March 30, 1937. W. FOERSTE 2,075,606

GASEOUS DISCHARGE LAMP APPARATUS

Filed Jan. 4, 1935

FIG. 1

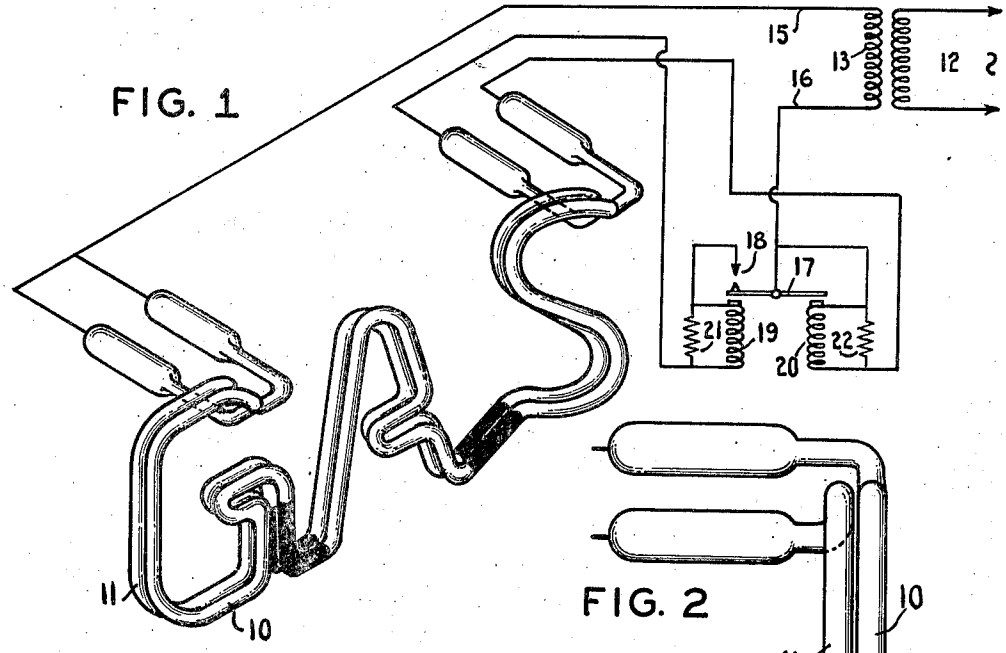


FIG. 2

FIG. 3

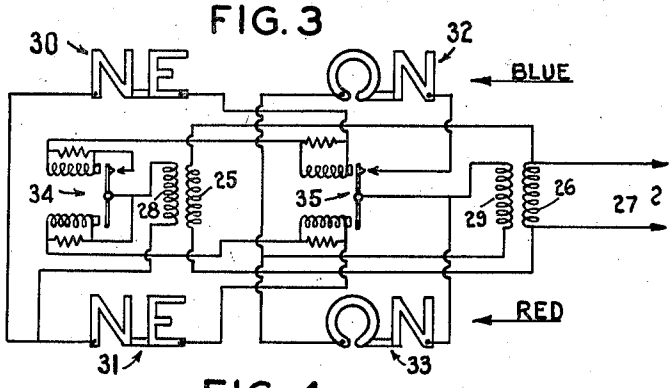
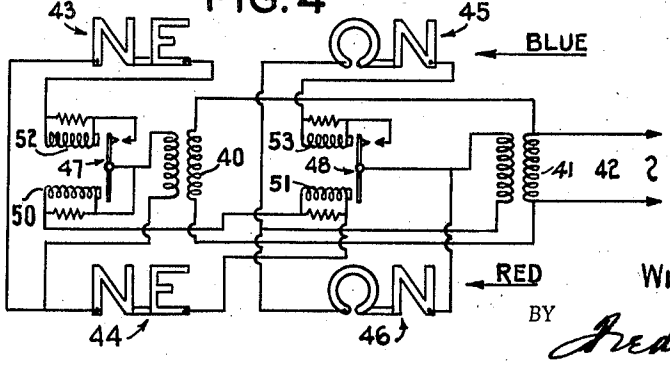


FIG. 4



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UNITED STATES PATENT OFFICE

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GASEOUS DISCHARGE LAMP APPARATUS

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Application January 4, 1935, Serial No. 407

3 Claims. (Cl. 177—346)

The invention relates to gaseous discharge lamp apparatus, and more particularly to such as is utilized for display or advertising purposes in color.

It is a well known fact that a flashing ("on" and "off") sign attracts greater attention than a sign of the non-flashing type; but generally, the former type, when designed to convey a message, is difficult to read, especially where long names, words, or several lines of words are involved. For this reason, it is often the practice to omit the flashing of the message portion or name and to flash only a border for the same to attract attention. However, this tends to detract attention from the message.

It is an object of the present invention to provide apparatus of this nature wherein the intensity of illumination, for example, the color displayed, may be varied through a succession of flashings, without, however, interrupting visibly the illumination. By this expedient, the attention-drawing characteristic of a flashing display is retained with the added advantage of the ease of reading a constantly illuminated design as the lamp has the appearance of not being extinguished but merely blending from one color into another or one shade of color into another. This latter effect does not detract from the ease of reading and really adds to the attention-drawing power of the display.

A further object of the invention resides in the novel arrangement of the apparatus whereby the same is effective also when viewed at an angle; and in which case there is afforded, moreover, an animated or motion effect. This is not possible with the ordinary type of display constructed of gaseous discharge lamps.

Another object of the invention resides in the novel arrangement of control whereby operation from a single transformer is possible; and whereby, when operation with multiple transformer is necessary for longer display, simultaneous illumination is had of all of the component sections for a particular color.

In carrying out the invention, a plurality of banks of gaseous discharge lamps is provided for intermittent energization and successively from the secondary or corresponding secondaries of a transformer or transformers, the energization being effected through a suitable control means. The transformer, or transformers, for this purpose is of the type having the characteristics of a practically constant current supply such, for example, as the well-known high magnetic leakage type of transformer commonly employed with gaseous discharge lamps. Or, if a standard substantially constant voltage type of transformer be utilized, the drop in potential resulting from the IR loss in the secondary and/or in the associated electromagnetic control means would provide sufficient variation of voltage in the lamp circuits. These lamp banks are of identical design for display of the desired subject matter and comprise the usual gas-filled tubes in which the portions not desired for illumination are painted out; and in the present arrangement, the one bank is juxtaposed to the other so that the luminous portion of a rearwardly disposed tube or tubes will be visible through the foremost one. By introducing different gases in the different banks of tubes, a different color will be displayed therein when the corresponding tube is energized, the respective tube banks being designed for operation at different ionization voltages. This results, when the apparatus is viewed from the front, in a succession of the different colors being displayed by the apparatus; and, furthermore, due to persistence of vision, intermediate colors or blends will also be noted. Furthermore, when the apparatus is viewed from the side, say at an angle of 45°, the successive luminosity of the different tube banks will give the appearance of a progression of the color resulting in motion or animated effect, which further enhances the value of the apparatus for display and/or advertising purposes.

Apparatus of this nature, furthermore, admits of being operated at relatively high alternations of the color so that a very striking effect may be had without impairing the legibility of the matter to be displayed.

The nature of the invention, however, will best be understood when described in connection with the accompanying drawing, in which:

Fig. 1 is a diagrammatic view of the circuit-connections for operating the novel lamp apparatus, with the lamp portion shown in perspective.

Fig. 2 is an end view of the lamp apparatus.

Figs. 3 and 4 are diagrammatic views illustrating modifications in the display arrangement and the operating circuits therefor.

Referring to the drawing, more particularly Figs. 1 and 2, a luminous display device is indicated comprising the two banks of gaseous discharge lamps 10 and 11 which are juxtaposed, the one bank 11 being located immediately behind the bank 10. These lamps are of the usual gas-filled glass tubing, the one being visible through the other, in particular the rearwardly

disposed bank 11 is to be visible through the forwardly disposed bank 10. Each bank of lamps contains a different gas so that their striking voltages are different; or, if of the same gas where different shades of a particular color are desired, the difference in striking voltage may be attained by varying the dimensions of the tubing and/or the pressure of the gas contained therein. Under certain conditions, it may be desirable, also, to color the glass of which the rearwardly disposed tube bank is constructed, and for the purpose hereinafter more fully set forth.

Each individual bank is to be operated in the usual manner, as from a source of alternating current supply 12 operating through a transformer whose secondary 13 is connected in the following manner to the two banks of lamps. A lead 15 common to these two banks extends from one terminal of the secondary 13, while a further lead 16 extends from the other terminal of said secondary to a pivoted armature 17 of an electromagnetically-actuated control device. This device may be of any well-known construction; but it is preferred to utilize a device of the nature more particularly set forth in my copending application for U. S. Letters Patent Serial #731,433, filed June 20, 1934.

A device of this nature is adapted to close or to open a circuit at the contact 18 thereof and is influenced by a pair of electromagnets 19 and 20, the former operating to open the circuit and the latter to close the same. It is preferred, also, to protect these electromagnets against the high self-inductance of the circuits by bridging them with high resistances 21 and 22, respectively.

The one electromagnet 20 is connected in series with the secondary 13 and the gaseous discharge lamp bank 10 so that upon energization of the secondary 13 said lamp bank 10 will be energized and become luminous. This, however, causes the circuit to be closed at the contact 18 which places the lamp bank 11 in multiple with the said lamp bank 10. The latter is designed to have a higher striking voltage than that of the bank 11 so that it will become extinguished when the two banks are placed in multiple, but the bank 11 will then respond and become luminous.

Current flowing through the lamp bank 11 flows also through the coil 19 operating the control device to open the contact 18 and restores the initial condition which provides sufficient striking voltage for operating the bank 10, whereupon the cycle is repeated.

Various expedients may be resorted to to control the rapidity of the change over from the one lamp bank to the other, for example, by changing the attractive force of the control device magnets; and an exceedingly rapid color changing effect may be attained.

In Figures 3 and 4 an arrangement is disclosed whereby it is possible to operate in this manner display apparatus embodying tubing of a length requiring operation from more than one transformer. Reference being had more particularly to Fig. 3 of the drawing, the primary 25 and the primary 26 of two transformers are both connected to the same source of alternating current supply 27 and have associated therewith secondaries 28 and 29, respectively, each transformer being adapted to operate a corresponding section of the display.

For example, the transformer 25 operates the section of the sign comprising the two juxtaposed lamp banks 30 and 31, the former designed for blue and the latter for red; while the other transformer operates the associated section and comprising the two lamp banks 32 and 33 similarly designed as to color. It will be understood that these two banks of each section are juxtaposed in the manner more clearly set forth in Figs. 1 and 2 of the drawing. Each individual section is then provided with its respective control device 34 and 35 which operate in the manner hereinbefore described to place one of the banks of a section in multiple with the other bank thereof.

It will be appreciated that with such sectional arrangement, synchronization of the associated section elements is necessary in their energization so that they may become luminous at the same instant. This is effected without mechanically or electrically coupling, connecting or linking the high-voltage secondaries of the transformers—an expedient which is not permissible in practice. As indicated, the plurality of transformers all have a common primary circuit, but their secondary circuits feed individual sections of the lamp banks. Thus, to secure the synchronization, the respective operating electromagnets of the control device 34 are connected in series with the corresponding operating electromagnets of the control device 35.

Similarly, and as indicated in Fig. 4, the two sections embodying the primary coils 40 and 41, both connected to the same source of A. C. 42, supply the respective sections comprising lamp banks 43, 44 and 45, 46. Control devices 47 and 48 for the respective sections are provided, but in this embodiment only one of the operating electromagnets of a control device is connected in series with that of the other device. Thus, the electromagnets 50 and 51 controlling the closing of the contacts of control devices 47 and 48 operate to energize lamp banks 43, 45. The other lamp banks 44, 46 are independently energized through actuation of the control contact devices 47 and 48 by their respective electromagnets 52 and 53. This simplifies the wiring of the circuits, and for most purposes will be adequate.

I claim:

1. In a display sign, a positive column gaseous discharge tube of predetermined contour adapted when energized to emit a predetermined optical effect, a second positive column gaseous discharge tube of substantially the same contour and adapted when energized to emit a different optical effect, means to mount said tubes with their contours aligned and adjacent, and to be visible from at least two angles, and means to alternately energize said tubes whereby when viewed from the front the contour design continuously is displayed but in varying optical effects, and when viewed from the side an animated effect is displayed.

2. In a display sign, a positive column gaseous discharge tube of predetermined contour adapted when energized to emit a predetermined color, a second positive column gaseous discharge tube of substantially the same contour and adapted when energized to emit a different color, means to mount said tubes with their contours aligned and adjacent, and to be visible from at least one side and front, and means to alternately energize said tubes whereby when viewed from the front the contour design continuously is displayed but in varying colors, and when viewed from the side an animated effect is displayed.

3. In a display sign, a positive column gaseous discharge tube of predetermined contour adapted when energized to emit a color of one intensity, a second positive column gaseous discharge tube of

substantially the same contour, and adapted when energized to emit the same color but of different intensity, means to mount said tubes with their contours aligned and adjacent, and to be visible from at least one side and front, and means to alternately energize said tubes whereby when viewed from the front the contour design continuously is displayed but in varying intensity of illumination, and when viewed from the side an animated effect is displayed.

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