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UNITED STATES DISTRICT COURT
CENTRAL DISTRICT OF CALIFORNIA

LUTRON ELECTRONICS CO., INC., A
~~PENNSYLVANIA CORPORATION~~
Plaintiff,

v.

PASS & SEYMOUR, INC.; AH
LIGHTING; BIG DEAL ELECTRIC
CORP.; AMERICAN TOP ELECTRIC
CORP.; WESTGATE MANUFACTURING
CO.; ELEMENTAL LED, LLC; and
DIODE LED,

Defendants.

Case No. SACM-748-JST
(MLG)
**COMPLAINT FOR PATENT
INFRINGEMENT**

Jury Trial Demanded

2011 MAY 16 AM 11:03
CLERK U.S. DISTRICT COURT
CENTRAL DIST. OF CALIF.
LOS ANGELES

FILED

1 Lutron Electronics Co., Inc. ("Lutron"), by its undersigned counsel, alleges, on
2 knowledge as to its own conduct and on information and belief, as follows:

3 **PRELIMINARY STATEMENT**

4 1. This is a patent infringement action to recover damages, and obtain
5 injunctive and other equitable relief, as a result of patent infringement by Pass &
6 Seymour, Inc. ("P&S"), AH Lighting ("AH Lighting"), Big Deal Electric Corp. ("Big
7 Deal"); American Top Electric Corp. ("Top Electric"), Westgate Manufacturing Co.
8 ("Westgate"), Elemental LED, LLC ("Elemental"), and Diode LED (collectively
9 "Defendants") of Lutron's U.S. Patent No. 5,637,930 ("the '930 Patent"; a copy of which
10 is attached hereto as Exhibit A), and as a result of patent infringement by Westgate of
11 Lutron's U.S. Patent No. 5,248,919 ("the '919 Patent"; a copy of which is attached hereto
12 as Exhibit B).

13 **PARTIES**

14 2. Lutron is a Pennsylvania corporation with its principal place of business
15 located at 7200 Suter Road, Coopersburg, PA 18036.

16 3. P&S is a New York corporation with its principal place of business at 50
17 Boyd Avenue, Syracuse, NY 13209. P&S is a manufacturer of electrical and electronic
18 devices, including dimmer switches and related lighting control devices. In this District,
19 P&S has a warehouse and other facilities in Rancho Cucamonga, California. P&S
20 distributes and sells its products throughout the United States, including through several
21 distributors in this District.

22 4. AH Lighting is a private company with its primary place of business located
23 at 2442 Hunter Street, Los Angeles, CA 90021. AH Lighting distributes and sells its
24 products in this District.

25 5. Big Deal is a California corporation with its primary place of business
26 located at 1202 East Walnut Street, Suite G, Santa Ana, CA 92701. Big Deal distributes
27 and sells its products in this District.
28

6. Top Electric is a California corporation with its primary place of business located at 1202 East Walnut Street, Suite H, Santa Ana, CA 92701. Top Electric distributes and sells its products in this District.

7. Westgate is a California corporation with its primary place of business located at 4500 South Boyle Avenue, Vernon, CA 90058. Westgate distributes and sells its products in this District.

8. Elemental is a Nevada limited liability company with its primary place of business located at 1195 Park Avenue, Suite 211, Emeryville, CA 94608. Elemental distributes and sells its products in the State of California.

9. Diode LED maintains its primary place of business at 1195 Park Avenue, Suite 211, Emeryville, CA 94608 — the same address as Defendant Elemental. Diode LED distributes and sells its products in the State of California.

JURISDICTION AND VENUE

10. This action for patent infringement arises under the laws of the United States, 35 U.S.C. §§ 101 *et seq.* This Court has original subject matter jurisdiction over Lutron's claims for relief under 28 U.S.C. §§ 1331 and 1338(a).

11. This Court has personal jurisdiction over Defendants because each Defendant is present within or has minimum contacts with the State of California and/or the Central District of California, has purposefully availed itself of the privileges of conducting business in the State of California, and each Defendant conducts business within the State of California and has substantial operations in this state.

12. Venue is proper in this Judicial District pursuant to the provisions of 28 U.S.C. §§ 1391 and 1400(b).

BACKGROUND

I. LUTRON COMPANY HISTORY

13. Established in 1961, Lutron is the lighting control industry pioneer, manufacturing and/or supplying more than 15,000 products to address the lighting control requirements of virtually any residential or commercial project. Lutron's success is the

1 result of its long history of innovation, beginning with its founder's successful
2 commercialization of the solid-state dimmer switch used to dim lamps (a generic term for
3 light bulbs of many varieties). After nearly fifty years, Lutron remains a leading
4 innovator and the world's industry leader in controlling natural and artificial light. Lutron
5 is also a leader in efforts to reduce electrical consumption. Lutron lighting controls have
6 reduced electrical use by an estimated 9.2 billion kWh, which equates to a collective
7 reduction in its customers' electric bills by approximately \$1 billion annually.

8 14. Lutron's history of innovation, quality, and success has been widely
9 recognized. For example, on April 29, 2010, notable products, objects, and papers from
10 Lutron's 50-year history were added to the Electricity Collection of the Smithsonian's
11 National Museum of American History, joining other notable artifacts such as Thomas
12 Edison's experimental light bulbs. Lutron's products are also utilized in some of the most
13 renowned locations in the world. For example, Lutron's lighting control systems are
14 utilized in such locations as the White House, the Guggenheim Museum, the Statue of
15 Liberty, the Metropolitan Museum of Art, the Bank of China headquarters, and Windsor
16 Castle.

17 15. Lutron introduced the world's first commercially viable solid-state electronic
18 lighting control device used to dim electric lamps. This device, often referred to as a
19 "dimmer switch," replaced bulky rheostats and autotransformers that were inefficient and
20 unattractive. Lutron remains a leading innovator and manufacturer of dimmer switches
21 and other lighting control devices worldwide.

22 16. An ideal dimmer switch incorporates both functions (switching and
23 dimming), taking into account the relative frequency with which each is used.
24 Historically, combining the switching and dimming functions in a single device suffered
25 from two problems: (a) not allowing the switching function to be performed without
26 disturbing the dimming function; and (b) failing to convey to the user the particular
27 function of each part of the product. Thus, there was a long-felt and unsupplied need in a
28 highly competitive field for a dimmer-switch combination in which the lamp intensity

1 setting established through the use of the dimming function would remain undisturbed
2 when the lamps were turned on or off, even when operated by a user previously
3 unfamiliar with the control.

4 17. Lutron engineers solved this problem. Lutron's invention was a product
5 arrangement that provides for, among other things, the switching control to be sized and
6 arranged relative to the dimming control so that the switching function is emphasized over
7 the dimming function from the perspective of the user. This invention led to the issuance
8 of the '930 Patent.

9 18. By the early 1990's, some dimmer switches were being controlled by
10 microprocessor-based circuits. Sophisticated versions of these dimmer switches included
11 circuitry to store previously-set light levels, and some could even implement a fade
12 function, referring to the manner in which the lamp transitions from one light level to
13 another.

14 19. While these types of dimmer switches had the potential for greater
15 functionality, they also demonstrated the potential to be confusing for the user. For
16 example, one tap of a button might cause the lamp to begin fading, but then, if the button
17 were tapped again because the user did not realize the fade had begun, the lamp might
18 suddenly jump to full on.

19 20. There was therefore a need to harness the power of a digital dimmer switch
20 and to develop a user-friendly dimmer switch with sophisticated fade capability. Lutron's
21 solution was a dimmer switch with multiple-fade-rate capability. This capability is
22 particularly useful, for example, in situations where it is desirable to allow a longer period
23 of time from the tap of an on-off button to the lamp turning fully off. This invention led
24 to the issuance of the '919 Patent.

25 **II. LUTRON'S U.S. PATENT NOS. 5,637,930 AND 5,248,919**

26 21. U.S. Patent No. 5,637,930 entitled "Wall-Mountable Switch and Dimmer"
27 was duly and legally issued by the United States Patent and Trademark Office on June 10,
28 1997. Michael J. Rowen, Joel S. Spira, Michael J. D'Aleo, Darryl W. Tucker, Russell J.

Jacobs, and James R. Graybill are the named inventors on the '930 Patent. Lutron is the sole and exclusive assignee and owner of all right, title, and interest to the '930 Patent.

22. The '930 patent was reexamined by the USPTO in light of a long list of prior art references submitted by then-accused-infringer Cooper Wiring Devices, Inc., as well as by Lutron itself. The two requests for Reexamination (No. 90/006,594 filed on April 8, 2003 and No. 90/007,153, filed on August 3, 2004) were subsequently merged. The Ex Parte Reexamination Certificate, in which 132 claims were affirmed as patentable as amended, issued on September 12, 2006.

23. Lutron's Diva® dimmer switch, which incorporates the invention of the '930 Patent, is depicted in Figure 1 below, which shows the large rectangle in the middle of the device (a paddle switch to the turn the light on and off), and the much thinner and shorter white rectangle on the right side of the device (a dimming slider that controls the intensity of the lamp):

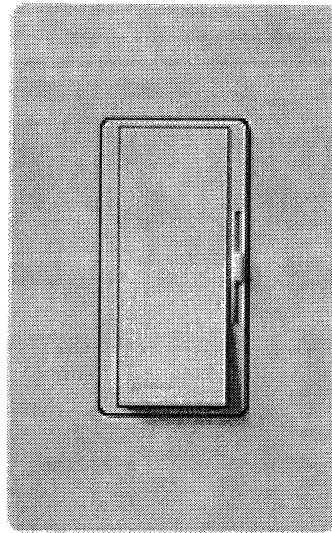


Figure 1: Lutron's Diva® (viewed as installed).

24. U.S. Patent No. 5,248,919 entitled "Lighting Control Device" was duly and legally issued by the United States Patent and Trademark Office on September 28, 1993. Robert S. Hanna, Donald F. Hausman, Jr., David E. Houggy, Jr., Donald R. Mosebrook, and Joel S. Spira are the named inventors on '919 Patent. Lutron is the sole and exclusive

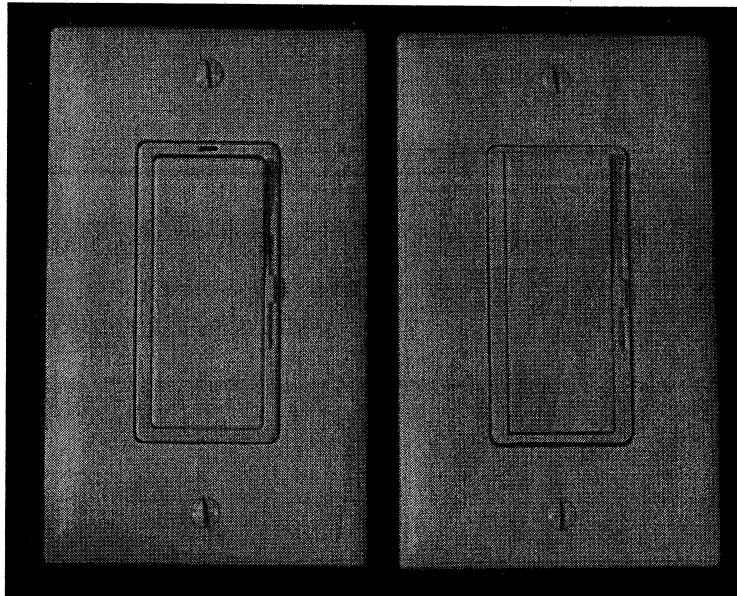
1 assignee and owner of all right, title, and interest to the '919 Patent.

2 **III. DEFENDANTS' INFRINGING PRODUCTS**

3 25. Lutron and Defendants compete in the sale of electrical and electronic
4 devices, particularly lighting control devices. Defendants each make, use, offer to sell,
5 and/or sell products that infringe Lutron's '930 Patent. Defendant Westgate also makes,
6 uses, offers to sell, and/or sells products that infringe Lutron's '919 Patent.

7 **A. P&S's Infringing Products**

8 26. P&S manufactures and sells dimmer switches that infringe the '930 Patent.
9 P&S sells these products under various brands, including, but not limited to, under the
10 brand name Harmony®. P&S' Harmony® dimmer switch is pictured next to Lutron's
11 Diva® dimmer switch in Figure 2, below.

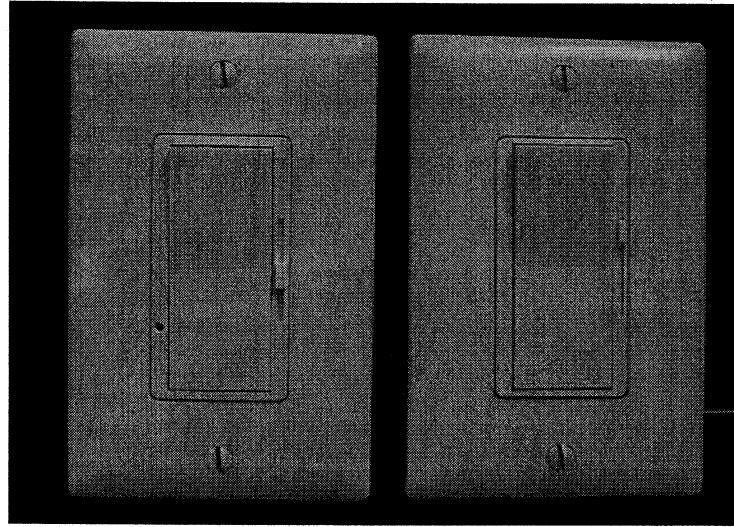


22 **Figure 2: Pass & Seymour's Harmony® (left) and Lutron's Diva® (right), viewed as installed.**

24 **B. AH Lighting's Infringing Products**

25 27. AH Lighting manufactures and/or sells dimmer switches that infringe the
26 '930 Patent. Upon information and belief, AH Lighting sells these products under various
27 names and models. An example of AH Lighting's infringing switches is depicted below
28

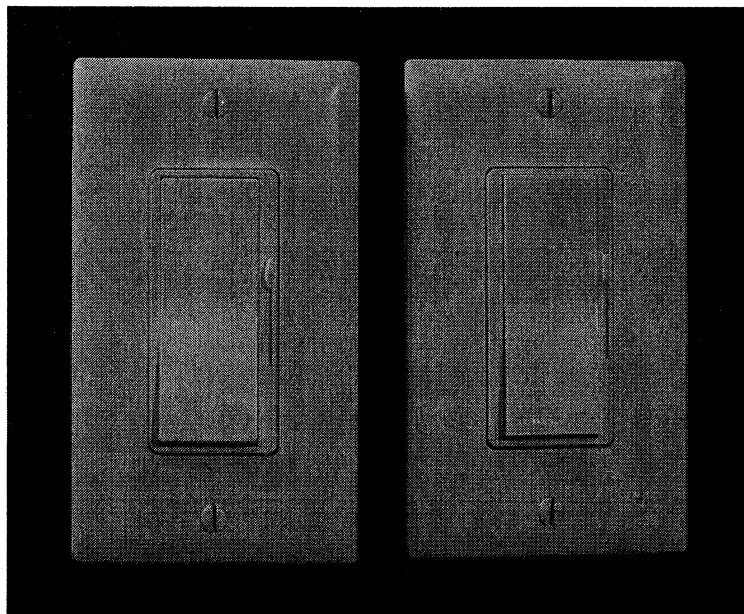
1 in Figure 3 next to Lutron's Diva[®] dimmer switch.



10
11 **Figure 3: AH Lighting's dimmer switch (left) and Lutron's Diva[®] (right), viewed as installed.**

12 **C. Top Electric's Infringing Products**

13 28. Top Electric manufactures and/or sells dimmer switches that infringe the
14 '930 Patent. Upon information and belief, Top Electric sells these products under various
15 names and models. An example of Top Electric's infringing switches is depicted below in
16 Figure 4 next to Lutron's Diva[®] dimmer switch.



27 **Figure 4: Top Electric's dimmer switch (left) and Lutron's Diva[®] (right), viewed as installed.**

D. Big Deal's Infringing Products

29. Big Deal manufactures and/or sells dimmer switches that infringe the '930 Patent. Upon information and belief, Big Deal sells these products under various names and models. Big Deal and Top Electric are both registered under the same address with the Secretary of State of California, filed for incorporation on the same day, and have consecutive entity numbers.

30. Upon information and belief, Big Deal's infringing dimmer switch is the same as Top Electric's as shown in Figure 4.

E. Westgate's Infringing Products

31. Westgate manufactures and/or sells dimmer switches that infringe the '930 Patent and '919 Patent. Upon information and belief, Westgate sells these products under various names and models. An example of Westgate's infringing dimmer switches is depicted below in Figure 5 next to Lutron's Maestro[®] dimmer switch. In Lutron's Maestro[®] dimmer switch, the large white rectangle in the middle of the device is a tap button switch used to turn the light on and off, and the much thinner and shorter segmented white rectangle on the right side of the device is a dimming rocker control to raise and lower the light intensity level of the lamp.

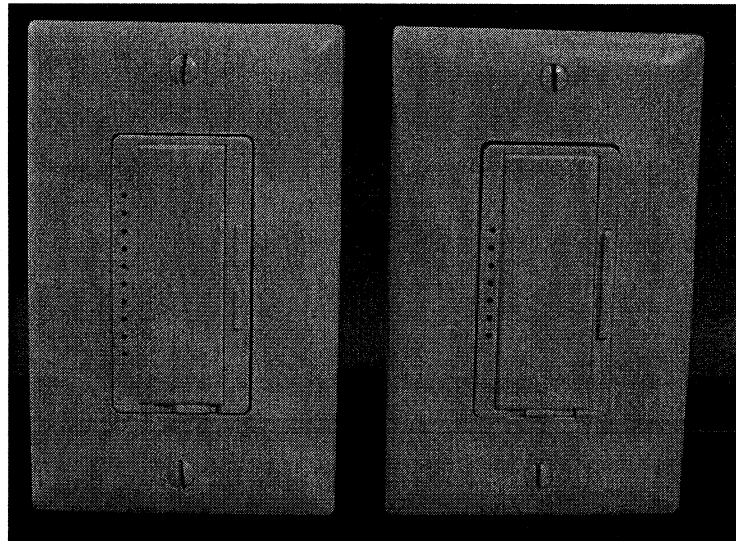


Figure 5: Westgate's dimmer switch (left) and Lutron's Maestro[®] Dimmer switch (right), viewed as installed.

F. Elemental's Infringing Products

32. Elemental manufactures and/or sells dimmer switches that infringe the '930 Patent. Upon information and belief, Elemental sells these products under various names and models. An example of Elemental's infringing dimmer switches is depicted below in Figure 6 next to Lutron's Diva[®] dimmer switch.

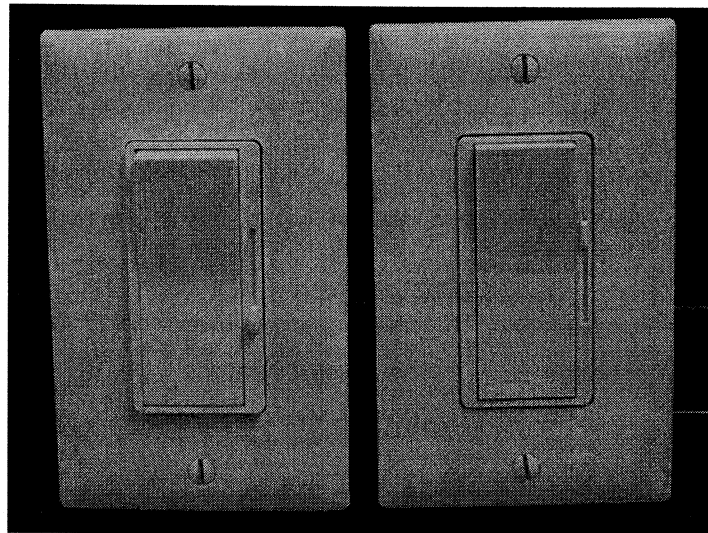


Figure 6: Elemental's dimmer switch (left) and Lutron's Diva[®] (right), viewed as installed.

G. Diode LED's Infringing Products

33. Diode LED manufactures and/or sells dimmer switches that infringe the '930 Patent. Upon information and belief, Diode LED sells these products under various names and models. Upon further information and belief, Diode LED and Elemental share a principal place of business and market and sell identical looking dimmer switches.

34. Upon information and belief, Diode LED's infringing dimmer switch is the same as Elemental's dimmer switch as shown in Figure 6.

FIRST CLAIM FOR RELIEF

(Infringement of the '930 Patent, all Defendants)

(35 U.S.C. § 271)

35. Lutron incorporates all foregoing paragraphs as if fully set forth herein.

36. Defendants have directly infringed, induced infringement, and/or

1 contributorily infringed the '930 Patent by making, using, offering for sale, selling, and/or
2 importing one or more of the infringing devices, or alternatively by actively inducing
3 others to use, offer for sale, and/or sell one or more of the infringing devices.

4 37. Defendants' acts of infringement of the '930 Patent have been and continue
5 to be deliberate and willful in reckless disregard for Lutron's patent rights. For example,
6 P&S was aware of the '930 Patent by no later than August 2008, when the PTO
7 referenced Lutron's '930 Patent as part of P&S's 7,416,310 patent.

8 38. Lutron has been damaged by Defendants' direct and indirect infringement of
9 the '930 patent in an amount that will be proved at trial.

10 39. Defendants' infringement of the '930 Patent has deprived Lutron of sales
11 which it otherwise would have made and has in other respects injured Lutron and will
12 cause Lutron added injury and loss of profits unless enjoined by this Court.

13 40. As a result of Defendants' direct and indirect infringement of the '930 Patent,
14 Lutron has also suffered and will continue to suffer irreparable injury for which there is no
15 adequate remedy at law. Such irreparable injury shall continue until Defendants' actions
16 are enjoined by this Court.

17 **SECOND CLAIM FOR RELIEF**

18 (Infringement of the '919 Patent, Westgate)

19 (35 U.S.C. § 271)

20 41. Lutron incorporates all foregoing paragraphs as if fully set forth herein.

21 42. Westgate has directly infringed, induced infringement, and/or contributorily
22 infringed the '919 Patent by making, using, offering for sale, selling, and/or importing one
23 or more of the infringing devices, or alternatively by actively inducing others to use, offer
24 for sale, and/or sell one or more of the infringing devices.

25 43. Westgate's acts of infringement of the '919 Patent have been and continue to
26 be deliberate and willful in reckless disregard for Lutron's patent rights.

27 44. Lutron has been damaged by Westgate's direct and indirect infringement of
28 the '919 patent in an amount that will be proved at trial.

45. Westgate's infringement of the '919 Patent has deprived Lutron of sales which it otherwise would have made and has in other respects injured Lutron and will cause Lutron added injury and loss of profits unless enjoined by this Court.

46. As a result of Westgate's direct and indirect infringement of the '919 Patent, Lutron has also suffered and will continue to suffer irreparable injury for which there is no adequate remedy at law. Such irreparable injury shall continue until Westgate's actions are enjoined by this Court.

JURY DEMAND

47. Lutron hereby requests a jury trial as to all issues in this action that are so triable.

PRAYER FOR RELIEF

WHEREFORE, Plaintiff Lutron respectfully requests judgment against each of the Defendants:

(a) Holding that Defendants have infringed (by direct infringement, inducement to infringe, and/or contributory infringement) U.S. Patent No. 5,637,930 and that Westgate has infringed (by direct infringement, inducement to infringe, and/or contributory infringement) U.S. Patent No. 5,248,919.

(b) Permanently enjoining Defendants and their agents, attorneys, successors, assigns, employees and any and all parties acting in concert or participation with any of them from directly or indirectly infringing in any manner the '930 Patent;

(c) Permanently enjoining Westgate and its agents, attorneys, successors, assigns, employees and any and all parties acting in concert or participation with any of them from directly or indirectly infringing in any manner the '919 Patent;

(c) Directing Defendants to destroy the entire stock of infringing products in their possession;

(d) Awarding compensation damages to Lutron for Defendants' infringement of the '930 Patent and for Westgate's infringement of the '919 Patent under 35 U.S.C. § 284, in an amount to be determined at trial;

1 (e) Holding that Defendants' conduct was willful and awarding Lutron treble
2 damages pursuant to 35 U.S.C § 284;

3 (f) Awarding Lutron their reasonable attorney fees and expenses against
4 Defendants pursuant to 35 U.S.C. § 285; and

5 (g) Any further relief that this Court deems just and proper.

6
7 Dated: May 16, 2011

Respectfully submitted,

8
9
10 By: 

11 Rick Richmond

Nick G. Saros

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16 *Attorneys for Plaintiff Lutron Electronics*
17 *Co., Inc.*

EXHIBIT A



US005637930A

United States Patent [19]

Rowen et al.

[11] Patent Number: **5,637,930**[45] Date of Patent: **Jun. 10, 1997**[54] **WALL-MOUNTABLE SWITCH & DIMMER**

[75] Inventors: **Michael J. Rowen**, Center Valley; **Joel S. Spira**, Coopersburg; **Michael J. D'Aleo**, Erwinna; **Darryl W. Tucker**, Royersford; **Russell J. Jacobs**, Center Valley; **James R. Graybill**, Allentown, all of Pa.

[73] Assignee: **Lutron Electronics Co., Inc.**, Coopersburg, Pa.

[21] Appl. No.: **386,850**

[22] Filed: **Feb. 10, 1995**

Related U.S. Application Data

[63] Continuation of Ser. No. 871,876, Apr. 21, 1992, abandoned, which is a continuation of Ser. No. 225,457, Jul. 28, 1988, abandoned.

[51] Int. Cl.⁶ **H01H 47/00**

[52] U.S. Cl. **307/112; 307/125**

[58] Field of Search **307/100-125; 323/903**

[56] **References Cited****U.S. PATENT DOCUMENTS**

3,225,265 12/1965 Krause et al. 317/138
3,746,923 7/1973 Spira et al. 315/291

3,971,028 7/1976 Funk 343/225
4,563,592 1/1986 Yuhasz et al. 307/115
4,567,375 1/1986 Jimerson et al. 307/98
4,764,717 8/1988 Tucker et al. 323/364
5,017,837 5/1991 Hanna et al. 315/136
5,146,153 9/1992 Luchaco et al. 323/324

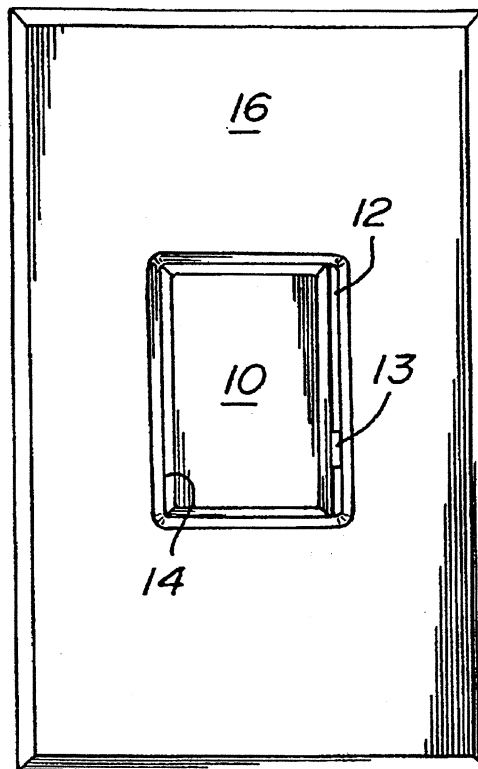
OTHER PUBLICATIONS

Home Automation Catalog, Jan. 1984, page 7.
Lutron Electronics Co. - Nets Brochure P/N 362-199.
Lutron Electronics Co. - D-600P Brochure P/N 362-009.
Lutron Electronics Co. - Skylark Brochure P/N 362-168.
Lutron Electronics Co. - Nova® Brochure P/N 360-110.
Extract from Matsushita Electric Works, Ltd. Brochure '89/4 (4th Qtr 1989).

Primary Examiner—Aditya Krishnan
Attorney, Agent, or Firm—Seidel Coonda Lavorgna & Monaco, PC

[57] **ABSTRACT**

A wall-mountable system for controlling electrical power to a load includes a switch and a dimmer, with the switch actuator being substantially larger than the dimmer actuator. Preferably, the switch is a short-throw, light-force switch and the dimmer is a linear slide dimmer. Another embodiment of the invention provides a wallbox-mountable, pushbutton-actuated electrical control device in which the pushbutton is resiliently supported on the device support.

221 Claims, 7 Drawing Sheets

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FIG. 1

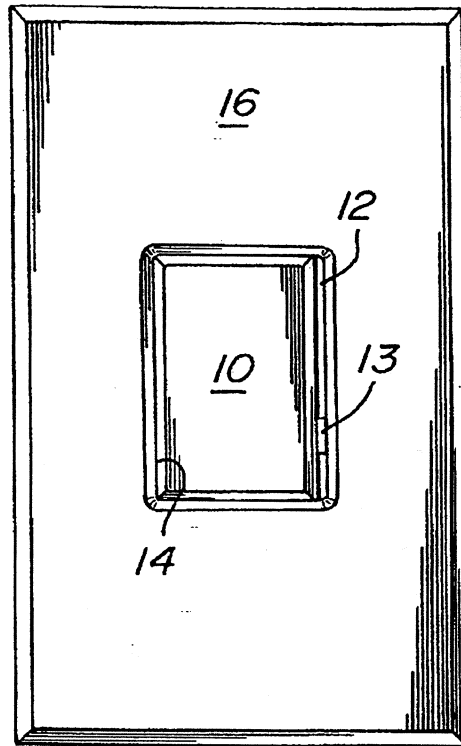
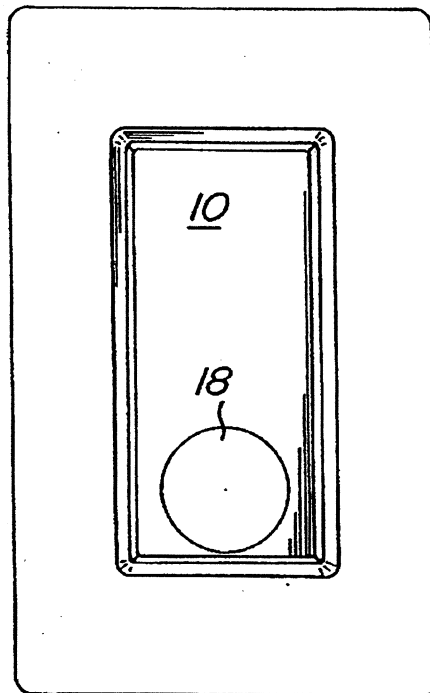


FIG. 2



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FIG. 2A

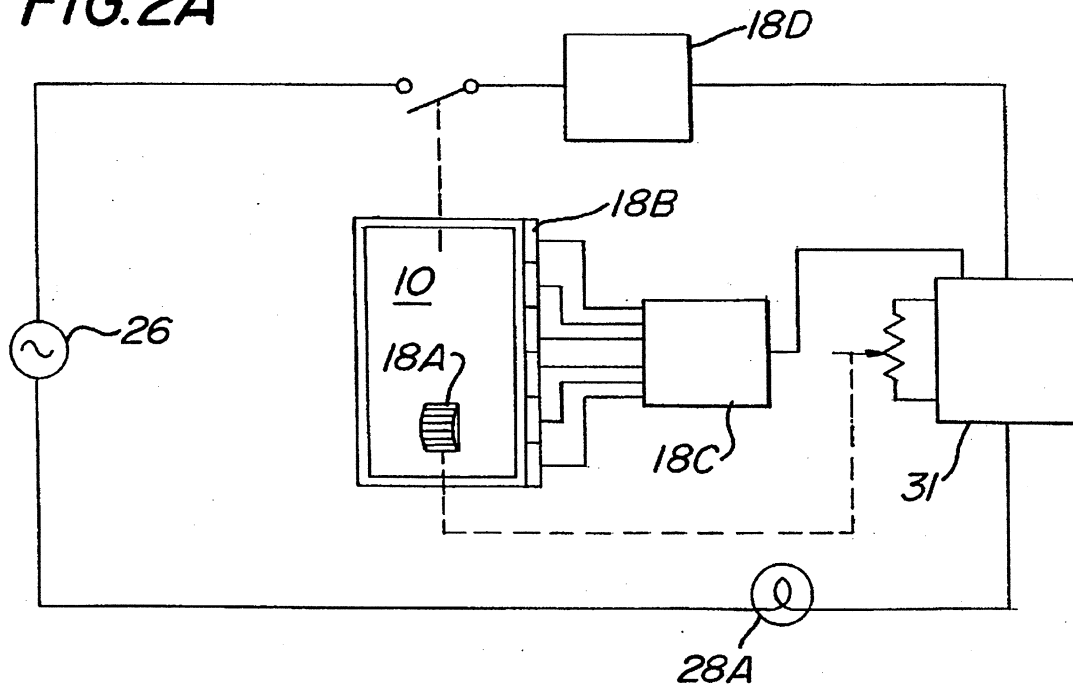
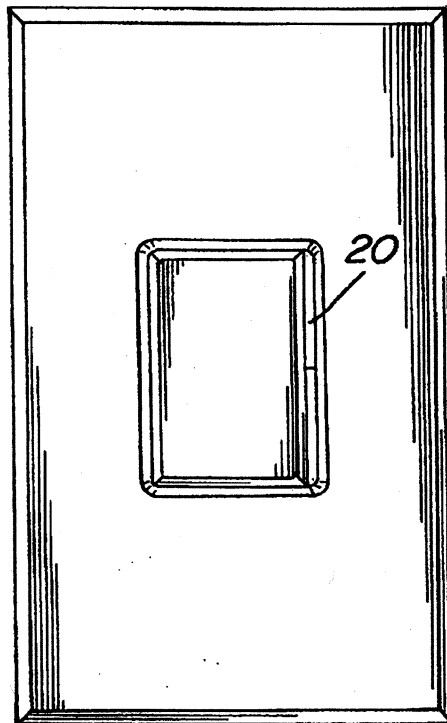


FIG. 3



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FIG. 3A

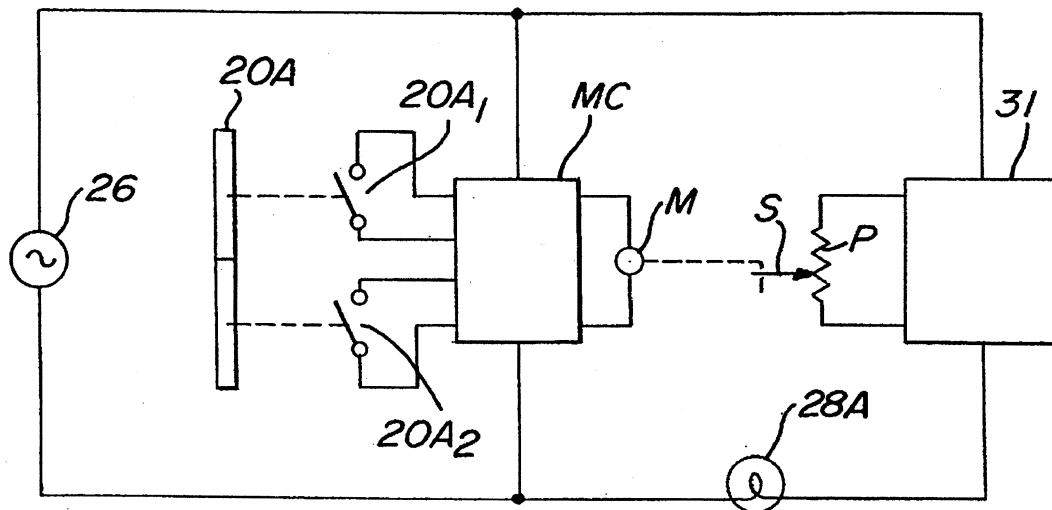
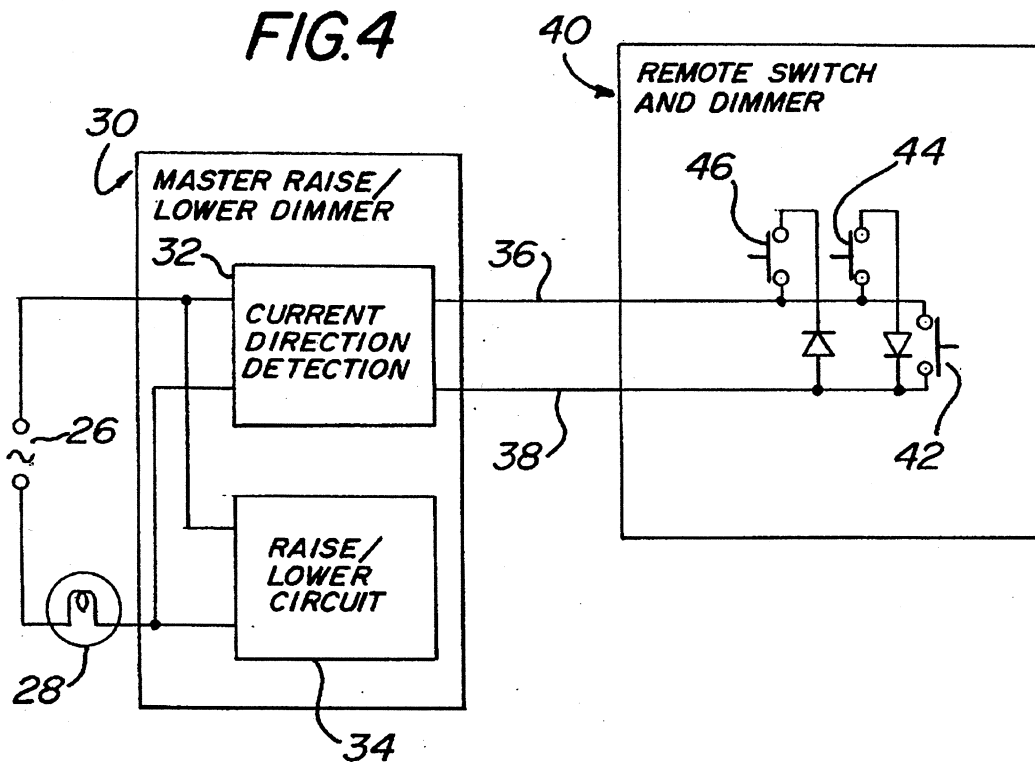


FIG. 4



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FIG.5

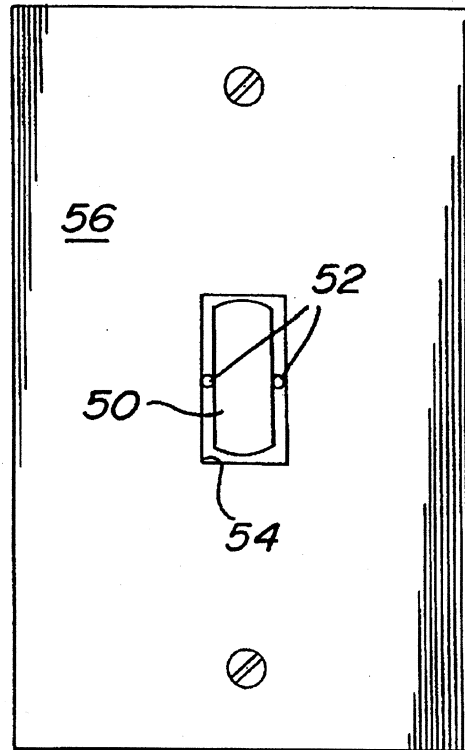
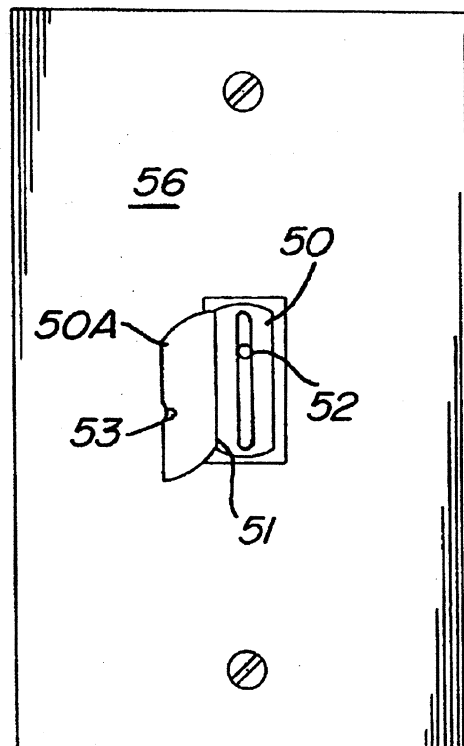


FIG.5A



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FIG. 6

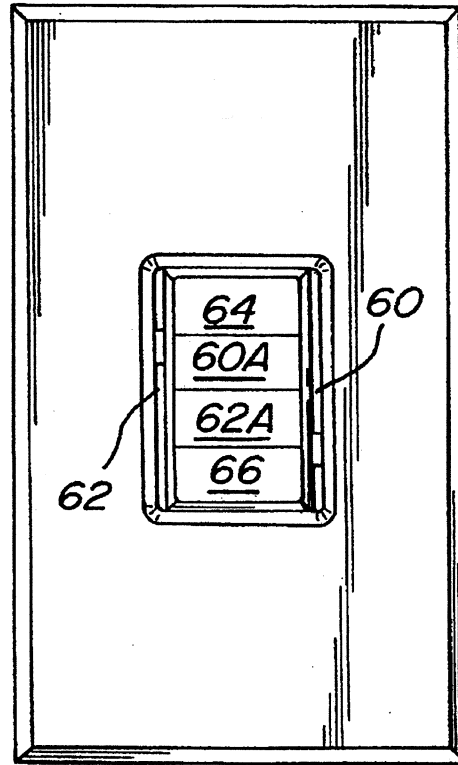
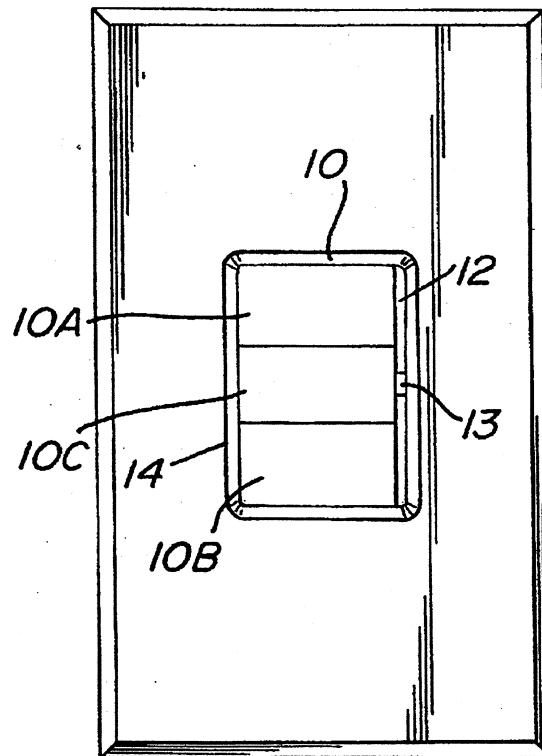


FIG. 9

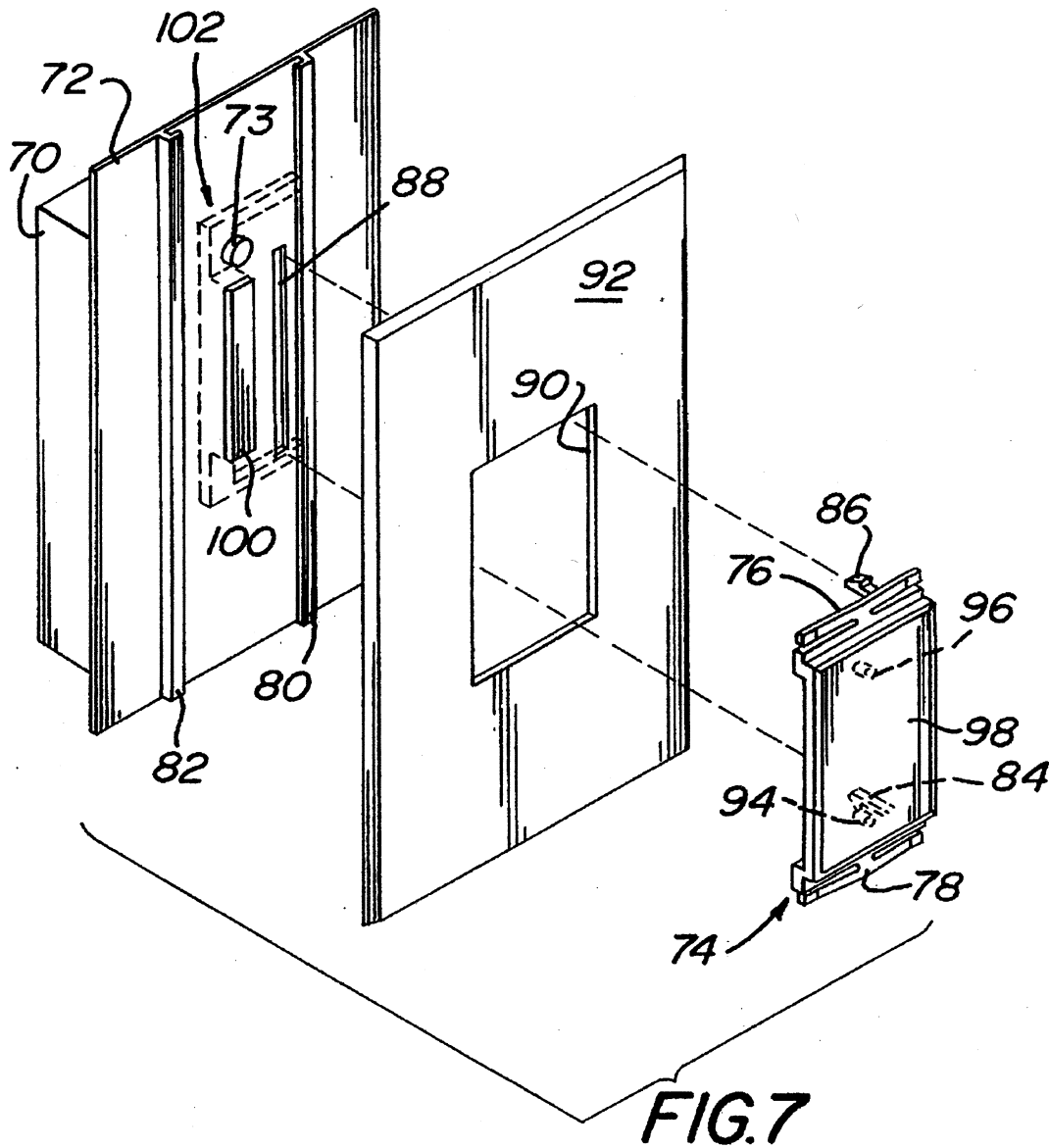


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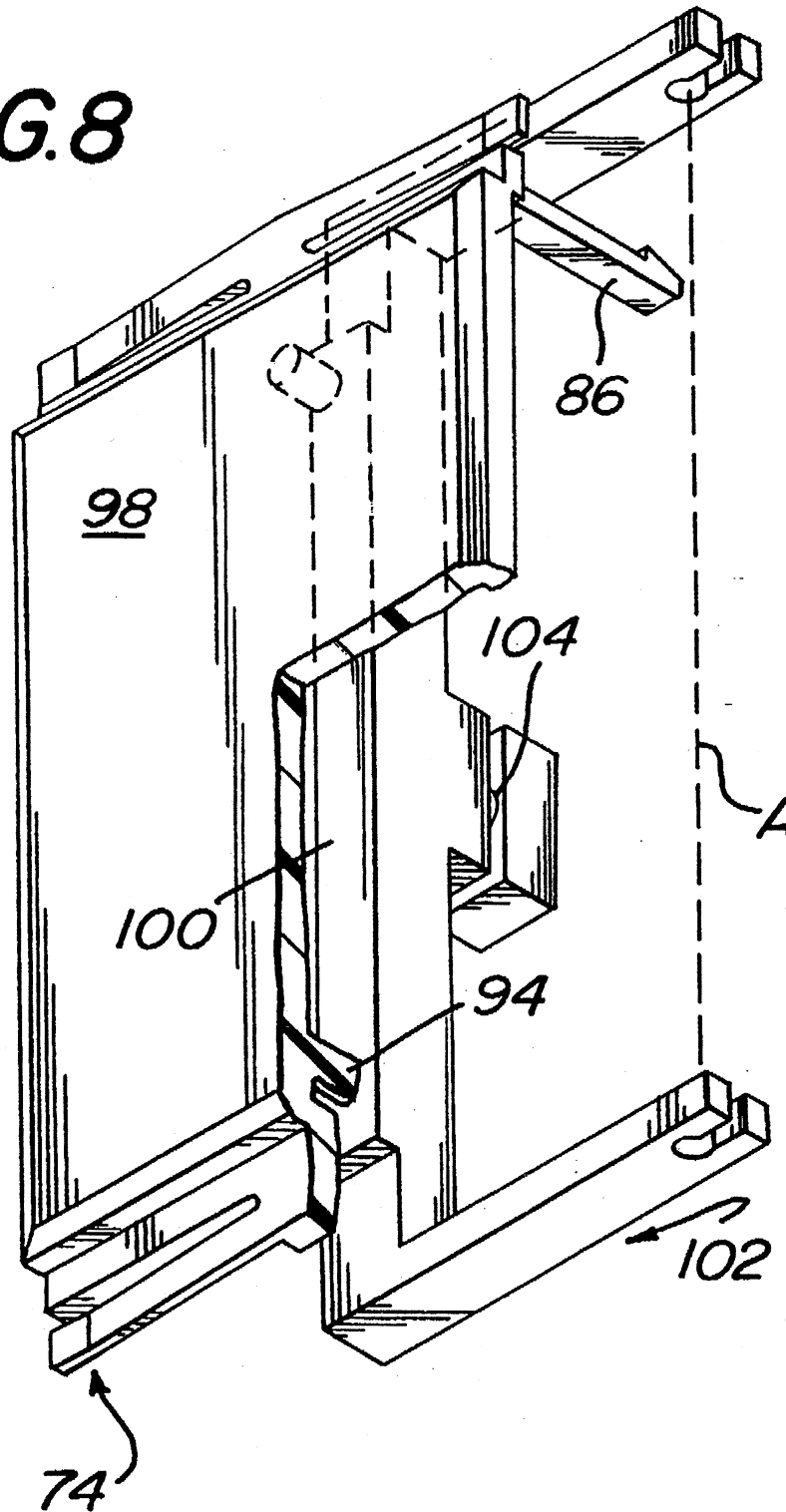
U.S. Patent

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FIG. 8



5,637,930

1

WALL-MOUNTABLE SWITCH & DIMMER**BACKGROUND OF THE INVENTION****1. Field of the Invention**

This invention is a continuation of co-pending application Ser. No. 07/871,876, filed Apr. 21, 1992 now abandoned, which is a continuation of application Serial No. 07/225,457, filed Jul. 28, 1988 now abandoned, which relates to a switch and dimmer for controlling power to an electrical load.

2. Description of the Related Art

Wallbox mountable dimmers, switches, and combination dimmers and switches have been known for many years. A slide dimmer was disclosed in U.S. Pat. No. 3,746,923, issued Jul. 17, 1973, to Spira et al., and a dimmer of the type disclosed—Nova® linear slide dimmer—is sold by Lutron Electronics Co. Toggle switches are the most common type of wallbox-mounted switch for lighting control, but other types are known, as well. A wallbox-mountable touch switch was disclosed in U.S. Pat. No. 4,563,592, issued Jan. 7, 1986 to S.J. Yuhasz et al., and a switch of the type disclosed—Nova® electronic touch switch—is sold by Lutron Electronics Co.

Combination dimmer-and-switch devices are of two types. In the first type, the switch function is accomplished by operation of the dimmer control. For example, a rotary dimmer can be pushed to operate as a switch, turned to operate as a dimmer. Alternatively, a linear slide dimmer can be designed to operate a switch at the low end of its travel. (See U.S. Pat. No. 3,746,923, referred to above).

The second type of combination dimmer/switch device includes separate actuators for the dimmer and switch functions. Examples of this device are Lutron's Skylark® Model S600P and Nova® Model N-600ML. Another example of this device is available from Home Automation Ltd., in the U.K., and consists of a linear slide dimmer mounted beside a rocker switch (Slider Dimmer Model SC630W ID). The dimmer and switch actuators are mounted side-by-side, each occupying half of a rectangular opening in a faceplate.

Characteristic of prior art dimmer/switches is that their appearance does not emphasize their switching function. Where a single actuator serves both functions, the switch aspect may not be apparent. Where a separate actuator operates the switch, that actuator has occupied a smaller opening in the faceplate, or, at most, an opening the same size as that which accommodates the dimmer actuator.

SUMMARY OF THE INVENTION

In accordance with the present invention, a wallbox-mountable system for controlling electrical power to a load comprises, in combination,

- (a) switch means for turning said power on and off,
- (b) dimmer means for controlling the amount of power provided to said load, and
- (c) first and second actuator means, said first actuator means adapted for operating said switch means and being substantially larger than said second actuator means, which is adapted for operating said dimmer means.

The device of the present invention is ergonomically simple, with the switch function being primary and dominating the switch-and-dimmer combination. Typically, the switch actuator is at least twice as large as the dimmer actuator, more preferably, at least four times as large.

In another embodiment of the present invention, wallbox-mountable electrical control comprises, in combination,

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- (a) a pushbutton-actuated electrical control device,
- (b) means for supporting said device, attachable to said wallbox,
- (c) a faceplate for mounting over said support means, said faceplate having an opening through it,
- (d) a pushbutton, resiliently supported on said support means and actuatable through said opening in said faceplate, and
- (e) means for transmitting a force applied to said pushbutton to provide control of said device.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a front view of a switch and dimmer of this invention.

FIG. 2 is a front view of another embodiment of this invention.

FIG. 2A is a functional illustration of other embodiments of the present invention utilizing a thumbwheel adjustment.

FIG. 3 is an front view of another embodiment of this invention.

FIG. 3A an illustration of other embodiments of the present invention utilizing a motorized potentiometer control.

FIG. 4 is a circuit schematic of an embodiment of this invention.

FIG. 5 is a front view of another switch and dimmer of this invention.

FIG. 5A is an illustration of another embodiment having a hinged door member for covering the dimmer actuator.

FIG. 6 is a front view of a multi-segment switch and dimmer of this invention.

FIG. 7 is an exploded isometric view of a pushbutton device of this invention.

FIG. 8 is a partially cutaway view of some elements of FIG. 7.

FIG. 9 is a front view of a switch segmented into two or more parts.

DETAILED DESCRIPTION OF THE INVENTION

The present invention provides a combined switch and dimmer for controlling electrical power to a load, in which the primary element is the switch. As used in this specification and the appended claims, a "dimmer" is understood to be a device that controls the power to be provided to a load, which may be a lighting load; not the more narrow meaning in which the load must be a lighting load.

One embodiment of the present invention is depicted in FIG. 1, which shows a frontal view of a touch switch 10 and slide dimmer actuator 12 contained within rectangular opening 14 of faceplate 16. Actuator 12 controls a linear potentiometer, whose wiper position determines the power to a load. Of course, actuator 12 could be positioned on either side of the faceplate or in the middle. Alternatively, actuator travel could be horizontal, along the top, bottom, or center of the faceplate. The handle 13 of actuator 12 may be spring-loaded, so that it can retract—e.g., to the side or into the faceplate—when not being used to adjust the power. The term actuator, as used herein, is understood to comprise the entire element that is seen to move (e.g. 12), not just the handle (e.g. 13). Thus, the length of actuator 12 is slightly greater than that of switch 10. As used in this specification and the appended claims, "touch switch" designates a switch

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that is activated by a soft touch and that involves little or no actuator travel to accomplish its function. A touch switch typically controls power to a load through an intermediate controllably conductive device (i.e., an electronic switch), such as a thyristor, transistor, or relay. The touch switch itself provides switching at voltages well below line voltage. In a preferred embodiment, switch 10 is a biased, alternate-action touch switch. Alternatively, switch 10 may be a mechanical power switch and handle full power from the line.

FIG. 2 depicts an embodiment of the present invention which includes a touch switch 10 and a rotary dimmer with actuator 18, in place of a slide dimmer. Actuator 18 operates a rotary potentiometer that controls the power to a load. The potentiometer may be of the type whose shaft is spring-loaded and "pops out" for adjustment and may then be pushed in. An example of this type of potentiometer is Model RK097111T, available from ALPS Electronic Co., San Jose, Calif. A thumbwheel is another alternative dimmer actuator.

FIG. 3 depicts an embodiment of the present invention in which the dimmer function is provided by a raise/lower rocker 20. Pushing the upper half of the rocker causes the power to a load to increase; pushing the lower half causes the power to decrease. The rocker may be split in half horizontally to form an upper element that is depressed to raise and a lower element to lower. The raise/lower mechanism may drive a motorized potentiometer or operate electronically. Such a mechanism is generally illustrated in FIG. 3A showing a rocker-type switch 20A having upper and lower contacts 20A₁ and 20A₂, respectively, interconnected to a control circuit that is connected to a power source 26. The control circuit comprises a motor control (MC) that is coupled to a motor (M) which, in turn, is connected to the shaft (S) of a potentiometer (P). When closed, the upper switch contact 20A₁ applies the excitation of the source 26 to the motor control (MC) causing the motor (M) to move in a first or clockwise direction which, in turn, causes the setting of potentiometer (P) to change so as to raise or increase the power supplied through conventional dimmer circuit 31 to a load 28 such as an electric lamp 28A. Conversely, when closed, the lower switch contact 20A₂ applies the excitation of the source 26 to the motor control (MC) causing the motor (M) to move in a second or counterclockwise direction which, in turn, causes the setting of potentiometer (P) to change so as to lower or decrease the power supplied through conventional dimmer circuit 21 to the load 28A. Further, the switch and dimmer of FIG. 3 can be remote from a master raise/lower dimmer, with only two wires joining the devices; and FIG. 4 is a schematic of a circuit that accomplishes that. Source 26 provides power to load 28. Master dimmer 30 includes a circuit 32 that detects the direction of current flow and controls a raise/lower circuit 34. Wires 36 and 38 carry ac power to the remote switch-and-dimmer unit 40, which includes switches 42, 44, and 46, which provide "on/off", "raise" and "lower" functions, respectively. When switch 42, which may be a momentary contact switch, provides closure, then circuit 32 detects current flowing in both directions. When switch 44 or 46 is activated, only one polarity of current (either positive or negative, depending on diode polarity) is detected by circuit 32. In this way, four different states of the remote unit can be sensed—no current, positive current, negative current, and both polarities, corresponding to no signal, raise power, lower power, and alternate on/off switching, respectively.

The present invention is also adapted for use with a standard "toggle" faceplate, in which the opening is a

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rectangle that is about 25 mm high and 12 mm wide. FIG. 5 depicts an embodiment in which both pushbutton 50 and slide actuator 52 are accommodated within standard toggle opening 54 in faceplate 56. Preferably, the switch actuated by pushbutton 50 is a biased, alternate-action mechanical pushbutton switch. It may include a "dead travel" of at least 1 mm from its rest position. Depressing the pushbutton over the dead travel range does not affect the switch; thus, the switch is not likely to be actuated accidentally by a person brushing against it. Note that slide actuator 52 moves in and out with pushbutton 50. The slide actuator may be within, rather than outside the pushbutton area and, optionally, may be hidden from view behind a hinged or sliding door on the front of the pushbutton. Such a hinged door arrangement is shown in FIG. 5A where slide actuator 52 is within pushbutton 50 and is removably covered by hinged door 50A. Hinged door 50A is connected to pushbutton 50 along hinge line 51 and has a notch 53 into which a fingernail can be inserted to allow the operator to easily open the hinged door. The embodiment of FIG. 1 may be adapted for use with a toggle faceplate, simply by scaling the faceplate opening to 25 mm high×12 mm wide.

The switch-and-dimmer device of this invention, is preferably used to control a lighting load. It is often desirable to have, at the control device, an indication of the status of the lighting, particularly if the device is remote from the space illuminated by the load. Such an indication can take a variety of forms and can be mounted on the faceplate or on one of the actuators. For example, a light (such as an LED) on the device can be dim if the lighting load is off and bright if the load is on. Such a "status" light is disclosed in U.S. Appl. Ser. No. 131,776, incorporated herein by reference. Alternatively, an indicator may be quantitative or semi-quantitative, such as a lighting intensity indicator on the device. The indicator could comprise a vertical array of LEDs that light in succession as power to the load is increased and that go out as power is reduced. Such an arrangement is generally illustrated in FIG. 2A where the thumbwheel 18A is used to adjust the power applied to the lighting load 28A from source 26. The relative intensity of the adjusted power is indicated by a vertical array of LEDs 18B that is sequentially responsive to a display driver 18C that is connected to an output from dimmer circuit 31 whose output signal is indicative of the power supplied to the lighting load 28A.

The response of load power to the operation of the switch and dimmer of the invention may be immediate, but it need not be. Various time-delay circuits, well known in the art, can be used with this invention to delay the onset of a changed load power status and/or to cause the change to occur over a period of time (i.e., "fade"). The delay and/or fade rate may be fixed or adjustable. The arrangement of such a delay device is generally illustrated in FIG. 2A in which time delay means 18D employing, for example, one or more thermistors whose resistance decrease as a result of self-heating, may be interposed, in a serial manner, between the lighting load 28A and the output side of the switch 10.

A variety of extensions are envisioned within the scope of this invention, beyond the device of the type shown in FIG. 1. As depicted there, alternate action switch 10 alternately turns power to the load off and provides to the load an amount of power that is determined by the position of actuator 12. However, the switch may be segmented into two or more parts as shown in FIG. 9. The switch 10 of FIG. 9 comprises a segmented switch with two or more parts, and has associated with it an actuator having an upper portion 10a for turning power to the load on, and lower portion 10b

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for turning power to the load off. Further, the switch 10 has a central portion 10c on the actuator for housing means for detecting a signal, such as radiant energy from an external source for controlling operation of the switch in response to the signal. (See discussion below). A two-part switch could provide "on" and "off", a three-part switch could provide "full" on, "preset" (i.e., the level determined by the dimmer), and "off." Likewise, one or more additional dimmers could be incorporated into the device to provide additional "preset" levels selectable by actuating additional switch segments. FIG. 6 depicts a device that includes two dimmers 60 and 62, to provide two "preset" levels, and a four-segment switch to permit the selection of preset 60 by depressing segment 60A, preset 62 by depressing 62A, full on by depressing 64, and off by depressing 66.

The switch-and-dimmer devices discussed above are manually operated. Devices of similar appearance could be remotely operated, controlled by wire or wireless. Infrared, radio, sound or other wireless methods, well known in the art, are suitable, provided that the devices have the appropriate detectors. Wireless operation of dimmer and switch devices is described in co-pending U.S. Appl. Ser. No. 079,847, which is incorporated herein by reference. If a load is controlled from more than one location, then a dimmer-switch device can also include a "take command" button to put that particular device in control of power to the load.

FIG. 7 is an exploded isometric drawing of a pushbutton-actuated device of the present invention. Electrical control device 70 is supported by element 72 for mounting in a wallbox (not shown). Preferably, control device 70 is an alternate-action switch, more preferably a short-throw device. Alternatively, 70 is a dimmer that controls power to a load by increasing power while the switch is depressed and cycling after reaching maximum power. Pushbutton 74 has resilient legs 76 and 78 that are captured on support element 72. An indicator lamp 73 may be placed between the support means 72 and the pushbutton 74. The resiliency of legs 76 and 78 desirably provides a built-in bias, somewhat like a dome switch. Resilient legs 76 and 78 can be captured on support 72 in a variety of ways. One or more rails, such as 80 and 82 can constrain the legs right and left. Optional arms 84 and 86 can be snapped into the ends of optional slot 88 to constrain the pushbutton at the top and bottom and obviate the need for constraint rail 80. Pushbutton 74 may be actuated through opening 90 in faceplate 92. Force transmitter means 94 and 96 are mounted on pushbutton 74 on the reverse side from pushbutton face 98. Pushing face 98 causes force transmitters 94 and 96 to push surface 100 of pivoted hinge bar 102, which in turn actuates electrical control device 70.

FIG. 8 shows an isometric view, in partial cutaway, of pushbutton 74 and pivoted hinge bar 102, which pivots about axis A. FIG. 8, by omitting support means 72 and faceplate 92, clarifies the manner in which a force applied to face 98 is transmitted through transmitters 94 and 96 and surface 100 to depress plunger 104 and actuate control device 70.

If the pushbutton face 98 is generally opaque, then a hidden nightlight could be provided by making face 98 translucent over a small part of its area and backlighting that area with an LED or similar small light. The translucent region can be provided by thinning 98 over a small area or by cutting out an area from 98 and optionally filling the area with a partially transmissive material. If the backlight is spaced away from face 98, then force transmitter 94 or 96 could act as a light pipe.

The pushbutton mechanism of FIGS. 7 and 8 and a slide dimmer can be mounted on a single support plate to provide a device like that shown in FIG. 1.

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The present invention having been described in connection with preferred embodiments, many variations and modifications will now become apparent to those skilled in the art. Therefore, the present invention is to be limited not by the specific disclosure, but only by the appended claims.

By "substantially larger" as used in the claims is meant at least twice as large.

We claim:

1. A wall-mountable system for controlling electrical power to a load comprising, in combination:

(a) switch means for turning said power on and off, including first pushbutton or touch actuator means constructed and arranged for operating said switch means; and

(b) dimmer means for controlling the amount of power provided to said load, including second actuator means constructed and arranged for operating said dimmer means, said first actuator means constructed and arranged for being operated by a user and having a surface area which is substantially larger than the surface area of said second actuator means which is constructed and arranged for being operated by the user, said first and second actuator means being located immediately adjacent to each other, said first and second actuator means occupying a region which serves as an active control zone for said wall-mountable system, said active control zone having a surface area which is dominated by the surface area of said first actuator means, whereby the switch function is emphasized over the dimmer function to the user.

2. The system of claim 1, further comprising a faceplate for mounting over said switch and dimmer means, said faceplate having an opening through which said first and second actuators extend.

3. The system of claim 1, in which said switch means is mechanical.

4. The system of claim 1, in which said switch means comprises an electronic touch switch.

5. The system of claim 1, in which said switch means is an alternate-action switch.

6. The system of claim 1, in which said switch means is a biased pushbutton switch.

7. The system of claim 1, in which depressing said pushbutton about 1 mm does not activate said switch.

8. The system of claim 1, in which said dimmer means is a raise-lower dimmer and comprises a rocker device which is split into two separate portions, and whereby the depression of one portion causes an increase of said power provided to said load and, conversely, the depression of the other portion causes a decrease of said power provided to said load.

9. The system of claim 8, in which said dimmer means comprises a motorized potentiometer control.

10. The system of claim 8, in which said dimmer means comprises an electronic control.

11. The system of claim 10, in which said electronic control includes a remote control joined to said dimmer means by not more than two wires.

12. The system of claim 1, in which said second actuator means is a linear slide.

13. A wall-mountable system for controlling electrical power to a load comprising, in combination:

(a) switch means for turning said power on and off, including first pushbutton or touch actuator means constructed and arranged for operating said switch means; and

(b) dimmer means for controlling the amount of power provided to said load, including second actuator means

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constructed and arranged for operating said dimmer means, said first actuator means being substantially larger than said second actuator means, said second actuator means being a linear slide and in which said first actuator means is a pushbutton and is located immediately adjacent to said linear slide, whereby the switch function is emphasized over the dimmer function to the user.

14. The system of claim 13, further comprising an element on said pushbutton for removably covering said linear slide.

15. The system of claim 1, in which said second actuator means is a thumbwheel.

16. The system of claim 1, in which said second actuator means is a rotary knob.

17. The system of claim 16, in which said rotary knob is retractable.

18. The system of claim 2, in which said opening is rectangular.

19. The system of claim 18, in which length and width dimensions of said opening are about 25 mm and about 12 mm, respectively.

20. The system of claim 1, further comprising time-delay circuit means for controllably delaying switching of said power on and off.

21. The system of claim 1, further comprising lamp means for indicating whether power to said load is on.

22. The system of claim 21, in which said lamp means is a light-emitting diode.

23. The system of claim 21, in which said lamp means emits a light intensity that is greater when said power is on than when said power is off.

24. The system of claim 21, in which said second actuator means is a linear slide and said lamp means moves with said slide.

25. The system of claim 1, further comprising means for indicating the amount of power being provided to said load.

26. The system of claim 25, in which said indicating means comprises a light-emitting diode.

27. The system of claim 1, further comprising means for remotely controlling said switch means and dimmer means.

28. The system of claim 27, in which said means for remotely controlling is wireless.

29. The system of claim 28, in which said means for remotely controlling comprises an infrared signal transmitter.

30. The system of claim 1, further comprising an additional switch, controlled by a corresponding switch actuator.

31. The system of claim 1, further comprising an additional dimmer, controlled by a corresponding dimmer actuator.

32. The control of claim 31, further comprising an indicator lamp between said support means and said pushbutton.

33. The control of claim 32, in which said force transmitting means is a light pipe and extends between said indicator lamp and said pushbutton.

34. A wallbox-mountable electrical control comprising, in combination,

- (a) a pushbutton-actuated electrical control device,
- (b) support means for supporting said device, attachable to said wallbox,
- (c) a faceplate for mounting over said support means, said faceplate having an opening,
- (d) a pushbutton, resiliently supported on said support means and actuatable through said opening in said faceplate,
- (e) means for transmitting a force applied to said pushbutton to provide control of said device, and

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(f) an indicator lamp located between said support means and said pushbutton.

35. The control of claim 34, in which said force transmitting means is a light pipe and extends between said indicator lamp and said pushbutton.

36. A wall-mountable system for controlling electrical power to a load comprising, in combination:

(a) switch means for turning said power on and off, said switch means including a first actuator means constructed and arranged for operating said switch means; and

(b) dimmer means for controlling the amount of power provided to said load, said dimmer means including a second actuator means constructed and arranged for operating said dimmer means, said first actuator means constructed and arranged for being operated by a user and having a surface area which is substantially larger than the surface area of said second actuator means which is constructed and arranged for being operated by the user, said second actuator means being located at the perimeter of said first actuator, whereby the switch function is emphasized over the dimmer function to the user.

37. The system of claim 36, further comprising a faceplate for mounting over said switch means and dimmer means, said faceplate having an opening through which said first and second actuators extend.

38. The system of claim 36, in which said switch means is mechanical.

39. The system of claim 36, in which said switch means comprises an electronic touch switch.

40. The system of claim 36, in which said switch means is an alternate-action switch.

41. The system of claim 36, in which said switch means is a biased pushbutton switch.

42. The system of claim 41, in which said first actuator means is a pushbutton and depressing said pushbutton about 1 mm does not activate said switch.

43. The system of claim 36, in which said dimmer means is a raise-lower dimmer and said second actuator means comprises a rocker device which is split into two portions, and whereby the depression of one portion causes an increase of said power provided to said load and, conversely, the depression of the other portion causes a decrease of said power provided to said load.

44. The system of claim 43, in which said dimmer means comprises a motorized potentiometer control.

45. The system of claim 43, in which said dimmer means comprises an electronic control.

46. The system of claim 45, in which said electronic control includes a remote control joined to said dimmer means by not more than two wires.

47. The system of claim 36, in which said second actuator means is a linear slide.

48. The system of claim 36, in which said second actuator means is a thumbwheel.

49. The system of claim 36, in which said second actuator means is a rotary knob.

50. The system of claim 49, in which said rotary knob is retractable.

51. The system of claim 33, in which said opening is rectangular.

52. The system of claim 51, in which length and width dimensions of said opening are about 25 mm and about 12 mm, respectively.

53. The system of claim 36, further comprising time-delay circuit means for controllably delaying switching of said power on and off.

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54. The system of claim 36, further comprising lamp means for indicating whether power to said load is on.

55. The system of claim 54, in which said lamp means is a light-emitting diode.

56. The system of claim 54, in which said lamp means emits a light intensity that is greater when said power is on than when said power is off.

57. The system of claim 54, in which said second actuator means is a linear slide and said lamp means moves with said slide.

58. The system of claim 36, further comprising means for indicating the amount of power being provided to said load.

59. The system of claim 58, in which said indicating means comprises a light-emitting diode.

60. The system of claim 36, further comprising means for remotely controlling said switch means and dimmer means.

61. The system of claim 60, in which said means for remotely controlling is wireless.

62. The system of claim 61, in which said means for remotely controlling comprises an infrared signal transmitter.

63. The system of claim 36, further comprising an additional switch means, controlled by a corresponding switch actuator.

64. The system of claim 36, further comprising an additional dimmer means, controlled by a corresponding dimmer actuator.

65. A wall-mountable system for controlling electrical power to a load, said system having a faceplate with a centerline and comprising, in combination:

(a) switch means for turning said power on and off, said switch means including a first actuator means constructed and arranged for operating said switch means; and

(b) dimmer means for controlling the amount of power provided to said load, said dimmer means including a second actuator means constructed and arranged for operating said dimmer means, said first actuator means being centrally positioned on said faceplate and said second actuator means being located at a distance from said centerline, wherein said first actuator means has a surface area at least two times as large as the surface area of said second actuator means, whereby the switch function is emphasized over the dimmer function to the user.

66. The system of claim 65, said faceplate being constructed and arranged for mounting over said switch means and dimmer means, said faceplate having an opening through which said first and second actuator means extend.

67. The system of claim 65, in which said switch means is mechanical.

68. The system of claim 65, in which said switch means comprises an electronic touch switch.

69. The system of claim 65, in which said switch means is an alternate-action switch.

70. The system of claim 65, in which said switch means is a biased pushbutton switch.

71. The system of claim 70, in which said first actuator means is a pushbutton and depressing said pushbutton about 1 mm does not activate said switch.

72. The system of claim 65, in which said dimmer means is a raise-lower dimmer and said second actuator means comprises a rocker device which is split into two portions, and whereby the depression of one portion causes an increase of said power provided to said load and, conversely, the depression of the other portion causes a decrease of said power provided to said load.

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73. The system of claim 72, in which said dimmer means comprises a motorized potentiometer control.

74. The system of claim 72, in which said dimmer means comprises an electronic control.

75. The system of claim 74, in which said electronic control includes a remote control joined to said dimmer means by not more than two wires.

76. The system of claim 65, in which said second actuator means is a linear slide.

77. The system of claim 65, in which said second actuator means is a thumbwheel.

78. The system of claim 65, in which said second actuator means is a rotary knob.

79. The system of claim 78, in which said rotary knob is retractable.

80. The system of claim 66, in which said opening is rectangular.

81. The system of claim 80, in which length and width dimensions of said opening are about 25 mm and about 12 mm, respectively.

82. The system of claim 65, further comprising time-delay circuit means for controllably delaying switching of said power on and off.

83. The system of claim 65, further comprising lamp means for indicating whether power to said load is on.

84. The system of claim 83, in which said lamp means is a light-emitting diode.

85. The system of claim 83, in which said lamp means emits a light intensity that is greater when said power is on than when said power is off.

86. The system of claim 83, in which said second actuator means is a linear slide and said lamp means moves with said slide.

87. The system of claim 65, further comprising means for indicating the amount of power being provided to said load.

88. The system of claim 87, in which said indicating means comprises a light-emitting diode.

89. The system of claim 65, further comprising means for remotely controlling said switch means and dimmer means.

90. The system of claim 89, in which said means for remotely controlling is wireless.

91. The system of claim 90, in which said means for remotely controlling comprises an infrared signal transmitter.

92. The system of claim 65, further comprising an additional switch means, controlled by a corresponding switch actuator.

93. The system of claim 65, further comprising an additional dimmer means, controlled by a corresponding dimmer actuator.

94. A wall-mountable system for controlling electrical power to a load, said system having a faceplate with a centerline and comprising, in combination:

(a) switch means for turning said power on and off, said switch means including a first actuator means constructed and arranged for operating said switch means; and

(b) dimmer means for controlling the amount of power provided to said load, said dimmer means including a second actuator means constructed and arranged for operating said dimmer means, said first actuator means being centrally positioned on said faceplate and said second actuator means being

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located at a distance from said centerline but adjacent to said first actuator means, whereby the switch function is emphasized over the dimmer function to the user.

95. The system of claim 94, said faceplate being constructive and arranged for mounting over said switch means and dimmer means, said faceplate having an opening through which said first and second actuators extend.

96. The system of claim 94, in which said switch means is mechanical.

97. The system of claim 94, in which said switch means comprises an electronic touch switch.

98. The system of claim 94, in which said switch means is an alternate-action switch.

99. The system of claim 94, in which said switch means is a biased pushbutton switch.

100. The system of claim 99, in which said first actuator means is a pushbutton and depressing said pushbutton about 1 mm does not activate said switch.

101. The system of claim 94, in which said dimmer means is a raise-lower dimmer and said second actuator means comprises a rocker device which is split into two portions, and whereby the depression of one portion causes an increase of said power provided to said load and, conversely, the depression of the other portion causes a decrease of said power provided to said load.

102. The system of claim 101, in which said dimmer means comprises a motorized potentiometer control.

103. The system of claim 101, in which said dimmer means comprises an electronic control.

104. The system of claim 103, in which said electronic control includes a remote control joined to said dimmer means by not more than two wires.

105. The system of claim 94, in which said second actuator means is a linear slide.

106. The system of claim 94, in which said second actuator means is a thumbwheel.

107. The system of claim 94, in which said second actuator means is a rotary knob.

108. The system of claim 107, in which said rotary knob is retractable.

109. The system of claim 95, in which said opening is rectangular.

110. The system of claim 107, in which length and width dimensions of said opening are about 25 mm and about 12 mm, respectively.

111. The system of claim 94, further comprising time-delay circuit means for controllably delaying switching of said power on and off.

112. The system of claim 94, further comprising lamp means for indicating whether power to said load is on.

113. The system of claim 112, in which said lamp means is a light-emitting diode.

114. The system of claim 112, in which said lamp means emits a light intensity that is greater when said power is on than when said power is off.

115. The system of claim 112, in which said second actuator means is a linear slide and said lamp means moves with said slide.

116. The system of claim 94, further comprising means for indicating the amount of power being provided to said load.

117. The system of claim 116, in which said indicating means comprises a light-emitting diode.

118. The system of claim 94, further comprising means for remotely controlling said switch means and dimmer means.

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119. The system of claim 118, in which said means for remotely controlling is wireless.

120. The system of claim 119, in which said means for remotely controlling comprises an infrared signal transmitter.

121. The system of claim 94, further comprising an additional switch means, controlled by a corresponding switch actuator.

122. The system of claim 94, further comprising an additional dimmer means, controlled by a corresponding dimmer actuator.

123. A wall-mountable system for controlling electrical power to a load comprising, in combination:

(a) switch means for turning said power on and off, said switch means including a first actuator means constructed and arranged for operating said switch means; and

(b) dimmer means for controlling the amount of power provided to said load, said dimmer means including a slider or a rocker device which serves as a second actuator means constructed and arranged for operating said dimmer means, said first and second actuator means being located immediately adjacent to each other, said first and second actuators occupying a region which serves as an active control zone for said wall-mountable system, and said first actuator having a substantially larger surface area to be contacted by the user for operating said switch means than the surface area of the second actuator to be contacted by the user or operating said dimmer means, whereby the switch function is emphasized over the dimmer function to the user.

124. The system of claim 123, further comprising a faceplate for mounting over said switch and dimmer means, said faceplate having an opening through which said first and second actuator means extend.

125. The system of claim 123, in which said switch means is mechanical.

126. The system of claim 123, in which said switch means comprises an electronic touch switch.

127. The system of claim 123, in which said switch means is an alternate-action switch.

128. The system of claim 123, in which said switch means is a biased pushbutton switch.

129. The system of claim 128, in which said first actuator means is a pushbutton and depressing said pushbutton about 1 mm does not activate said switch.

130. The system of claim 123, in which said dimmer means is a raise-lower dimmer and said second actuator means comprises a rocker device which is split into two portions, and whereby the depression of one portion causes an increase of said power provided to said load and, conversely, the depression of the other portion causes a decrease of said power provided to said load.

131. The system of claim 130, in which said dimmer means comprises a motorized potentiometer control.

132. The system of claim 130, in which said dimmer means comprises an electronic control.

133. The system of claim 132, in which said electronic control includes a remote control joined to said dimmer means by not more than two wires.

134. The system of claim 123, in which said second actuator means is a linear slide.

135. The system of claim 124, in which said opening is rectangular.

136. The system of claim 135, in which length and width dimensions of said opening are about 25 mm and about 12 mm, respectively.

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137. The system of claim 123, further comprising time-delay circuit means for controllably delaying switching of said power on and off.

138. The system of claim 123, further comprising lamp means for indicating whether power to said load is on.

139. The system of claim 138, in which said lamp means is a light-emitting diode.

140. The system of claim 138, in which said lamp means emits a light intensity that is greater when said power is on than when said power is off.

141. The system of claim 138, in which said second actuator means is a linear slide and said lamp means moves with said slide.

142. The system of claim 123, further comprising means for indicating the amount of power being provided to said load.

143. The system of claim 142, in which said indicating means comprises a light-emitting diode.

144. The system of claim 123, further comprising means for remotely controlling said switch means and dimmer means.

145. The system of claim 144, in which said means for remotely controlling is wireless.

146. The system of claim 145, in which said means for remotely controlling comprises an infrared signal transmitter.

147. The system of claim 123, further comprising an additional switch means, controlled by a corresponding switch actuator.

148. The system of claim 129, further comprising an additional dimmer means, controlled by a corresponding dimmer actuator.

149. A wall-mountable system for controlling electrical power to a load comprising, in combination:

(a) switch means for turning said power on and off, said switch means including a first actuator means constructed and arranged for operating said switch means; and

(b) dimmer means for controlling the amount of power provided to said load, said dimmer means including a slider, a rocker device or rotary device which serves as a second actuator means constructed and arranged for operating said dimmer means, said second actuator means being located at the perimeter of said first actuator, said first and second actuator means occupying a region which serves as an active control zone for said wall-mountable system, and said first actuator means having a substantially larger surface area to be contacted by the user for operating said switch means than the surface area of the second actuator to be contacted by the user for operating said dimmer means, whereby the switch function is emphasized over the dimmer function to the user.

150. The system of claim 149, further comprising a faceplate for mounting over said switch and dimmer means, said faceplate having an opening through which said first and second actuator means extend.

151. The system of claim 149, in which said switch means is mechanical.

152. The system of claim 149, in which said switch means comprises an electronic touch switch.

153. The system of claim 149, in which said switch means is an alternate-action switch.

154. The system of claim 149, in which said switch means is a biased pushbutton switch.

155. The system of claim 154, in which said first actuator means is a pushbutton and depressing said pushbutton about 1 mm does not activate said switch.

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156. The system of claim 149, in which said dimmer means is a raise-lower dimmer and said second actuator means comprises a rocker device which is split into two portions, and whereby the depression of one portion causes an increase of said power provided to said load and, conversely, the depression of the other portion causes a decrease of said power provided to said load.

157. The system of claim 156, in which said dimmer means comprises a motorized potentiometer control.

158. The system of claim 156, in which said dimmer means comprises an electronic control.

159. The system of claim 158, in which said electronic control includes a remote control joined to said dimmer means by not more than two wires.

160. The system of claim 149, in which said second actuator means is a linear slide.

161. The system of claim 149, in which said second actuator means is a thumbwheel.

162. The system of claim 149, in which said second actuator means is a rotary knob.

163. The system of claim 162, in which said rotary knob is retractable.

164. The system of claim 150, in which said opening is rectangular.

165. The system of claim 164, in which length and width dimensions of said opening are about 25 mm and about 12 mm, respectively.

166. The system of claim 149, further comprising time-delay circuit means for controllably delaying switching of said power on and off.

167. The system of claim 149, further comprising lamp means for indicating whether power to said load is on.

168. The system of claim 167, in which said lamp means is a light-emitting diode.

169. The system of claim 167, in which said lamp means emits a light intensity that is greater when said power is on than when said power is off.

170. The system of claim 167, in which said second actuator means is a linear slide and said lamp means moves with said slide.

171. The system of claim 149, further comprising means for indicating the amount of power being provided to said load.

172. The system of claim 171, in which said indicating means comprises a light-emitting diode.

173. The system of claim 149, further comprising means for remotely controlling said switch means and dimmer means.

174. The system of claim 173, in which said means for remotely controlling is wireless.

175. The system of claim 174, in which said means for remotely controlling comprises an infrared signal transmitter.

176. The system of claim 149, further comprising an additional switch means, controlled by a corresponding switch actuator.

177. The system of claim 149, further comprising an additional dimmer means, controlled by a corresponding dimmer actuator.

178. A wall-mountable system for controlling electrical power to a load comprising, in combination:

(a) switch means for turning said power on and off, said switch means including a first actuator means constructed and arranged for operating said switch means; and

(b) dimmer means for controlling the amount of power provided to said load, said dimmer means including a

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slider or rocker device which serves as a second actuator means constructed and arranged for operating said dimmer means, said first actuator means constructed and arranged for being operated by a user and having a control area which is substantially larger than the control area of said second actuator means which is constructed and arranged for being operated by the user, whereby the switch function is emphasized over the dimmer function to the user.

179. The system of claim 178, further comprising a faceplate for mounting over said switch and dimmer means, said faceplate having an opening through which said first and second actuators extend.

180. The system of claim 178, in which said switch means is mechanical.

181. The system of claim 178, in which said switch means comprises an electronic touch switch.

182. The system of claim 178, in which said switch means is an alternate-action switch.

183. The system of claim 178, in which said switch means is a biased pushbutton switch.

184. The system of claim 183, in which said first actuator means is a pushbutton and depressing said pushbutton about 1 mm does not activate said switch.

185. The system of claim 178, in which said dimmer means is a raise-lower dimmer and said second actuator means comprises a rocker device which is split into two portions, and whereby the depression of one portion causes an increase of said power provided to said load and, conversely, the depression of the other portion causes a decrease of said power provided to said load.

186. The system of claim 185, in which said dimmer means comprises a motorized potentiometer control.

187. The system of claim 185, in which said dimmer means comprises an electronic control.

188. The system of claim 187, in which said electronic control includes a remote control joined to said dimmer means by not more than two wires.

189. The system of claim 178, in which said second actuator means is a linear slide.

190. The system of claim 179, in which said opening is rectangular.

191. The system of claim 190, in which length and width dimensions of said opening are about 25 mm and about 12 mm, respectively.

192. The system of claim 178, further comprising time-delay circuit means for controllably delaying switching of said power on and off.

193. The system of claim 178, further comprising lamp means for indicating whether power to said load is on.

194. The system of claim 193, in which said lamp means is a light-emitting diode.

195. The system of claim 193, in which said lamp means emits a light intensity that is greater when said power is on than when said power is off.

196. The system of claim 193, in which said second actuator means is a linear slide and said lamp means moves with said slide.

197. The system of claim 178, further comprising means for indicating the amount of power being provided to said load.

198. The system of claim 197, in which said indicating means comprises a light-emitting diode.

199. The system of claim 178, further comprising means for remotely controlling said switch means and dimmer means.

200. The system of claim 199, in which said means for remotely controlling is wireless.

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201. The system of claim 200, in which said means for remotely controlling comprises an infrared signal transmitter.

202. The system of claim 178, further comprising an additional switch means, controlled by a corresponding switch actuator.

203. The system of claim 178, further comprising an additional dimmer means, controlled by a corresponding dimmer actuator.

204. A wallbox-mountable electrical control comprising, in combination,

(a) a pushbutton-actuated electrical control device having a first actuator means for operating said pushbutton-actuated electrical control device,

(b) means attachable to said wallbox for supporting said device,

(c) dimmer means for controlling the amount of power provided to a load, said dimmer means including a second actuator means constructed and arranged for operating said dimmer means,

(d) a faceplate for mounting over said support means, said faceplate having an opening,

(e) a pushbutton having integral means for resiliently supporting said pushbutton on said support means, said pushbutton being actuatable through said opening in said faceplate, and

(f) means for transmitting a force applied to said pushbutton to provide control of said device, wherein said first actuator means has a substantially larger surface area than said second actuator means, whereby the switch function is emphasized over the dimmer function to the user.

205. The control of claim 204, in which said pushbutton-actuated electrical control device comprises a switch.

206. The control of claim 205, in which said pushbutton-actuated electrical control device comprises a touch switch.

207. The control of claim 205, in which said second actuator means is a linear slide type means.

208. The control of claim 207, in which said second actuator means adjoins said pushbutton.

209. The control of claim 204, further comprising an elongated member on said pushbutton for snapping into a corresponding opening in said support means.

210. The control of claim 204, further comprising an indicator lamp between said support means and said pushbutton.

211. The control of claim 210, in which said force transmitting means is a light pipe and extends between said indicator lamp and said pushbutton.

212. A wall-mountable system for controlling electrical power to a load comprising in combination:

(a) switch means for turning said power on and off, said switch means including a first actuator means adapted for operating said switch means, said first actuator means having upper and lower portions for turning said power on and off, respectively, and a central portion housing means for detecting a signal from an external source for also controlling said power in response to said signal; and

(b) dimmer means for controlling the amount of power provided to said load, said dimmer means including a second actuator means adapted for operating said dimmer means, said first actuator having a surface area which is substantially larger than the surface area of said second actuator means, said second actuator means being located adjacent a peripheral edge of said first actuator.

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213. The system of claim 1 wherein said first actuator means has a surface area at least four times as large as the surface area of said second actuator means.

214. The system of claim 13 wherein said first actuator means has a surface area at least four times as large as the surface area of said second actuator means. 5

215. The system of claim 36 wherein said first actuator means has a surface area at least four times as large as the surface area of said second actuator means.

216. The system of claim 65 wherein said first actuator means has a surface area at least four times as large as the surface area of said second actuator means. 10

217. The system of claim 94 wherein said first actuator means has a surface area at least four times as large as the surface area of said second actuator means.

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218. The system of claim 123 wherein said first actuator means has a surface area at least four times as large as the surface area of said second actuator means.

219. The system of claim 149 wherein said first actuator means has a surface area at least four times as large as the surface area of said second actuator means.

220. The system of claim 178 wherein said first actuator means has a surface area at least four times as large as the surface area of said second actuator means.

221. The control of claim 204 wherein said first actuator means has a surface area at least four times as large as the surface area of said second actuator means.

* * * * *



US005637930C1

(12) **EX PARTE REEXAMINATION CERTIFICATE** (5497th)**United States Patent****Rowen et al.**(10) **Number:** **US 5,637,930 C1**(45) **Certificate Issued:** **Sep. 12, 2006**(54) **WALL-MOUNTABLE SWITCH AND DIMMER**

(75) Inventors: **Michael J. Rowen**, Center Valley, PA (US); **Joel S. Spira**, Coopersburg, PA (US); **Michael J. D'Aleo**, Erwinna, PA (US); **Darryl W. Tucker**, Royersford, PA (US); **Russell J. Jacobs**, Center Valley, PA (US); **James R. Graybill**, Allentown, PA (US)

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(63) Continuation of application No. 07/871,876, filed on Apr. 21, 1992, now abandoned, which is a continuation of application No. 07/225,457, filed on Jul. 28, 1988, now abandoned.

(51) **Int. Cl.**
H01H 47/00 (2006.01)

(52) **U.S. Cl.** **307/112; 307/125**

(58) **Field of Classification Search** **307/112, 307/125**

See application file for complete search history.

(56) **References Cited****U.S. PATENT DOCUMENTS**

3,225,265 A 12/1965 Krause et al. 317/138
3,584,174 A * 6/1971 Sprando et al. 200/314
3,746,923 A 7/1973 Spira et al. 315/291
3,846,604 A 11/1974 Shallbetter 200/168 D

3,971,028 A 7/1976 Funk 343/225
4,131,870 A 12/1978 Hilgendorf et al. 338/183
RE30,296 E 6/1980 Kirby et al. 307/252 B
4,350,903 A 9/1982 Jimerson et al. 307/252 B
4,360,721 A 11/1982 Niinuma 200/153 J
4,368,406 A 1/1983 Kruzich et al. 315/158
D268,564 S 4/1983 Mack D8/353
4,479,170 A 10/1984 Richardson 362/95
4,551,714 A * 11/1985 Giammarese 340/825.72
4,556,863 A 12/1985 Devitt et al. 340/81 R
4,563,592 A 1/1986 Yuhasz et al. 307/115
4,567,375 A 1/1986 Jimerson et al. 307/98
4,649,323 A 3/1987 Pearlman 315/307
4,670,629 A 6/1987 VanBenthuyzen et al. .. 200/5 C
4,695,820 A 9/1987 D'Aleo 338/179
4,751,355 A * 6/1988 Wisskirchen et al. 200/521
4,764,717 A 8/1988 Tucker et al. 323/364
4,770,518 A 9/1988 Emmel 350/523
4,825,200 A * 4/1989 Evans et al. 341/23
5,017,837 A 5/1991 Hanna et al. 315/136
5,146,153 A 9/1992 Luchaco et al. 323/324

FOREIGN PATENT DOCUMENTS

CH 500 580 1/1971
DE 35 29 711 C2 3/1987
DE 37 07 951 9/1987
FR 2 116 669 7/1972
FR 2119669 7/1972

(Continued)

OTHER PUBLICATIONS

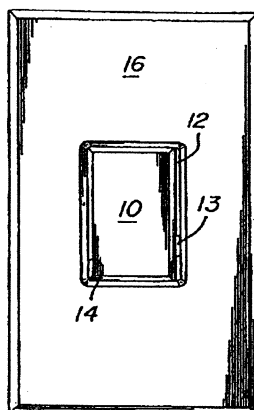
Home Automation Catalog, Jan. 1984, p. 7.

(Continued)

Primary Examiner—Robert L. DeBeradinis

(57) **ABSTRACT**

A wall-mountable system for controlling electrical power to a load includes a switch and a dimmer, with the switch actuator being substantially larger than the dimmer actuator. Preferably, the switch is a short-throw, light-force switch and the dimmer is a linear slide dimmer. Another embodiment of the invention provides a wallbox-mountable, pushbutton-actuated electrical control device in which the pushbutton is resiliently supported on the device support.



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FOREIGN PATENT DOCUMENTS

GB	239 950	9/1925
GB	1 451 438	10/1976
GB	2 013 049 A	8/1979
GB	DES 1 048 797	9/1980
GB	1 603 862	12/1981
GB	2 128 822 A	5/1984
JP	55-159689	12/1980
JP	56-28199	3/1981
JP	56-129100 U	10/1981
JP	59-114792 A	7/1984
JP	59-113022	8/1984

JP	59-219897 A	12/1984
JP	61-243694 A	10/1986

OTHER PUBLICATIONS

Extract from Matsushita Electric Works, Ltd. Brochure 89/4 (4th Qtr 1989).
Home Automation Catalog, Jan. 1984.
Eagle Catalog, Fall-Winter 1989.
Patent Abstract, Australian Patent Application No. 38914/89, Australian Patent Office, Feb. 1, 1990.

* cited by examiner

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**EX PARTE
REEXAMINATION CERTIFICATE
ISSUED UNDER 35 U.S.C. 307**

THE PATENT IS HEREBY AMENDED AS
INDICATED BELOW.

Matter enclosed in heavy brackets [] appeared in the patent, but has been deleted and is no longer a part of the patent; matter printed in *italics* indicates additions made to the patent.

AS A RESULT OF REEXAMINATION, IT HAS BEEN DETERMINED THAT:

Claims 2, 9, 18, 19, 22, 26, 34, 35, 37, 44, 51, 52, 55, 59, 66, 73, 80, 81, 84, 88, 95, 102, 109, 110, 113, 117, 124-148, 150-177, 179, 186, 190, 191, 194, 198, 206, 208, 218 and 219 are cancelled.

Claims 1, 13, 32, 33, 36, 65, 94, 123, 149, 178, 204 and 212 are determined to be patentable as amended.

Claims 3-8, 10-12, 14-17, 20-21, 23-25, 27-31, 38-43, 45-50, 53-54, 56-58, 60-64, 67-72, 74-79, 82-83, 85-87, 89-93, 96-101, 103-108, 111-112, 114-116, 118-122, 180-185, 187-189, 192-193, 195-197, 199-203, 205, 207, 209-211, 213-217 and 220-221, dependent on an amended claim, are determined to be patentable.

1. A wall-mountable system for controlling electrical power to a load comprising, in combination:

(a) switch means for turning said power on and off, including first pushbutton or touch actuator means constructed and arranged for operating said switch means; *[and]*

(b) dimmer means for controlling the amount of power provided to said load, including second actuator means constructed and arranged for operating said dimmer means, said first actuator means constructed and arranged for being operated by a user and having a surface area which is substantially larger than the surface area of said second actuator means which is constructed and arranged for being operated by the user; *[and]*

(c) *a faceplate for mounting over said switch means and dimmer means, said faceplate having an opening through which said first and second actuators extend; said first and second actuator means being located immediately adjacent to each other, said first and second actuator means occupying a region which serves as an active control zone for said wall-mountable system, said active control zone having a surface area which is dominated by the surface area of said first actuator means, whereby the switch function is emphasized over the dimmer function to the user.*

13. A wall-mountable system for controlling electrical power to a load comprising, in combination:

(a) switch means for turning said power on and off, including first *[pushbutton or touch]* actuator means *which is a pushbutton* constructed and arranged for operating said switch means; and

(b) dimmer means for controlling the amount of power provided to said load, including second actuator means constructed and arranged for operating said dimmer means; *[and]*

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(c) *a faceplate for mounting over said switch means and dimmer means, said faceplate having an opening through which said first and second actuators extend; said first actuator means being substantially larger than said second actuator means, said second actuator means being a linear slide and in which said [first actuator means is a] pushbutton [and] is located immediately adjacent to said linear slide, whereby the switch function is emphasized over the dimmer function to the user.*

32. The *[control] system* of claim 31, *wherein said pushbutton or touch actuator means comprises a pushbutton, further comprising support means for supporting said device and an indicator lamp between said support means and said pushbutton.*

33. The *[control] system* of claim 32, *further comprising means for transmitting a force applied to said pushbutton to provide control of said device, in which said force transmitting means is a light pipe and extends between said indicator lamp and said pushbutton.*

36. A wall-mountable system for controlling electrical power to a load comprising, in combination:

(a) switch means for turning said power on and off, said switch means including a first actuator means constructed and arranged for operating said switch means; and

(b) dimmer means for controlling the amount of power provided to said load, said dimmer means including a second actuator means constructed and arranged for operating said dimmer means, said first actuator means constructed and arranged for being operated by a user and having a surface area which is substantially larger than the surface area of said second actuator means which is constructed and arranged for being operated by the user; *and*

(c) *a faceplate for mounting over said switch means and dimmer means, said faceplate having an opening through which said first and second actuators extend, said second actuator means being located at the perimeter of said first actuator, whereby the switch function is emphasized over the dimmer function to the user.*

65. A wall-mountable system for controlling electrical power to a load, said system having a faceplate with a *vertical centerline* and comprising, in combination:

(a) switch means for turning said power on and off, said switch means including a first actuator means constructed and arranged for operating said switch means; and

(b) dimmer means for controlling the amount of power provided to said load, said dimmer means including a second actuator means constructed and arranged for operating said dimmer means, said first actuator means being centrally positioned on said faceplate and said second actuator means being located at a distance from said *vertical centerline*, wherein said first actuator means has a surface area at least two times as large as the surface area of said second actuator means, whereby the switch function is emphasized over the dimmer function to the user, *said faceplate being constructed and arranged for mounting over said switch means and dimmer means, said faceplate having an opening through which said first and second actuator means extend.*

94. A wall-mountable system for controlling electrical power to a load, said system having a faceplate with a *centerline* and comprising, in combination:

(a) switch means for turning said power on and off, said switch means including a first actuator means constructed and arranged for operating said switch means; and

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(b) dimmer means for controlling the amount of power provided to said load, said dimmer means including a second actuator means constructed and arranged for operating said dimmer means, said first actuator constructed and arranged for being operated by a user and having a surface area which is substantially larger than the surface area of said second actuator means which is constructed and arranged for being operated by the user, said first actuator means being centrally positioned on said faceplate and positioned on said centerline and said second actuator being located at a distance from said centerline but adjacent to said first actuator means, whereby the switch function is emphasized over the dimmer function to the user, said faceplate being constructed and arranged for mounting over said switch means and dimmer means, said faceplate having an opening through which said first and second actuators extend.

123. [A wall-mountable] The system [for controlling electrical power to a load comprising, in combination:

(a) switch means for turning said power on and off, said switch means including a first actuator means constructed and arranged for operating said switch means; and
(b) dimmer means for controlling the amount of power provided to said load, said dimmer means including a slider or a rocker device which serves as a second actuator means constructed and arranged for operating said dimmer means,] according to claim 178, wherein said first and second actuator means [being located] extend through said opening immediately adjacent to each other, said first and second actuators occupying a region which serves as an active control zone for said wall-mountable system, and said first actuator having a substantially larger surface area to be contacted by the user for operating said switch means than the surface area of the second actuator to be contacted by the user for operating said dimmer means, whereby the switch function is emphasized over the dimmer function to the user].

149. [A wall-mountable] The system [for controlling electrical power to a load comprising, in combination:

(a) switch means for turning said power on and off, said switch means including a first actuator means constructed and arranged for operating said switch means; and
(b) dimmer means for controlling the amount of power provided to said load, said dimmer means including a slider, a rocker device or rotary device which serves as a second actuator means constructed and arranged for operating said dimmer means,] according to claim 178, wherein said second actuator means [being] is located at the perimeter of said first actuator means, and said first and second actuator means [occupying] occupy a region which serves as an active control zone for said wall-mountable system, and said first actuator means having a substantially larger surface area to be contacted by the user for operating said switch means than the surface area of the second actuator to be contacted by the user for operating said dimmer means, whereby the switch function is emphasized over the dimmer function to the user].

178. A wall-mountable system for controlling electrical power to a load comprising, in combination:

(a) switch means for turning said power on and off, said switch means including a first actuator means constructed and arranged for operating said switch means; [and]

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(b) dimmer means for controlling the amount of power provided to said load, said dimmer means including a slider or rocker device which serves as a second actuator means constructed and arranged for operating said dimmer means, said first actuator means constructed and arranged for being operated by a user and having a control area which is substantially larger than the control area of said second actuator means which is constructed and arranged for being operated by the user, whereby the switch function is emphasized over the dimmer function to the user; and

(c) a faceplate for mounting over said switch and dimmer means, said faceplate having an opening through which said first and second actuators extend and said second actuator means being located adjacent a peripheral edge of said first actuator means within said opening.

204. A wallbox-mountable electrical control comprising, in combination,

(a) a pushbutton-actuated electrical control device having a first actuator means for operating said pushbutton-actuated electrical control device,

(b) means attachable to said wallbox for supporting said device,

(c) dimmer means for controlling the amount of power provided to a load, said dimmer means including a second actuator means constructed and arranged for operating said dimmer means,

(d) a faceplate for mounting over said support means, said faceplate having an opening,

(e) said first actuator means comprising a pushbutton having integral means for resiliently supporting said pushbutton on said support means, said pushbutton being actuatable through said opening in said faceplate, and

(f) means for transmitting a force applied to said pushbutton to provide control of said device, wherein said second actuator means is actuatable through said opening in said faceplate and adjoins said pushbutton, and wherein said first actuator means has a substantially larger surface area than said second actuator means, whereby the switch function is emphasized over the dimmer function to the user.

212. A wall-mountable system for controlling electrical power to a load comprising in combination:

(a) switch means for turning said power on and off, said switch means including a first actuator means adapted for operating said switch means, said first actuator means having upper and lower portions for turning said power on and off, respectively, and a central portion housing means for detecting a signal from an external source for also controlling said power in response to said signal; and

(b) dimmer means for controlling the amount of power provided to said load, said dimmer means including a second actuator means adapted for operating said dimmer means, said first actuator having a surface area which is substantially larger than the surface area of said second actuator means, said second actuator means being located adjacent a peripheral edge of said first actuator; and

(c) a faceplate for mounting over said switch and dimmer means, said faceplate having an opening through which said first and second actuators extend and said second actuator means being located adjacent a peripheral edge of said first actuator means within said opening.

* * * * *

EXHIBIT B

US005248919A

United States Patent [19][11] **Patent Number:** 5,248,919**Hanna et al.**[45] **Date of Patent:** Sep. 28, 1993[54] **LIGHTING CONTROL DEVICE**

[75] **Inventors:** Robert S. Hanna, Macungie; Donald F. Hausman, Jr., Emmaus; David E. Houggy, Jr., Allentown; Donald R. Mosebrook, Bethlehem; Joel S. Spira, Coopersburg, all of Pa.

[73] **Assignee:** Lutron Electronics Co., Inc., Coopersburg, Pa.

[21] **Appl. No.:** 860,921

[22] **Filed:** Mar. 31, 1992

[51] **Int. Cl.⁵** H05B 37/02

[52] **U.S. Cl.** 315/291; 315/292; 315/293; 315/297

[58] **Field of Search** 315/291, 292, 293, 294, 315/DIG. 4, 307, 297

[56] **References Cited****U.S. PATENT DOCUMENTS**

4,359,670 11/1982 Hosaka et al. 315/291
4,649,323 3/1987 Pearlman et al. 315/291
4,924,151 5/1990 D'Aleo et al. 315/297

FOREIGN PATENT DOCUMENTS

2021751 12/1979 United Kingdom .

OTHER PUBLICATIONS

Lightolier® Controls brochure, "Lighting Controls for the 1990's", Brochure No. 27191, Jan. 1991.

Ambiance™ Kliegl brochure, Kliegl Bros. Universal Electric Stage Lighting Co., Inc.

Architectural Dimming Environ®2 brochure, Aug. 1983, Strand Century, Inc.

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[57]

ABSTRACT

A lighting control device for controlling the state and intensity level of at least one lamp. The device includes a user-actuable intensity selector for selecting a desired intensity level between a minimum intensity level and a maximum intensity level, a control switch for generating control signals representative of preselected states and intensity levels of the lamp in response to an input, and a control responsive to the intensity selector and the control switch for causing the lamp to fade from an off state to the desired intensity level when the input from a user causes a single switch closure of transitory duration, such fade occurring at a first fade rate, fade from any intensity level to the maximum intensity level when the input from a user comprises two switch closures of transitory duration in rapid succession, such fade occurring at a second fade rate, and fade from the desired intensity level to an off state when the input from a user comprises a single switch closure of more than a transitory duration, such fade occurring at a third fade rate, each of such fade rates being non-instantaneous.

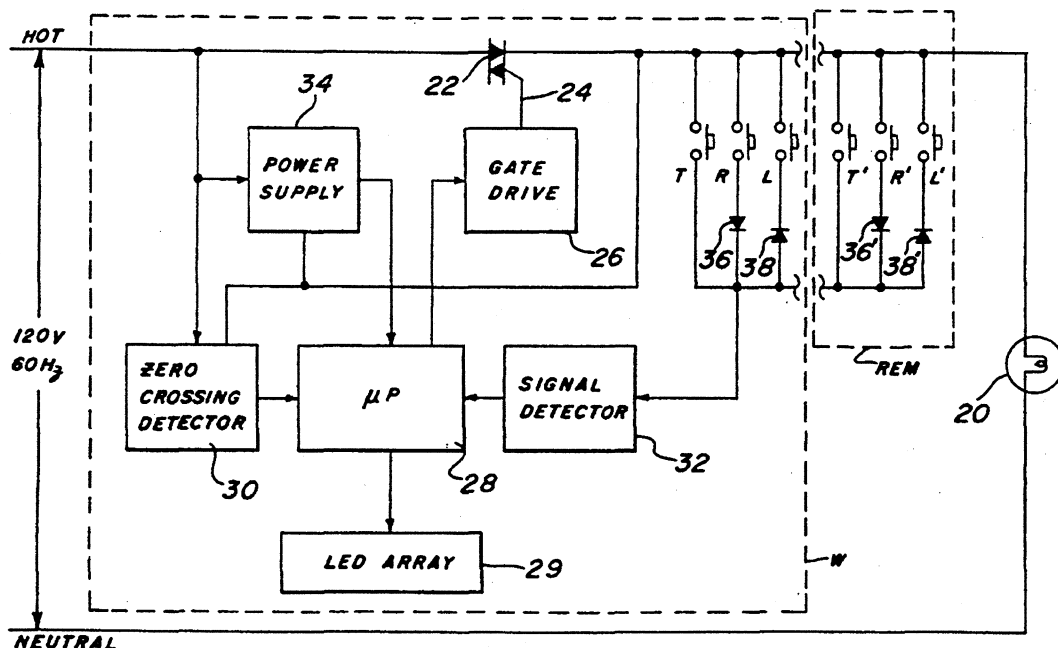
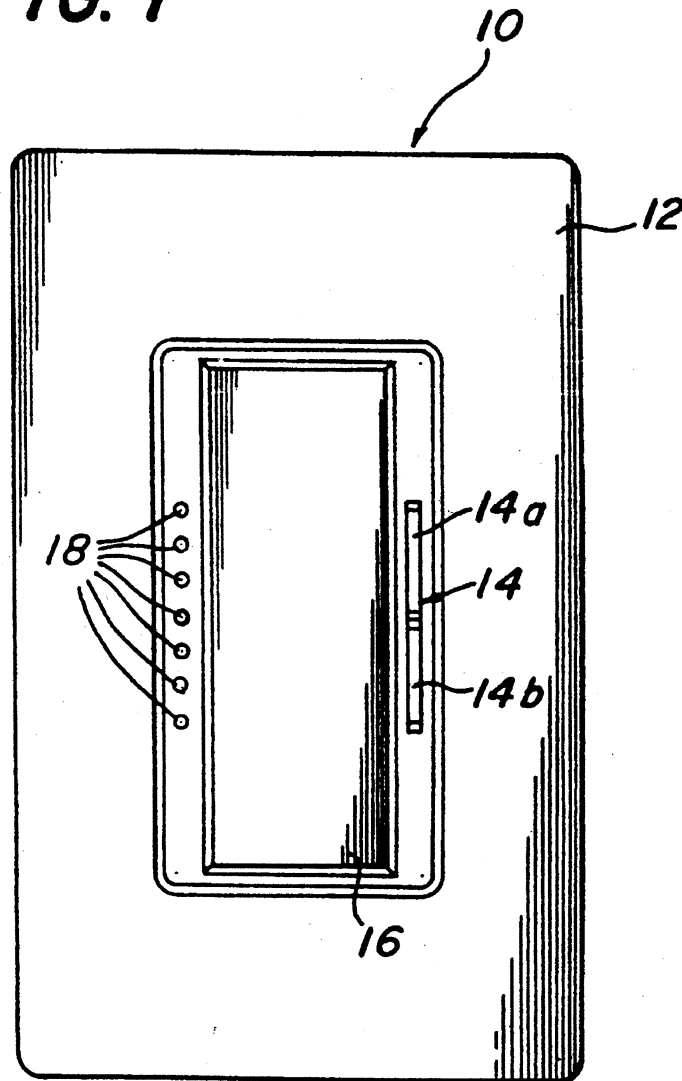
52 Claims, 5 Drawing Sheets

FIG. 1



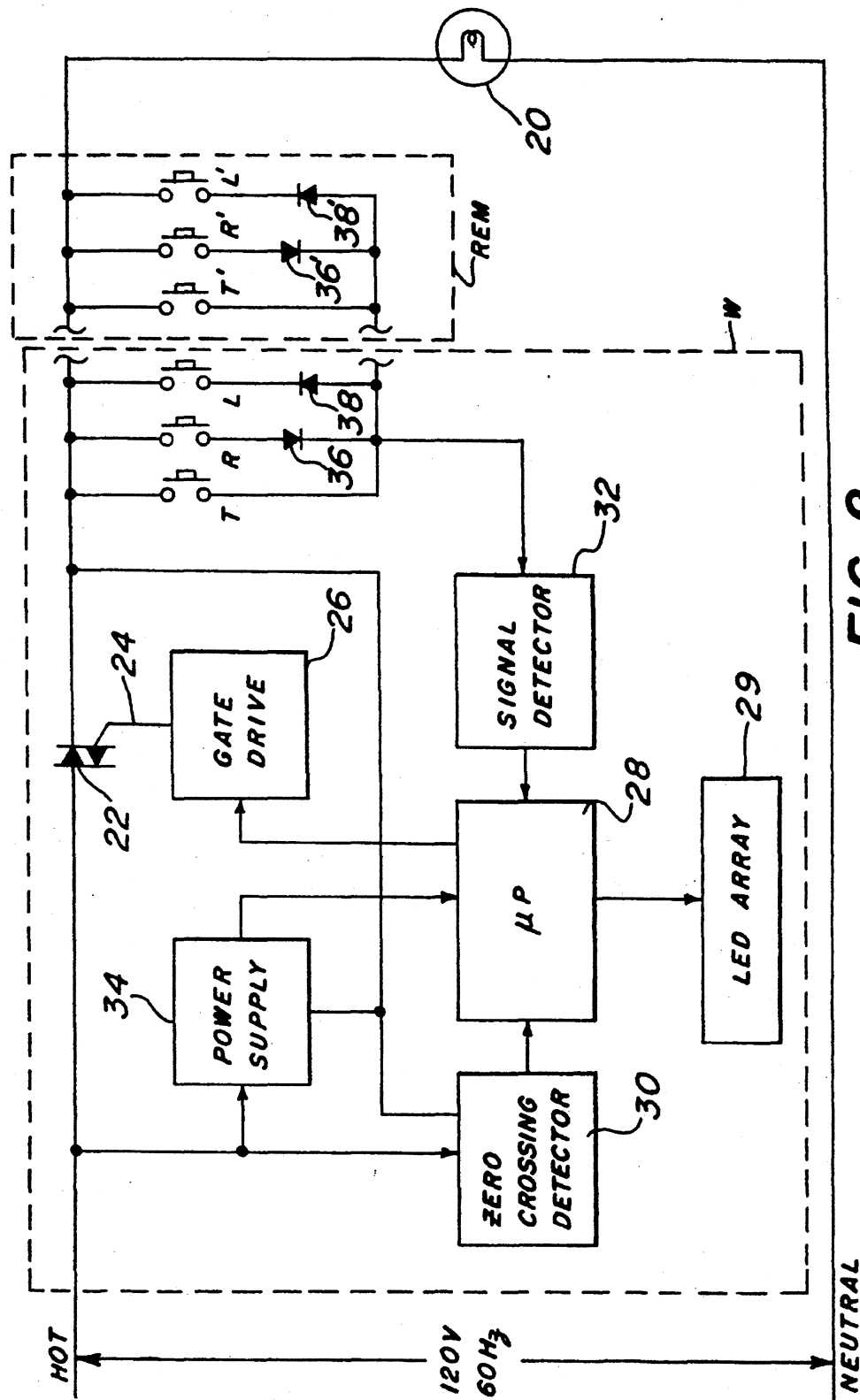


FIG. 2

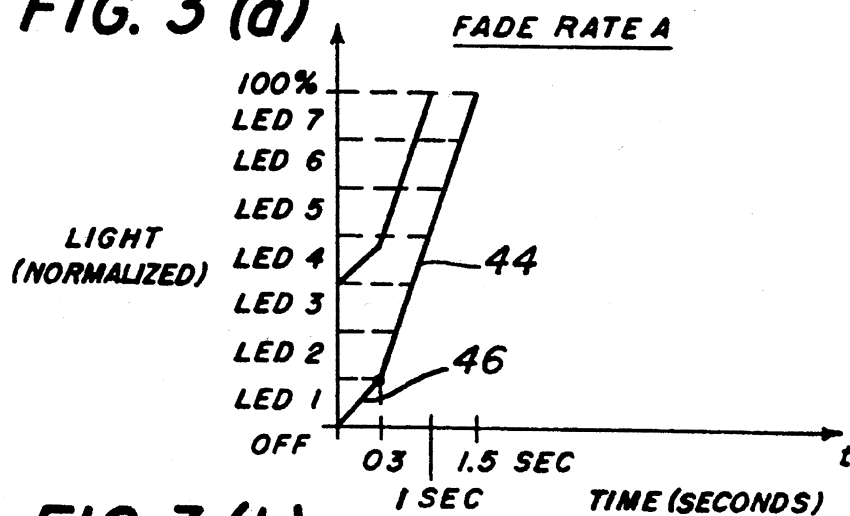
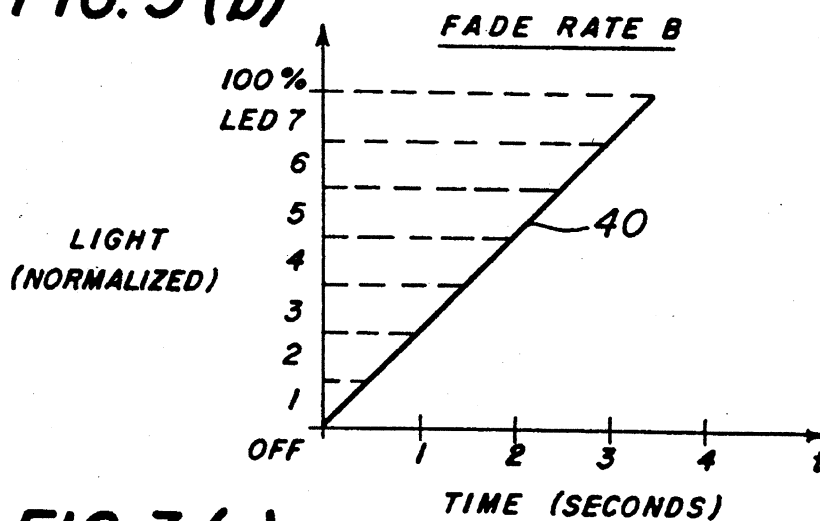
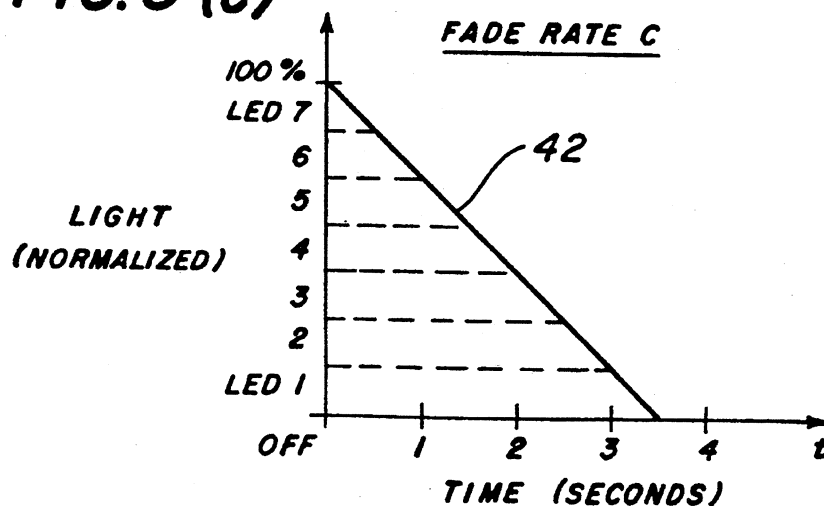
FIG. 3 (a)**FIG. 3 (b)****FIG. 3 (c)**

FIG. 3(d)

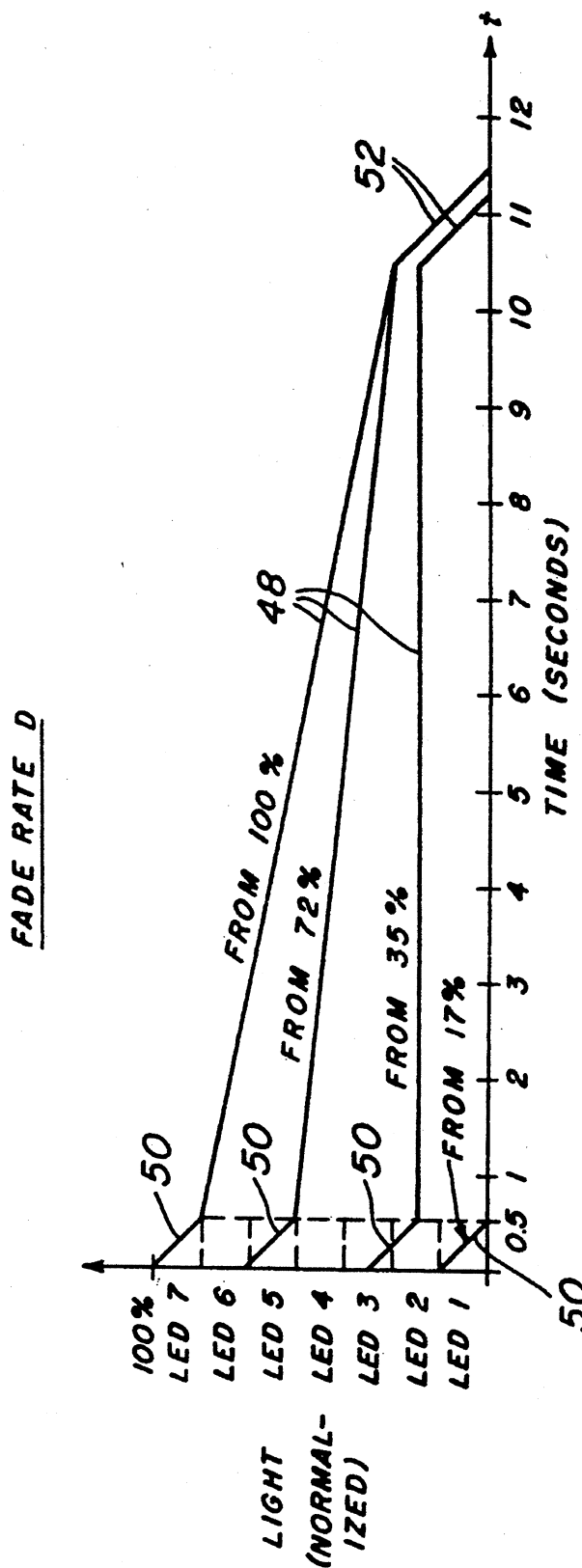
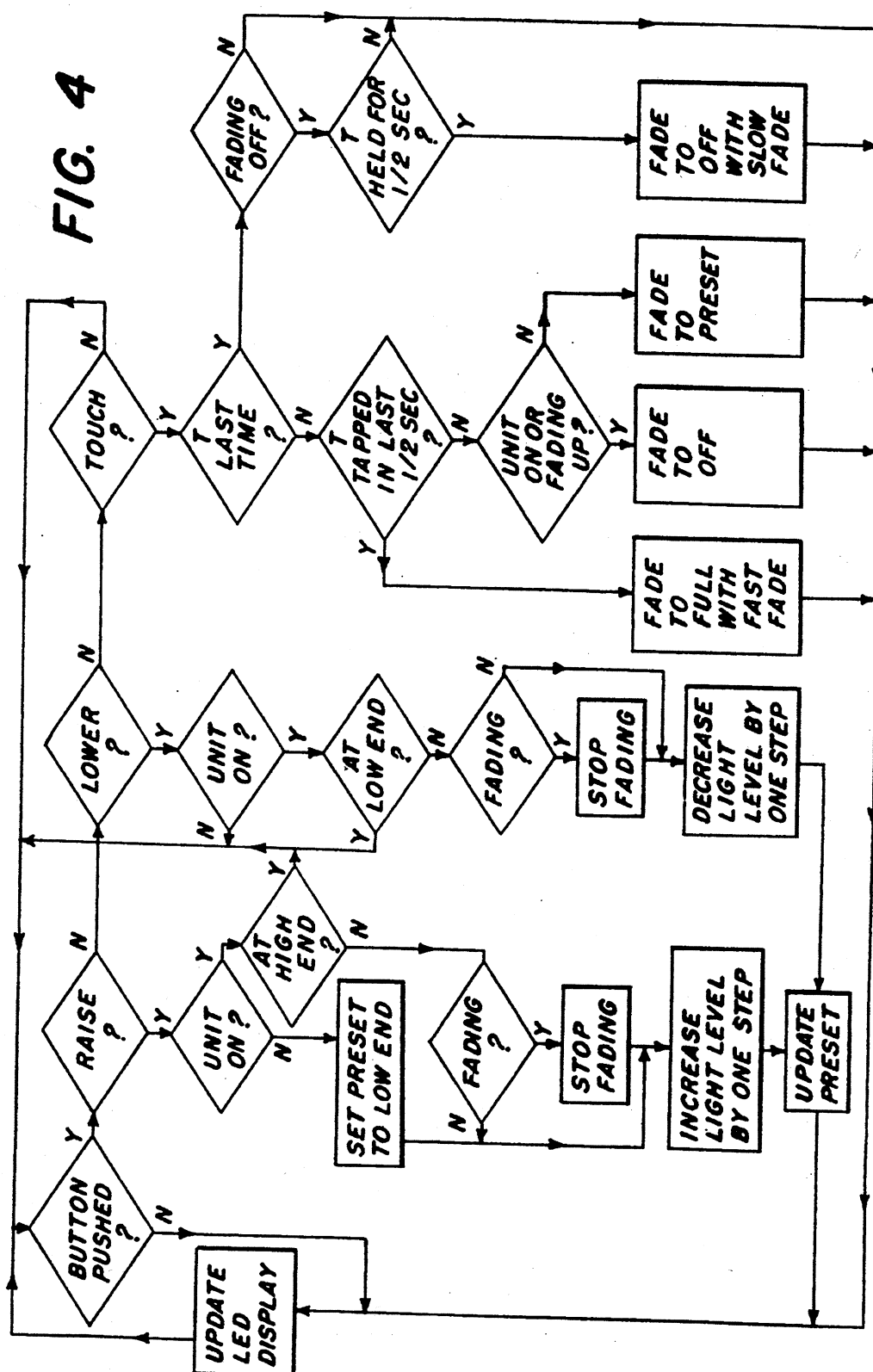


FIG. 4



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LIGHTING CONTROL DEVICE

FIELD OF THE INVENTION

The present invention relates to devices for operating, switching and controlling the intensity of lighting.

BACKGROUND OF THE INVENTION

Wall-mounted light switches which include a dimmer have become increasingly popular, especially for applications where it is desired to precisely control the level of light intensity in a particular room. Such dimmer switches usually employ a variable resistor which is manipulated by hand to control the switching of a triac which in turn varies the voltage input to the lamp to be dimmed.

This type of dimmer switch is simple and easy to construct, but offers limited flexibility. One feature this type of dimmer switch lacks is the ability to return to a preselected light intensity level after having been turned to full power. This type of dimmer switch has no memory to enable it to do this, however, and preselected light intensity levels established previously can be reestablished only by trial and error in manipulating the variable resistor.

There exist touch actuator controls which address some of the limitations of the manually-operated variable resistor dimmer switches just described. One such touch actuator control cycles repetitively through a range of intensities from dim to bright in response to extended touch inputs. A memory function is provided such that, when the touch input is removed, the cycle will be stopped and the level of light intensity at that point in the cycle will be stored in a memory. A subsequent short touch input will turn the light off, and a further short touch input will turn the light on at the intensity level stored in the memory. While this type of switch is an improvement over manually-operated variable resistor dimmer switches, it requires the user to go through the cycle of intensity levels in order to arrive at a desired intensity level. In addition, it still lacks the ability to return to a desired intensity level after having been set to full light output. A user must go through the cycle again until he or she finds the light intensity level desired. Moreover, this type of switch has no ability to perform certain aesthetic effects such as a gradual fade from one light intensity level to another.

U.S. Pat. No. 4,649,323 discloses a microcomputer-controlled light control which provides a fade function. The control disclosed in that patent is operated by a pair of non-latching switches which provide inputs to a microcomputer. The microcomputer is programmed to determine whether the switches are tapped or held (i.e., whether they are touched for a transitory duration or for a longer period of time). When a switch is held, the light intensity is either decreased or increased, and release of the switch causes the intensity setting to be entered into a memory. If the control is operating at a static light intensity level, a tap of a switch will cause the light intensity level to fade toward a predetermined level, either off, full on or a preset level. A tap while the light intensity level is fading will cause the fade to be terminated and cause the light intensity level to shift immediately and abruptly to either full on or full off, depending on which switch was tapped. This type of control, however, is not without drawbacks of its own. For example, a single tap by a user is interpreted in either of two very different ways (initiate fade or termi-

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nate fade), depending on the state of the control at the time the user applies the tap to a switch. This can be confusing to a user, who may erroneously terminate a fade when it is desired to initiate a fade, and vice versa.

In addition, it is not possible to reverse a fade by a subsequent tap of the same switch while a fade is in progress. Instead, a tap while the control is fading in one direction will not reverse the direction of the fade but will cause the control to "jump" to either full on or full off. An abrupt shift from a low intensity level to full on, or from a high intensity to no light at all (full off) can be quite startling to the user and others in the area (and even dangerous, if the user and others are suddenly plunged into darkness).

The control disclosed in U.S. Pat. No. 4,649,323 also lacks a long-duration fade to off, as do the other prior control designs. In many cases, it is desirable for a user to be able to have the lights fade out gradually. For example, a user may wish to turn out bedroom lights before retiring, but still have sufficient light to safely make his or her way from the control location to the bed before the lights are completely extinguished. There may also be situations where the night staff of a large building may need to extinguish ambient lights from a central location which is located some distance away from an exit, and may need a gradually decreasing level of illumination in order to walk safely to the exit. These situations would not be possible with the prior control, which would offer the user either almost immediate darkness or a constant level of intensity throughout the night, neither of which would be acceptable.

There is thus a need for an improved lighting control and dimming device which offers advantages not possible with prior controls while avoiding the drawbacks of the prior controls. The present invention fills that need.

SUMMARY OF THE INVENTION

The present invention is directed to a lighting control for controlling the state and intensity level of at least one lamp. The device includes user-actuable intensity selecting means for selecting a desired intensity level between a minimum intensity level and a maximum intensity level, control switch means for generating control signals representative of preselected states and intensity levels of said at least one lamp in response to an input from a user, and control means responsive to said intensity selecting means and said control switch means for causing said lamp to fade from an off state to the desired intensity level when said input from a user causes a switch closure, said fade occurring at a first fade rate, fade from any intensity level to the maximum intensity level when said input from a user causes two switch closures of transitory duration in rapid succession, said fade occurring at a second fade rate, and fade from the desired intensity level to an off state when said input from a user causes a single switch closure of a transitory duration, said fade occurring at a third fade rate, each of said fade rates being non-instantaneous, or fade from the desired intensity level to an off state when said input from a user causes a single switch closure of more than a transitory duration, said fade occurring at a fourth fade rate.

In one embodiment of the invention, the first, second and third fade rates are equal. In an alternate embodiment, the second fade rate is substantially faster than the first fade rate. In still another embodiment, the fourth

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fade rate is substantially slower than both the first, second and third fade rates.

The control means may be further responsive to said intensity selecting means for causing said lamp to fade from a first intensity level to a second intensity level at a fifth fade rate when said intensity selecting means is actuated for a period of more than transitory duration.

The invention may further comprise indicator means for visually indicating the intensity level when the lamp is on. The indicator means may comprise a plurality of light sources disposed in a sequence representing a range from the minimum intensity level to the maximum intensity level, the position of each light source within said sequence being representative of an intensity level relative to said minimum and maximum intensity levels. The sequence may, but need not, be linear.

The indicator means may further comprise a plurality of light sources disposed in a sequence representing a range from the minimum intensity level to the maximum intensity level, a selected one of said light sources representing said desired intensity level relative to said minimum and maximum intensity levels being illuminated at a first illumination level and each of the remaining light sources being illuminated at a second illumination level which is less than said first illumination level when said lamp is off. The second illumination level is preferably sufficient to enable said light sources to be readily perceived by eye in a darkened environment. This further plurality of light sources may be the same light sources as the first-mentioned plurality of light sources.

The control means preferably includes a microcomputer means. The microcomputer means may include means for storing in a memory means digital data representative of said fade rates. The microcomputer means may also include means for storing in a memory means digital data representative of a desired intensity level in response to actuation of said intensity selecting means. Further said control means may comprise means for varying the fade rates stored in memory.

In one embodiment of the invention, the intensity selecting means comprises rocker switch means actuable between first, second and third positions, one of said positions corresponding to an increase in intensity level, the second of said positions corresponding to a decrease in intensity level, and the third being a neutral position. In an alternate embodiment, the intensity selecting means comprises first and second switch means each actuatable between first and second positions, actuation of one of said switch means causing an increase in the desired intensity level and actuation of the other of said switch means causing a decrease in the desired intensity level.

The control means may comprise microcomputer means for distinguishing between an input to said control switch means of transitory duration and an input of more than a transitory duration, and for initiating the fade of said lamp according to an appropriate one of said fade rates as determined by said inputs. In that case, the microcomputer means may include means for storing in a memory means digital data representative of said fade rates.

DESCRIPTION OF THE DRAWINGS

For the purpose of illustrating the invention, there is shown in the drawings a form which is presently preferred; it being understood, however, that this invention is not limited to the precise arrangements and instrumentalities shown.

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FIG. 1 is a front view of a wall control embodying the lighting control device according to the present invention.

FIG. 2 is a simplified block diagram of a preferred embodiment of the lighting control device according to the invention.

FIG. 3, parts (a) through (d), illustrates the various fade rates and fade rate profiles for the control device.

FIG. 4 is a flow diagram showing the operation of the control device according to the invention.

DESCRIPTION OF THE INVENTION

Referring now to the drawings, wherein like numerals indicate like elements, there is shown in FIG. 1 a wall control 10 embodying the lighting control device according to the present invention. Wall control 10 comprises a cover plate 12, intensity selection actuator 14 for selecting a desired level of light intensity of a lamp controlled by the device, and a control switch actuator 16. Cover plate 12 need not be limited to any specific form, and is preferably of a type adapted to be mounted to a conventional wall box commonly used in the installation of lighting control devices. Actuators 14 and 16 likewise are not limited to any specific form, and may be of any suitable design which permits manual actuation by a user. Preferably, although not necessarily, actuator 14 controls a rocker switch, but may also control two separate push switches, for example, without departing from the invention. The switches controlled by actuator 14 may be directly wired into the control circuitry to be described below, or may be linked by an extended wired link, infrared link, radio frequency link, power line carrier link or otherwise to the control circuitry. Likewise, the switch controlled by actuator 16 may also be directly wired into the control circuitry, or linked by an extended wired link, infrared link, radio frequency link, power line carrier link or otherwise to the control circuitry. Preferably, but not necessarily, actuator 16 controls a pushbutton type of switch, but may it be of the touch-sensitive type or any other suitable type. Actuation of the upper portion 14a of actuator 14 increases or raises the light intensity level, while actuation of lower portion 14b of actuator 14 decreases or lowers the light intensity level.

Wall control 10 includes an intensity level indicator in the form of a plurality of light sources 18. Light sources 18 are preferably, but need not be, light-emitting diodes (LEDs) or the like. Light sources 18 may occasionally be referred to herein as LEDs, but it should be understood that such a reference is for ease of describing the invention and is not intended to limit the invention to any particular type of light source. Light sources 18 are arranged in an array, in this embodiment a linear array, representative of a range of light intensity levels of the lamp or lamps being controlled from a minimum intensity level, preferably the lowest visible intensity (but which may be zero, or "full off") to a maximum intensity level (which is typically "full on"). By illuminating a selected one of light sources 18 depending upon light intensity level, the position of the illuminated light source within the array will provide a visual indication of the light intensity relative to the range when the lamp or lamps being controlled are on. For example, seven LEDs are illustrated in FIG. 1. Illuminating the uppermost LED in the array will give an indication that the light intensity level is at or near maximum. Illuminating the center LED will give an indication that the light intensity level is at about the

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midpoint of the range. Any convenient number of light sources 18 can be used, and it will be understood that a larger number of light sources in the array will yield a commensurately finer gradation between intensity levels within the range. In addition, when the lamp or lamps being controlled are off, all of the light sources 18 can be constantly illuminated at a low level of illumination, while the LED representative of the present intensity level in the on state is illuminated at a higher illumination level. This enables the light source array to be more readily perceived by the eye in a darkened environment, which assists a user in locating the switch in a dark room, for example, in order to actuate the switch to control the lights in the room, but still provides sufficient contrast between the level-indicating LED and the remaining LEDs to enable a user to perceive the relative intensity level at a glance.

The circuitry of the control device of the present invention is illustrated in the simplified block diagram of FIG. 2. A lamp 20, which may be an incandescent lamp (or lamps) rated between 40 W and several hundred watts, is connected between the HOT and NEUTRAL terminals of a standard source of 120 V, 60 Hz AC power through a thyristor or similar control device 22. A conventional radio frequency interface filter (not shown) comprising a series choke and parallel capacitor can also be included. Thyristor 22 has a control, or gate, input 24 which is connected to a gate drive circuit 26. As those skilled in the art will understand, control inputs on the gate input 24 will render the thyristor conductive or non-conductive, which in turn controls the power supplied to lamp 20. Gate drive circuit 26 provides the control inputs appropriate to the particular thyristor 22 being used in response to command signals from a microcomputer 28. Microcomputer 28 also generates command signals to the array 29 of light sources (labeled "LED ARRAY" in FIG. 2). Inputs to microcomputer 28 are received from zero-crossing detector 30 and signal detector 32. Power to microcomputer 28 is supplied by power supply 34.

Signal detector 32 receives as inputs switch closure signals from switches designated T, R, and L in FIG. 2. Switch T corresponds to the switch controlled by switch actuator 16 in FIG. 1, and switches R and L correspond to the switches controlled by the upper portion a and lower portion b, respectively, of intensity selection actuator 14. Actuators 14 and 16 may be linked to switches T, R and L in any convenient manner.

As will be seen in FIG. 2, closure of switch T will connect the input of signal detector 32 to the dimmed HOT side of the AC supply when triac 22 is nonconducting, and will allow both positive and negative half-cycles of the AC waveform (as referenced to the HOT line) to reach signal detector 32. Closure of switches R and L will also connect the input of signal detector 32 to the dimmed HOT side of the AC supply when triac 22 is nonconducting, but when switch R is closed, only the positive half-cycles of the AC waveform are passed to signal detector 32 because of series diode 36. Series diode 36 is connected with its anode to switch R and its cathode to signal detector 32, so that only positive polarity signals are passed by diode 36. In similar manner, when switch L is closed, only the negative half-cycles of the AC waveform are passed to signal detector 32 because of series diode 38, which is connected so as to allow only negative polarity signals to pass to signal detector 32.

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Signal detector 32 detects when, switches T, R, and L are closed, and outputs signals representative of the state of the switches as inputs to microcomputer 28. Signal detector 32 can be any form of conventional circuit for detecting a switch closure and converting it to a form suitable as an input to a microcomputer. Those skilled in the art will understand how to construct signal detector 32 without the need for further explanation herein. Microcomputer 28 determines the duration of closure in response to inputs from signal detector 32.

Zero-crossing detector 30 determines the zero-crossing points of the input 60 Hz AC waveform from the AC power source. The zero-crossing information is provided as an input to microcomputer 28, so that the gate drive commands from microcomputer 28 "gate" the thyristor 22 to provide voltage from the AC power source to lamp 20 at predetermined times relative to the zero-crossing points of the AC waveform. Zero-crossing detector 30 per se is conventional, and need not be described here in further detail. In addition, the timing of the thyristor firing pulses relative to the zero crossings of the AC waveform is also known per se, and need not be described further.

Closure of switch R, such as by a user depressing actuator 14a, initiates a preprogrammed "raise light level" routine in microcomputer 28 and causes microcomputer 28 to decrease the length of time between the zero crossing and the firing pulse to thyristor 22 via gate drive circuit 26 in each half cycle. Decreasing the off time increases the amount of time thyristor 22 is conductive, which means that a greater proportion of AC voltage from the AC input is transferred to lamp 20. Thus, the light intensity level of lamp 20 is increased. The off time decreases as long as switch R remains closed. As soon as switch R opens, by the user releasing actuator 14a, the routine in the microcomputer is terminated, and the time between the zero crossing and the firing pulse to thyristor 22 is held constant. In a similar manner, closure of switch L initiates a preprogrammed "lower light level" routine in microcomputer 28 and causes microcomputer 28 to increase the time between the zero crossing and the firing pulse to thyristor 22 via gate drive circuit 26. Increasing the off time decreases the amount of time thyristor 22 is conductive, which means that a lesser proportion of AC voltage from the AC input is transferred to lamp 20. Thus, the light intensity level of lamp 20 is decreased. The off time is increased as long as switch L remains closed. As soon as switch L opens, by the user releasing actuator 14b, the routine in the microcomputer 28 is terminated, and the time between the zero crossing and the firing pulse to thyristor 22 is held constant.

Switch T is closed in response to actuation of actuator 16, and will remain closed for as long as actuator 16 is depressed by a user. Signal detector 32 provides a signal to microcomputer 28 that switch T has been closed. Microcomputer 28 determines the length of time that switch T has been closed. Microcomputer 28 can discriminate between a closure of switch T which is of only transitory duration and a closure which is of more than a transitory duration. Thus, microcomputer 28 is able to distinguish between a "tap" (a closure of transitory duration) and a "hold" (a closure of more than transitory duration). Microcomputer 28 is also able to determine when switch T is transitorily closed a plurality of times in succession. That is, microcomputer 28 is

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able to determine the occurrence of two or more taps in quick succession.

Different closures of switch T will result in different effects depending on the state of lamp 20. When lamp 20 is already on at a given preset intensity level, a single tap, i.e., a transitory closure of switch T, will cause a fade to off and two taps in quick succession will initiate a routine in microcomputer 28 which fades the lamp from the preset intensity level to a maximum intensity level at a preprogrammed fade rate. A "hold" of switch T, i.e., a closure of more than a transitory duration, initiates a routine in microcomputer 28 which gradually fades in a predetermined fade rate sequence over an extended period of time from the preset intensity level to off. When lamp 20 is off and microcomputer 28 detects a single tap or a closure of more than transitory duration, however, a preprogrammed routine is initiated in microcomputer 28 which fades the light intensity level of lamp 20 from the off state to a preset desired intensity level at a preprogrammed fade rate. Two taps in quick succession will initiate a routine in microcomputer 28 which fades at a predetermined rate from off to full. The fade rates may all be equal, or they may be different.

All of the previously-described circuitry is preferably contained in a standard wall box, schematically illustrated in FIG. 2 by the dashed outline labelled W. In addition, a further set of switches R', L' and T' and diodes 36' and 38' may be provided in a remote location in a separate wall box, schematically illustrated in FIG. 2 by the second dashed outline, labelled Rem. The action of switches R', L' and T' corresponds to the action of switches R, L and T.

Examples of suitable fade rates and fade rate profiles are illustrated in FIG. 3, parts (a) through (d). Although these fade rates are presently preferred, it should be understood that the illustrated fade rates are not the only ones which may be used with the invention, and any desired fade rate or fade rate profile may be employed without departing from the invention. Part (b) of FIG. 3 illustrates a first fade rate, at which lamp 20 fades up from an off state to a desired intensity level. The first fade rate from "off" to a desired intensity level is labelled with reference numeral 40. Part (b) of FIG. 3 illustrates the fade rate in terms of a graph of normalized light intensity level, from "off" to 100%, v. time, given in seconds. Preferably, fade rate 40 fades from "off" to 100% in about 3.5 seconds, i.e., at the rate of about +30% per second. This fade rate is used when the lighting control device 10 of the invention receives as a user input a single tap of the control switch actuator 16 and the lamp under control was previously off. This fade rate may, but need not, also be used when a user selects a desired intensity level by actuating intensity selection actuator 14. Thus, the lamp 20 will fade up from one intensity level to another at fade rate 40 when upper portion 14a of actuator 14 is actuated by the user. Similarly, part (c) of FIG. 3 illustrates a fade rate 42 at which lamp 20 will fade down from one intensity level to another when actuator 16 is tapped when the lamp under control is already on or lower portion 14b of actuator 14 is actuated by the user. Fade rate 42 is illustrated as being the same as fade rate 40, but with opposite sign, and fades down from 100% to "off" in about 3.5 seconds, for a fade rate of about 30% per second. However, it will be understood that the precise fade rates are not crucial to the invention, and fade rates 40 and 42 can be different.

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Part (a) of FIG. 3 illustrates a second fade rate 44 at which lamp 20 fades up to 100% when the lighting control device 10 receives as a user input two quick taps in succession on control switch actuator 16. As noted above, two quick taps on actuator 16 cause lamp 20 to fade from its then-current light intensity level to 100%, or full on. Fade rate 44 is preferably substantially faster than first fade rate 40, but not so fast as to be substantially instantaneous. A preferred fade rate 44 is about +66% per second, and preferably does not exceed 100% per second. If desired, the fade rate 44 can be initiated after a short time delay, such as 0.3 seconds, or can, in that interval, be preceded by a slower fade rate 46, as shown in part (a) of FIG. 3. This provides a more gradual initiation to the fade up, and is less startling to a user.

A "hold" input at actuator 16 causes lamp 20 to fade from its then-current intensity level to off at a third fade rate 48, as shown in part (d) of FIG. 3. Preferably, fade rate 48 is substantially slower than any of the previously illustrated fade rates. Fade rate 48 is also not constant, but varies depending upon the then-current intensity level of lamp 20. However, the fade rate is preferably always such that the lamp 20 will fade from its then-current intensity level to off in approximately the same amount of time for all initial intensity levels. For example, if lamp 20 is desired to fade to off in about ten seconds (to give the user time to cross a room before the lights are extinguished, for example), a fade rate of about 10% per second will be used if the then-current intensity level of the lamp 20 is 100%. On the other hand, if the then-current intensity level of lamp 20 is only 35%, the fade rate will be only 3.5% per second, so that the lamp 20 will not reach full off until the desired ten seconds. In addition, if desired, a slightly faster fade rate 50 may be used in the initial half-second or so of fadeout, in order to give the user immediate feedback to confirm that the fadeout has been initiated. A suitable fade rate 50 may be on the order of 33% per second. A similarly more rapid fade rate 52 may also be used near the very end of the fadeout, so that the lamp 20 be quickly extinguished after fading to a low level. Thus, after about ten seconds of fadeout, at a relatively slow rate, the lamp 20 will fade the rest of the way to off in about one more second. If the fast initial and final fade rates are used, then the intervening fade rate must be slowed down to achieve the same fade time.

As illustrated in FIG. 3(d), with lower initial intensity levels, the intervening fade rate may be zero (constant light output), and with even lower initial intensity levels, the lamp may fade off during the initial fast fade.

Of course, it will be understood by those skilled in the art that any desired fade rates may be used without departing from the invention, and that the numbers used in illustrating the various fade rates is not crucial to the invention.

Preferably, the fade rates are stored in the form of digital data in microcomputer 28, and may be called up from memory when required by preprogrammed fade routines also stored in microcomputer 28. The preprogrammed routines in microcomputer 28 are in themselves not crucial to the present invention. That is, the precise form and structure of the preprogrammed routines may vary depending upon the particular microprocessor used and the fade rates desired. The programming of microcomputer 28 is well within the ordinary skill in the art, and it is not necessary to describe that aspect of the invention in any further detail.

Operation of the preprogrammed routines in microcomputer 28 is illustrated in flow chart form in FIG. 4. Referring to FIG. 4, there are three major flow paths, or routines, which microcomputer 28 can follow, depending on whether switch R, L or T is closed. The first decision node encountered is the "BUTTON PUSHED?" node. If neither actuator 14 or 16 is actuated by a user, no change is made to the state of control device 10 except to update the LED display. However, if the output of the "BUTTON PUSHED?" is a "yes" (Y), then one of the three major routines is initiated. The decision node following the "BUTTON PUSHED?" node is the "RAISE?" decision node. If the output of the "RAISE" decision node is Y (switch R was closed), the routine moves to the "UNIT ON?" decision node. If the control is in the ON state, the output from the "UNIT ON?" decision node is a Y, and the routine next moves to the "AT HIGH END" decision node. If the lamp is at a maximum, no further change is made to control 10. If the lamp is not at a maximum, the routine moves to the "FADING?" decision node. If the unit is then-currently fading from one intensity level to another, i.e., the output of the "FADING?" decision node is Y, the fade is stopped, and the intensity level is incremented by one level step corresponding to the fade rate preprogrammed into microcomputer 28. The slower the fade, the smaller the level step. The desired intensity level is then stored ("UPDATE PRESET"), and the LED array is updated ("UPDATE LED DISPLAY") to display the raised intensity level by brightly illuminating the appropriate LED. On the other hand, if there is no fade then in progress, i.e., the output of the "FADING?" decision node is N, microcomputer 28 immediately begins to raise the intensity level as above by one level step, update the preset intensity level and update the LED display.

If the control device is in the OFF state, the output from the "UNIT ON?" decision node is N, and the routine sets the intensity level to a minimum and then begins to increase the intensity level as above. Since the control device is in the OFF state, the routine skips the "FADING?" decision node.

If the output of the "BUTTON PUSHED?" decision node is Y and the output of the "RAISE?" decision node is N, the microcomputer 28 moves to the next major routine and enters the "LOWER?" decision node. If the output of the "LOWER?" decision node is Y (switch L was closed), the routine moves to a second "UNIT ON?" decision node. If the control device is in the ON state, the output from the "UNIT ON?" decision node is a Y, and the routine next moves to the next decision node ("AT LOW END?") to determine if the intensity level is already at the minimum. If it is, i.e., the output of the decision node is Y, the routine returns to the starting point and no changes are made in the intensity level. If the output of the "AT LOW END?" decision node is N, however, the routine moves on to the "FADING?" decision node. If the unit is then-currently fading from one intensity level to another, i.e., the output of the "FADING?" decision node is Y, the fade is stopped, and the intensity level is decremented by one level step corresponding to the fade rate preprogrammed into microcomputer 28, to the desired intensity level. The desired intensity level is then stored ("UPDATE PRESET"), and the LED array is updated ("UPDATE LED DISPLAY") to display the lowered intensity level, as already described. On the other hand,

if there is no fade then in progress, i.e., the output of the "FADING?" decision node is N, microcomputer 28 immediately begins to lower the intensity level as above by one level step, update the preset intensity level and update the LED display.

If the control device is in the OFF state, the output from the "UNIT ON?" decision node is N, and the routine returns to the starting point.

If the output of the "BUTTON PUSHED?" node is Y, and the outputs of both the "RAISE?" and "LOWER?" nodes is N, the microcomputer 28 enters the third major routine and enters the "TOUCH?" decision node. If the output of that decision node is N, the routine returns to the starting point. If the output is Y, however (switch T was closed), the routine moves to a decision node at which a determination is made as to whether switch T was closed on the previous cycle through the routine. If it was not (N), the routine moves to a decision node at which a determination is made as to whether switch T was tapped in the last half second. If the output is Y, then the output of the control is faded to full light output with the fade rate profile illustrated in FIG. 3(a) and the LED display is updated as the fade progresses to display the current intensity level.

If the output from the decision node at which a determination is made as to whether switch T was tapped in the last half second is N, then the routine enters a "UNIT ON OR FADING UP" decision node. If the output from this node is Y, then the output of the control is faded to off with the profile illustrated in FIG. 3(c) and the LED display is updated as the fade progresses to illustrate the current intensity level. When the output level reaches zero, the LED display is updated to have all the LEDs on at a much reduced level except the LED which corresponds to the stored preset level which is illuminated at an intermediate level. This provides a nightlight display which enables the unit to be located in the dark and a determination made of the stored preset level.

If the output from the unit on or fading up decision node is N, the output of the control is faded up from off to the stored present level with the fade profile illustrated in FIG. 3(b) and the LED display is updated as the fade progresses to illustrate the current intensity level.

If the output from the decision node at which a determination is made as to whether switch T was closed on the previous cycle through the routine was yes (Y), the routine moves to a decision node at which a determination is made as to whether the unit is in the process of fading to off. If the output is N, then no further action is taken except to update the LED display. If the output is Y, the routine moves to a decision node at which a determination is made as to whether switch T has been held closed for half a second. If the output is N, then no further action is taken except to update the LED display.

If the output is Y, then the output of the control is faded to off with one of the slow fade profiles illustrated in FIG. 3(d). The LED is updated as the fade progresses to illustrate the current intensity level and show that the unit is in the slow fade to off mode by flashing the LED corresponding to the instantaneous intensity level. When the output reaches zero, the LED display is updated to have all the LEDs on at a much reduced level except the LED which corresponds to the stored present level which is illuminated at an intermediate level.

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Another feature of the invention is that microcomputer 28 may be preprogrammed to illuminate lamp 20 at an intermediate intensity level for a predetermined period when power is restored to lighting control device 10 after a power interruption, and then fade lamp 20 to a very low, but non-zero, intensity level. Prior art devices either do not offer such a feature at all, or illuminate lamp 20 at full power indefinitely when power is restored. Full indefinite illumination of lamp 20 is obviously wasteful of energy, especially if a power interruption/restoration occurs when the user is away from the premises and will not return for an extended period of time. The present invention provides intermediate illumination after power is restored to enable the user to see his way to the lighting control device to reset it to the desired light intensity level set prior to a power interruption. In the event the user is away from the premises for a long time, the fade-to-minimum feature conserves energy and still provides a low level of illumination to enable a user to see in the event illumination from lamp 20 is required when the user returns.

It will be appreciated that the particular matching of a particular control input with a given response is not critical to the invention. For example, microcomputer 28 could be reprogrammed such that a hold input from switch T caused a fade to full and two taps on switch T caused an extended fade to off. Alternatively, the different control inputs to produce the various desired responses, e.g., fade to preset intensity level, fade to full, fade to off and fade to off over an extended period of time, could be provided by separate control switches.

The present invention may be embodied in other specific forms without departing from the spirit or essential attributes thereof and, accordingly, reference should be made to the appended claims, rather than to the foregoing specification, as indicating the scope of the invention.

We claim:

1. A lighting control device for controlling the state and light intensity level of at least one lamp, comprising
 - a) user-actuable intensity selecting means for selecting a desired intensity level between a minimum intensity level and a maximum intensity level,
 - b) a single control switch, independent of said user-actuable intensity selecting means, for generating control signals in response to an input from a user, and
 - c) control means operatively coupled to said intensity selecting means and said control switch for causing the lamp intensity to
 - (i) fade from an off state to a desired intensity level when said input from a user causes a single switch closure of transitory duration, said fade occurring at a first fade rate,
 - (ii) fade from any intensity level to said maximum intensity level when said input from a user causes multiple switch closures of transitory duration occurring within a predetermined time interval, said fade occurring at a second fade rate, and
 - (iii) fade from a desired intensity level to an off state when said input from a user causes a single switch closure of more than a transitory duration, said fade occurring at a third fade rate.
2. A device according to claim 1, wherein said first, second and third fade rates are equal.
3. A device according to claim 1, wherein said second fade rate is substantially faster than said first fade rate.

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4. A device according to claim 1, wherein said third fade rate is substantially slower than both said first and second fade rates.

5. A device according to claim 1, wherein said control means is further responsive to said intensity selecting means for causing said lamp intensity to fade from a first intensity level to a second intensity level at a fourth fade rate when said intensity selecting means is actuated.

6. A device according to claim 1, further comprising indicator means for visually indicating the desired intensity level.

7. A device according to claim 6, wherein said indicator means comprises a plurality of light sources disposed in a sequence representing a range from said minimum intensity level to said maximum intensity level, the position of each light source within said sequence being representative of an intensity level relative to said minimum and maximum intensity levels.

8. A device according to claim 7, wherein said sequence is linear.

9. A device according to claim 6, wherein said indicator means comprises a plurality of light sources disposed in a sequence representing a range from said minimum intensity level to said maximum intensity level, a selected one of said light sources representing said desired intensity level relative to said minimum and maximum intensity levels being illuminated at a first illumination level and each of the remaining light sources being illuminated at a second illumination level which is less than said first illumination level.

10. A device according to claim 9, wherein said second illumination level is sufficient to enable said light sources to be readily perceived by eye in a darkened environment.

11. A device according to claim 1, wherein the control means includes a microcomputer means.

12. A device according to claim 11, wherein the microcomputer means includes means for storing in a memory means digital data representative of said fade rates.

13. A device according to claim 11, wherein said microcomputer means includes means for storing in a memory means digital data representative of a desired intensity level in response to actuation of said intensity selecting means.

14. A device according to claim 1 wherein said intensity selecting means comprises rocker switch means actuatable between first and second positions, one of said positions corresponding to an increase in intensity level and the other of said positions corresponding to a decrease in intensity level.

15. A device according to claim 1 wherein said intensity selecting means comprises first and second switch means each actuatable between first and second positions, actuation of one of said switch means causing an increase in said desired intensity level and actuation of the other of said switch means causing a decrease in said desired intensity level.

16. A device according to claim 1, wherein said control means further comprises discriminator means for distinguishing between an input to said control switch means of transitory duration and an input of more than a transitory duration.

17. A device according to claim 16, wherein said control means further comprises means responsive to said discriminator means for initiating the fade of said

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lamp according to an appropriate one of said fade rates as determined by said input.

18. A device according to claim 1, wherein said control means comprises microcomputer means for distinguishing between an input to said control switch means of transitory duration and an input of more than a transitory duration, and for initiating the fade of said lamp according to an appropriate one of said fade rates as determined by said input.

19. A device according to claim 18, wherein said microcomputer means includes means for storing in a memory means digital data representative of said fade rates.

20. A lighting control device for controlling the state and light intensity level of at least one lamp, comprising:

- a) user-actuable intensity selecting means for selecting a desired intensity level between a minimum intensity level and a maximum intensity level,
- b) a single control switch, independent of said user-actuable intensity selecting means, for generating control signals in response to an input from a user, and
- c) control means operatively coupled to said intensity selecting means and said control switch for causing the lamp intensity to
 - (i) fade from an off state to said desired intensity level when said input from a user causes a single switch closure of transitory duration, said fade occurring at a first fade rate,
 - (ii) fade from any intensity level to said maximum intensity level when said input from a user comprises two switch closures of transitory duration in rapid succession, said fade occurring a second fade rate, and
 - (iii) fade from said desired intensity level to an off state when a user touch causes a single switch closure of more than a transitory duration, said fade occurring at a third fade rate,
 said control means being further responsive to said intensity selecting means for causing said lamp to fade from a first intensity level to a second intensity level at a fourth fade rate when said intensity selecting means is actuated.

21. A device according to claim 20, wherein said second fade rate is substantially faster than said first fade rate, and wherein said third fade rate is substantially slower than both said first and second fade rates.

22. A device according to claim 20, further comprising indicator means for visually indicating the desired intensity level, said indicator means comprising a plurality of light sources disposed in a linear sequence representing a range from said minimum intensity level to said maximum intensity level, the position of each light source within said sequence being representative of an intensity level relative to said minimum and maximum intensity levels, a selected one of said light sources representing said desired intensity level relative to said minimum and maximum intensity levels being illuminated at a first illumination level and each of the remaining light sources being illuminated at a second illumination level which is less than said first illumination level, said second illumination level being sufficient to enable said light sources to be readily perceived by eye in a darkened environment.

23. A device according to claim 20, wherein the control means includes a microcomputer means, the microcomputer means including means for storing in a memory means digital data representative of said fade

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rates and digital data representative of a desired intensity level in response to actuation of said intensity selecting means.

24. A device according to claim 20, wherein said intensity selecting means comprises rocker switch means actuatable between first and second positions, one of said positions corresponding to an increase in intensity level and the other of said positions corresponding to a decrease in intensity level.

25. A device according to claim 20, wherein said intensity selecting means comprises first and second switch means each actuatable between first and second positions, actuation of one of said switch means causing an increase in said desired intensity level and actuation of the other of said switch means causing a decrease in said desired intensity level.

26. A device according to claim 20, wherein said control means further comprises discriminator means for distinguishing between an input to said control switch means of transitory duration and an input of more than a transitory duration.

27. A device according to claim 26, wherein said control means further comprises means responsive to said discriminator means for initiating the fade of said lamp according to an appropriate one of said fade rates as determined by said input.

28. A device according to claim 20, wherein said control means comprises microcomputer means for distinguishing between an input to said control switch means of transitory duration and an input of more than a transitory duration, and for initiating the fade of said lamp according to an appropriate one of said fade rates as determined by said input, said microcomputer means including means for storing in a memory means digital data representative of said fade rates.

29. A lighting control device for controlling the state and light intensity level of at least one lamp, comprising:

- a) user-actuable intensity selecting means for selecting a desired intensity level between a minimum intensity level and a maximum intensity level,
- b) a single control switch, independent of said user-actuable intensity selecting means, for generating control signals representative of on and off states and preselected intensity levels of said at least one lamp in response to an input from a user, and
- c) control means for causing said lamp intensity to fade from a first intensity level to a second intensity level greater than said first intensity level when said intensity selecting means is actuated, said first intensity level being a minimum intensity level independent of any of said preselected intensity levels when said lamp is in said off state prior to actuation of said intensity selecting means.

30. A device according to claim 29, further comprising indicator means for visually indicating the desired intensity level.

31. A device according to claim 30, wherein said indicator means comprises a plurality of light sources disposed in a sequence representing a range from said minimum intensity level to a maximum intensity level, the position of each light source within said sequence being representative of an intensity level relative to said minimum and maximum intensity levels.

32. A device according to claim 31, wherein said sequence is linear.

33. A device according to claim 30, wherein said indicator means comprises a plurality of light sources disposed in a sequence representing a range from said

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minimum intensity level to a maximum intensity level, a selected one of said light sources representing said desired intensity level relative to said minimum and maximum intensity levels being illuminated at a first illumination level and each of the remaining light sources being illuminated at a second illumination level which is less than said first illumination level.

34. A device according to claim 33, wherein said second illumination level is sufficient to enable said light sources to be readily perceived by eye in a darkened environment.

35. A device according to claim 29, wherein the control means includes a microcomputer means.

36. A device according to claim 35, wherein said microcomputer means includes means for storing in a memory means digital data representative of a desired intensity level in response to actuation of said intensity selecting means.

37. A device according to claim 29, wherein said intensity selecting means comprises rocker switch means actuatable between first and second positions, one of said positions corresponding to an increase in intensity level and the other of said positions corresponding to a decrease in intensity level.

38. A device according to claim 29, wherein said intensity selecting means comprises first and second switch means each actuatable between first and second positions, actuation of one of said switch means causing an increase in said desired intensity level and actuation of the other of said switch means causing a decrease in said desired intensity level.

39. A lighting control device for controlling the state and light intensity level of at least one lamp, comprising:

- (a) user-actuatable intensity selecting means for selecting a desired intensity level of said at least one lamp,
- (b) control switch means for generating control signals representative of preselected states and intensity levels of said at least one lamp in response to an input from a user, and
- (c) control means operatively coupled to said intensity selecting means and said control switch means for causing said lamp to fade from a non-zero intensity level to a substantially-zero intensity level at a first fade rate in response to a first input from a user to said control switch means, and for causing said lamp to fade from a non-zero intensity level to a substantially-zero intensity level at a second fade rate, different from said first fade rate in response to a second input from said user to said control switch means.

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40. A device according to claim 39, wherein said second fade rate is substantially slower than said first fade rate.

41. A device according to claim 39, wherein said first input from a user comprises closure of a first switch and said second input from a user comprises closure of a second switch.

42. A device according to claim 39, wherein said first input from a user comprises a single switch closure of transitory duration and said second input from a user comprises a single switch closure of more than transitory duration.

43. A device according to claim 39, wherein said first input from a user comprises a single switch closure of transitory duration and said second input from a user comprises two switch closures of transitory duration in rapid succession.

44. In a lighting control device including intensity selecting means for selectively controlling the rate of change current applied to a lamp to cause the lamp intensity to fade from one steady-state intensity level to another, the improvement comprising:

a fade control switch and control means responsive to a control signal produced by a single actuation of said control switch for causing the rate of change of current applied to said lamp to vary in such a manner as to cause the lamp intensity to fade from a first intensity level to a second intensity level in accordance with a fade profile comprising at least first and second fade rates in sequence, said second fade rate being substantially different from said first fade rate.

45. A device according to claim 44, wherein said fade profile comprises first, second and third fade rates in sequence, and wherein the second fade rate is substantially slower than said first and third fade rates, and occurs over a substantially longer time period than said first and third fade rates.

46. A device according to claim 45, wherein said first and third fade rates each occur over time periods of approximately one second, and said second fade rate occurs over a period of approximately ten seconds.

47. A device according to claim 44, wherein said first intensity level is greater than said second intensity level.

48. A device according to claim 44, wherein said first intensity level is less than said second intensity level.

49. A device according to claim 44, further comprising indicator means for indicating when said fade profile is being executed by said fade means.

50. A device according to claim 45, wherein said first, second and third fade rates are adjustable.

51. A device according to claim 45, wherein said second fade rate is substantially zero.

52. A device according to claim 45, wherein said first and third fade rates are approximately equal.

* * * * *

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UNITED STATES DISTRICT COURT, CENTRAL DISTRICT OF CALIFORNIA
CIVIL COVER SHEET

COPY

I (a) PLAINTIFFS (Check box if you are representing yourself ☐)
Lutron Electronics Co., Inc.**DEFENDANTS**

Pass & Seymour, Inc.; AH Lighting; Big Deal Electric Corp.; American Top Electric Corp.; Westgate Manufacturing Co.; Elemental LED, LLC, and Diode LED

(b) Attorneys (Firm Name, Address and Telephone Number. If you are representing yourself, provide same.)

JENNER & BLOCK LLP

Nick G. Saros, Esq.

633 West 5th Street, Suite 3500, Los Angeles, CA 90071

Attorneys (If Known)

II. BASIS OF JURISDICTION (Place an X in one box only.)

- ☐ 1 U.S. Government Plaintiff ☒ 3 Federal Question (U.S. Government Not a Party)
- ☐ 2 U.S. Government Defendant ☐ 4 Diversity (Indicate Citizenship of Parties in Item III)

III. CITIZENSHIP OF PRINCIPAL PARTIES - For Diversity Cases Only
(Place an X in one box for plaintiff and one for defendant.)

- | | | | |
|---|---|---|---|
| Citizen of This State | PTF ☐ 1 DEF ☐ 1 | Incorporated or Principal Place of Business in this State | PTF ☐ 4 DEF ☐ 4 |
| Citizen of Another State | ☐ 2 ☐ 2 | Incorporated and Principal Place of Business in Another State | ☐ 5 ☐ 5 |
| Citizen or Subject of a Foreign Country | ☐ 3 ☐ 3 | Foreign Nation | ☐ 6 ☐ 6 |

IV. ORIGIN (Place an X in one box only.)

- ☒ 1 Original Proceeding ☐ 2 Removed from State Court ☐ 3 Remanded from Appellate Court ☐ 4 Reinstated or Reopened ☐ 5 Transferred from another district (specify): ☐ 6 Multi-District Litigation ☐ 7 Appeal to District Judge from Magistrate Judge

V. REQUESTED IN COMPLAINT: JURY DEMAND: ☒ Yes ☐ No (Check 'Yes' only if demanded in complaint.)**CLASS ACTION** under F.R.C.P. 23: ☐ Yes ☒ No**MONEY DEMANDED IN COMPLAINT:** \$ To be determined.**VI. CAUSE OF ACTION** (Cite the U.S. Civil Statute under which you are filing and write a brief statement of cause. Do not cite jurisdictional statutes unless diversity.)

35 U.S.C. § 271. Defendants directly infringing, induced infringement, and/or contributorily infringed on Plaintiff's patents.

VII. NATURE OF SUIT (Place an X in one box only.)

OTHER STATUTES	CONTRACT	TORTS	TORTS	PRISONER	LABOR
☐ 400 State Reapportionment	☐ 110 Insurance	PERSONAL INJURY	PERSONAL PROPERTY	PETITIONS	☐ 710 Fair Labor Standards Act
☐ 410 Antitrust	☐ 120 Marine	☐ 310 Airplane	☐ 370 Other Fraud	☐ 510 Motions to Vacate Sentence	☐ 720 Labor/Mgmt. Relations
☐ 430 Banks and Banking	☐ 130 Miller Act	☐ 315 Airplane Product Liability	☐ 371 Truth in Lending	☐ 530 General Habeas Corpus	☐ 730 Labor/Mgmt. Reporting & Disclosure Act
☐ 450 Commerce/ICC Rates/etc.	☐ 140 Negotiable Instrument	☐ 320 Assault, Libel & Slander	☐ 380 Other Personal Property Damage	☐ 535 Death Penalty	☐ 740 Railway Labor Act
☐ 460 Deportation	☐ 150 Recovery of Overpayment & Enforcement of Judgment	☐ 330 Fed. Employers' Liability	☐ 385 Property Damage Product Liability	☐ 540 Mandamus/Other	☐ 790 Other Labor Litigation
☐ 470 Racketeer Influenced and Corrupt Organizations	☐ 151 Medicare Act	☐ 340 Marine	BANKRUPTCY	☐ 550 Civil Rights	☐ 791 Empl. Ret. Inc. Security Act
☐ 480 Consumer Credit	☐ 152 Recovery of Defaulted Student Loan (Excl. Veterans)	☐ 345 Marine Product Liability	☐ 422 Appeal 28 USC 158	☐ 555 Prison Condition	
☐ 490 Cable/Sat TV	☐ 153 Recovery of Overpayment of Veteran's Benefits	☐ 350 Motor Vehicle	☐ 423 Withdrawal 28 USC 157	FORFEITURE / PENALTY	PROPERTY RIGHTS
☐ 810 Selective Service	☐ 160 Stockholders' Suits	☐ 355 Motor Vehicle Product Liability	CIVIL RIGHTS	☐ 610 Agriculture	☐ 820 Copyrights
☐ 850 Securities/Commodities/Exchange	☐ 190 Other Contract	☐ 360 Other Personal Injury	☐ 441 Voting	☐ 620 Other Food & Drug	☒ 830 Patent
☐ 875 Customer Challenge 12 USC 3410	☐ 195 Contract Product Liability	☐ 362 Personal Injury-Med Malpractice	☐ 442 Employment	☐ 625 Drug Related Seizure of Property 21 USC 881	☐ 840 Trademark
☐ 890 Other Statutory Actions	☐ 196 Franchise	☐ 365 Personal Injury-Product Liability	☐ 443 Housing/Accommodations	☐ 630 Liquor Laws	SOCIAL SECURITY
☐ 891 Agricultural Act	REAL PROPERTY	☐ 368 Asbestos Personal Injury Product Liability	☐ 444 Welfare	☐ 640 R.R. & Truck	☐ 861 HIA (1395ff)
☐ 892 Economic Stabilization Act	☐ 210 Land Condemnation	IMMIGRATION	☐ 445 American with Disabilities - Employment	☐ 650 Airline Regs	☐ 862 Black Lung (923)
☐ 893 Environmental Matters	☐ 220 Foreclosure	☐ 462 Naturalization Application	☐ 446 American with Disabilities - Other	☐ 660 Occupational Safety /Health	☐ 863 DIWC/DIWW (405(g))
☐ 894 Energy Allocation Act	☐ 230 Rent Lease & Ejectment	☐ 463 Habeas Corpus-Alien Detainee	☐ 440 Other Civil Rights	☐ 690 Other	☐ 864 SSID Title XVI
☐ 895 Freedom of Info. Act	☐ 240 Torts to Land	☐ 465 Other Immigration Actions			☐ 865 RSI (405(g))
☐ 900 Appeal of Fee Determination Under Equal Access to Justice	☐ 245 Tort Product Liability				FEDERAL TAX SUITS
☐ 950 Constitutionality of State Statutes	☐ 290 All Other Real Property				☐ 870 Taxes (U.S. Plaintiff or Defendant)
					☐ 871 IRS-Third Party 26 USC 7609

FOR OFFICE USE ONLY: Case Number: SA 11-CV-748

AFTER COMPLETING THE FRONT SIDE OF FORM CV-71, COMPLETE THE INFORMATION REQUESTED BELOW.

UNITED STATES DISTRICT COURT, CENTRAL DISTRICT OF CALIFORNIA
CIVIL COVER SHEET

VIII(a). IDENTICAL CASES: Has this action been previously filed in this court and dismissed, remanded or closed? ☒ No ☐ Yes
 If yes, list case number(s): _____

VIII(b). RELATED CASES: Have any cases been previously filed in this court that are related to the present case? ☒ No ☐ Yes
 If yes, list case number(s): _____

Civil cases are deemed related if a previously filed case and the present case:

- (Check all boxes that apply) ☐ A. Arise from the same or closely related transactions, happenings, or events; or
☐ B. Call for determination of the same or substantially related or similar questions of law and fact; or
☐ C. For other reasons would entail substantial duplication of labor if heard by different judges; or
☐ D. Involve the same patent, trademark or copyright, and one of the factors identified above in a, b or c also is present.

IX. VENUE: (When completing the following information, use an additional sheet if necessary.)

- (a) List the County in this District; California County outside of this District; State if other than California; or Foreign Country, in which **EACH** named plaintiff resides.
☐ Check here if the government, its agencies or employees is a named plaintiff. If this box is checked, go to item (b).

County in this District:*	California County outside of this District; State, if other than California; or Foreign Country
Lutron Electronics Co., Inc.	Pennsylvania

- (b) List the County in this District; California County outside of this District; State if other than California; or Foreign Country, in which **EACH** named defendant resides.
☐ Check here if the government, its agencies or employees is a named defendant. If this box is checked, go to item (c).

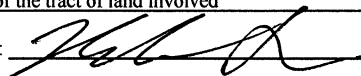
County in this District:*	California County outside of this District; State, if other than California; or Foreign Country
See Attachment A.	

- (c) List the County in this District; California County outside of this District; State if other than California; or Foreign Country, in which **EACH** claim arose.
Note: In land condemnation cases, use the location of the tract of land involved.

County in this District:*	California County outside of this District; State, if other than California; or Foreign Country
LOS ANGELES	

* Los Angeles, Orange, San Bernardino, Riverside, Ventura, Santa Barbara, or San Luis Obispo Counties

Note: In land condemnation cases, use the location of the tract of land involved

X. SIGNATURE OF ATTORNEY (OR PRO PER):  Date May 16, 2011

Notice to Counsel/Parties: The CV-71 (JS-44) Civil Cover Sheet and the information contained herein neither replace nor supplement the filing and service of pleadings or other papers as required by law. This form, approved by the Judicial Conference of the United States in September 1974, is required pursuant to Local Rule 3-1 is not filed but is used by the Clerk of the Court for the purpose of statistics, venue and initiating the civil docket sheet. (For more detailed instructions, see separate instructions sheet.)

Key to Statistical codes relating to Social Security Cases:

Nature of Suit Code	Abbreviation	Substantive Statement of Cause of Action
861	HIA	All claims for health insurance benefits (Medicare) under Title 18, Part A, of the Social Security Act, as amended. Also, include claims by hospitals, skilled nursing facilities, etc., for certification as providers of services under the program. (42 U.S.C. 1935FF(b))
862	BL	All claims for "Black Lung" benefits under Title 4, Part B, of the Federal Coal Mine Health and Safety Act of 1969. (30 U.S.C. 923)
863	DIWC	All claims filed by insured workers for disability insurance benefits under Title 2 of the Social Security Act, as amended; plus all claims filed for child's insurance benefits based on disability. (42 U.S.C. 405(g))
863	DIWW	All claims filed for widows or widowers insurance benefits based on disability under Title 2 of the Social Security Act, as amended. (42 U.S.C. 405(g))
864	SSID	All claims for supplemental security income payments based upon disability filed under Title 16 of the Social Security Act, as amended.
865	RSI	All claims for retirement (old age) and survivors benefits under Title 2 of the Social Security Act, as amended. (42 U.S.C. (g))

Attachment A

Pass & Seymour, Inc.
AH Lighting
Big Deal Electronic Corp.
American Top Electric Corp.
Westgate Manufacturing Co.
Elemental LED, LLC
Diode LED

Pennsylvania
Los Angeles
Orange County
Orange County
Los Angeles
Alameda County
Alameda County

**UNITED STATES DISTRICT COURT
CENTRAL DISTRICT OF CALIFORNIA**

NOTICE OF ASSIGNMENT TO UNITED STATES MAGISTRATE JUDGE FOR DISCOVERY

This case has been assigned to District Judge Josephine Tucker and the assigned discovery Magistrate Judge is Marc Goldman.

The case number on all documents filed with the Court should read as follows:

SACV11- 748 JST (MLGx)

Pursuant to General Order 05-07 of the United States District Court for the Central District of California, the Magistrate Judge has been designated to hear discovery related motions.

All discovery related motions should be noticed on the calendar of the Magistrate Judge

=====

NOTICE TO COUNSEL

A copy of this notice must be served with the summons and complaint on all defendants (if a removal action is filed, a copy of this notice must be served on all plaintiffs).

Subsequent documents must be filed at the following location:

☐ **Western Division**
312 N. Spring St., Rm. G-8
Los Angeles, CA 90012

☒ **Southern Division**
411 West Fourth St., Rm. 1-053
Santa Ana, CA 92701-4516

☐ **Eastern Division**
3470 Twelfth St., Rm. 134
Riverside, CA 92501

Failure to file at the proper location will result in your documents being returned to you.

Name & Address:

JENNER & BLOCK LLP

Nick G. Saros (SBN 209922)

633 West 5th Street, Suite 3500

Los Angeles, CA 90071

**UNITED STATES DISTRICT COURT
CENTRAL DISTRICT OF CALIFORNIA**

LUTRON ELECTRONICS CO., INC., a
Pennsylvania corporation,

CASE NUMBER

PLAINTIFF(S)

v.

SA 11-CV-748-JST (MLG)

See Attachment A

SUMMONS

DEFENDANT(S).

TO: DEFENDANT(S): Please see attachment A

A lawsuit has been filed against you.

Within 21 days after service of this summons on you (not counting the day you received it), you must serve on the plaintiff an answer to the attached ☒ complaint ☐ amended complaint ☐ counterclaim ☐ cross-claim or a motion under Rule 12 of the Federal Rules of Civil Procedure. The answer or motion must be served on the plaintiff's attorney, Nick G. Saros, whose address is 633 West 5th Street, Suite 3500, Los Angeles, CA 90071. If you fail to do so, judgment by default will be entered against you for the relief demanded in the complaint. You also must file your answer or motion with the court.

Clerk, U.S. District Court

Dated: May 16, 2011By: MARILYN DAVIS

Deputy Clerk

(Seal of the Court)

[Use 60 days if the defendant is the United States or a United States agency, or is an officer or employee of the United States. Allowed 60 days by Rule 12(a)(3)].

ATTACHMENT A

PASS & SEYMOUR, INC.; AH LIGHTING; BIG DEAL ELECTRIC CORP.;
AMERICAN TOP ELECTRIC CORP.; WESTGATE MANUFACTURING CO.;
ELEMENTAL LED, LLC; and DIODE LED,