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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. 338,832, March 7, 1973, Pat. No. 3,808,450.

[52] **U.S. Cl.** ..... **307/132,** 315/185 S, 307/38

[51] **Int. Cl.** **H05b 37/00**

[58] **Field of Search** ..... 323/23, 24, 25; 315/185 S; 307/11, 38, 39, 41, 132, 133, 134

[56] **References Cited**

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Primary Examiner—Herman 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.

10 Claims, 6 Drawing Figures

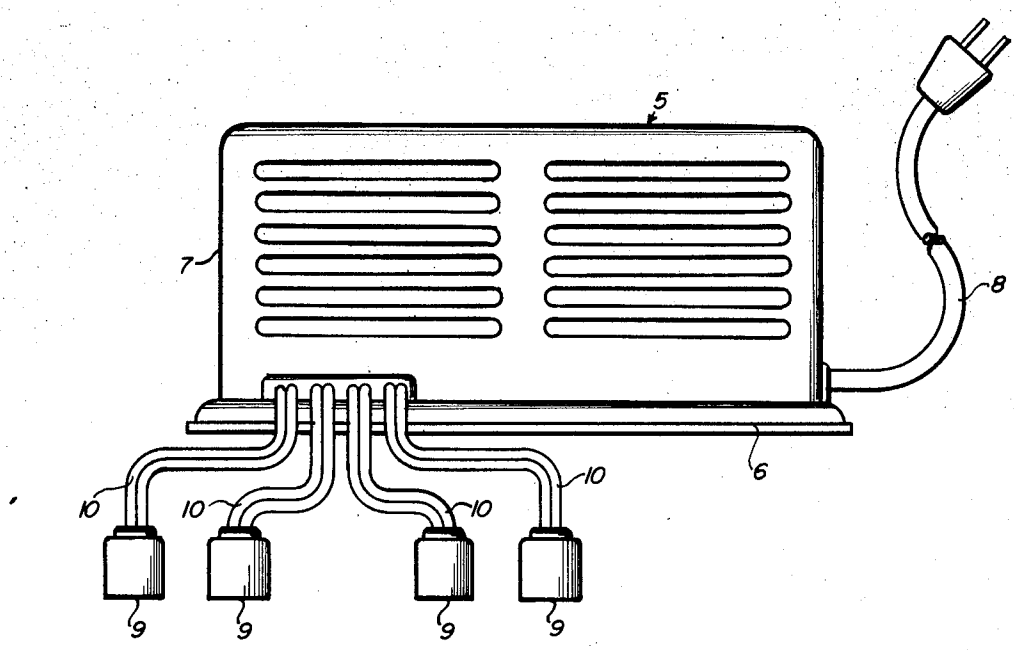


Fig. 1

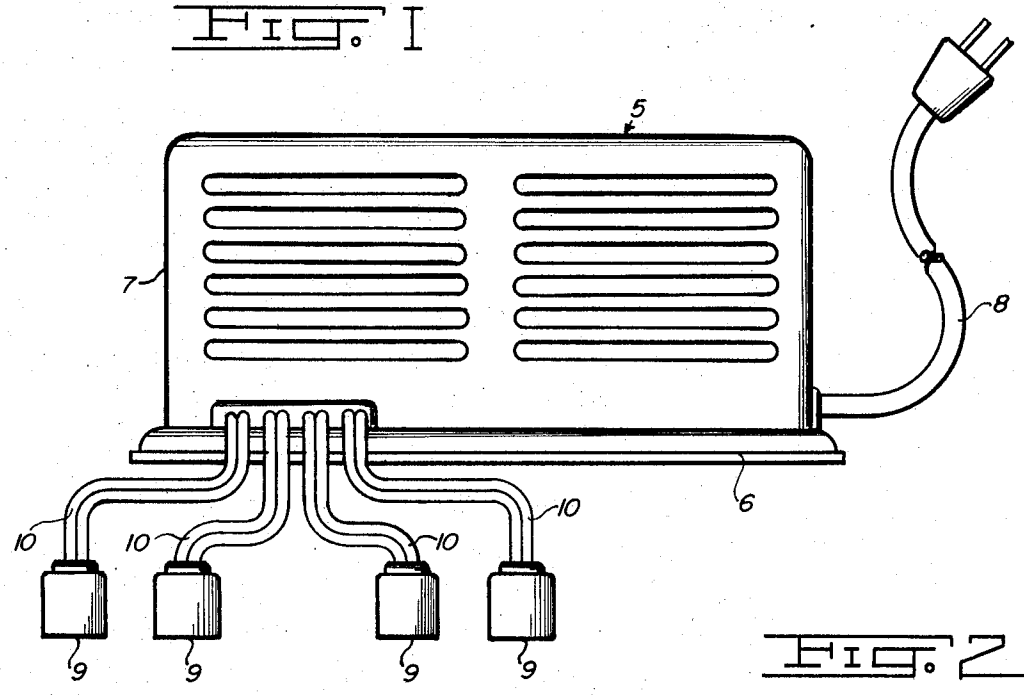

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Fig. 2

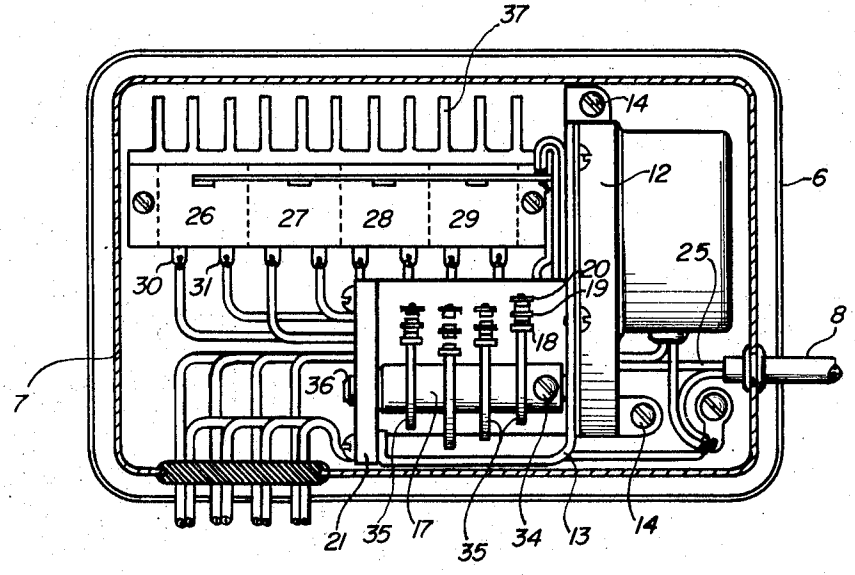

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Fig. 2

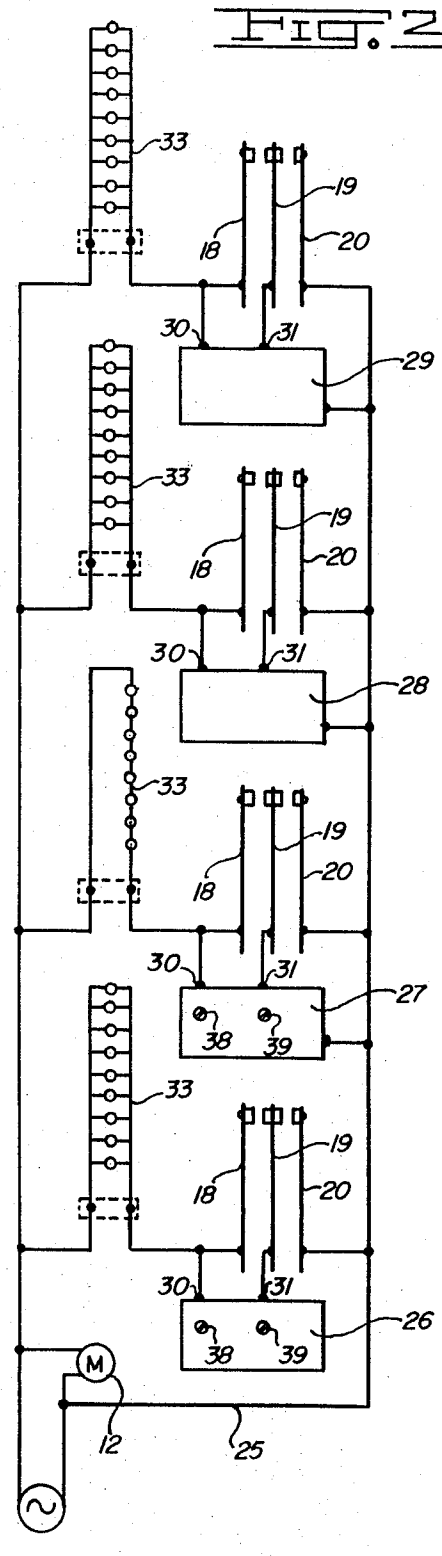


Fig. 4

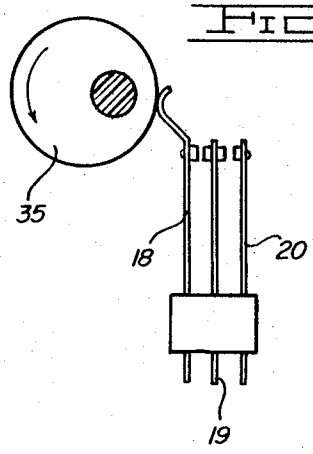


Fig. 5

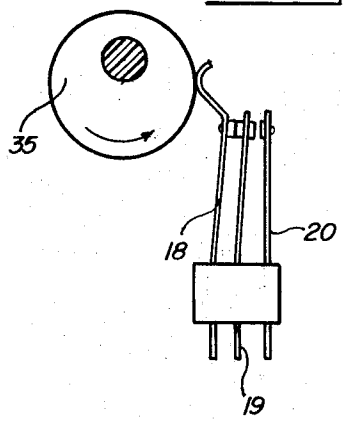
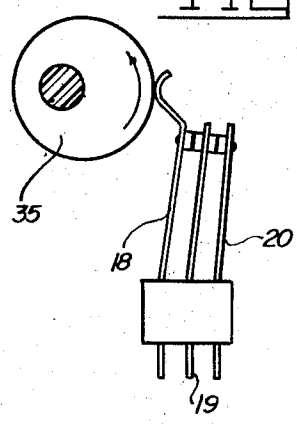


Fig. 6



CHRISTMAS TREE LIGHTING CONTROL

This is a continuation in part of application Ser. No. 338,832 filed Mar. 7, 1973, now U.S. Pat. No. 3,808,450.

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 public's increasing desire 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 in predetermined timed sequence.

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 parelled 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 schematic showing the position of the cam with all contacts in open position.

FIG. **5** is a plan view of the cam with two contacts of the control closed.

FIG. **6** is a plan view of the cam with all contacts of the control in closed position.

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 various components of the device within the cover **7** and which is here shown as cut-away. The motor and gear reduction drive **12,** is mounted to the bracket member **13** and secured to the base **6** as by screws **14.** Driven by the motor **12** is a cam member **17** the cams **35** of which may be of any configeration suitable for closing in predetermined sequence, contact members **18, 19,** and **20** to produce the lighting effect desired and which will hereafter be more fully described. Contact member **18, 19,** and **20** are preferably molded within the insulating block **21.**

The voltage source or power supply of the device includes, along with the line voltage input **25,** solid state units **26, 27, 28,** and **29** each having two differing duty-cycle outputs **30** and **31.** These units may be of any suitable duty-cycle type such as the commonly known SCR or diac and triac variety, however, certain transistor assemblies will suffice. The duty interval of the outputs **30** and **31** may, if desired, be slightly varied between differing units to provide for further light intensity changes throughout the lights of the tree for a more varied and pleasing effect.

From the electrical schematic of FIG. **3** it will be noted that the lowest duty-cycle output **30** is continuously in circuit with the lights of the strings **33** and also with the contact member **18.** This structure provides that at all times the light intensity output of the strings will never drop below that established by the duty-cycle of the output **30.** The contact member **19** is shown as electrically connected to the output **31** which has a duty interval greater than that of the output **30** and thereby as contact member **18** is forced by cam **35** into electrical engagement with the contact member **19,** as illustrated in FIG. **5,** the duty-cycle interval to the lamps is increased to result in a brightening of the lamps over their initial luminous state. As the contacts members **18** and **19** are further forced by the cam into electrical contact with the contact member **20,** as in FIG. **6,** line voltage from **25** is applied through the contacts to the strings to result in full lamp brightness. During this operation of shunting out the various duty-cycle outputs there is no flashing or flickering of the lamps of the string as would be the case were switching employed for connecting sequentially the various voltage inputs to the light strings. The order and rate at which these contacts members **18, 19,** and **20** are closed can be selectively established by the configura-

tion of the cams **35** and the motor speed. For example, contacts **18** and **19** may be made to close, say twice, to the final closing of all three contacts to produce a more staggered lighting effect. The interval of their closing time may be varied by the shapes of the cams as related to the motor speed.

The cam member **17**, as shown in FIG. **2**, is preferably a one piece molded unit secured to the motor shaft as by set-screw **34**. The back-geared motor drive **12** rotates the cams **35**, desirably, at a speed of between **3** to **4** regulations per minute depending upon the configeration of the cams. The cam member **17** includes a shaft extension **36** that rotates within the molded contact mounting block **21**. This arrangement provides a rigid structure for maintaining contact members **18, 19,** and **20** in proper working relation with the surfaces of the cams. A heatsink **37** is positioned against the duty-cycle members **26, 27, 28** and **29** as shown and against which internally the triacs of the unit are secured. The sink serves to dissipate the heat from the triacs during operation of the device. If desired, the now fixed duty-cycles of the units may be altered selectively by including an adjustable pot in the gaiting circuit, the adjusting shafts of the pots are shown at **38** and **39**. The pots should be of a resistance value, however, to prevent reducing the light intensity of the string by greater than 80 percent of full brightness.

The duty-cycle of the unit as herein referred to shall be understood to mean the ratio between the interval of the cycle the unit is "on" or passing current to the "off" time of the cycle when no current or relatively no current is passing. The "on" and "off" intervals occur very rapidly varying into the milliseconds with the relative duration of these conducting 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 incondescent lamp filament and consequently the light intensity output of the lighting source.

While one variation of the device is herein shown, it is understood that minor structural and circuit modification may be resorted to without departing from the inventive concept as herein disclosed.

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

1. A control for Christmas tree lighting including in combination a power supply having two or more differing duty-cycle outputs, an electrical outlet electrically connected to the lowest duty-cycle output of said power supply for connecting thereto one or more strings of Christmas tree lights, means movable for electrically connecting in common with the said lowest duty-cycle output the other outputs of said power supply in predetermined sequencial order.

2. A Christmas tree lighting control as claimed in claim **1** wherein the duty-cycle to said outputs may be selectively varied.

3. A Christmas tree lighting control as claimed in claim **1** wherein the duty-cycle of said lowest output will not reduce the light intensity output of said Christmas tree lighting string by greater than 80 percent from full brightness.

4. A Christmas tree lighting control as claimed in claim **1** wherein electrical circuit between said power supply and said outlet is never interrupted.

5. A Christmas tree lighting control as claimed in claim **1** wherein said means movable is in the form of a motor driven cam operable to intermittently close, in predetermined timed sequence, contact members respectively connected to the differing duty-cycle outputs of said power supply.

6. A control for Christmas tree lighting including in combination a power supply having two or more differing duty-cycle outputs, an electrical outlet electrically connected to the lowest duty-cycle output of said power supply for connecting therewith one or more strings of Christmas tree lights, means movable for intermittently connecting in common with the said lowest duty-cycle output the other outputs of said power supply.

7. A control for Christmas tree lighting as claimed in claim **6** wherein the said movable means is in the form of a motor driven cam operative to intermittently move together, into and out of common electrical engagement, spring contact members respectively connected to the differing duty-cycle outputs of said power supply.

8. A control as claimed in claim **7** wherein the said spring contact members are moved together in the order required to increase the duty-cycle to said outlet.

9. A control as claimed in claim **6** wherein the circuit between said power supply and said outlet is never interrupted.

10. A control as claimed in claim **6** wherein the light intensity to said lighting string is never deminished by said control by greater than 80% from full brightness.

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