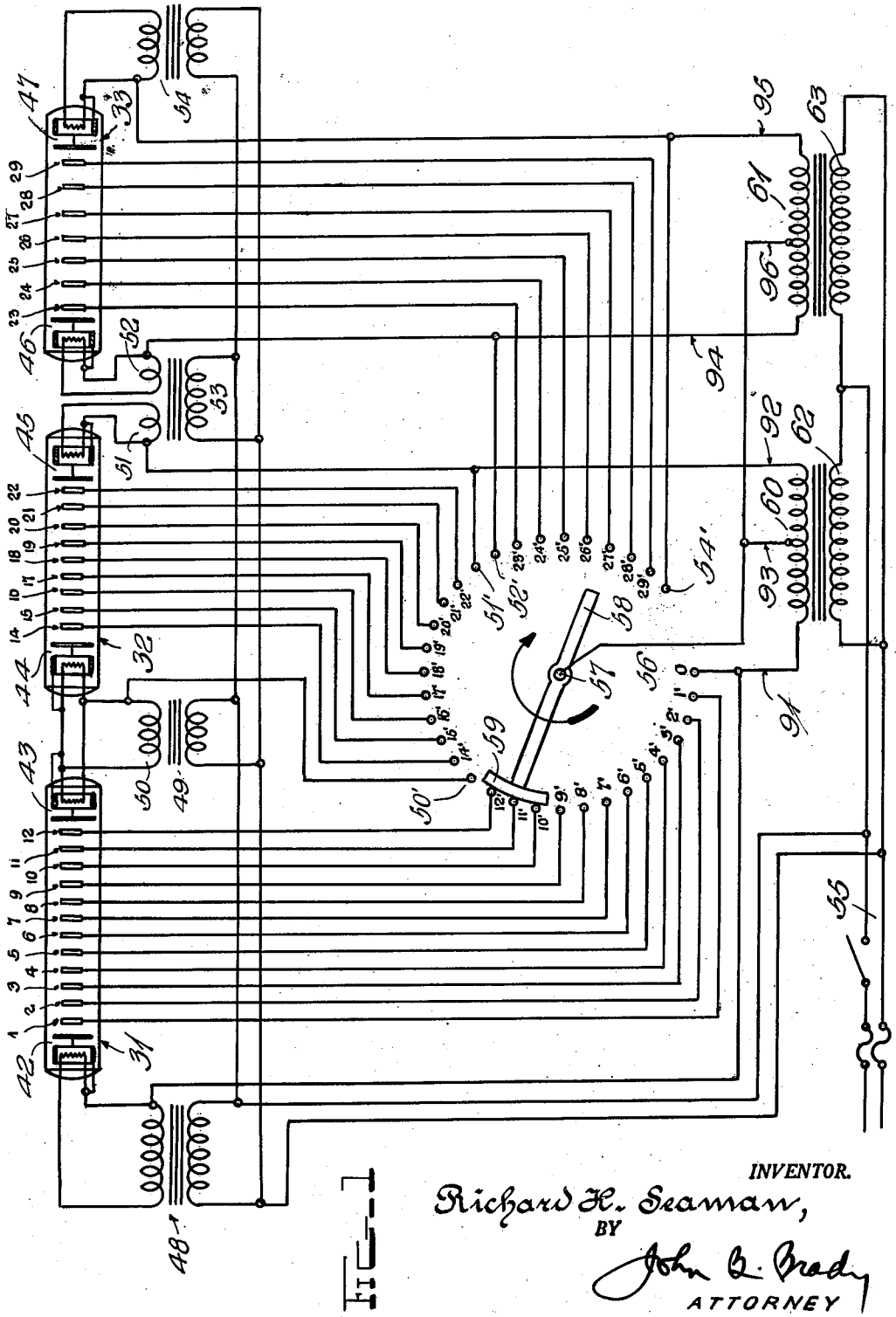
Sept. 25, 1951 R. H. SEAMAN 2,568,767

ELECTRONIC ANIMATED ADVERTISING SIGN SYSTEM

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ELECTRONIC ANIMATED ADVERTISING SIGN SYSTEM

Filed July 2, 1947 3 Sheets-Sheet 2

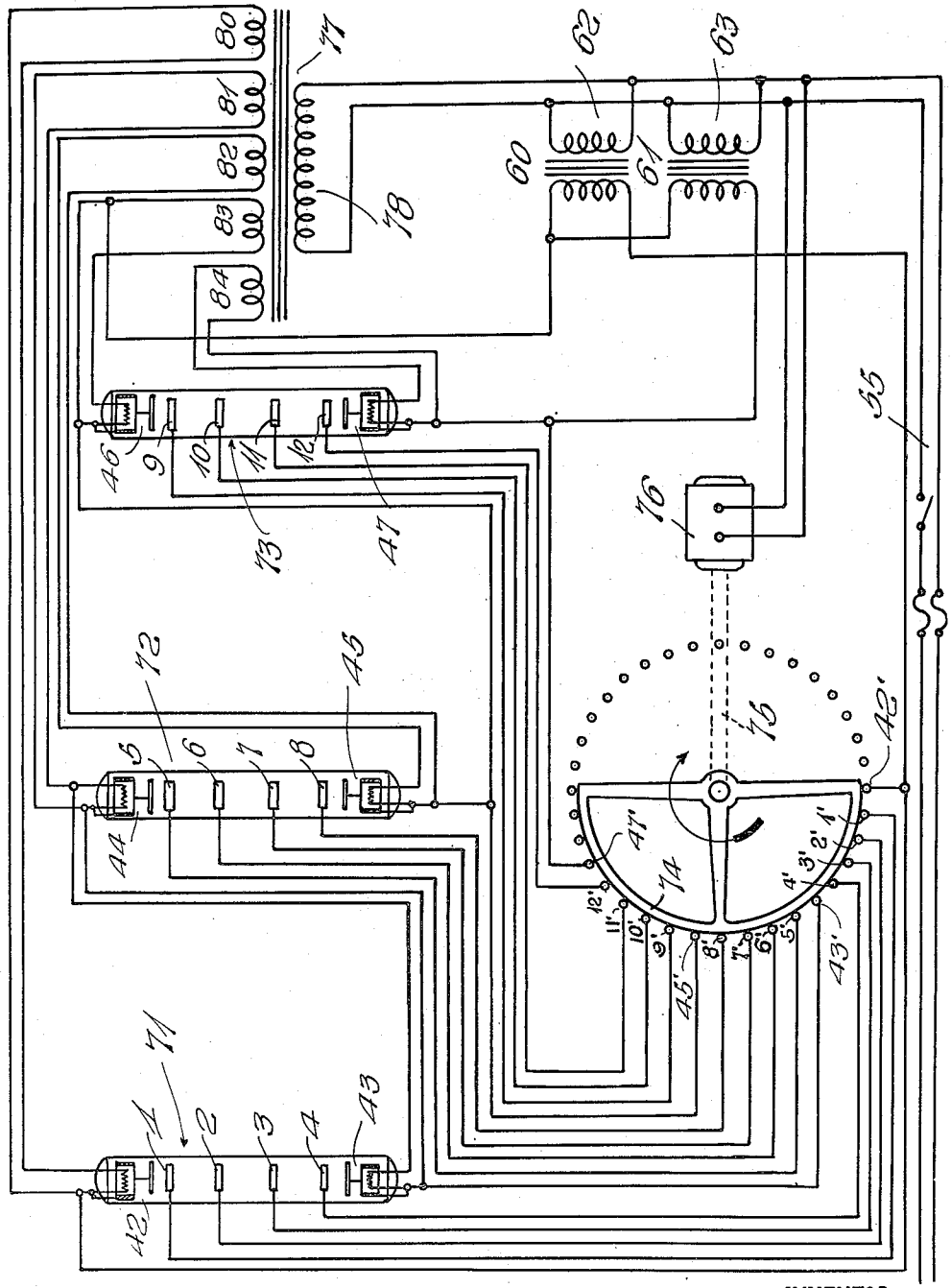


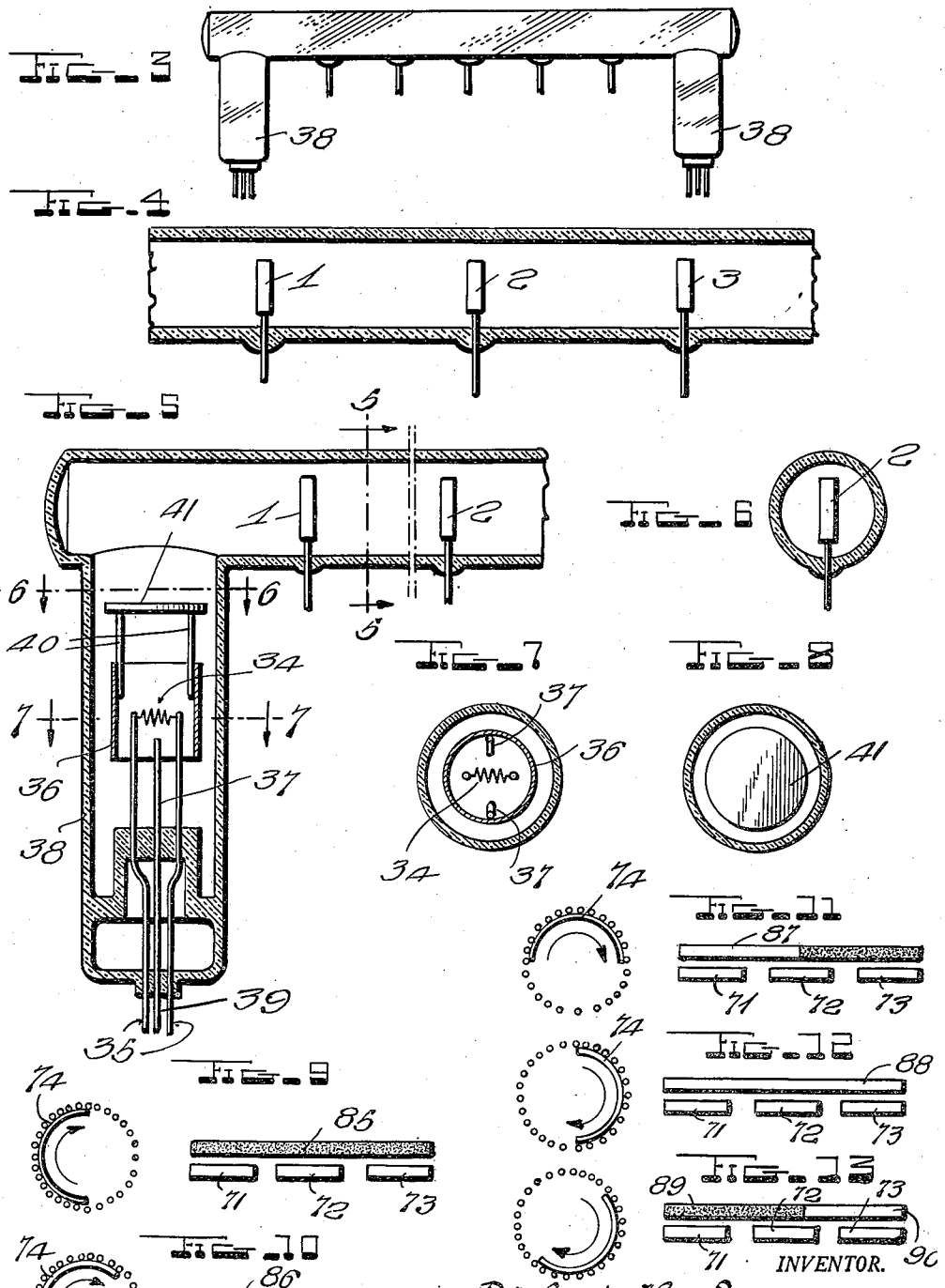
FIG. 2

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ELECTRONIC ANIMATED ADVERTISING SIGN SYSTEM

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ELECTRONIC ANIMATED ADVERTISING SIGN SYSTEM

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7 Claims. (Cl. 315—255)

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This invention relates broadly to electronic animated advertising sign systems and more particularly to an improved circuit and structural arrangement for animated signs producing the effect of repeated writing, animated work or designs by means of a traveling dark space.

One of the objects of my invention is to provide an improved circuit arrangement for electronically and visually reproducing writings, animated works, designs and pictorial representations with provisions for predetermining the relative illuminated and non-illuminated portions of the mobile display.

Still another object of my invention is to provide an improved circuit arrangement for an animated sign system employing a multiplicity of electronic discharge tubes arranged in coacting relation in which each of the tubes includes composite anode and cathode devices in each end thereof with a multiplicity of spaced anodes distributed therebetween and arranged for controlled excitation in predetermined and cyclic order.

Another object of my invention is to provide a system of electronic discharge tubes which coact to form an animated sign system in which the efficiency of each of the tubes is increased by the use of a hot cathode device in each end thereof for facilitating the ionization of the gaseous path through the tube.

A further object of my invention is to provide a circuit arrangement for a multiple tube electronic sign system in which a multiplicity of multiple electrode gaseous discharge tubes are arranged in electrical series in a circuit arrangement powered from alternating current with periodical operating means for producing an inert path cyclically repeating through each of the coacting tubes to provide in effect a dark space intermediate electronical active illuminated portions of the tubes for cyclically reproducing writings, animated works, designs and other pictorial representations.

A further object of my invention is to provide a novel construction of composite cathode and anode for the opposite interior of gaseous discharge tubes constituting an animated design system.

Still another object of my invention is to provide a circuit system for electronic discharge tubes of the multiple electrode type having composite anode and cathode devices in the opposite interior ends thereof electrically connected through a control circuit and energized so that the electrodes in the outward ends of the coacting tubes become alternately in effect a cathode or anode in reproducing the visual animations in accordance with a prearranged program of operation.

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Other and further objects of my invention reside in the circuit arrangement for the alternate operation of the electrodes in opposite ends of a multiple electrode electronic tube system, as cathode and anode, as set forth more fully in the specification hereinafter following by reference to the accompanying drawings, in which:

Figure 1 is a diagrammatic view of the circuit arrangement of the animated electronic sign system of my invention and illustrating means for determining the minimum length of the dark space provided in the electronic sign system; Fig. 2 is a diagrammatic view of a modified form of electronic sign system embodying my invention and illustrating the arrangement of control means for predetermining the dark space in the electronic discharge paths, that is, means for wholly extinguishing the coacting electronic tubes through a definite time interval between the intervals of illumination thereof; Fig. 3 is a side elevational view of one of the electronic discharge tubes employed in the improved system of my invention; Fig. 4 is a fragmentary view through a longitudinal section of the electronic discharge tube and showing the spaced anodes therein between which the electronic discharge or glow tends to increase or decrease, or grow or decay; Fig. 5 is an enlarged cross sectional view through a fragmentary end of one of the electronic discharge tubes embodying my invention and illustrating the structure of the composite cathode and anode mounted in each end of the tube; Fig. 6 is a transverse sectional view taken on the line 6—6 of Fig. 5; Fig. 7 is a transverse sectional view taken on line 7—7 of Fig. 5; Fig. 8 is a transverse sectional view taken substantially on line 8—8 of Fig. 5; Fig. 9 is a theoretical view showing the position of the electrical control switch of Fig. 2 for a predetermined sequence of operation of the coacting electronic discharge tubes, all of the coacting tubes being de-activated to conjointly produce a dark condition for a sequence of time represented by the corresponding position of the electrical switch; Fig. 10 is a similar theoretical view illustrating the position of the control switch for a succeeding condition of the coacting electronic tube sections; Fig. 11 illustrates the next sequential position of the electrically controlled switch for a growing electrical discharge through the coacting electronic discharge tubes; Fig. 12 illustrates

the next succeeding position of the control switch of the circuit arrangement of Fig. 2 for the complete and progressive visual activation of the coacting electronic discharge tubes; and, Fig. 13 illustrates the position of the control switch in the next succeeding position wherein a portion of the coacting electronic discharge tubes erases or becomes darkened at the same relative end at which the illumination was originally initiated.

Referring to the drawings in detail I have illustrated the sign system of my invention as including a multiplicity of coacting gaseous discharge tubes, illustrated at 31, 32 and 33, each including a multiplicity of electrodes which I have represented at 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11 and 12 in electron discharge tube 31; and at 14, 15, 16, 17, 18, 19, 20, 21 and 22 in electron tube 32; and at 23, 24, 25, 26, 27, 28, and 29 in electron tube 33.

At opposite ends of each of the gaseous discharge tubes containing the enumerated spacially separate anodes I provide a composite cathode and anode construction illustrated more clearly in Figs. 5, 7 and 8. The composite cathode and anode located at each end of the several gaseous discharge tubes are of similar construction and include the electron emitting cathode 34 connected to terminals 35 leading out through the plug 38 extending normal to the axis of the tube. Surrounding the cathode 34, I provide a sleeve-like electrode or shell 36 which is in spaced position within the envelope of the tube by means of supporting members 37 which constitute electrical connections to the sleeve-like electrode or shell 36 leading out to terminal 39 extending from plug 38. The sleeve-like electrode or shell 36 is provided with extension members 40 which project therefrom for supporting disc-like electrode 41. Disc-like electrode 41 serves as an anode surface and also as a light shield to prevent appreciable light rays from illuminating the ends of the tubes during the inactive or dark space period of the tube. The disc-like electrode 41 is sufficiently spaced from the inner walls of the gaseous discharge tube to allow for the discharge of electrons from the electron generator constituted by filament 34 in a stream extending longitudinally of the vessel in a path across anodes 1, 2, 3, etc. When the composite cathode and anode device operates as an anode the surface of disc-like electrode 41 is bombarded with electrons and serves as a collector of electrons under conditions where the potential of cathode 34, shell 36 and disc-like electrode 41, go positive. Under conditions where the polarity of the potential reverses, the cathode 34, shell 36 and disc-like electrode 41 becomes negative instead of positive and serves as a generator or electron discharge electrode.

In Fig. 1 I have illustrated for purposes of example, three coacting gaseous discharge tubes, although it should be understood that any number of such tubes may be employed in the animated sign system of my invention. These tubes are electrically symmetrical and contain the composite cathode and anode devices in opposite ends thereof. In order to explain my invention I have illustrated the composite electrodes in gaseous discharge tube 31 at 42 and 43. In gaseous discharge tube 32 I have shown the composite electrodes at 44 and 45. Gaseous discharge tube 33 contains the composite electrodes at opposite ends thereof as represented at 46 and 47.

The cathode or electrode 42 is heated by transformer system 48. Similarly, the cathodes of

the composite electrode 43 and 44 of tubes 31 and 32, respectively, are heated from a transformer system 49. In this instance the cathodes are connected in parallel and activated from a common secondary winding 50 of transformer 49. In order to obtain proper phasing I arrange separate transformer secondary windings 51 and 52 on power transformer 53 for respectively exciting the anodes of composite electrodes 45 and 46 of tubes 32 and 33 from transformer 53. Composite electrode 47 has the cathode thereof energized from transformer 54. The primary windings of transformers 48, 49, 53 and 54 all connect to the source of alternating current represented by line circuit 55 leading to a commercial power supply system. This may be any commercial frequency such as 60 cycle alternating current.

The control switch for successively activating or de-activating the several electrodes is represented at 56 as including a motor-driven shaft 57 carrying switch arm 58 thereon. Switch arm 58 carries an arcuate shaped contactor 59 on the end thereof forming a shoe which establishes sliding electrical contact with the series of contacts arranged in the circular path of the arm as shown. For purposes of simplification I have numbered these contacts successively with primed reference characters, corresponding to the numbered anodes within the several gaseous discharge tubes. Contact 0 leads to the composite cathode-anode structure 42 which contact 1' leads to anode 1; and contact 2' leads to anode 2, etc. Contact 50' leads to both of the composite cathode and anode structures 43 and 44. Contacts 14' through 22' connect respectively to the several anodes 14—22 in tube 32. Contact 51' connects to composite cathode and anode 45. Contact 52' connects to composite cathode and anode 46. The set of contacts 23' through 29' connect to electrode 23—29 in tube 33, respectively. Contact 54' connects to composite cathode and anode 47. Anode excitation for the several tubes is supplied from transformer systems 60 and 61. The primary windings 62 and 63 of transformer 60 and 61, respectively, connect with the alternating current supply system 55. The secondary windings of these transformers supply alternating current across discharge paths through the several tubes 31, 32 and 33. In the case of tubes 31 and 32 which are electrically connected in series, transformer 60 is sufficient to supply required power to both of these tubes in series. In the case of the separate tube 33 the power transformer 61 furnishes the alternating current required for operation through the discharge path from composite electrode 46 to composite electrode 47.

In each instance it will be observed that the sleeve-like electrode 36 is electrically connected to the cathode 34. In the operation of the circuit of Fig. 1 the shoe 59 in shunting any successive series of contacts serves to externally conduct current which would otherwise pass through the ionized path between electrodes within the gaseous discharge tube resulting in a dark space or deactivation of a discharge tube over that area. Accordingly, as arm 58 revolves over control of the driving motor, which operates shaft 57, certain of the electrodes are cyclically shunted out of the discharge path of each discharge tube, producing in effect a bubbling action visually producing a travelling mobile or animated effect. Thus, portions of the coacting tubes are successively illuminated and a dark spot appears to travel along the coacting tubes arranged in co-

acting relation as the arm 58 advances around the path of the contacts.

In Fig. 2 I have shown a system in which an entire series of coacting electronic discharge tubes may be quenched or darkened and then activated to produce animations simulating writing. In this arrangement I have illustrated the electronic discharge tubes 71, 72 and 73 arranged with composite cathode and anode devices in opposite ends thereof and a series of spaced anodes as explained in the arrangement of Fig. 1. However, in the system of Fig. 2 the number of electrodes which may be shunted for deactivating the discharge space within the several tubes is increased by predetermining the effective deductive length of the shunt switch represented at 74 rotatably operative by shaft 75 driven from motor 76. In the arrangement shown the peripheral length of the contact face of the switch 74 is of such length that all of the contacts 1'—12', and the intermediate contacts, may be bridged and shunted, thereby providing an external path around the electrodes of the tubes by which conductivity through the tubes is bipassed and luminous glow thereof eliminated. In the arrangement shown in Fig. 2, a similar group of composite anode and cathode devices are employed for each of the tubes, that is, composite anodes and cathodes 42 and 43 are provided in tubes 71; composite cathodes and anodes 44 and 45 are provided in tube 72 and composite cathodes and anodes 46 and 47 are provided in tube 73. The circuit of Fig. 2 shows an extreme condition opposite that of the condition illustrated in Fig. 1, because in Fig. 2 the entire series of electronic discharge tubes may be darkened; whereas, in the arrangement shown in Fig. 1 certain electronic discharge paths across a restricted number of electrodes may be darkened. In both cases the bubbling effect or dark space effect is similar and the animation is obtained in a similar manner, except that in the arrangement of Fig. 2 the dark space is much longer than the dark space in the arrangement of Fig. 1.

The visual effect in the arrangement of Fig. 2 is one of erasing and established glow discharge and the reestablishment of the glow discharge in a very attractive manner which arrests the attention of the average observer thereby affording an important application of the sign of my invention for advertising purposes.

The composite cathode and anode devices are also connected to contacts in the path of travel of the switch 74, that is, composite electrode 42 connects to contact 42'; composite electrode 43 connects to contact 43'; composite electrode 44 connects to contact 43'; composite electrode 45 connects to contact 45'; composite electrode 46 connects to contact 45'; and composite electrode 47 connects to contact 47', all arranged in the path with contacts 1'—12', and adapted to be bridged by the switch 74. Hot cathode portions of each of the composite electrodes are energized from a common power transformer system represented at 77 having a primary winding 78 connected to the alternating current supply system represented at 55 and having a multiplicity of secondary windings corresponding to the secondary windings on the individual transformer illustrated in Fig. 1. Secondary winding 80 energizes the cathode portion of composite electrode 42; secondary winding 81 energizes the cathode portions of composite electrodes 43 and 44 in parallel; secondary winding 82 energizes the cathode portion of composite electrode 45; secondary winding 83 energizes the cathode portion of composite electrode 46; and secondary winding 84 energizes the cathode portion of composite electrode 47.

As explained in connection with Fig. 1, power transformer 60 serves to supply alternating current to both electronic discharge tubes 71 and 72; whereas, transformer system 61 serves to supply alternating current to electronic discharge tube 73. In the arrangement shown electron discharge tubes 71 and 72 are arranged in electrical series with each other whereby electron discharge tube 73 is electrically independent of tubes 71 and 73.

In Figs. 9–13 I have illustrated the cyclic progression of the growth and decay of the glow discharge in the several coacting tubes. In Fig. 9, for example, I have shown switch 74 forming an external shunt path along all of the tube electrodes so that a condition of darkness throughout the several tubes 71, 72 and 73 is obtained, as represented by the light pattern 85, showing all of the tubes dark. As the switch 74 revolves clockwise activation of all of the electrodes of tube 71 and the beginning of electrodes in tube 72 occurs as a result of which the luminous discharge pattern changes as represented at 86 in Fig. 10. As the switch 74 continues to move in a clockwise direction, as represented in Fig. 11, the external shunt path is removed from the coacting electrodes and anodes resulting in the mobile advancement of the illuminated portion of tube 72, while tube 71 has the luminosity thereof sustained according to the pattern 87 in Fig. 11. As the switch 74 continues to advance in a clockwise direction, as represented in Fig. 12, the external shunt path is removed from all of the tubes 71, 72 and 73, thereby establishing a continuous luminous discharge path 88 through all of the coacting tubes 71, 72 and 73 according to the pattern 88 in Fig. 12. As the switch 74 continues to revolve in a clockwise direction the luminosity of tubes 71 and 72 is erased according to the pattern 89 in Fig. 13 leaving only the portion 90 of tube 72 and the entire tube 73 illuminated. This condition progresses to a repeat cycle removed in Fig. 9.

By means of a suitable rectifier system, I may operate the circuit of Fig. 1 in such a fashion that at terminals 91 and 92 the polarity is negative with respect to positive polarity at terminal 93. In the same way, a rectifier system may be provided to produce at terminals 94 and 95 negative polarity with respect to positive polariyt at terminal 96 .

I have found the switching system of my invention particularly effective by reason of the brilliancy of the discharge which is secured by the multiple activation which is secured by the alternate change of effective polarity at the opposite ends of the coacting tubes. The composite cathode and anode devices enable the tubes to be reversed in the operation thereof so that electronic discharge takes place first in one direction and then in the opposite direction, thereby increasing the brilliance of illumination by more effective ionization of the discharge paths. The benefits of both hot and cold cathode electronic discharge systems are obtained in the tubes of my invention employing the composite cathode and anode devices as shown herein. Adjustment may be readily made of the effective length of the dark space between the illuminated writings or animations by changing the effective length of the shunt consituting the external path around the tube of electrodes.

While I have described my invention in certain of its preferred embodiments I realize that

modifications may be made and I desire that it be understood that no limitations upon my invention are intended other than may be imposed by the scope of the appended claims.

What I claim as new and desire to secure by Letters Patent of the United States is as follows:

1. An electronic animated sign comprising a multiplicity of preformed gaseous discharge tubes arranged in coacting relation, each including a composite anode and hot cathode electrode of the filamentary heated cathode type in each end thereof and a multiplicity of intermediate spacially disposed anodes therebetween, a source of alternating current, means for individually energizing certain of said cathode electrodes from said source, means for energizing others of said cathode electrodes in common from said source, means for progressively exciting said electrodes and anodes in cyclic order and means associated with the aforesaid means for establishing an external shunt path around certain of said electrodes for maintaining a mobile dark space intermediate the illuminated portions of said tubes in cyclic progression and means for shielding the visual effects of said hot cathode electrode from said discharge.

2. An electronic animated sign comprising a multiplicity of preformed gaseous discharge tubes arranged in coacting relation, each including a composite anode and hot cathode electrode of the filamentary heated cathode type in each end thereof, a series of electrical connections between the composite electrodes of certain of said tubes, a multiplicity of spaced anodes disposed between said composite electrodes, a source of alternating current, means for individually energizing certain of said cathode electrodes from said source, means for energizing others of said cathode electrodes in common from said source, means for cyclically exciting said electrodes from said source while maintaining an external shunt path around certain of said electrodes for producing a dark space within said tubes intermediate the energized portions thereof for visually producing animated effect in said coacting tubes and means for shielding the visual effect of said hot cathode electrode from said discharge.

3. An electronic animated sign comprising a multiplicity of preformed gaseous discharge tubes arranged in coacting relation, each including a composite anode and hot cathode electrode of the filamentary heated cathode type in each end thereof, and a multiplicity of spacially disposed anodes distributed therebetween, a source of alternating current, means for independently energizing certain of said cathode electrodes from said source, separate means for simultaneously energizing others of said cathode electrodes in common switching means for selectively and progressively applying alternating current to said anodes for cyclically controlling the discharge through said tubes at a rate determined by the rate of operation of said switching means and means for shielding the visual effect of said hot cathode electrode from said discharge.

4. An electronic animated sign comprising a multiplicity of preformed gaseous discharge tubes arranged in coacting relation, each including a composite anode and hot cathode electrode of the filamentary heated cathode type in each end thereof and a multiplicity of spacially disposed anodes distributed therebetween, a source of alternating current, means for separately energizing certain of said cathode electrodes from said source means for energizing others of said cathode electrodes through a parallel circuit connected with said source and switching means for selectively and progressively applying alternating current to said anodes for cyclically controlling the discharge through said tubes at a rate determined by the rate of operation of said switching means, means associated with said switching means for establishing a shunt path around certain of said external electrodes for producing a dark space intermediate the illuminated activated portions of said coacting tubes and means for shielding the visual effect of said hot cathode electrode from said discharge.

5. An electronic animated sign comprising a multiplicity of preformed gaseous discharge tubes arranged in coacting relation, each including a composite anode and hot cathode electrode of the filamentary heated cathode type in each end thereof and a multiplicity of intermediate spacially disposed anodes therebetween, a source of alternating current, means for independently energizing certain of said cathode electrodes from said source, separate means for simultaneously energizing others of said cathode electrodes in common means for progressively exciting said electrodes and anodes in cyclic order, means associated with the aforesaid means for establishing an external shunt path around certain of said electrodes for maintaining a mobile dark space intermediate the illuminated portions of said tubes in cyclic progression, and means associated with each of said composite anodes and hot cathodes for shielding the dark space in said tubes from the visual effects of the hot cathode portions of said composite anodes and cathodes.

6. An electronic animated sign comprising a multiplicity of preformed gaseous discharge tubes arranged in coacting relation, each including a composite anode and hot cathode electrode of the filamentary heated cathode type in each end thereof and a multiplicity of intermediate spacially disposed anodes therebetween, a source of alternating current, circuit connections including said electrodes means for independently energizing certain of said cathode electrodes from said source, separate means for simultaneously energizing others of said cathode electrodes in common, switching means including a rotary driven contactor a multiplicity of contacts disposed in the path of said contactor and individually and sequentially connected with said electrodes, said contactor operating to shunt certain of said contacts for establishing an external shunt path around said electrodes for producing a dark or deactivated space in said tubes intermediate the illuminated or activated portions thereof said dark or deactivated space progressing along said tubes at a rate governed by the rate of movement of said contactor and means for shielding the visual effect of said hot cathode electrode from said discharge.

7. An electronic animated sign comprising a multiplicity of preformed gaseous discharge tubes arranged in coacting relation, each including a composite anode and hot cathode electrode of the filamentary heated cathode type in each end thereof and a multiplicity of intermediate spacially disposed anodes therebetween, a source of alternating current, circuit connections including said electrodes means for independently energizing certain of said cathode electrodes from said source, separate means for simultaneously energizing others of said cathode electrodes in common, switching means including a rotary

driven contactor a multiplicity of contacts disposed in the path of said contactor and individually and sequentially connected with said electrodes, said contactor operating to shunt certain of said contacts for establishing an external shunt path around said electrodes for producing a dark or deactivated space in said tubes intermediate the illuminated or activated portions thereof said dark or deactivated space progressing along said tubes at a rate governed by the rate of movement of said contactor, the effective width of said contactor in bridging said contacts being determinative of the effective length of the dark or deactivated space in said tubes and means for shielding the visual effect of said hot cathode electrode from said discharge.

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