

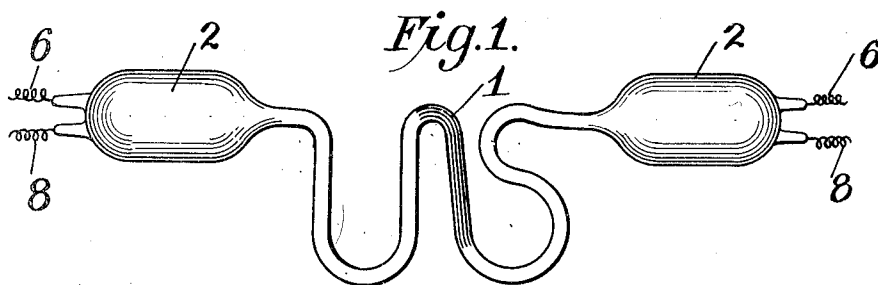
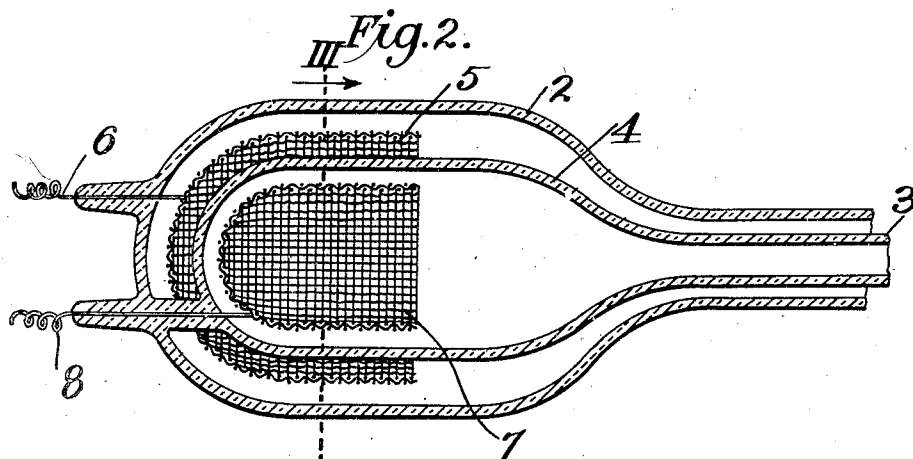
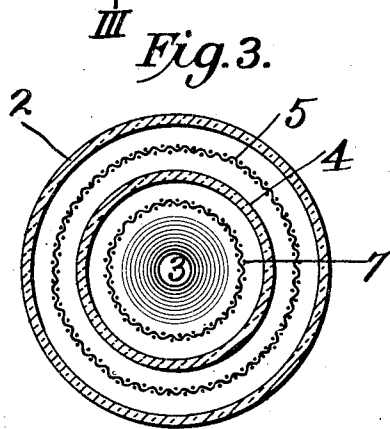
Oct. 11, 1932.

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1,882,609

ELECTROLUMINOUS DISPLAY

Filed June 8, 1928



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ELECTROLUMINOUS DISPLAY

Application filed June 8, 1928. Serial No. 283,883.

This invention relates to improvements in electro-luminous displays or signs, and refers more particularly to concentric tubes in which are placed gases rendered refulgent by electricity. The invention contemplates not only the usual type of commercial sign, but also electro-luminous displays of any character.

The invention involves the application of the well-known principles of electricity demonstrated by the Geissler tube, namely, that when an induced current is passed through a tube of transparent or translucent material containing rarefied vapor or gas forming the conductor between the poles of the inductor coil, the electrode impulses of the induced current produce sparks or glow in the tube, the color of the light varying according to that of the material forming the tube, to change in the current, or to a degree of rarefaction the kind of fluid employed.

The particular novelty in the present invention lies primarily in the use of concentric tubes containing gases of different or same characters, and these tubes hermetically and electrically sealed from one another so that their operation is entirely complete in itself; the arranging, however, of the tubes concentrically, permits the producing of effects not heretofore accomplished by the single tubes used at the present time in commercial signs such as the well-known neon tube sign.

Referring to the drawing:

Fig. 1 represents a diagrammatic showing of the invention.

Fig. 2 is an enlarged section of one end of the tube, showing the electrodes and the electric connections.

Fig. 3 is a view taken along the line 3—3 of Fig. 2.

Referring to the drawing, the intermediate portion or portion of smaller diameter of the outer tube is designated as 1, and the enlarged ends of the outer tubes are designated as 2. The intermediate tube portion of smaller diameter of the internal tube is designated

at 3, and its enlarged ends designated as 4. Within the ends of the outer tubes are electrodes 5 having wire connections 6, while the electrodes 7 supply the current to the internal tube and have wire connections 8.

The electrodes are shown as wire gauze, but electrodes of any suitable type are contemplated, such as cylindrical members or cup-shaped members of metallic plate, in place of the wire gauze.

The internal tube 3 is sealed from the outer tube and the wire connections are likewise sealed from the outer tube.

A Geissler tube consisting of a glass vessel comprising two enlarged ends connected together with a portion of smaller diameter in each of which ends is enclosed an electrode, is well known in the art. Such a tube evacuated and having introduced thereto a conductive gas which constitutes the sole medium between the electrodes is also well known. Gases of rare, inert or monatomic group including neon, helium, argon, krypton and xenon, have been described as gaseous mediums which on the passage of an electric current therethrough, each has its own characteristic color.

The invention contemplated herein has to do with the use of two or more concentrically positioned tubes which are formed in any desired configuration with gases of different types or same in the different tubes and operated entirely separately by controlled electric currents of pre-determined desirable character to illuminate or render refulgent the gases in the individual tubes. The invention also contemplates the variation, manipulation or control of the currents so as to produce continuous or intermittent changes in the light effects and color effects of the tubes, thereby increasing the attractiveness and effectiveness of the display.

All gases are electrically conductive and glow under the ionizing effect of the current passing between the electrodes. This

current may be either direct or alternating, or pulsating. The particular pressure at which a gas is at its best conductivity varies with each gas. Speaking generally, the so-called active gases are most readily conductive at a pressure in the order of $\frac{1}{10}$ of a millimeter of mercury. Such active gases are air, nitrogen, carbon-monoxide and carbon-dioxide, the so-called inert gases are most readily conducted at pressures of 1 millimeter of mercury. These inert or monatomic gases are the so-called rare gases of the atmosphere and comprises helium, argon, neon, krypton and xenon.

In the case of an active gas, the conducting pressure is fairly critical, that is to say, a very small change in pressure above or below the point of maximum conduction prevents the tube from operating. On the other hand, in the case of inert gases, the conducting pressures extend over a larger relative range. For example, in the case of neon, the gas will conduct and glow at pressures as high as 10 millimeters or more, the minimum conductive pressure being somewhat below 1 millimeter.

As suggested, the color of the light due to the ionization of the gas by the electric current depends upon the particular gas. In a Geissler tube, for example, air glows with a purple color, carbon-monoxide with a milky white, helium with a yellow color and neon with a fiery red or orange color.

The color characteristics of the different gases are purely inherent physical properties.

While the difference in the color effects will normally be produced by the inherent color characteristics of the gases, it is also contemplated to produce additional color effects by the coloring of the tubes themselves, or by adding impurities to the gases which will produce the desired coloration.

The control and regulation of the light effects in the separate tubes will be manipulated by an automatic or mechanically operated circuit-breaking device adapted to produce the intermittent or continuous illumination of a selected tube or of the tubes in series or wave effects in the separate tubes either singly or in conjunction with wave effects produced in the other tubes.

It will be obvious that innumerable combinations of effects can be produced by manipulation of the electric currents passing through the gases in the separate tubes.

In the drawing there is shown but an inner and an outer tube, but the invention contemplates the use of a plurality of tubes containing gases of different or same characters.

Furthermore, the control for the manipulation of the electric currents has been eliminated in the interest of simplicity.

The specifications and drawing contemplate a concentric tube arrangement in which the inner and outer tubes are the same diam-

eter throughout their length. It will be understood however that the invention is drawn to cover any device in which a plurality of tubes are used regardless of the size or configuration of the passage ways through which the illuminated gases pass. For instance, the inner tube or the outer tube may vary in diameter or configuration at different points to produce fantastic effects and increase the effectiveness of the display.

I claim as my invention:

1. An illuminated display comprising inner and outer concentric transparent tubes containing conductive gases and having bulbular ends, and cup-shaped electrodes arranged within the bulbular ends of the tubes and having portions concentric with the tubes.

2. An illuminated display comprising inner and outer concentric transparent tubes containing conductive gases and having bulbular ends, and cup-shaped metallic gauze electrodes arranged within the bulbular ends of the tubes and having portions concentric with the tubes.

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