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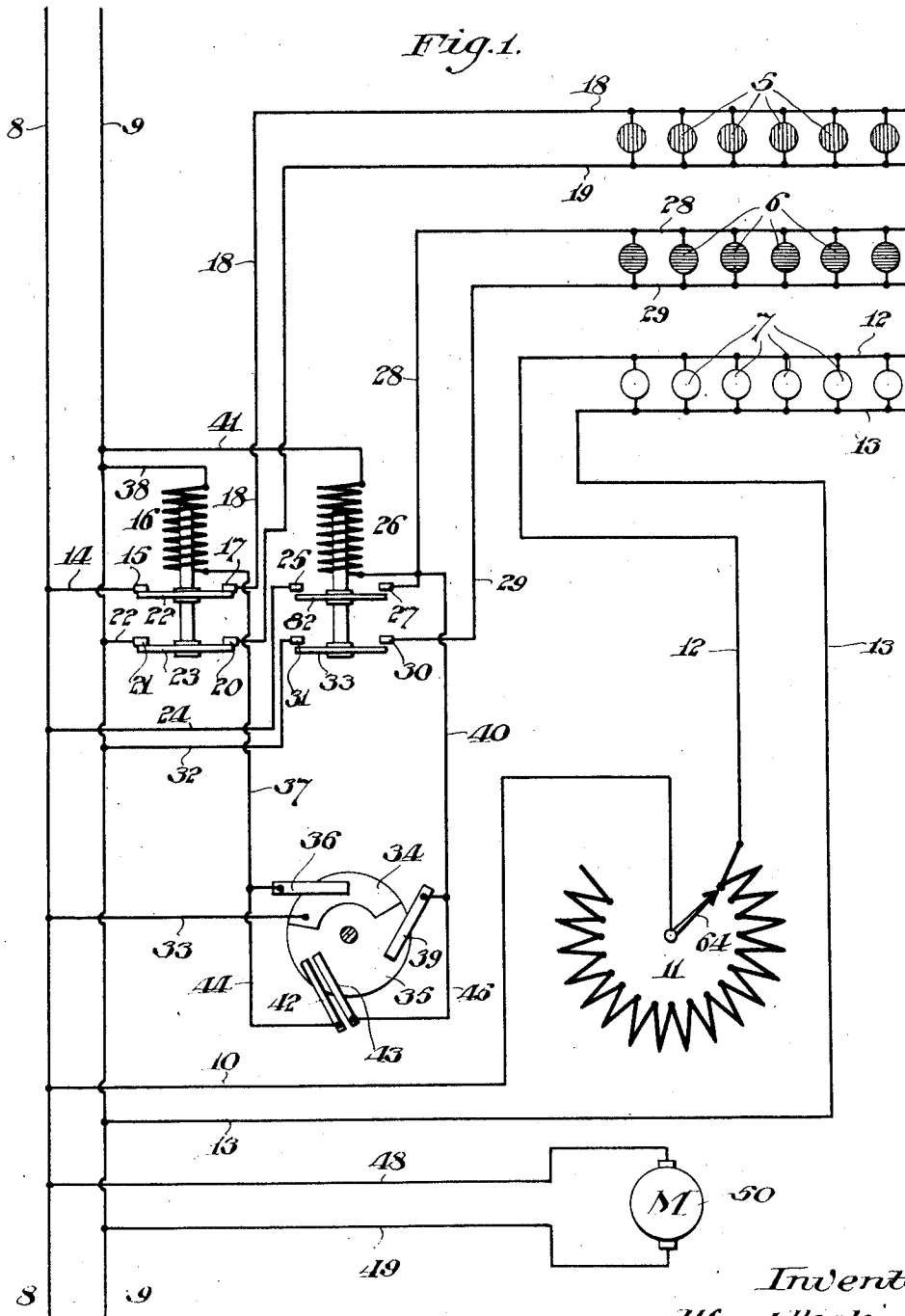
A. HOPKIN, JR

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METHOD OF AND APPARATUS FOR PRODUCING ILLUMINATION EFFECTS

Filed Feb. 27, 1929

2 Sheets-Sheet 1



Inventor.
Alfred Hopkin Jr.
By Jas. C. Hobbesmith
Attorney

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A. HOPKIN, JR

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2 Sheets-Sheet 2

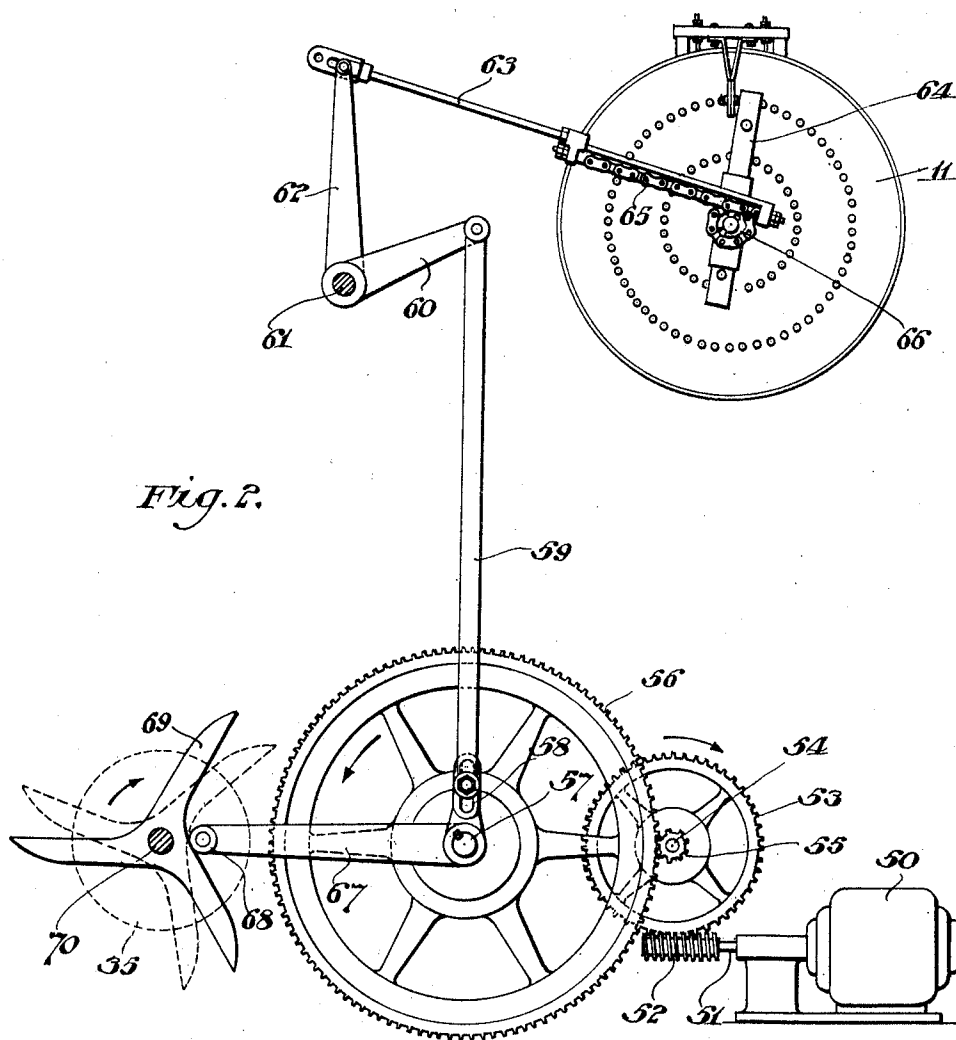


Fig. 2.

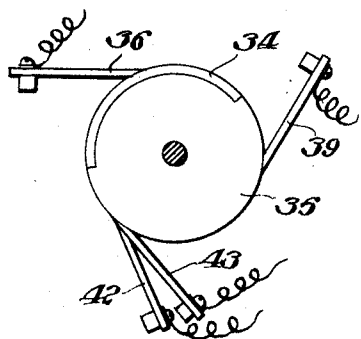


Fig. 3.

Inventor:
Alfred Hopkin Jr.,
By Jas. C. Hobuswith
Attorney.

UNITED STATES PATENT OFFICE

ALFRED HOPKIN, JR., OF PHILADELPHIA, PENNSYLVANIA

METHOD OF AND APPARATUS FOR PRODUCING ILLUMINATION EFFECTS

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My invention relates to a method of and apparatus for producing illumination effects, which are particularly adaptable for the spectacular illumination of buildings and similar structures.

The principal object of my invention is to provide a method of and apparatus for producing illumination effects of a novel and pleasing character, which are particularly adapted for the illumination of buildings and the like.

With the foregoing object in view, my invention contemplates the provision of a novel method and apparatus, whereby flood lighting of wall surfaces and the like may be accomplished with various gradations in color, or from one color to another, in such manner that the effect will be exceedingly pleasing to the beholder.

I have discovered that, where colored lights are used for spectacular illuminating purposes, pleasing variations in the color effects may be obtained by gradually causing white light to be projected upon the same surface as that upon which the colored light is projected, so that when the white light is sufficiently brilliant, the colored light will be imperceptible to the beholder; and further, that under a flood of brilliant white light the colored lights may be changed from one to another without the change being perceptible, and without necessarily dimming the colored light.

The nature and characteristic features of my invention will be more readily understood from the following description, taken in connection with the accompanying drawings forming part hereof, in which:

Figure 1 is a diagrammatic view illustrating a preferred arrangement of circuits, with means for controlling the same, embodying the main features of my present invention;

Fig. 2 is an elevational view, to a certain extent diagrammatic, illustrating a preferred form of mechanism for controlling the circuits illustrated in Fig. 1; and

Fig. 3 is a similar view of a portion of the switching device used in the apparatus.

Referring to the drawings, the invention is there shown in a typical embodiment as ap-

plied to two colored electric light circuits and one white electric light circuit, and also as applied to a two-wire system, but it will, of course, be understood that the invention is equally applicable to other arrangements—for example, wherein a greater number of lighting circuits are employed, where a greater variety of color effects is desired—and also to other systems of current supply where occasion requires.

Throughout the specification and in the claims, reference is frequently made to "white light". It should be understood that by such designation is meant light in which white predominates, and that various tints may be included in the white light without departing from the spirit of the invention. It should also be understood that, where specific colors are herein referred to, other colors may be substituted therefor, as desired for particular installations.

Referring now more particularly to Fig. 1 of the drawings, 5 represents a series of lamps adapted to project red light, it being of course understood that the lamp bulbs may be colored red if desired, or, preferably, color screens may be placed in front of said lamps. There is also provided a similar series of lamps 6 adapted to project blue light, and a series of lamps 7 adapted to project white light.

The current is supplied by main power leads 8 and 9. A wire 10 extends from the power lead 8 to one of the terminals of a rheostat 11, preferably of the type known in the trade as a "dimmer". A wire 12 extends from the other terminal of the rheostat 11 to one side of the series of white lamps 7. Another wire 13 extends from the other power lead 9 to the other side of the series of white lamps 7.

A wire 14 extends from the power lead 8 to a terminal 15 of a remote control switch 16. Another terminal 17 of the remote control switch 16 is connected by wire 18 to one side of the series of red lamps 5. The other side of the series of red lamps 5 is connected by wire 19 to another terminal 20 of the remote control switch 16. Another terminal 21 of

the remote control switch 16 is connected by wire 22 to the power lead 9.

When the coil of the remote control switch 16 is energized, the contact bar 22 thereof bridges the terminals 15 and 17, and the contact bar 23 bridges the terminals 20 and 21, thereby establishing a circuit through the red lamps.

A wire 24 extends from the power lead 8 to a terminal 25 of a remote control switch 26. Another terminal 27 of the remote control switch 26 is connected by wire 28 to one side of the series of blue lamps 6. The other side of the series of blue lamps 6 is connected by wire 29 to another terminal 30 of the remote control switch 26. Another terminal 31 of the remote control switch 26 is connected by wire 32 to the power lead 9.

When the coil of the remote control switch 26 is energized, the contact bar 32 thereof bridges the terminals 25 and 27, and the contact bar 33 bridges the terminals 30 and 31, thereby establishing a circuit through the blue lamps.

A wire 33 extends from the power lead 8, and is electrically connected in any suitable manner to a sector member 34, carried by the rotor 35 of a suitable switching device. The rotor 35 is adapted to be rotated, as herein-after more fully set forth, with a step by step motion, in synchronism with the actuation of the contact arm of the rheostat 11.

A plurality of brushes are provided, which are adapted selectively and periodically to contact with the sector member 34 as the rotor 35 is actuated. One of these brushes 36 is connected by wire 37 to one end of the energizing coil of the remote control switch 16. The other end of the energizing coil of the remote control switch 16 is connected by wire 38 to the power lead 9.

Another of the brushes 39 is connected by wire 40 to one end of the energizing coil of the remote control switch 26, and the other end of the energizing coil of the remote control switch 26 is connected by wire 41 to the power lead 9.

In the arrangement shown, there are also provided a pair of brushes 42 and 43, which are adapted to contact simultaneously with the sector member 34. Brush 42 is connected by wire 44 to wire 37, and brush 43 is connected by wire 45 to wire 40.

This is also provided an electric motor 50, for actuating the mechanism for effecting the control of the several light circuits. This motor 50 is supplied with current by wires 48 and 49, extending from the power leads 8 and 9, respectively.

Referring now more particularly to Figs. 2 and 3 of the drawings, there is there shown, to a certain extent schematically, mechanism for effecting the control of the several light circuits. As there shown, the same includes an electric motor 50, the shaft 51 of which

carries a worm 52. The worm 52 meshes with and drives a worm wheel 53. The worm wheel 53 is mounted on a shaft 54, which also carries a pinion 55. The pinion 55 meshes with and drives a gear wheel 56.

The gear wheel 56 is mounted on a shaft 57, which also carries a crank arm 58, to the end of which one end of a connecting rod 59 is pivotally connected. The other end of the connecting rod 59 is pivotally connected to a lever arm 60. The lever arm 60 is mounted on a shaft 61, which also has mounted thereon a lever arm 62. The lever arm 62 is pivotally connected at its end to a connecting rod 63, which serves to actuate the contact arm 64 of the rheostat 11.

The preferred means of actuating the contact arm 64 comprises a chain 65, connected at its respective ends to portions of the structure of the connecting rod 63. The chain 65 extends around a stud 66, upon which the contact arm 64 is mounted, the arrangement being such that as the connecting rod 63 is reciprocated back and forth by means of the lever 62, the contact arm 64 of the rheostat 11 will be rotably reciprocated, so as progressively to throw the resistance in and out. The rheostat 11 may comprise a device of the type well known in the art, commonly designated as a "dimmer".

The shaft 57, upon which the crank arm 58 is mounted, also carries an arm 67, the end of which may carry a roller 68 which is adapted successively to engage the arms of a star wheel 69.

The star wheel 69 is mounted upon a shaft 70, which also carries the rotor 35 of the switching device, hereinbefore referred to in connection with the description of the circuits shown in Fig. 1 of the drawings, and, as also hereinbefore described, the rotor 35 carries a sector contacting member 34, which is electrically connected to one of the power leads, and against which the brushes 36, 39, and 42 and 43, are adapted selectively to impinge as the rotor is actuated.

The operation of the apparatus may now be described. Current being supplied to the power leads 8 and 9, and the motor 50 being thereby continuously operated, the shaft 57 will be continuously rotated, through the intermediary of the worm 52, worm wheel 53, pinion 55, and gear wheel 56.

As the shaft 57 is continuously rotated, the crank arm 58 will, through the connecting rod 59, lever arm 60, shaft 61, lever arm 62, and connecting rod 63, cause the contact arm of the rheostat or dimmer to be rotably and continuously reciprocated. As the rheostat is included in the white light circuit, in this manner the white lamps will be brought periodically from dullness to full brilliance, and vice versa.

As the shaft 57 is rotated, the roller 68 carried by the arm 67 will, at each revolution of

the shaft 57, encounter one of the arms of the star wheel 69, and thus cause the shaft 70 to be rotated for a portion of a revolution corresponding to the number of arms of the star wheel 69. In the present instance, the star wheel 69 being provided with three arms, the shaft 70 will be rotated one-third of a revolution during a certain portion of each revolution of the shaft 57.

As the rotor 35 of the switching device is mounted on the shaft 70, it will be seen that the contact sector member 34 will be successively brought under the brushes 36 and 39, and 42 and 43.

The sector member 34 is of such angular dimension that the same will simultaneously contact with the brushes 36 and 39; with the brush 39 and the brushes 42 and 43; and with the brushes 42 and 43 and the brush 36, so that at all times current will be flowing through one or both of the wires 37 and 40, thus minimizing arcing between the sector member and the brushes as the rotor 35 of the switching device is periodically actuated.

It should here be noted that the actuation of the switching device takes place at the time when the contact arm 64 of the rheostat or dimmer is in such position that the resistance is reduced to a minimum and full current is being supplied to the series of white lamps.

When the sector member 34 of the switching device is in such position that the brush 36 contacts therewith, current will be supplied from the power lead 8, through the wire 33, to the sector member 34, thence by brush 36 to wire 37, passing through the coil of the remote control switch 16, energizing the same, and passing by wire 38 to the other power lead 9.

When the coil of the remote control switch 16 is thus energized, the contact bar 22 of said switch will bridge the terminals 15 and 17, and contact bar 23 will bridge the terminals 20 and 21. When the terminals of the remote control switch 16 are thus bridged, the current will pass through wire 14 to terminal 15, thence through contact bar 22 to terminal 17, thence through wire 18 to the series of red lamps 5, thence passing through wire 19 to terminal 20, thence through contact bar 23 to terminal 21, and thence through wire 22 to power lead 9.

In like manner, when the sector member 34 is brought to such position that the brush 39 contacts therewith, the current will pass by wire 40 through the coil of the remote control switch 26, thence by wire 41 to the power lead 9. The coil of the remote control switch 26 being thus energized, the contact bar 82 will bridge the terminals 25 and 27, and the contact bar 33 will bridge the terminals 30 and 31.

When the terminals of the remote control switch 26 are thus bridged, the current will pass from power lead 8, through wire 24 to

terminal 25, thence through contact bar 82 to terminal 27, thence through wire 28 to the series of blue lights 6, thence by wire 29 to terminal 30, thence by contact bar 33 to terminal 31, and thence by wire 32 to the power lead 9.

When the sector member 34 is brought to such position that the brushes 42 and 43 will simultaneously contact therewith, the remote control switches 16 and 26 will be energized simultaneously, thereby closing the circuits in which both the red and the blue lamps are included.

It will, of course, be understood that the several series of lamps are so positioned as to project the light therefrom upon a wall or other surface to be illuminated, and the purpose of the arrangement will perhaps be better understood by a recital of the cycle of operations resulting from the specific arrangement shown in the drawings and hereinbefore described.

Starting with the arrangement in the condition as shown in Fig. 1 of the drawings, the series of white lights is in a condition of full illumination, the contact arm 64 of the rheostat being in such position that the resistance in the white lamp circuit is reduced to the minimum. At this stage, the roller 68 of the arm 67, which is carried by the shaft 57, is engaging the star wheel 69, advancing the same to cause the sector member 34 of the switching device to pass from the position where it is contacting with the brush 36, by means of which the red lamp circuit is controlled, to the brush 39, by means of which the blue lamp circuit is controlled.

It will be seen that the switching of the circuits for controlling the colored lamps occurs at the time when the white lamps are at their greatest brilliance, whereby the light from the colored lamps will not be perceptible to the beholder, and also the changing from one color to another will not be perceptible.

As the shaft 57 continues to rotate, the contact arm 64 of the rheostat or dimmer 11 will be actuated progressively to increase the resistance in the white lamp circuit, until the white lamps are brought to a condition of dimness. The color from the series of blue lamps 6 will then gradually become more apparent.

As the shaft 57 continues to rotate the contact arm 64 will again be brought to the position where the resistance in the white lamp circuit will be reduced to a minimum, and the white lamps will again attain their greatest brilliance, at which time the switching device will be rotated one step further, bringing the sector member 34 to a position where the brushes 42 and 43 will simultaneously contact therewith, thus causing the red and blue circuits to be established, so that when the contact arm 64 of the rheostat or

dimmer 11 is again brought to the position where the series of white lamps is dimmed, the color from both the red and blue lamps will be displayed.

5 The contact arm 64 of the rheostat 11 continuing to be actuated, the series of white lamps will again be brought to the condition of their greatest brilliance, at which time the rotor will again be actuated, bringing
10 the sector member 34 to the position where the contact is established with the brush 36, as shown in the drawings; and, after the red light has been displayed by the white being again dimmed, and the white lamps there-
15 after brought to brilliance, a cycle of operations will have been completed.

The operation is continuous, so that the effect is that of the building being illuminated by the white light, which gradually
20 changes to a red light, then back to white, then gradually changes to the blue light, then back to the white, then to a mixture of red and blue, then back to the white, then again to the red, and so on continuously.

25 The changes from the white light to a color, then to the white, and then to another color, occur gradually, and the switching of the colored lamp circuits is imperceptible, and the entire effect is beautiful and pleasing
30 to the beholder.

I claim:

1. The method of producing illumination effects which consists in providing a set of white lights and a set of colored lights; pe-
35 riodically and gradually causing the white lights to be brought from dimness to brilliance, and vice versa; the colored light being maintained at substantially uniform intensity but being gradually rendered imper-
40 ceptible by the white lights as the same are brought to a condition of brilliance and gradually predominating as the white lights are dimmed.

2. The method of producing illumination effects which consists in providing a set of white lights and a plurality of sets of colored
45 lights; periodically and gradually causing the white lights to be brought from dimness to brilliance and vice versa; and changing
50 from one colored light to another and when the white lights are in their condition of brilliance whereby the change of colored light will be imperceptible, the respective colored lights being maintained at substantially uni-
55 form intensity while on.

3. The method of producing illumination effects which consists in providing an electric circuit including a set of white lights and a
60 plurality of circuits each including a set of colored lights; periodically and gradually changing the resistance in the white light circuit whereby the white lights will be brought from a condition of dimness to one of bril-
65 liance and vice versa; switching current from one colored light circuit to another when the

white lights are in their condition of brilliance, and maintaining a current of the colored light circuits substantially uniform while on.

4. The method of producing illumination effects which consists in providing an electric circuit including a set of white lights and a plurality of circuits each including a set of colored lights; periodically and gradually
75 changing the resistance in the white light circuit whereby the white lights will be brought from a condition of dimness to one of brilliance and vice versa; switching current by remote control switches from one colored light circuit to another when the white lights
80 are in their condition of brilliance, and maintaining the current of the colored light circuits substantially uniform while on.

5. In apparatus for producing illumination effects, a set of white lamps, means for
85 causing said white lamps to be periodically brought from dimness to brilliance and vice versa, a plurality of sets of colored lamps, and means for extinguishing one set of colored lamps and fully lighting another set
90 of colored lamps when the white lamps are in their condition of brilliance.

6. In apparatus for producing illumination effects, a set of white lamps, an electric circuit in which said lamps are included,
95 means for periodically dimming said white lamps, a plurality of sets of colored lamps, electric circuits for supplying current thereto, a switching device for controlling the colored lamp circuits, and means for periodically
100 actuating said switching device in synchronism with the means for dimming the white lamps whereby full current will be switched from one colored lamp circuit to another when the white lamps are in a condition of
105 brilliance.

7. In apparatus for producing illumination effects, a set of white lamps, an electric circuit in which said lamps are included, a rheostat included in said white lamp circuit, a
110 plurality of sets of colored lamps, individual electric circuits for supplying current thereto, a switching device for controlling said colored lamp circuits, means for operating the rheostat whereby the white lights will
115 be periodically brought from dimness to brilliance and vice versa, and means for periodically actuating said switching device in synchronism with the operation of the rheostat whereby full current will be switched from
120 one colored lamp circuit to another when the white lamps are in a condition of brilliance.

8. In apparatus for producing illumination effects, a set of white lamps, an electric circuit in which said lamps are included, a
125 rheostat included in said white lamp circuit, a plurality of sets of colored lamps, individual electric circuits for supplying current thereto, a remote control switch included in each of the colored lamp circuits, primary
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circuits for controlling the remote control switches, a switching device connected to said primary circuits, means for operating the rheostat whereby the white lights will be
5 periodically brought from dimness to brilliance and vice versa, and means for periodically actuating said switching device in synchronism with the operation of the rheostat whereby current will be switched from one
10 colored lamp circuit to another when the white lamps are in a condition of brilliance.
In testimony whereof, I have hereunto signed my name.

ALFRED HOPKIN, JR.

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