array.

The structures described above and defined in the appended claims thus achieve two results not possible by the construction of the prior art devices. First, they allow an observer moving relative to the illumination array to observe the maximum of the viewable surface of the poles of the array which are facing towards the observer. Secondly, they allow such a moving observer to view those surfaces with either total elimination of, or maximum reduction of, the amount of flicker. As explained above, flickering of light arrays in any of their usages, causes fatigue to the moving observer and also causes distraction. It is important for the pilot of a plane or of a boat, for example, to have eliminated such distraction, so far as is possible, since any flickering visible to the pilot as he views the arrays which he is passing is dangerously distracting, it being understood that in most airports, roadways or other navigational channels, there is generally utilized a plurality, frequently in very large numbers, of illumination arrays, which in effect form a path to guide the moving observer along the desired course whether on an airport runway, a roadway or a water or other navigational channel. Hence, the usage of a plurality of the structures of the present invention eliminates the distraction and fatigue caused by the multiples of the prior art arrays as they flash past the observer, while at the same time presenting to him the highest, relatively fixed, percentage of viewable surface attainable.

While the invention, as thus far described, has been directed to the construction of a light source which eliminates or reduces to a minimum, flicker and fatigue, particularly to a moving observer, it will be understood that there are certain instances in which, of necessity, the illumination source must be intentionally caused to flash. In such usage, a third electrical connection is normally required to excite the gas to its illuminated state. Generally, as is known in the art, this is done by an external wire, such as is utilized with flashing strobe lights.

Among other uses for which the present illumination system is especially effective is that of a flash source of light, particularly for photographic purposes; in such use strobe effects are often desirable, so that some known source for creation of strobe lighting should be workably coupled to the system.

In addition to the dispositions specifically shown, it should be obvious that multiple array elements of the same or variable sizes made in accordance with the invention can be arranged, if so desired, to provide the desired lighting of the invention. As stated, the legs or poles of the array element can comprise individual lighting elements not connected as a single envelope without departing from the scope of this invention.

Within normal human physiological limits, the small light intensity variations of some of the forms of the invention will not result in noticeable flicker to the average eye, and it should, therefore, be understood that, within the limits of the appended claims, the number and size of the vertical poles and/or arrangement thereof can be varied as required.

What is new and therefore desired to be protected by Letters Patent of the United States is:

1. In a lighting element of the type wherein light is generated by passing an electric current through at least one array of adjacent substantially parallel light poles, each said pole containing a gaseous medium adapted to emit light when excited by the passage of said current, the improvement comprising

disposing said poles to form a plurality of substantially parallel adjacent poles, said poles being at least four in number, one of said poles being substantially centrally located relative to said remaining poles and spaced from said remaining poles, said poles each having an axis, each of said axes being substantially parallel to each other,

said poles being disposed such that at least about 75 percent of the exterior facing surface areas thereof are viewable on any plane substantially perpendicular to and passing through each of said axes from any point on any of said planes, any said point being spaced a distance from the viewable surface of the most proximate pole to said point, which distance is at least equal to the spacing between the exterior surfaces of the most proximate viewable pole and the nearest pole thereto.

2. The structure of claim **1** wherein the percent of viewable surface array is substantially identical at any of said points on any of said planes.

3. The structure of claim **1** wherein an envelope having a tortuous configuration forms the major portion of said array and includes all of said plurality of poles, all

of said poles having substantially vertical axes and, said poles and axes being substantially parallel.

4. A structure in accordance with claim **1** wherein said remaining poles are substantially cylindrically disposed and spaced from each other a fixed distance, each of said axes being vertical.

5. The structure of claim **4** wherein each of said cylindrically disposed poles is positioned a substantially equal distance from each of its next most proximate cylindrically disposed poles, each of said cylindrically disposed poles having a substantially equal width, said distance being substantially greater than said width and at least twice said width, said one substantially centrally located pole being positioned substantially central to said cylindrically disposed poles and having a fixed width, said centrally located pole being spaced from each of said cylindrically disposed poles a distance at least equal to said fixed width.

6. The structure of claim **4** wherein all of said poles have substantially equal widths.

7. The structure of claim **4** wherein the spaced distance of said centrally located pole from said remaining poles is substantially equal to the width of said cylindrically disposed poles.

8. The structure of claim **6** wherein the spaced distance of said cylindrically disposed poles is substantially greater than the width of each of said cylindrically disposed poles.

9. The structure of claim **4** wherein the width of said centrally located pole is substantially twice the width of said cylindrically disposed poles.

10. The structure of claim **1** and including an electrical connection on one pole and an electrical connection on one of said other poles.

11. A lighting element in accordance with claim **1,** wherein at least two substantially identical arrays are positioned with their poles in spaced, parallel relation, the individual poles of the first array having the same spatial relation to each other as those of the second array, the second of said arrays being circumferentially displaced from the first of said arrays.

12. The structure of claim **1** and including support means for said lighting element, at least one of said poles extending into said support means.

13. The structure of claim **12** and including a top conical reflector positioned on said support means above most of said array and a bottom conical reflector positioned on said support means below most of said array, at least one of said poles extending through at least one of said reflectors.

14. The structure of claim **13,** and including a cylindrical lens carried by said support means and surrounding said poles.

15. The structure of claim **1,** and including an external intermittent excitation source.

16. In a lighting element of the type wherein light is generated by passing an electric current through a plurality of generally parallel, contiguous poles forming an array for illumination purposes, said poles containing a gaseous medium adapted to emit light when excited by the passage of said current, the improvement comprising disposing said plurality of substantially parallel poles in connective gaseous and electrical relation, said parallel poles being at least four in number, one of said poles being substantially centrally located relative to each of said remaining poles and spaced from said remaining poles substantially equal distances, said array having a substantially unidirectional axis,

said centrally located pole having an exterior surface,

each of said remaining poles having an exterior wall having a radially, most inwardly positioned portion, each of said remaining poles being positioned such that any line drawn from any point on its said radially most inwardly positioned portion to any point on the radially most inwardly positioned portion of each of its most proximate poles, has every point along said line positioned radially outwardly from the exterior surface of said centrally located pole, each of said inwardly positioned wall portions having a point thereon radially nearest to the exterior wall of said center pole and spaced therefrom a first fixed distance, each of said inwardly positioned wall portions having a point thereon nearest to the exterior wall of its most proximate pole and spaced therefrom a second fixed distance, said second fixed distance being at least twice the amount of said first distance.

17. In a lighting element of the type wherein light is generated by passing an electric current through at least one elongated envelope array containing a gaseous medium adapted to emit light when excited by the passage of said current, the improvement comprising disposing said envelopes to form a plurality of substantially parallel vertical poles, said vertical poles being at least four in number, one of said vertical poles being substantially centrally located relative to said remaining poles and spaced from said remaining poles, said array having a substantially vertical axis,

each of said poles having a substantially equal width,

each of said poles being spaced from the pole most proximate thereto a distance substantially equal to the said width thereof.

* * * * *