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Davis, Jr.

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[54] **CHRISTMAS TREE LIGHTING CONTROL**

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Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 242,627, April 10, 1972, Pat. No. 3,748,488.

[52] **U.S. Cl.** **307/38,** 307/18

[51] **Int. Cl.** **H02j 1/00**

[58] **Field of Search** 307/38, 39, 41, 141, 141.4, 307/141.8, 132, 11, 18

[56] **References Cited**

UNITED STATES PATENTS

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Primary Examiner—Herman J. Hohauser

[57] **ABSTRACT**

A control for Christmas tree lighting wherein a plurality of varying light intensity effects are produced and in a predetermined sequential order throughout all the lighting strings of a tree to result in a twinkling or shimmering effect heretofore unobtainable with any form or combination of flasher apparatus.

6 Claims, 5 Drawing Figures

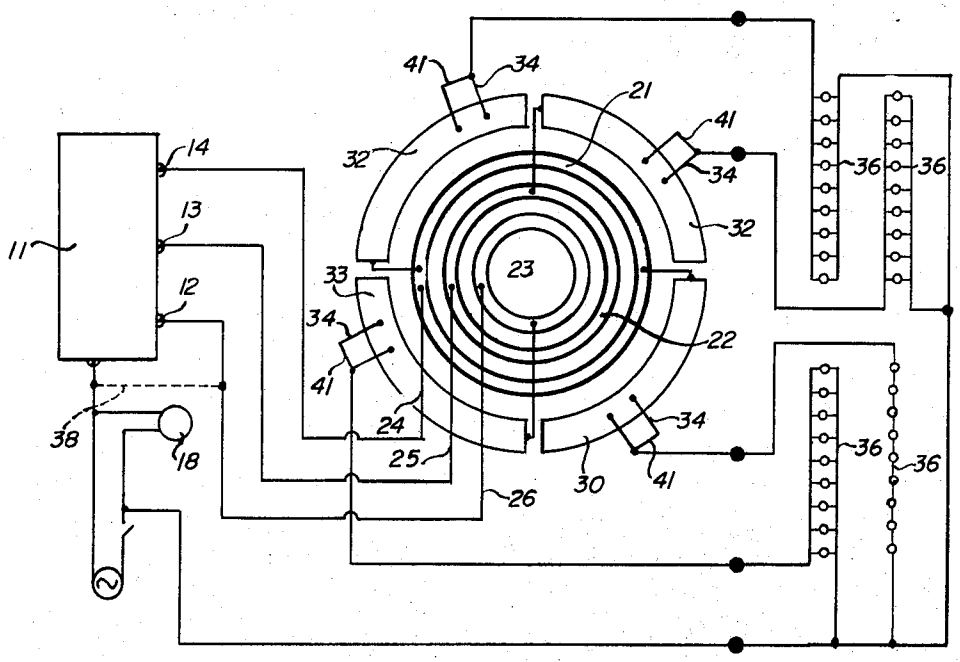


Fig. 1

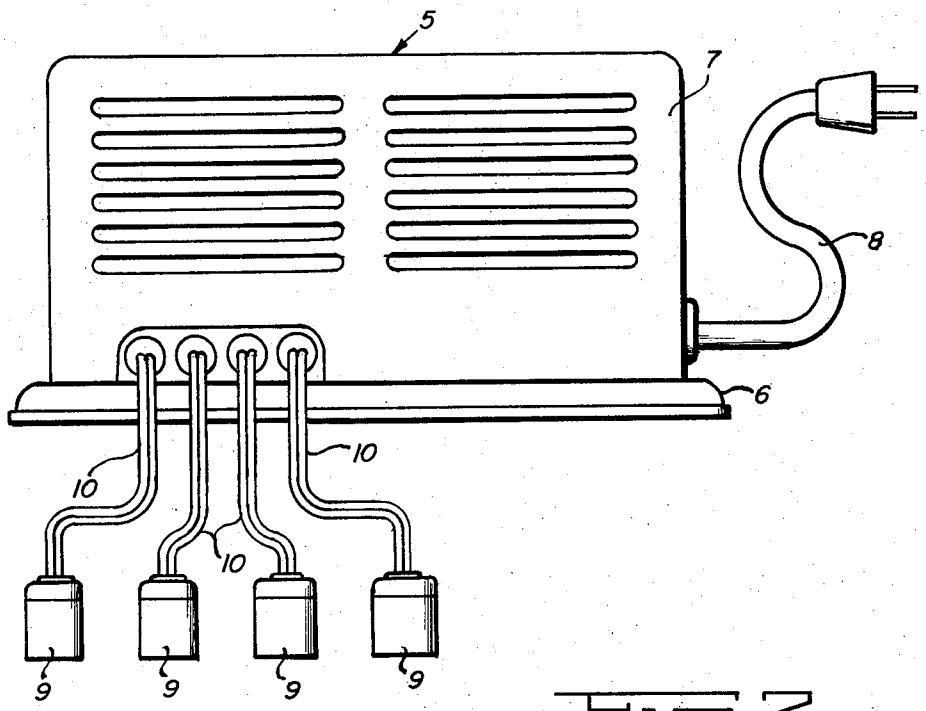


Fig. 2

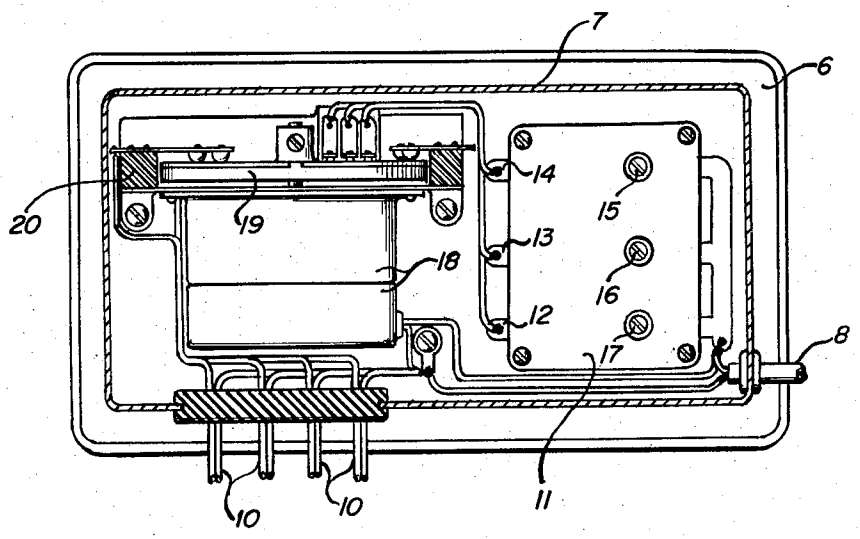
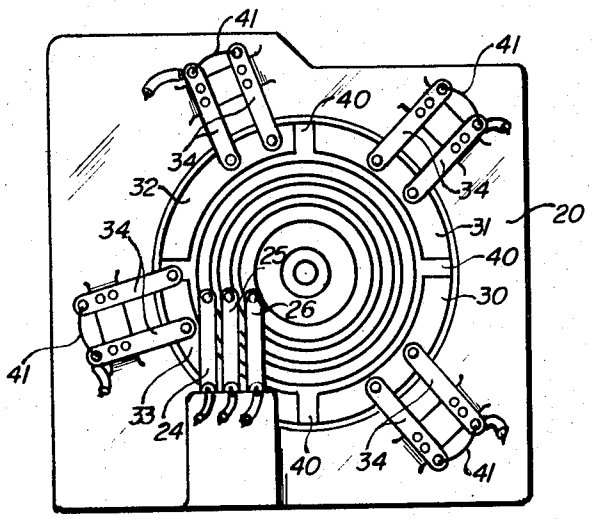


Fig. 4



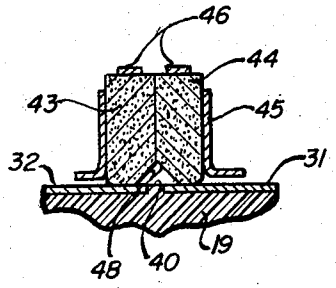


Fig. 5

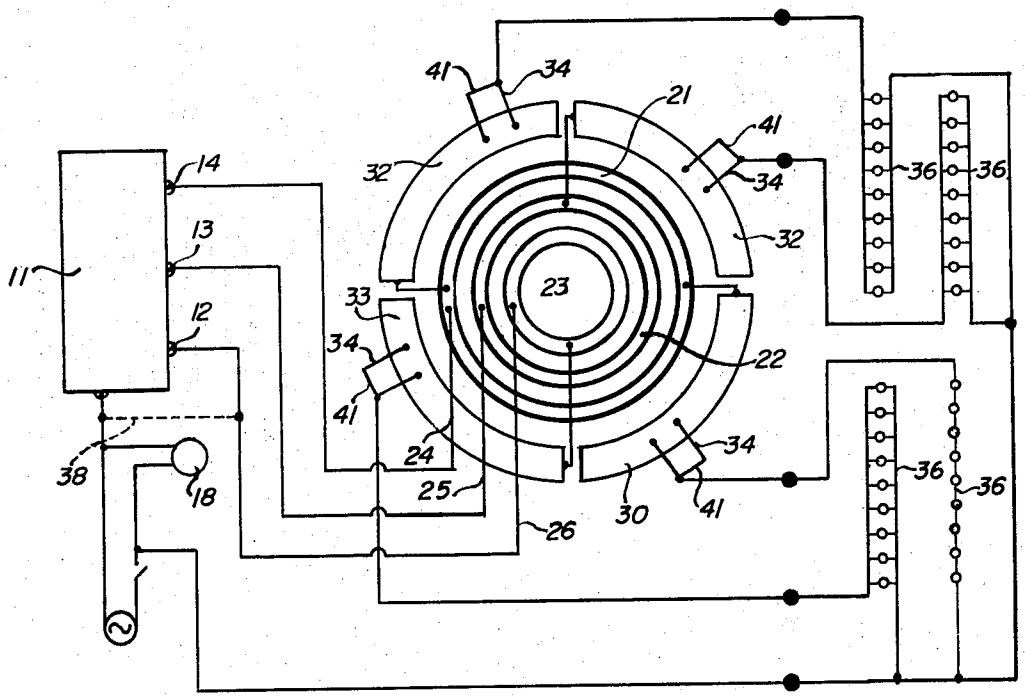


Fig. 3

CHRISTMAS TREE LIGHTING CONTROL

This application is a continuation in part of U.S. Pat. application Ser. No. 242,627 filed Apr. 10, 1972, now U.S. Pat. No. 3,748,488.

This invention relates generally to Christmas tree lighting and more particularly to a Christmas tree lighting control that, when in operation, produces a continuously changing lighting intensity throughout all the lighting strings of a tree and in a predetermined order to result in a twinkling or shimmering effect rather than the conventional method of making and breaking the circuit through the lamps to produce a flashing or by so reducing the voltage thereto as to produce a similar flashing result.

With the increasing desire of the public for movement or action in Christmas tree lighting, the use of string flashers or individual flasher bulbs has become widely accepted. While such devices do relieve the lifelessness of a lighted tree, the violent action of flashing lights can become quite annoying particularly when such flashing affects the entire string. This is generally the case even when not looking directly at the tree. The on and off of any light source within a room, such as the flashing of tree lights, can become quite distracting. This is particularly true when the flashing of two or more strings reach a condition of synchronization so as to flash simultaneously. Such a condition will invariably occur when any flasher apparatus operates individually whether in bulbs or strings.

It is an object of the present invention to provide a new and improved Christmas tree lighting control which, when in operation, produces a plurality of light intensity changes and as applied to all the lighting strings of a tree and in a predetermined sequence or order.

A further object is to provide a control for Christmas tree lighting wherein the circuits to the lighting strings are never interrupted to cause flashing, but produces a continual change in lighting intensity and in such a manner as to effect a twinkling or shimmering of the lights of the entire tree.

A still further object is to provide a Christmas tree lighting control that will effect a plurality of Christmas tree lighting strings simultaneously and in a manner to produce a coordination of lighting effects between the individual strings without materially varying the overall light intensity of the system.

A further object is to provide a light intensity control for Christmas tree lighting which will operate equally well with lights wired either parellel or in series and which, if desired, may be used in combination with the conventional individual flasher bulb.

In order that this invention may be more readily understood, reference is now made to the accompanying drawings wherein:

FIG. 1 is a view in elevation of the assembled device of the invention.

FIG. 2 is a plan view, partly cut-away of the invention as assembled beneath the cover.

FIG. 3 is an electrical schematic of the invention.

FIG. 4 is a plan view in elevation of the contact mounting plate and contact disk as used in the device.

FIG. 5 is a cross-sectional view of a variation of the contact assembly as embodying copper-carbon contacts members.

Referring now to the drawings, and more particularly to FIG. 1 thereof, wherein is shown the assembled device of the present invention and as will be generally designated 5 and to which may be connected strings of Christmas tree lights with the lights being either of the parallel or series wired types. The assembly 5 includes a mounting base 6 to which the perforated cover 7 is attached and wherein is enclosed the working mechanism of the device. The connector and power supply cord 8 provides means for electrically connecting the device to a conventional 110 volt a.c. power supply source.

Extending from the side of the cover in the manner shown, is a number of electrical outlets 9 and into which, when in use, strings of Christmas tree lights are plugged. The lead wires 10 to the various outlets may be of any length desired, preferably, sufficiently long as to extend well into the tree for easy access to the lighting strings while allowing the control to rest beneath the tree or possibly some distance away.

FIG. 2 shows the arrangement of the components of the device within the cover 7 and as herein shown cutaway. The component 11 as will here-and-after be referred to generally as the voltage supply, is comprised of two or more duty cycle units such as the commonly known silicon controlled rectifier variety or one of the disc and triac types. It is understood, however, that here any of the many similar such electronic duly cycling assemblies will suffice.

The duty cycle of the unit, as herein referred to, shall be understood to mean the ratio between the interval of the cycle that the unit is on or passing current to the "off" time of the cycle when no or relatively no current is passing. This "on" and "off" cycling occurs very rapidly varying into the order of milliseconds with the relative duration of these intervals being controlled by the design of the gate or triggering circuit to the SCR, triac or such similar electronic elements of the circuitry. The "conducting" interval of the cycle as it relates to the "off" interval, determines the relative heating and cooling time of the incandescent lamp filament and consequently the light intensity of the lighting source. Each output 12, 13 and 14 of the voltage supply 11 is designed or adjusted to have different fixed duty cycle, however, if so desired, the design may provide for this duty interval being selectively varied by rotation of an internal pot, as at points 15, 16 and 17, to result in selectively changing the different light outputs intensity sequences of the lighting strings and that occurs during each cycle of the control as will hereafter be more fully described.

Confined along with the voltage supply 11 within the cover 7 is a motor drive and gear reduction assembly 18 which in operation rotates an insulating disk 19 of the control within a contact mounting plate 20 as shown to advantage in FIG. 4. Rotation of the disk, upon which is mounted various contact surfaces, operates to route voltages from the voltage supply outputs 12, 13, and 14 to the various lighting strings connected therewith, by way of the control, and at a predetermined rate and sequence.

FIG. 3 is an electrical schematic diagram of the invention and showing more clearly the interrelationship of the various components thereof and how they combine to produce the novel Christmas tree lighting effect desired. The slip rings 21, 22 and 23 are here shown as being engaged by rubbing spring contact fingers 24, 25

and 26 respectively and thereby to convey to the rings voltage from the outputs of the solid-state voltage supply connected therewith. Contact segments 30, 31, 32 and 33, while isolated from each other, are electrically connected to the slip rings as shown and are engaged by contact pairs 34 mounted upon the contact ring 19. Each of these contact pairs 34 are respectively connected to an electrical outlet 9 and into which in use is plugged the various type light strings 36 which may be either those wired in parallel or series.

In the schematic, three duty cycle units are shown as comprising the voltage supply and having outputs 12, 13 and 14. However, it is understood that two such units will suffice with the line voltage passing to the slip ring 23 by making the connection 38 and eliminating the duty cycle unit represented by the output 12. While two units will suffice to produce the three distinct lighting effects desired, it is highly desirable that three units be used and in this manner the duty cycles of the entire voltage supply system may be lowered preportionally to reduce lamp heat to give a softer lighting effect and greatly prelong the life of the lamps.

In FIG. 4 is shown the staggered arrangement of the contact pairs 34 about the contact ring 20 and whereby is produced the intermittent light changes and in the random time sequence most desirable to observe. It will be noted that the spacing of the contact fingers 34 with respect to each other is such as to possitively bridge the insulation gap 40 between the contact segments. This arrangement, by reason that the contact pairs are electrically connected together at 41, assures a positive electrical connection between one contact and the advancing contact segment before connection is broken between the second contact and the trailing segment. This structure definately prevents any off or flickering of the lights of the strings as they go through their light intensity changes.

FIG. 5 shows a variation of the contact pairs, as shown in FIG. 4, and wherein a pair of copper-graphite contact members 43 and 44 are confined within a guide 45 and urged by spring members 46 into continuous bearing contact with the contact segments 31 and 32. Copper-graphite contacts are, for sliding contacts such as used herein, highly desirable because of requiring no lubrication of any kind and because of their good conductivity and cheapness. It will be noted that these contacts 31 and 32 have been notched out at 48 in a manner to span the insulation gap 40 between the contact segments. This structure assures a good connection between the contacts and contact segments should segment wear exceed that of the insulation to cause a resulting insulation hump that would lift a contact member from its connection with a contact segment as the segments move therebeneath. Such a condition would cause a most undesirable off or flickering of the lights effected by this poor connection. A see-saw contact assembly with the copper-graphite contacts cemented to the see-saw bar has here been found equally effective.

While the voltage supply of the device as here used shows 3 differing duty cycle outputs it is understood that 2 or 4 or more may also be used. It has been found that 3 distinct light intensity changes applied in a preestablished order to all the light strings of a tree produces a twinkling and shimmering of the lights that is soft and restful in appearance and totally impossible to be duplicated by any combination of individually operated flasher type mechanisms.

What I therefore claim and desire to cover by letters patent is:

1. A Christmas tree lighting control including in combination a solid-state voltage supply source having a plurality of differing duty cycle outputs, a plurality of electrical outlets respectively connected to one or more of said duty cycle outputs for connecting thereto one or more strings of Christmas tree lights, driving means, a circuit control electrically interposed between said duty cycle outputs and said outlets and operative when driven by said driving means to to intermittently route, and in a predetermined order, voltage from said outputs to differing said electrical outlets.

2. A Christmas tree lighting control as claimed in claim 1 wherein the duty cycle of each output of said voltage supply may be selectively varied.

3. A Christmas tree lighting control as claimed in claim 1 wherein the duty cycle of at least two of said voltage source outputs may be selectively varied.

4. A Christmas tree lighting control as claimed in claim 1 including a plurality of contact segments one or more of which are connected respectively to each of the output of said voltage supply, insulating means respectively separating said contact segments, contact means respectively connected to said electrical outlets and operative as the control is driven by said driving means to span the insulation separating said contact segments to respectively engage simultaneously at least two of said contact segments.

5. A Christmas tree lighting control including in combination a solid-state voltage supply having a plurality of differing duty cycle outputs, a plurality of electrical outlets continuously in circuit with said outputs for connecting thereto one or more strings of Christmas tree lights, driving means, a circuit control interposed between said outputs and said electrical outlets and operative when driven by said driving means to intermittently route, and in a predetermined order, voltage from said outputs to differing said electrical outlets, said control including a plurality of contact segments, means electrically connecting said contact segments with said voltage outputs, contact means respectively connected to said electrical outlets and electrically engaging one or more of said contact segments, said contact being operative upon relative movement between said contact means and said contact segments to pass voltage from said contact segments to said electrical outlets.

6. A Christmas tree lighting control including in combination a solid-state voltage supply source having a plurality of differing duty cycle outputs, a plurality of electrical outlets continuously in circuit with said voltage supply outputs for electrically connecting thereto one or more strings of Christmas tree lights, driving means, a circuit control interposed between said voltage supply and said electrical outlets and operative when driven by said driving means to intermittently route and in predetermined order voltage from said differing duty cycle outputs to differing said electrical outlets, said control including a plurality of contact segments electrically connected to said voltage supply source, pairs of contact members electrically engaging one or more of said contact segments and connected as pairs respectively to said electrical outlets for passing voltage from said contact segments to said outlets when relative movement between said contact segments and said contact pairs is effected by said driving means.

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