

April 12, 1932.

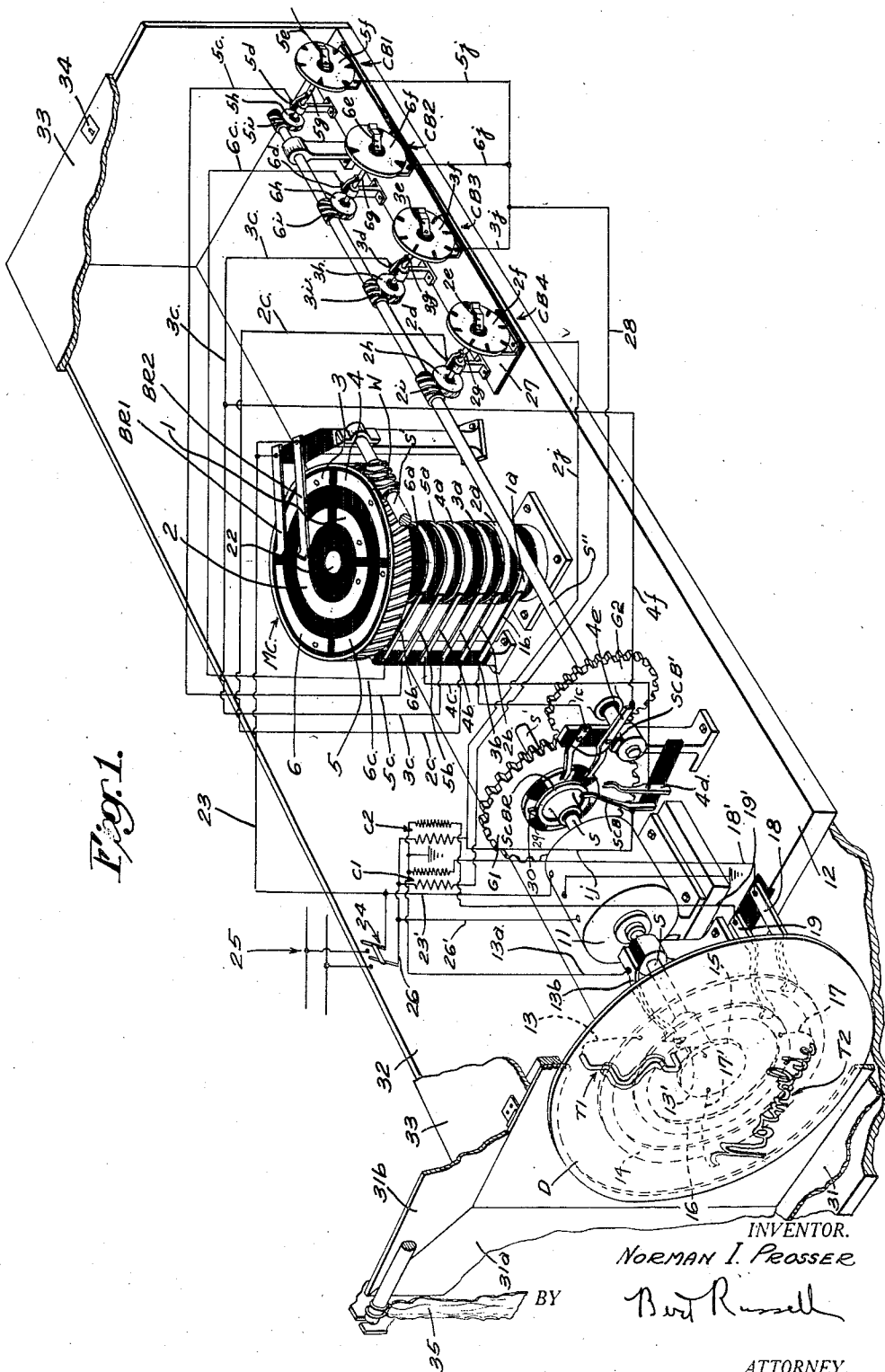
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LUMINOUS REVOLVING SIGN, SYSTEM, AND METHOD

Filed Dec. 22, 1927

2 Sheets-Sheet 1



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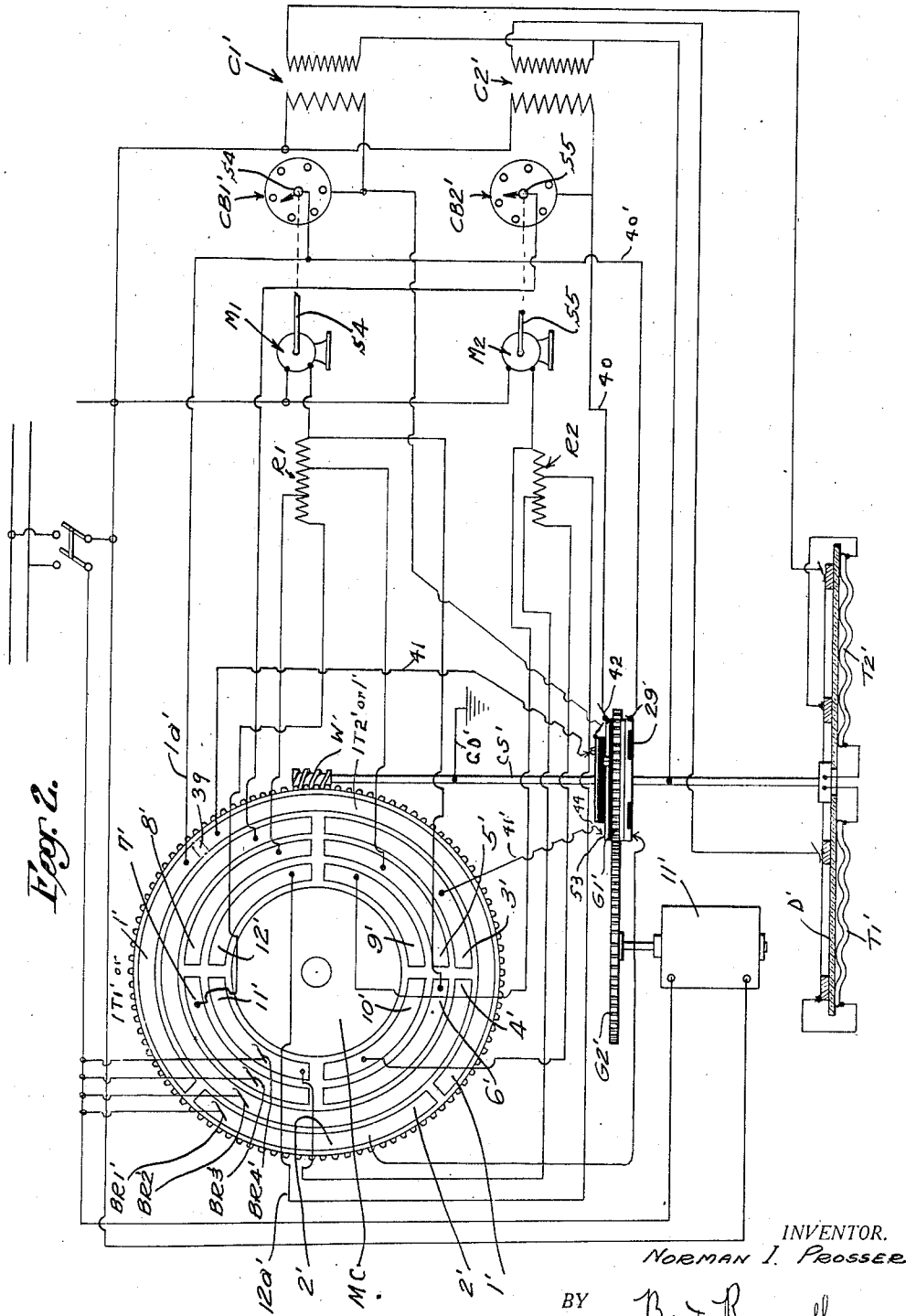
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LUMINOUS REVOLVING SIGN, SYSTEM, AND METHOD

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2 Sheets-Sheet 2



UNITED STATES PATENT OFFICE

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LUMINOUS REVOLVING SIGN, SYSTEM, AND METHOD

Application filed December 22, 1927. Serial No. 241,369.

Although my present invention relates to revolving signs, and more particularly to signs in which special light effects are obtained by the use of high voltage alternating currents, it should be understood that all embodiments of this invention involve the rotation of a disc, or the like, at a fairly high R. P. M.; and that they involve also such use of illumination as to produce various special optical effects,—the appearance of luminous patterns of light resembling rosettes in which parts of the patterns may appear to revolve either in the direction of the disc or oppositely and in which there are present different colors and shades of light of concentric circles, luminous light portions moving or stationary and with parts of light moving in opposite directions while patterns are continuously changed and in which there may appear a significant display including, for example, the appearance of a substantially stationary display of a word, a trade-mark, or some other significant character. The display last referred to is preferably interrupted, through automatic or other means, for intervals during which various color effects, also subject to automatic or manual control, are presented in such a manner as to assure the attention of passersby.

It being well known that, due to the laws governing "persistence" of vision, the intermittent illumination of a rotating character or configuration may produce, when suitably timed, the impression that the same is stationary, or is slowly rotating in either direction, or is repeated in the production of a design characterized by radial symmetry, it is an object of my invention, using illumination units such as Geissler tubes, or neon tubes, the mentioned tubes being preferably secured to a rotating disc of bakelite or other insulating material, to produce and to repeat, with or without considerable variation, mysterious and variable light effects,—preferably interrupting or overlapping the same, or dissolving the same into significant characters, for advertising effect. Thus, I may represent not only words but emblems, line-drawings, etc.—various kaleidoscopic pinwheel effects, spoked wheel effects, Maltese cross effects,

and the like being so employed as to attract attention to the mentioned trade-marks, etc.; and, in preferred embodiments of my invention, securing the mentioned bakelite disc, or its equivalent, directly upon a driven shaft (which may be used, if desired as a conductive return) I may employ suitable gearing, driven from the mentioned shaft, to rotate, at a reduced speed, a so-called master controller and circuit breakers adapted repeatedly to vary the circuit connections and the interruption of a primary source of current in such a manner that the mentioned cycles of luminous effects may be automatically repeated for any desired period.

Other objects of my invention, which is especially suitable for use in the production of evening or dim-light displays in store windows or the like, and in which I may drive the mentioned shaft by a motor which is indirectly or directly energized from the same main source of current that indirectly or directly produces the mentioned luminous effects (preferably thru suitable transformers, whose primaries and/or secondaries can be either automatically or otherwise interrupted) may be best appreciated from the following description of illustrative embodiments thereof, taken in connection with the appended claims in the accompanying drawings, in which

Fig. 1 is a diagrammatic general perspective view of one embodiment of my invention,—this view being used incidentally as a wiring diagram (in which dotted lines are employed to show only such concealed parts as are conductive, and in which circuit wires are generally represented by either horizontal, vertical, or freehand lines).

Fig. 2 is a wiring diagram illustrating an alternative organization, as hereinafter described, circuit breaker shafts being shown as broken and turned.

General statement of the system

Before proceeding with a detailed discussion of the disclosure, a general statement of the effect obtained by the present apparatus is in order.

The application relates to a display or ad-

5 advertising device intended primarily to attract the attention of the passer-by to some insignia or other, such as a trade-mark, trade-name, symbol, or the like. The device exposed to view comprises a rotating disk which carries one or two or more Geissler tubes. One or both of these tubes is shaped to form a desired trade-mark or trade name or symbol. As the disk rotates, these tubes are intermittently illuminated. The desired optical illuminating effects are obtained by the combination of the intermittent illumination of the tubes and the rotation of the disk carrying these tubes. The essential purpose of the device being to attract the attention of the public to the trade-mark, the intermittent illumination of the trade-mark tube will be so timed with relation to the rotation of the disk, as for example by illuminating this tube once every revolution for a small fraction of a second, so that due to the persistence of vision, the trade-mark appears to be stationary and continuously illuminated and may be read by the observer. In order, however, to make the entire device more attractive to the eye and in order that the device should hold the attention of the observer the disk also carries another tube which, if desired, may, when illuminated, give a color effect different from the color of the trade-mark tube, this second tube being also intermittently illuminated and this illumination of the second tube being so timed with relation to the rotation of the disk that a predetermined illuminated design is formed thereby. This design may be varied by varying the relation between the rotation of the disk and the rate of intermittent operation of the tube. On the basis of the same principle of persistency of vision, this design may be, if desired, made to appear stationary. If desired this design may also be given an animated or kaleidoscopic effect. Other effects are obtained by the same apparatus by displaying the trade-mark as such intermittently and using it for design effects during alternate intervals, thereby giving the effect of a stationarily illuminated trade-mark followed by another period of time during which the trade-mark tube itself is utilized to give a predetermined illuminated design covering the entire disk. By means of this device, therefore, either the trade-mark tube alone may be used to give the combined effect or an alternate display of an animated design and of a stationary trade-mark tube may be combined with another tube, the other tube serving to form the desired animated design, the trade-mark tube serving to furnish the appearance of a stationary trade-mark.

The resultant effect displayed to the observer may be, therefore, any one of the following optical effects.

1. An illuminated stationary, readable trade-mark.
2. An illuminated, stationary, color pattern or design covering substantially the entire disk.
3. An illuminated, animated or kaleidoscopic pattern or design covering substantially the entire disk.
4. An illuminated, stationary trade-mark in combination with an illuminating display pattern or design of the same or a different color.
5. An illuminated, stationary, readable trade-mark in combination with an animated illuminated pattern or design over substantially the entire disk.
6. An alternate display of an illuminated stationary, readable trade-mark and of an illuminated design, animated or stationary, of one or more colors covering substantially the entire area of the disk.

An animated design may be illustrated by the effect obtained by a moving spoked wheel or as another illustration, a rotating Maltese cross. One radial tube is sufficient to give either of these effects. In animated designs of this nature, the spoked wheel or Maltese cross may be given the appearance of rotating in one direction or in the other direction as desired.

Referring to the details of that specific embodiment of my invention shown in Fig. 1 (in which the illustrated parts are not drawn to scale), I show a motor 11 as supported from a suitable base 12, and as adapted to rotate, by means of a shaft S, an insulating or other support, such as a glass or bakelite disc D, for self-luminous tubes, or the like, of any desired character.

I suggest at T1 an ordinary or special Geissler tube one end of this being connected, by means such as a wire 13, with a concealed collector ring 14; and the other end thereof being connected, as by a wire 13', with a conductive flange 15, serving also for the connection of disc D, or its equivalent, with shaft S,—and presumably insulated therefrom.

Assuming that the tube T1, or its equivalent, is employed (with or without additional tubes for a like effect) primarily to attract or fascinate the passing observer, I may give the tube T2 any special configuration for an advertising effect,—the word "Normalite" being shown, by way of illustration. One end of the tube T2, hereinafter referred to as providing a "significant-character" display,—(to distinguish the same from the "entertainment" tube T1) is shown as connected with an inner collector ring 16 and flange 15 by means of wires 17 and 17'; and secondary circuits through the respective tubes T1 and T2, or through any desired "significant-character" and/or "entertainment" tubes, may be completed by means such as

separate brushes 18 and 19, respectively connected with wires 18' and 19',—the latter being, in turn, connected with a suitable high voltage source or sources such as transformers or spark coils C1 and C2. A common return wire 13a is shown as connected with a brush 13b, engaging the flange 15, and a common "ground" is indicated at 20.

The brush 13b is shown as supported upon one of the bearings of the motor 11 or shaft S of said bearing and on an insulated portion of said bearing. This insulated bearing is stationary relative to the brush 13b.

Although any one of a great variety of organizations might be employed to energize the respective tubes referred to, at desired intervals during the rotation of the same at fixed or varying speeds, in the present embodiment of my invention I show a shaft S' as coaxial (and optionally identical) with the shaft S; and the remaining movable parts of this embodiment of my invention will be found to be concerned mainly or entirely with the energization of the respective coils C1 and C2 at suitable intervals for desired optical effects.

Disregarding mention of bearing and supporting elements whose configuration may be regarded as wholly immaterial to the principles of this invention, I show a so-called master controller MC as so connected with a worm gear 21 as to be slowly rotated (at a rate such as one revolution per minute) by means of a worm W,—the latter being either indirectly driven from or carried by the mentioned shaft S. The master controller MC, shown as rotatable upon a vertical shaft 22, may comprise inner conductive segments 1 and 2, respectively connected with rings 1a and 2a,—hereinafter described as pertaining to the illumination of the "significant-character" tube T2, by the energization of the coil C2; and said master cam may comprise also outer conductive segments 3, 4, 5, and 6, respectively connected with rings 3a, 4a, 5a, and 6a.

A brush BR1 is shown as adapted to contact successively with the outer conductive segments last mentioned; and a brush BR2 may similarly contact with one of the inner segments 1 and 2, both of the mentioned brushes being connected with a main supply wire 23. The latter leads from a switch 24, connected with an outside source of current 25,—a branch 23' being led to the motor 11 and a return wire 26 being also provided with a branch 26', connected with said motor.

The respective rings 1a—6a are shown as respectively engaged by brushes 1b—6b, with which wires 1c—6c are respectively connected; and the wires 5c, 6c, 3c and 2c are shown as respectively leading to contact breakers (which may be of the so-called ignition type) through brushes 5d, 6d, 3d, and 2d.

I show contact breakers CB1, CB2 CB3 and CB4, as mounted upon a common insulating element 27, and as comprising, in addition to rotatable contact arms 5e, 6e, 3e, and 2e, in conductive connection with the respective wires 5c, 6c, 3c and 2c, fixed contact discs 5f, 6f, 3f and 2f, provided with various numbers of contact points; and, assuming the respective shafts 5g, 6g, 3g and 2g, to be included in the respective circuits referred to, they may be driven by means such as worm gears 5h, 6h, 3h, and 2h, respectively provided with means for insulating the same from said shafts.

In case the last-mentioned gears are to be driven from a common shaft, such as a shaft S'', identical with or driven from the shaft S or the shaft S' (as, by means of intermeshing gears G1 and G2) I may employ, for the purpose here referred to, means such as a series of worms 5i, 6i, 3i, and 2i; and I may connect any desired number of the described circuit breakers, as by wires 5j, 6j, and 3j, with a common return wire 28, leading through the coil C1, or its equivalent, to the main return wire 26.

I show the gears G1, and G2 as adapted to effect an appreciable speed increase,—as, a multiplication from about 600 R. P. M. to about 1800 R. P. M.; and, in order to utilize one or both of these gears for a circuit-breaking effect to provide for additional variations in the luminosity of the mentioned tubes, by carrying the wire 4c for C1 to a brush 4d, (adapted to conduct current through the gear G1 except as interruption may be effected by insulating insertions or prominences 29) assuming the gear G1 to be insulated from the shaft S', a current may be permitted to pass, within periods predetermined by the described construction of the master controller MC, or its equivalent, through an additional brush 4e, shown as connected by a branch 4f with the wire 3c. This will be seen to result in intermittent periods of energization of the coil C1 for predetermined intervals during each rotation of the shafts S and S',—as, for the production of a "Maltese cross" effect by special illumination of the tube T1, during a predetermined portion (as, one-fourth) of each revolution of the master controller MC; and I may also utilize an additional special contact brush SCB, constantly engaging a special contact brush ring SCBR (shown as insulated from the gear G1 by the inserts or prominences 29), the last mentioned ring being shown as provided with a contact point 30 to make connection, by way of an additional special contact brush SCB', between the wire 1c and a wire 1j, leading through the primary of coil C2 to the mentioned return wire 26.

When the significant character is to be illuminated once per revolution to present the illusion of being stationary and legible, a cir-

cuit embodying contact 30 in Figure 1 is used. During the interval when the master controller MC has its brush BR2 on the contact strip 1, a circuit can be completed through the contact 30 for this purpose. Since the brush BR2 contacts with the strip 1 during a quarter of the period of operation of the sign, thus the significant character formed by the shape of the tube T2 is rendered legible during the quarter of the period of operation of the sign. Hence, the master controller may be termed a "program device". The circuit through the contact 30 for energizing the tube T2 is as follows: From the main line 25 through switch 24, through line 26, through primary of transformer C2, hence through line 1j, through brush SCB and ring SCBR to contact 30. Once during each revolution of the disc D contact 30 engages the brush SCB' completing a circuit through wire 1c, brush 1b, ring 1a, contact strip 1, brush BR2, line 23, switch 24, to the opposite side of the line. Since the disc D is revolving at, for example, 600 R. P. M., and this circuit is completed always at the same point of revolution of the disc D, the tube T2 thereby becomes energized 600 times a minute at the same point and appears to be continuously illuminated and stationary. The circuit for energizing the tube T2 on energizing the primary of the transformer C2 has been heretofore described.

The flow of current through the wire 1j being utilized to produce, once during each revolution of the shaft S, a brilliant illumination of the "significant-character" tube T2, presumably when in a position of maximum legibility and at such short intervals as to produce substantially the effect of a stationary position and constant lighting thereof, in order to produce, at certain intervals, a rosette-like repetition of the same, for an "entertainment" effect, I may, if desired, connect the contact-breaker CB4, or its equivalent, also with the primary of the coil C2, as by means of a wire 2j.

Using the described means, it will be seen that, so long as the brush BR1 engages the segment 3, for example, current passing through the ring 3a, the brush 3b, the wire 3c, the brush 3d, and the contact-breaker CB3 (and thence by wires 3j and 28 through the coil C1) will be interrupted at intervals dependent upon the gear ratios employed in the described transmission, and upon the number of contact points provided in CB3; and that any desired number of alternative illumination intervals may be obtained through additional circuit-breakers, such as the circuit-breakers CB2 and CB1,—the former being adapted (assuming 1 to 1 or other whole-number ratios between gears) to produce a triangular, or three-multiple rosette effect, and the latter a pentagonal or five-multiple rosette effect, by reason of the

provision of three contact points, symmetrically disposed, upon the former, and five contact points upon the latter. The inner segments 1 and 2 being employed in predetermining the illumination of the "significant-character" tube T2, by energization of the coil C2, it will be obvious that the latter may be interrupted for any desired intervals, and/or caused to overlap, to any desired extent, with the various illuminations of the "entertainment" tube T1; and the provision of an extra tooth on either G1 or G2 may cause the mentioned "rosettes" to seem to travel slowly backward or forward.

Detailed description of the system

It is now proposed to trace the various circuits in detail. Thus in Figure 1, there is disclosed a rotating support D upon which are mounted two luminous tubes, the energization of which depends upon the position of the slow speed master controller MC, and also upon the high speed interrupters CB1, CB2, CB3, CB4, brushes SCB', 4e, 4d, and SCB and control contacts 30. Since it is easier to control a low potential circuit rather than a high potential circuit, these various circuit controllers all operate on the primary or low potential coils of transformers C1 and C2, the secondaries thereof being connected at all times to tubes T1 and T2.

The high potential circuit of tube T1 can, for example, be traced as follows:—Secondary coil of C1, wire 18', brush 18, ring 14, connection 13, tube T1, connection 13', disk 15, brush 13b, connection 13a, back to grounded side of the secondary coil of C1. The corresponding circuit for the tube T2 can be traced as follows:—Secondary coil of C2, wire 19', brush 19, ring 16, connection 17, tube T2, connection 17', disk 15, brush 13b, wire 13a, back to grounded side of the secondary coil of C2.

From the above it will be seen that the high potential side of the transformer C1 is permanently connected to the tube T1 and the high potential side of the transformer C2 is permanently connected to the trademark tube T2.

All interruptions in the illumination of these tubes is accomplished on the low potential side of these transformers. The remainder of the electrical system, therefore, is all inserted on the low potential side of the transformers and are in series with the low potential side of these transformers.

The disk is rotated by means of the motor 11. The same motor also serves to operate all of the remaining controlling devices. The master controller MC is rotated by the same motor, the speed of rotation of the master controller being many times smaller than the rotation of the disk D, this reduction being accomplished by means of the worm W, whereas the interrupters CB1, CB2, CB3 and CB4 are rotated at a comparatively high rate.

The interrupters are disposed in series with the master controller, the arrangement being such that the tube T1, for example, is illuminated only when the closure of the circuit controlled by one of the interrupters CB1, CB2 or CB3 coincides with the predetermined angular position of the master controller MC. The master controller makes one revolution while the disk makes a large number of revolutions. By means, therefore, of this system the tube T1 is under the control of the circuit breaker CB1 during one-quarter of a revolution of the master controller and during the next quarter it is under the control of the circuit breaker CB2 and then under the control of the circuit breaker CB3 for the last two quarters. The designed formed on the disk during the last quarter differs from the one formed during the third quarter by virtue of the the entry into the circuit of the brushes 4*d*, 4*e* and the gear G1.

The tube T2 forms a pattern during the first three quarters of a revolution of the master controller, and displays the mark or symbol in a stationary legible form during the last quarter. The tube T1 may also represent a mark or symbol.

The slow moving controller MC being in series relation with the supplementary fast moving interrupters, it is apparent that for a number of revolutions of support D (determined by the period of control of the slow moving controller) the tubes are energized for short intervals at definite angular positions (determined by the period of control of the fast moving interrupters). Due to the stroboscopic effect, the result is a pattern or character or symbol, or both, the appearance of which can be changed by the operation of the slow moving controller.

The series circuits for these effects will now be traced for both tubes. To obtain a pattern effect with tube T1, any one of the fast moving interrupters CB1, CB2 or CB3 is used, the choice depending upon the position of the controller MC. If CB1 is active, tube T1 will be energized six times for each revolution of arm 5*e*, because there are six points of contact on disk 5*f*, and each period of contact will correspond to the angular position of the tube T1 so as to produce a ray-like or streamer effect radially symmetrical. Similarly, if CB2 is active, tube T1 will be energized only three times for each revolution of the disk 6*f*, and if CB3 is active, tube T1 will be energized eight times for each revolution of the disk 3*f*.

The contacting position of brush BR1 of controller MC with respect to segments 3, 5 and 6 determines which of the devices CB1, CB2, CB3 is active. Thus while brush BR1 is in contact with segment 3 as shown, the primary circuit of transformer C1 can be traced as follows:—mains 25, right hand pole of switch 24, wire 23, brush BR1, segment

3, ring 3*a*, brush 3*b*, wire 3*c*, brush 3*d*, shaft 3*g*, arm 3*e*, disk 3*f*, wire 3*j*, wire 28, primary transformer C1, connection 26, switch 24, back to mains 25.

When brush BR1 is contacting with segment 6, the circuit up to brush BR1 is the same as before; thence by way of segment 6, ring 6*a*, brush 6*b*, wire 6*c*, through device CB2, and then to the common return 28, through transformer C1 as heretofore outlined.

Similarly, when brush BR1 is contacting with segment 5, the circuit up to brush BR1 is the same as before; thence by way of segment 5, ring 5*a*, brush 5*b*, connection 5*c*, through device CB1, and to common return 28.

Any of these alternate paths thus produce a pattern effect by the aid of tube T1, the seeming closeness of the individual lines of the pattern being determined by the choice of devices CB1, CB2 and CB3.

In the form of the invention disclosed, the devices CB1, CB2, CB3 need not be rotated so as to energize the tube T1 always in the same angular position with respect to the axis of disk D, so that in this way a clockwise or counter-clockwise rotary effect may be produced. However, I add still another controller that does ensure that tube T1 will be energized over definite angular portions of the visible disk, whereby such effects as a Maltese cross can be secured. For this purpose, the segment 4 of controller MC is utilized, which determines the period of visibility of the cross; as well as a pair of brushes 4*d*, 4*e*, cooperating with the segmented disk rotated in synchronism with disk D; and, in order to secure a streamer effect, one of the devices CB1, CB2 or CB3.

Thus when brush BR1 is in contact with segment 4, the "Maltese cross" circuit can be traced as follows: from brush BR1, segment 4, ring 4*a*, brush 4*b*, connection 4*c*, brush 4*d*, gear G1, a disk carrying alternate conducting segments and the non-conducting parts 29, brush 4*e*, connection 4*f*, connection 3*c*, device CB3, and common return 28. Due to the spacing of the contact segments on the disk carried on gear G1, the Maltese cross effect is secured at definite fixed angular relation to the line of sight, by number of impulses from CB3 while 4*e* contacts G1.

These various stages of energization of the tube T1 occur cyclically for each rotation of the slow moving controller MC.

This controller also acts to effect the energization of the character or name tube T2 by the aid of brush BR2 and segments 1 and 2. The name effect is secured once per revolution of disk D and in constant position, during the period when brush BR2 contacts with segment 1. This once per revolution energization utilizes the contact 30 on ring SCBR, and brushes SCB and SCB', the

ring SCBR being rotated in synchronism with disk D.

The circuit for the name effect can be traced as follows:—from mains 25, right hand pole of switch 24, connection 23, brush BR2, segment 1, ring 1a, brush 1b, connection 1c, brush SCB', contact 30, ring SCBR, brush SCB, connection 1j, primary coil of transformer C2, connection 26, switch 24, and back to mains 25. This circuit is established only when contact 30 makes a connection with brush SCB'. This occurs once per revolution of disk D; and in the embodiment shown, simultaneously when a Maltese cross effect is secured by tube T1, due to the position of brush BR1 on segment 4.

A pattern effect is also secured by tube T2 simultaneously with the pattern effects of tube T1. This is secured by the aid of segment 2, and device CB4, similar to devices CB1, CB2 and CB3. Thus when brush BR2 contacts with segment 2, the circuit of transformer C2 can be traced as follows:—through connection 23, brush BR2, segment 2, ring 2a, brush 2b, connection 2c, device CB4, connection 2j, primary of transformer C2, back to the other side of the circuit.

The operation of the system disclosed in Figure 1 may now be briefly summed up in the following manner. During one quarter of a revolution of MC the tube T1 is under the control of the interrupter CB1, by reason of the position of the master controller and the connection of the brush BR1 with the segment 5. The tube T1, during this period, offers a pattern which is determined by the number of contacts in the interrupters CB1, and its rate of rotation with relation to the rate of rotation of the disk D. During the next equal interval, the tube T1 is under the control of the interrupter CB2 and a new pattern and design is displayed by the intermittent operation and illumination of the tube T1. During the third interval contact of the brush BR1 with the segment 3 puts the tube T1 under the control of the interrupter CB3. During these three intervals the design or pattern formed by T1 will be in the nature of a multiplicity of radial spokes which may be made to give the appearance of rotating in a clockwise or anti-clockwise direction on the face of the disk. During these three intervals, the tube T2 also enters into the design or pattern appearing on the disk for during these periods the tube T2 is under the control of the interrupter CB4 by virtue of the engagement of the brush BR2 of the master controller with the segment 2. During the fourth and last interval of cyclic operation of the master controller the engagement of the brush BR1 with the segment 4 introduces into the circuit of the interrupter CB3 the gear G1 together with its electrically associated parts which include the brush 4z, the metallic segments of

which are interposed between the insulating prominences 29 and the brush 4e which rides over the insulating prominences 29 and contacts with the conducting segments interposed between them, these in their turn being connected electrically with the gear G1. By means of these devices the ornamental effect obtained by the tube T1 is that of a Maltese cross. At the same time and during this same interval the brush BR2 is in contact with the segment 1. This introduces into the circuit of the transformer C2 the brush SCB, the collector ring SCBR, the contact 30, integral therewith, and the brush SCB'. As a result of this circuit the tube T2 is illuminated once every revolution of the disk D with the result that the trade-mark is displayed in a legible form and gives the appearance of being stationary on the disk. This display of the trade-mark is simultaneous with the display of the Maltese cross and both are legible.

If desired, the Maltese cross may be so disposed that the trade-mark is between two arms of the cross or if desired the trade-mark may be of a different color from that of the cross.

The above cycle of operations is repeated at every complete revolution of the master controller.

It will be appreciated that, although my invention is not restricted thereto, my novel use of gas-containing luminous tubes (which may be of older Geissler type or may be mercury vapor tubes or tubes containing neon or any preferred gas or mixture, and may employ any special glasses or fluorescent jackets) and also my use of circuit-breakers which assure exceedingly brief but reliable contacts, have the great advantage (as compared with, for example, any use of incandescent conductors such as are required by filament lamps or arc lamps or any use of movable screens or shutters) that the periods of illumination may thereby be easily and reliably rendered so brief and so regular as substantially to avoid blurring of outlines; but I nevertheless mention that in case only a direct current or an alternating current of an unsuitable frequency is available, I may resort to such expedients as the replacement of the motor 11 by a motor-generator set supplying whatever alternating current may be most suitable to the particular tubes employed.

I find that between 500 and 700 R. P. M. (and preferably about 600 R. P. M.) are entirely suitable for the shaft S, in order to obtain, without objectionable or dangerous strains due to centrifugal action, a satisfactory appearance of continuous illumination; the disc is likely to be formed of glass or metal only when it is intended to be given a reflecting and/or irregular surface; unless the tubes are to be mechanically shifted during rota-

tion of the disc D, or its equivalent, they may be secured thereto by means of suitable straps,—whether or not the ends thereof are so bent as to project thru holes in the disc; all wires and any weights used to obtain perfect balance may be carried on the back of the disc; and it will be understood that, depending upon the position and the manner of use, the disc D (which is likely to be standardized at about 30" in diameter in the case of ordinary window-display units) may be of any desired size and may be disposed in any desired plane.

It being preferable, in all or many embodiments of this invention, to provide for a substantially uniform rate of rotation of the disc D, or its equivalent, in order to obtain further variations in the time relationships of current interruption affected by a limited number of circuit breakers, I may, in preference to introducing elliptical gears or friction drives and/or electro-magnetic brakes, or the like, obtain the general effects referred to, and certain additional advantages, by an alternative arrangement having the general character suggested in Fig. 2.

Coils C1 and C2 are diagrammatically represented as transformers or induction coils having primary and secondary windings. The secondaries of the coils C1 or C2 in either of the forms of the invention shown in Figures 1 and 2, are each connected to one of the neon or Geissler tubes T1, T2, the electrodes of the tubes being directly connected across the ends of the secondary. The connection, of course, is through the means of the center distributing ring 15 and the concentric distributing rings 14 and 17. Thus, whenever the primaries of either coils C1 or C2 is energized, the secondaries of the coil whose primary is energized passes energy to the tube connected therewith so as to illuminate the gas in said tube.

The master controller MC of Figure 1 and the interrupters SCB and SCB' cooperate together as follows: In each of its revolutions, the master controller in approximately a quarter of its revolution, brings the contact 1 in contact with brush BR2', thereby energizing line 1C leading to gears G1 and G2, which gears operate due to their contacts act like another one of the interrupters CB4 to interrupt the current which current is permitted to pass from line 1C to the primary of the coils C2, thereby providing an intermittent energization of one of the tubes or more particularly, the tube T2 at a certain rate of interruption during the revolution of master controller MC. Similarly, in one portion of its revolution or for about a quarter revolution of the controller MC, the brush BR1' supplies current from line 23 to contact 3 and hence to line 3C and to line 4F to the contacts of gears G1 and G2 which provide a rate of interrupting supply of energy

to primary of coil C2, thereby forming an intermittent energization of the tube T1.

It should be appreciated that in addition to current being supplied to the tubes at the intervals provided by the gears G1 and G2 during that same portion of revolution of the controller MC, additional intervals of energization may be provided by contacts being made through one or more of the interrupters CB1, CB2, CB3 and CB4, whereby a great variation in the rates of interruption of the energization of the tubes is provided. This causes the tubes to produce pattern effects which are continuously changing in operation.

In the arrangement shown in Fig. 2, instead of employing more than one ignition-type circuit-breaker for any one tube, and instead of driving all parts from a single motor 11' (shown driving a conductive shaft CS' by means of reducing gears G2' and G1') I propose to use a single circuit-breaker CB1' (or CB2') with each of the coils C1' and C2', and to obtain various rates of interruption by distributing current thereto, from any suitable primary source, by way of different "taps" or points upon variable or special resistance units R1 and R2, provided in separate motor circuits,—diminutive motors M1 and M2 being shown as employed to rotate separate conductive shafts S4, and S5, carrying the contact arms of the respective breakers CB1' and CB2'. This organization permits gradual or fade-out changes from one pattern to another in the so-called "entertainment" program, as the respective motors are speeded up and slowed down by the cutting-in and cutting-out of resistances in consequence of such changes in connections as may be automatically affected by, for example, the provision of a master cam MC',—comprising any appropriate number of segments.

The master cam MC' is shown as comprising 12 segments, to which the characters 1'—12' are applied; and it will be understood that these segments are respectively provided with corresponding insulated rings and brushes adapted to connect the same, during each cycle of rotation of the controller MC', with wires 1a'—12a',—to predetermine various rates of rotation of the respective motors M1 and M2 and thereby to energize the respective coils C1' and C2' at intervals predetermined by the resultant rotation of the respective shafts S4 and S5 and the number of contact points provided upon the current breakers CB1' and CB2'. In this case, especial attention is called to the fact that the motors referred to preferably pick up and slow down at moderate rates, thereby causing an almost infinite variation in pattern effects, but each conductive path may be maintained long enough to enable the motor concerned (unless it is so constructed as cyclically and automatically to undergo speed changes) to reach a

steady state; and these observations apply not only to any "entertainment" tube or tubes T1' but to the "character" tube or tubes T2' as well, during any periods when the latter, although rotating, may not be functioning for an "entertainment" effect.

Detailed description of Figure 2

The embodiment of Figure 2 is also inherently capable of producing similar effects, and its circuits will be detailed in full. In this embodiment, the devices CB1' and CB2' are similar in general to devices CB1, etc. of Figure 1, and control the primaries of the energizing transformers C1' and C2'. The secondary coils of these transformers are shown as energizing the tubes T1' and T2' respectively, mounted in a manner similar to that of Figure 1 on the disk D'. This disk is rotated by motor 11' through gearing; and separate variable speed motors M1, M2 are used to drive the devices CB1' and CB2'. Figure 2 being much more diagrammatic than Figure 1, the details of construction have been omitted.

For example, the secondary of transformer C1' as connected to tube T1' through a ground on shaft CS' and an exterior collector ring on the back of disk D'; while the secondary of transformer C2' is connected similarly to tube T2' through an inner collector ring, the brushes on the two rings being shown only diagrammatically.

The effects of the tubes are again controlled by a slow speed controller MC shown as of disk form, and slowly rotated by a worm and gear arrangement from shaft SC'. A series of annular segments are provided on this controller for securing the controlling functions. The four brushes BR1', BR2', BR3', and BR4' coact with this series and are joined to a common lead from the mains. The pattern effect of tube T1' is secured by a circuit now to be traced through controller MC primary of transformed C1' and device CB1'.

This pattern effect circuit occurs when brush BR1' is in contact with segment 1', and can be then traced as follows:—brush BR1', segment 1', connection 1a' device CB1' and primary of transformer C1' to a common return. If desired a name effect can be secured by splitting segment 1' to form a segment 1T2', and when brush BR1' rests on this portion of segment 1' (that is, on 1T2'), the name effect circuit can be traced through a controller energizing the tube T1' only once per revolution on disk D'. This controller device, similar to the point 30 and brush SCB' of Figure 1 is only diagrammatically shown. It is the small size insulation disk and contact disk placed on top of the gear assembly including gear G1'. The name effect circuit can be traced as follows:—brush RB1', a segment 1T2', connection 41, control device on shaft CS', unnumbered connection to

transformer C1', to a common return. If piece 39 is not used to split up segment 1' as indicated, then the name effect circuit has no function, because of the masking effect of controller CB1' which parallels the single contact device on shaft CS'.

A Maltese cross effect is also secured by tube T1' by the use of a synchronously driven commutator broken by insulation 29'. The circuit for this effect is completed when brush BR1', rests on segment 2', and it can then be traced as follows:—brush BR1', segment 2', device 29', wire 40', devices CB1', transformer C1', to a common return. Device 29' is similar to the arrangement described for a like purpose in connection with Figure 1, including parts 29 and brushes 4e and 4f of Figure 1.

A pattern effect and a name effect can also be secured by the aid of tube T2'. The pattern effect circuit is completed when brush BR2' rests on segment 4', when it can be traced as follows: brush BR2', segment 4', device CB2', primary of transformer C2', back to a common return.

The name effect circuit is controlled by segment 3' and also by a single contact device shown as supported on shaft CS'. The circuit can be traced as follows: brush BR2', segment 3', connection 41', single contact device on shaft CS', connection 40, transformer C2', back to a common return.

In this form of the apparatus, the speeds of devices CB1', and CB2' are shown as being capable of cyclic variation, in order to secure a more complex and attractive pattern. This is accomplished by varying the speed of motors M1 and M2 by the aid of controller MC. Thus resistances R1 and R2 are included in the motor circuits, having several taps for varying them, the taps leading to the series of segments 5' to 12'. The resistance R1 is intended to be controlled by the outer series of rings 5', 6', 7' and 8' and brush BR3'.

The circuit for motor M1 can be traced as follows: brush BR3', any one of segments 5', 6', 7', or 8', any one of the corresponding leads to resistance R1, motor M1, back to the common return.

The resistance R2 is varied by the aid of brush BR4', and the segments 9', 10', 11' and 12'. The circuit of motor M2 can thus be traced as follows: brush BR4', any one of segments 9', 10', 11', 12', any one of the corresponding leads to resistance R2, motor M2, back to the common return.

The operation of the system shown in Figure 2 may be summarized briefly as follows:

In this system tubes T1' and T2' are shown diagrammatically but these tubes may each be so shaped as to represent a significant character or a name. While broadly T1' corresponds to T1 of Figure 1, and in the system

operates to give a pattern effect followed by a Maltese cross, by dividing the segment 1' of the master controller into two portions, the tubes T1' may, for a period, be energized only once every revolution of the disk D' and thereby give a legible stationary significant character or name.

T2' is another tube which is illustrated diagrammatically and which may be energized once every revolution to give a stationary, legible significant character or name, this being alternated with more frequent energization so that it gives a pattern effect.

The simplification of the system as compared with the system shown in Figure 1 resides in the introduction of the resistances R1 and R2 in the circuits of the small motors M1 and M2 which operate only two interrupters CB1' and CB2'. By the introduction of these variable resistances into the circuits of the motors, the speed of rotation of the interrupters are cyclically varied thereby giving four different patterns by the use of only one interrupter and eight different patterns by the use of two interrupters.

As applying alike to the organization of Fig. 1 and that of Fig. 2 and any equivalent organization, I comment that any so-called "entertainment" tube (as T1 or T1') may be made up by connecting two or more suitable tubes, displaying the same or different colors, presumably in series; and likewise any "character" tube may be complex in organization. In this connection, it is important to note that, by the embodiment of comparatively simple additional expedients, I may adapt either of the described organizations to display each of two or more tubes, first for an "entertainment" effect and then for a "character" effect,—so that, if desired, two distinct or similar "characters", in the same or different colors, may be successively displayed as if stationary or slowly moving, for predetermined periods, or they may be simultaneously displayed in the same or different positions, entertainment stunts being interspersed.

In order that each tube may function in turn as an "entertainment" tube and then as a "character" tube, I may, for example, vary either of the described organizations in the general manner suggested in Fig. 2. Without tracing through the plainly indicated circuits comprising brushes BR1', BR2', BR3' and BR4', I comment that shaft CS' is shown as provided not only with a worm W' and with gear G1', but with a ground GD; and that the gear G1', shown as provided with the insulating inserts 29', may be provided with any desired number of special circuit breakers, each to make one contact per revolution.

For example, by suitably sub-dividing the segment 1' (or the analogous segment 1 of that embodiment which is shown in Fig. 1) along any suitable line 39 and providing not

only wires 40 and 41 (leading respectively from coil C2' to a brush 42, which contacts with a collector ring 53 on gear G1', or its equivalent, and from a contact element 44, to provide a once-per-revolution energization of tube T2' thru segment 1T2') but also similar wires 40' and 41' (to provide for earlier or later energization of the coil C1' thru a segment 1T1') each of the mentioned tubes, or any or all of any desired set of tubes provided with similar means of energization and control may be required to go successively thru any prescribed or variable series of entertainment "stunts" and then to settle down to the telling of a particular "promotion" tale to some group of "prospects" attracted by its own "stunts" or by the "stunts" or "tales" of an associated tube or tubes.

In any embodiment of my invention, I may, if desired, employ a special arrangement of mirrors, somewhat as suggested at 31, 31a, and 31b, to multiply or intensify the described effects; and, in order to contribute to the mystery thereof, I may not only enclose all of the described moving parts, excepting the disc D or D', if used, and the tubes or any equivalent rotated elements for "significant" and/or "entertainment" effects, within a box 32,—the illustrated box being provided with a hinged top 33, having a lock 34—but I may also provide the entire unit with removable screening means, such as, for example, a curtain 35, adapted to be withdrawn to permit a full view of the mentioned exposed parts only after the disc D, (or D' or an equivalent element) has been set in such rapid rotation as to deceive the eye of the observer.

It will be obvious that the mentioned tubes, or any equivalent "significant-character" elements and/or "entertainment" elements might theoretically be made so rugged as to admit of their being directly secured to a suitable shaft, no supporting device very similar to the discs D, D' being employed; that such "tubes" might include means for the production of arcs or sparks; that the rotation thereof need not be confined to a plane or planes at right angles to a line of sight nor to any constant plane or planes; and that, in preference to any considerable monopolization of display space by units of the general character illustrated, reliance may be placed upon either flat or special reflectors or refractors so arranged as to project images or beams of light from a hidden unit or units. It will also be obvious that the variations obtainable by additional expedients such as the rotation of irregular reflectors or refractors, the mounting of complete sets of tubes upon radial or other subsidiary shafts (not shown and either fixed or slidable or otherwise movable—said tubes being cut in and out incidentally to their movements or by manual means, not shown) are too numer-

ous for separate description,—being limited only by considerations of expense, strength of materials, and mechanical skill.

In Figure 2, the shaft CS' is used as a common return for the secondary of each of coils C1 and C2 so as to dispense with what collector rings to which the return ends of tubes T1 and T2 would be connected.

While in the specification the tubes are referred to as "Geissler" tubes or "neon" tubes, any equivalent tubes or lights may be substituted therefor. Geissler tubes or neon tubes have peculiar properties which are essential to the construction of this invention. Light is derived in a neon or Geissler tube due to the gas in the tube under energization from the electrical current undergoing certain vibrations to emit light of the frequency of the different spectral bands of the gas. The response of the neon tube to the current energizing the same is to a great extent practically instantaneous. Also, the light in the tube is extinguished practically instantaneously when the source of energy is disconnected from the tubes. It should be borne in mind that the tubes, in this respect, deviate rather markedly from the actions of incandescent lights. An incandescent lamp or light depends for the development of light upon the heating of a metallic filament to incandescence. While the filament is small, its mass is still material and light is not immediately given off from the filament when a potential is applied, nor is the emission of light immediately stopped when the potential is removed. Thus, when ordinary incandescent lamps are illuminated by ordinary alternating currents, such as 50 or 60 cycle currents, the emission of light is practically constant. When tubes such as are employed in the present invention are utilized and energized continuously with an alternating current, the light emitted from the tube having little or practically no inertia, is actually passed to full brilliance and then fades out completely twice during each cycle of the current, or 100 or 120 flashes per second in the case of 50 or 60 cycle alternating current.

While ordinarily, the light from a neon tube appears to be steady, this is on account of the phenomena known in the science of optics as "the persistence of vision". Briefly stated, it means that the retina of the eye retains every image that it gets from $\frac{1}{16}$ to $\frac{1}{8}$ of a second. This means that if light impulses are repeated at intervals at least less than $\frac{1}{16}$ of a second, in the same place, a steady light will appear.

With this explanation in mind the operation of the apparatus may be understood. If the disc is revolved for example, at a rate of ten revolutions per second and the tubes illuminated at intervals of one hundred times per second, such as could be effected by illu-

minating the tubes directly from a 50 cycle current, ten flashes of light will appear as stationary on the disc and each tube on the disc and each of these ten flashes of light will occur 36° apart. Each revolution of the disc brings about a repetition of the first ten flashes and corresponding points on the disc and there will be an illusion of ten tubes appearing to be illuminated for each tube on the disc. If the number of flashes during a revolution is equal to the whole number, the appearance of the image is stationary. If the number of flashes per revolution is between two whole numbers, the number of flashes visible will be that of the nearest whole number but the entire disc will appear to revolve in one direction or the other.

From the above description it will be apparent that an image or illusion can be created of any number of spokes providing proper frequencies are available and the patterns can be made to vary both as to the number of spokes, direction of rotation and speed of rotation. Moreover, if there is a plurality of tubes on the disc lit by different frequencies, the spokes formed from one tube may form patterns or rosettes, portions of which revolve oppositely to the spokes of the rosettes or patterns of light formed by the other tube.

Slight, almost unintentional variations in the speed of the motor may cause these patterns to be changed in appearance. As a result, the apparatus of the present invention is capable of producing luminous rosettes or patterns of light of great variety. In addition to the fact that different patterns of light may be formed, different colors and shades of colors of light may be formed in the different portions of the pattern.

It is an inherent property of Geissler or neon tubes that when the frequency of the potential applied to the tubes changes, the color or shade of color of light emitted by the tube changes. Thus, it will be seen that one tube may be emitting practically yellow light, while the other tube will be emitting the characteristic red neon light and changes may be made between these color limits and different colors will appear in different parts of the composite illusion of light formed on the disc. These colors may be continuously changing due to the change in the intervals at which the tubes are energized.

Due to the overlapping of flashes of light of the tubes on the disc, the system of rosettes which appear to the eye frequently and generally have no apparent connection with the actual shape of the tubes.

Although I have herein described but a limited number of embodiments of my invention, suggesting various alternatives, it will be understood not only that various features thereof may be independently employed, but also that numerous modifications thereof

might easily be devised by workers skilled in the arts to which this case relates, without involving the slightest departure from the spirit and scope of my invention, as the same is indicated above and in the following claims:

I claim:

1. An advertising device comprising: a significant character element capable of substantially instantaneous illumination; means for rotating the same at such a high speed as to render it substantially illegible under continuous illumination; and means for momentarily so illuminating the same, during such rotation, as to render the same legible for predetermined intervals.

2. An advertising device comprising: a significant character element capable of substantially instantaneous illumination; means for rotating the same at such a high speed as to render it substantially illegible under continuous illumination; and means for momentarily so illuminating the same, during such rotation, as to render the same legible for predetermined intervals,—said character element being so illuminated, during other intervals, as to produce relatively illegible but radially symmetrical light effects, for entertainment purposes.

3. An advertising device comprising: a significant character element capable of substantially instantaneous illumination; means for rotating the same at such a high speed as to render it substantially illegible under continuous illumination; and means for momentarily so illuminating the same, during such rotation, as to render the same legible for predetermined intervals, said rotating means being provided also with an entertainment element; and means for so illuminating the latter, during its rotation, as to produce various radially symmetrical patterns.

4. An advertising device comprising: a significant character element capable of substantially instantaneous illumination; means for rotating the same at such a high speed as to render it substantially illegible under continuous illumination; and means for momentarily so illuminating the same, during such rotation, as to render the same legible for predetermined intervals, said rotating means being provided also with an entertainment element; and means for so illuminating the latter, during its rotation, as to produce during certain intervals, various radially symmetrical patterns and also, during other intervals, the appearance of a character so stationary as to be legible.

5. A method of advertising display which comprises: rotating a significant-character element for an entertainment effect at such a rate as would render it illegible under continuous illumination; illuminating the same, during certain periods, at such intervals as to produce radially symmetrical entertain-

ment patterns; and illuminating the same, during other periods, at such intervals as to render said character legible.

6. A method such as is defined in claim 5, in which an entertainment character element is rotated simultaneously with said significant character element and is also so illuminated, at certain periods, as to produce a radially symmetrical pattern.

7. A method such as is defined in claim 5, in which an entertainment character element is rotated simultaneously with said significant character element and is also so illuminated, at certain periods, as to produce a radially symmetrical pattern; and in which the mentioned elements each function in turn for an illuminating effect and for a legible display of a significant character.

8. In an electro-mechanical system for producing advertising illusions; a character tube mounted for rotation; means for rotating the same at a rate unfavorable to the legibility thereof; a transformer comprising a primary and a secondary; means for connecting said secondary with said tube; and means for energizing said secondary at such intervals as to render said character legible at predetermined periods.

9. An electro-mechanical system of the general character defined in claim 8 in which, a plurality of character tubes being each provided with a separate transformer, each is energized, during one period, as a character tube and, during another period, as an entertainment tube.

10. In an advertising device, a significant character tube; means for rendering the same legible by periodic illumination; an entertainment tube in a common field of view with the significant character tube; means for simultaneous rotating and periodically illuminating said entertainment tube in a definite timed relation to the periods of illumination of the significant character tube.

11. An illuminated device comprising: a luminous element capable of substantially instantaneous illumination; means for rotating the same at such speed as to render the element substantially indistinguishable when not illuminated; and means for momentarily so illuminating the same, during such rotation, as to render the same distinguishable at a definite angular position with respect to the axis of rotation.

12. An advertising device comprising a plurality of Geissler tubes, means for revolving the tubes about a common axis in disc like path at such a rate that under continuous illumination the tubes are invisible, the tubes being arranged so that their paths overlap, means for energizing the tubes intermittently at different intervals, the intervals of energizing the tubes being so related to the speed of the tubes that the tubes form moving patterns of light.

13. An advertising device comprising a plurality of Geissler tubes, means for revolving the tubes about a common axis in a disc-like path at such a rate that under continuous illumination the tubes are indistinguishable, and means for energizing the tubes intermittently, the intervals of energizing the tubes being so related to the speed of rotation of the tubes that the tubes form moving patterns of light.

14. An advertising device comprising a plurality of Geissler tubes, means for revolving the tubes about a common axis in a disc-like path at such a rate that under continuous illumination the tubes are indistinguishable, the tubes being arranged so that their paths overlap, and means for energizing the tubes intermittently, the intervals of energizing the tubes being so related to the speed of the tubes that the tubes form moving patterns of light.

15. An advertising device comprising a plurality of Geissler tubes, means for revolving the tubes about a common axis in a disc-like path at such a rate that under continuous illumination the tubes are indistinguishable, and means for energizing the tubes intermittently at different intervals, the intervals of energizing the tubes being so related to the speed of the tubes that the tubes form moving patterns of light.

16. An advertising device comprising a disc, a plurality of Geissler tubes fixed to the disc so as to revolve with the disc, means for revolving the disc at such a high speed as to render the tubes indistinguishable under continuous illumination, and means for energizing the tubes during revolution so as to intermittently illuminate the gas of said tubes, said means illuminating the tubes at such frequency of intervals of illumination as compared with the rate of revolution of said disc as to produce a luminous pattern effect having no apparent similarity to the shape of the tubes or path of rotation of the tubes.

17. An advertising device comprising a disc, a plurality of Geissler tubes fixed to the disc so as to revolve with the disc, means for revolving the disc at such a high speed as to render the tubes indistinguishable under continuous illumination, means for energizing the tubes during revolution so as to intermittently illuminate the gas of said tubes, said means illuminating the tubes at such frequency of intervals of illumination as compared with the rate of revolution of said disc as to produce a luminous pattern effect having no apparent similarity to the shape of the tubes or path of rotation of the tubes, and means for changing the intervals of illumination while the disc is rotating to cause the apparent pattern formed by the revolving intermittently illuminated disc to be continuously changed.

18. A sign comprising a rotary supporting

member, luminescent tubes mounted on said supporting member, means for intermittently illuminating the tubes, means for rotating the supporting member at a relatively high speed, and means operating at a relatively low speed for controlling the means for intermittently illuminating the tubes during the rotation of the supporting member.

19. A sign comprising a supporting plate disposed to rotate in a vertical plane, luminescent tubes secured on one side of said plate fashioned to form characters, means for rotating the plate at relatively high speed, and means operating at a relatively low speed for controlling the illumination of the tubes and arranged to illuminate some of the characters once each revolution of the plate whereby the characters may give an impression of being stationary in readable position.

20. A sign comprising a rotatable display member, a plurality of neon tubes secured to the display face of said member and fashioned to form separate characters having distinctive spectral colors, means for illuminating the tubes, means for rotating the display member, to cause the characters to intermingle and produce a composite illuminated design and means for intermittently flashing certain of the tubes to render the display of the characters legible at predetermined intervals.

In witness whereof, I have hereunto affixed my signature.

NORMAN I. PROSSER.